National Park Service
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Biscayne National Park
Florida

Fishery Management Plan
Final Environmental Impact Statement
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On the Cover: A young woman fishes off of Elliott Key in Biscayne National Park. Fishing is a longstanding tradition in Biscayne National Park, and fish play a key role in ecosystem health. The National Park Service and the Florida Fish and Wildlife Conservation Commission have partnered to create this plan to set desired future conditions for the park's fisheries resources. We hope that maintaining sustainable fisheries resources will keep the tradition of recreational fishing alive for generations to come.
Photo Credit: Arend Thibodeau

Fishery Management Plan
Biscayne National Park, Florida

Biscayne National Park's Fishery Management Plan is the result of a cooperative effort between Biscayne National Park (9700 SW 328th Street, Homestead, FL 33033) and the Florida Fish and Wildlife Conservation Commission (620 S. Meridian Street, Tallahassee, FL 32399).
This document presents a range of alternatives being considered for the Biscayne National Park (BISC) Fishery Management Plan (FMP) and identifies a preferred alternative for the BISC FMP, which will guide fishery management decisions in BISC for the next five to ten years. BISC hosts both commercial and recreational fishers, and increases in South Florida's boating and fishing population combined with improved fishing and boating technology pose a threat to the long-term sustainability of fishery-related resources of BISC. A fishery management plan is deemed necessary to guide sustainable use of BISC's fishery-related resources, as recent studies suggest that many of BISC's fisheries resources are in decline. The development of the alternatives and the identification of the preferred alternative were based on a combination of public input (derived from three public comment periods and three series of public meetings, and the input of the FMP Working Group), inter-agency meetings, and environmental and socioeconomic analyses documented herein.

Executive Summary

BACKGROUND

Located in southeastern Florida, Biscayne National Park (BISC) encompasses an area of 173,000 acres (~270 square miles), of which 95% (~164,000 acres) is marine. Within BISC's boundaries exists a diversity of marine habitats, including seagrass meadows, hardbottom communities, expansive coral reefs, sand and mud flats, mangrove fringes, and the water column. Through provision of prey availability and shelter, these habitats provide essential fish habitat (EFH) for numerous species of ecologically important fish and macro-invertebrates[1]. Included in this total are more than 100 species targeted by commercial and recreational fisheries. BISC's waters also provide habitat for several federally listed threatened and endangered species, including the smalltooth sawfish, manatees, sea turtles (loggerheads, greens and hawksbills), bald eagles, and Acroporid corals.

From a regional perspective, BISC's coastal bay and coral reef habitat play a critical role in the function and dynamics of the larger Florida coral reef ecosystem, serving as a receptor of larvae and juveniles from offshore spawning adults, and as a source of production of adult fish and macro-invertebrates that undergo ontogenetic[2] habitat shifts and migrations to habitat outside BISC (Ault et al. 2001). As such, BISC's habitats contribute substantially to Florida's multibillion-dollar tourism and fishing industry. Since BISC's natural resources are intimately related to the broader, regional ecosystem through water movements and animal migrations, degradation of Park resources has consequences well beyond its boundaries (Ault et al. 2001).

BISC was established "to preserve and protect for the education, inspiration, recreation and enjoyment of present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty" (16 USC Sect. 410gg). In the legislative history for the 1980 enabling legislation, Congress recognized "the unique and special values" of the resources within BISC, as well as the "vulnerability of these resources to destruction or damage due to easy human access by water" (House of Representatives Report 96-693). Congress therefore directed the NPS to "manage this area in a positive and scientific way in order to protect the area's natural resource integrity." Additionally, Congress directed that with respect to lands donated after June 28, 1980, "…the waters within the park shall continue to be open to fishing in conformity with the laws of the State of Florida" (16 USC Sect. 410gg-2). Historically, the NPS has chosen to primarily follow State of Florida fishing regulations within all BISC [3], and recreational and commercial fisheries have occurred in BISC waters since its founding.

[1] BISC has been designated Essential Fish Habitat and a Habitat Area of Particular Concern (HAPC) by the South Atlantic Fishery Management Council (SAFMC 1998).
[2] Occurring as an organism develops.
[3] Regulations in BISC are identical to those in adjacent waters, with the following exceptions: (1) reduced bag limit of lobsters within non-bay Park waters during the two-day lobster sport season, and (2) a ban on sponge and ornamental fish and invertebrate harvest from all BISC waters.

FISHERY MANAGEMENT DIRECTIVES

While BISC's enabling legislation establishes that fishing will continue to occur in BISC waters in accordance with State regulations, BISC must also manage its fishery resources according to Park and NPS mandates and legislation. For example, Congress directed that "the Secretary of the Interior, after consultation with appropriate officials of the State, may designate species for which, areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which the park was established" (16 USC Sect. 410gg-2). Thus, even though fishing regulations in BISC waters should conform to State regulations, the Secretary of the Interior has the ability to establish additional fishing regulations pertaining strictly to BISC. Complicating this issue, however, is the provision that fishing in expansion areas donated by the State after the Act's effective date must be in conformance with State law. Therefore, in terms of management, Biscayne National Park can be divided into two zones: a) the original monument zone, in which fishing regulations follow State regulations, with the opportunity for the Secretary of the Interior to enforce additional regulations as deemed necessary, and b) the expansion zone, in which fishing is in conformance with State of Florida regulations (see 16 USC Sect. 410gg-2). Due to the complex nature of the legislations, policies, and other management directives, however, it is in the best interest of the public and BISC staff to manage fisheries uniformly within the park to the best extent practicable. Uniform regulations across all of BISC, regardless of the applicable regulatory authority, will allow for the most effective resource management and can ensure that visitors have a high-quality fishing experience.

Pursuant to the sound conservation of fishery resources, BISC must also adhere to the following NPS Management Policies (NPS 2006):

- Where harvesting is allowed and subject to NPS control, … harvesting will not unacceptably impact park resources or natural processes, including the natural distributions, densities, age-class distributions, and behavior of:

  (1) harvested species;
  (2) native species that harvested species use for any purpose; or,
  (3) native species that use harvested species for any purpose. (Sec. 4.4.3)

- While Congress has given NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement (enforceable by the federal courts) that NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise (Sec. 1.4.4). Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. (Sec. 1.4.5). For example, a loss of fisheries resources within BISC, due to overfishing at unsustainable levels, could be considered impairment since it would result in lost opportunities for enjoyment of fisheries resources (for both extractive and non-extractive activities), while drastically altering natural resource community composition.

Thus, BISC must balance the existence of recreational and commercial fishing in Park waters with its mandate and responsibility to manage its fisheries resources in a way that such resources remain unimpaired.

Additionally, a 1995 Executive Order on Recreational Fishing (Executive Order 12962) amended on September 26th, 2008 requires federal agencies to ensure that "recreational fishing shall be managed as a sustainable activity in national wildlife refuges, national parks, national monuments, national marine sanctuaries, marine protected areas, or any other relevant conservation or management areas or activities under any Federal authority, consistent with applicable law". Thus, BISC must ensure that fishing activities occurring within its boundaries are managed in a sustainable manner and BISC must balance visitor use (*e.g.*,recreational and commercial fishing) with resource protection. The NPS believes that managing fisheries in a way that allows for improvements of at least 20% in both the sizes and numbers of targeted species in the park will be deemed sustainable, not only in terms of ensuring the persistence of the park's fisheries resources but also in ensuring that fishing can continue for this and future generations. Thus, NPS believes that managing recreational and commercial harvest of fisheries resources as described under Alternatives 4 and 5 would be sustainable.

CURRENT FISHERY POLICIES IN BISC

This Fishery Management Plan is designed to guide fisheries policies in the park, yet it will serve hierarchically under the park's General Management Plan (discussed in detail in Section 1.5.). Other fishery-related policies (such as special designations, closures, public use limits, permit requirements and other restrictions) can be imposed under the discretionary authority of the Superintendent via the Superintendent's Compendium, which is updated annually. With regards to fishery management, the Superintendent's Compendium would only be used to address minor and/or short-term issues (*e.g.*, a temporary closure of land-based fishing from boardwalk at the Visitor Center in response to structural damage from a hurricane). It is the intent of the cooperating agencies to use the Fishery Management Plan to develop and implement long-term and major fisheries policies within the Park.

With minor exceptions, fishing in BISC follows State of Florida Fishing Regulations, as determined by the Fish and Wildlife Conservation Commission (FWC). Recreational fishing, which occurs in multiple habitats in both bay and ocean waters, targets species such as bonefish, snook, tarpon, permit, blue crabs, stone crabs, snappers, groupers, grunts, barracuda, spadefish, spiny lobster, and triggerfish. Commercial fishing also occurs in both bay and ocean waters, and targets numerous species including invertebrates (lobster, blue crabs, stone crabs, and bait shrimp), food fish (typically members of the snapper/grouper complex, concentrated on yellowtail snapper), and baitfish (*e.g.*, ballyhoo, Spanish sardines, thread herring and pilchards). Park visitors fishing in the park can freely remove as many lionfish as desired since this exotic species is not managed (*e.g.*, this species does not have a minimum size limit, a bag limit, closed season etc.) by NPS or FWC for fisheries purposes. More information about lionfish is provided in section 1.1.5.

To facilitate the assessment of the condition of fishery resources within BISC, fisheries data are gathered by BISC and by independent institutions through a number of methods. The most regularly performed and longstanding monitoring program is the creel survey (performed weekly since 1976), in which Park employees interview fishers returning from fishing trips and collect data on the number, size and species landed, as well as data on spatially-explicit fishing effort and catch-per-unit-effort. Additional fisheries-dependent and fisheries-independent data-collection programs are ongoing or have occurred in the past. In 1999, BISC commissioned a Site Characterization study (hereafter referred to as the Site Characterization) to utilize the data provided by the creel survey and additional data-collection programs to identify the current status of fishery resources and fishing effort in BISC. This Site Characterization, completed in 2000 (Ault et al. 2001), provided comprehensive data on the status of numerous recreationally and commercially harvested species. The Site Characterization was peer-reviewed by an international team of fisheries experts, who issued recommendations on additional analyses for validation of the conclusions of the report. Many of these validations have been made, while others are underway or planned (contingent on available funding). In concert with data provided from various data collection programs, as well as input from a Fishery Management Plan Working Group (discussed subsequently in this summary), the Site Characterization provided a troubling assessment of BISC's fishery resources. These data, conclusions, and implications for fisheries management in BISC are reported and discussed below.

OVERVIEW OF NEED FOR ACTION: HISTORIC TRENDS AND CURRENT STATUS OF THE FISHERY

Data collected in the programs and studies described above suggest that fisheries in BISC have declined from historical levels due to increasing population and related fishing pressure. For example:

- The human population of Florida has grown exponentially over the past century. The population of Miami-Dade County grew from just under 5000 residents in 1900 to nearly 2.5 million residents in 2010 (U.S Census Bureau 2010 estimate).
- Muller et al. (2001) identified a statistically significant positive relationship between population size and sales of resident saltwater fishing licenses from 1990 through 1998 (*i.e.*, more people = more recreational fishers).
- NOAA / NMFS Marine Recreational Statistics Survey (MRFSS; see http://www.st.nmfs.gov/st1/recreational/) data show a statistically significant increasing trend for the number of people participating in fishing along the east coast of Florida (NMFS 2005), and in the number of fishing trips anglers are taking along the east coast of Florida (NMFS 2005).
- The recreational vessel fleet in South Florida (Broward, Collier, Miami-Dade, Monroe and Palm Beach Counties) has grown substantially. The number of licensed vessels grew by 444% between 1964 and 1998 (Ault et al. 2001).
- The commercial fishing fleet in South Florida grew 197% from 1964 to 1998 (Ault et al. 2001).
- In Miami-Dade county, the recreational vessel registrations for 2012 increased approximately 9% over the recreational vessel registrations for 2000; in contrast, the county's

2012 registered commercial vessel fleet is 93.5% of what it was in 2000 (Florida Department of Highway Safety and Motor Vehicles 2013).

Perhaps most importantly, in tandem with increases in numbers of recreational and commercial fishers harvesting fish and invertebrates from BISC waters, there has been considerable improvement in fishing efficiency associated with the development and continued improvement of technology such as fish finders, depth indicators, global positioning systems, improved vessel and gear design, increased engine horsepower, and radio communications. This combination of increasing numbers of participants utilizing increasingly efficient harvesting methods has likely had synergistic negative impacts on BISC fishery resources.

A recent issue which has a very strong potential to further affect the park's already-compromised fisheries resources is the invasion of the non-native Indo-Pacific lionfish (*Pterois volitans* and *Pterois miles*). These fish, which contain venomous spines in several fins, are now abundant in BISC waters. With a combination of a voracious appetite, a lack of predators, and a high reproductive output, this species has high potential to adversely affect native fish community composition, abundance, and/or distributions by preying upon and competing with native species for resources while remaining free of predatory control. The park has implemented a Lionfish Management Plan which calls for continuous removal efforts to minimize the adverse effects of lionfish on native species, ecosystems, and park visitors. Should invasions of other non-native fish occur, they too will be managed using an approach similar to what has been used to manage lionfish.

EFFECT ON FISHERY RESOURCES AND INITIATION OF FISHERY MANAGEMENT PLAN

Not surprisingly, the preponderance of available data suggests that numerous fish species in BISC are under considerable fishing pressure and in some cases are regionally overfished or subject to overfishing. For example, seven species of fish that occur in Park waters (goliath grouper, Nassau grouper, red grouper, gag grouper, black grouper, red drum, and speckled hind) were listed as overfished or subject to overfishing in South Atlantic waters by the South Atlantic Fishery Management Council in 2003 (NMFS 2003). For more than 20 fished species, data are insufficient to determine whether or not those species are overfished or subject to overfishing. Preliminary analyses from a reef fish visual census performed in 2002 by researchers from the National Marine Fisheries Service and University of Miami – Rosenstiel School of Marine and Atmospheric Science indicated that size structures of highly desirable reef fishes (*i.e.*, groupers and snappers) were particularly truncated in BISC, relative to areas with lower fishing pressure (J. Ault and S. Smith, University of Miami, unpublished data). Additionally, in analyses of fishery data solely from BISC waters, Ault et al. (2001) concluded that:

- Seventy-one percent of the 17 individual species for which sufficient data were available appear to be overfished, as defined under the federal Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). An analysis of the Spawning Potential Ratios (SPR) of the fishery-targeted reef fish shows that 4 of 5 grouper species, 5 of 6 snapper species, barracuda, and 2 of 5 grunt species for which there are reliable data are below the SPR that constitutes overfishing as defined in the MSFCMA. Furthermore, all but

three of 18 additional species assessed (for which there were less reliable mean length observations) are likely to be overfished.

- For all harvested species analyzed in the study, the average size of fish landed was near the minimum harvest size for the past 25 years, suggesting that a majority of large fish have been removed from the population. For example, the average size of black grouper is now 40% of what it was in 1940 and the spawning stock appears to be less than 5% of its historical maximum.
- For 14 of 35 species analyzed, the minimum size of harvest is lower than the reported minimum size where 50% of individuals are sexually mature. For these species, it appears that most fish are being captured before they ever have a chance to spawn. The minimum harvest size for six of these 14 species is currently set by State regulations; the remaining eight species are unregulated.

The peer review of the Ault et al. (2001) Site Characterization recommended that many conclusions from the report need to be cross-validated. Many of these cross-validations have been made, while others are in process or are planned, contingent on funding availability. One criticism of the Ault et al. (2001) report is that the report treats fish within BISC at the stock level, but since true fish stocks operate at scales much larger than BISC's area, the use of stock assessment methods is inappropriate to assess a population within a stock. Stocks need to be assessed and managed at the appropriate scale, which would involve large-scale regulations and multi-agency cooperation. The fish populations that occur in BISC should not be viewed as 'stocks', but instead as 'park fisheries resources'. Regardless, all involved parties have agreed that given (1) the apparent condition of BISC's fishery resources, (2) the lack of knowledge regarding the status of many fisheries resources in BISC; (3) BISC's directives to protect *unimpaired* the area's natural resource integrity and to conserve its resources for the recreation and enjoyment of present and future generations; (4) the acknowledgement by the Florida Fish and Wildlife Conservation Commission (FWC) that resources in BISC should be managed to a more conservative standard than resources in surrounding waters, given BISC's status as a national park (FWC 2001); and (5) the lack of an existing management plan containing fishery-specific goals and management triggers, BISC managers feel it is imperative to establish a Fishery Management Plan (FMP) to ensure for the wise conservation and management of BISC's fisheries and fishery resources. Furthermore, since the 2001 Ault et al. assessment, other studies and assessments completed by NPS and non-NPS scientists continue to corroborate the findings of the Ault et al. report. The findings of these efforts have been considered in conjunction with the Ault et al. (2001) report during the development of the draft and final versions of the EIS.

Kellison et al (2011) compared historical (1977-1981) and recent (2006-2007) fish assemblages at seven intensively studied reefs. The findings of this work include:

- 64% of species observed in both time periods were observed less frequently in the recent surveys.
- Compared to historical surveys, mean species richness per recent survey declined at all sites, with declines ranging from 9% to 27% of species lost.
- The mean decline in frequency of occurrence for declining species was greater than the mean increase for increasing species for all trophic guilds but herbivores, for which means were nearly equal.

- The number of species observed per survey declined for all trophic guilds but herbivores.

BISC's recreational creel survey data reveal the following statistics:

- In 2007, one gag grouper was landed for every ~1566 person-hours of fishing effort in suitable grouper habitat and one black grouper was landed for every ~1044 person-hours of fishing effort in suitable grouper habitat. For comparative purposes, consider that in 1995-1998, one black grouper was landed for every 670 hours of effort and from 2000-2004, one black grouper was landed for every 925 hours of effort (see Ault et al. (2007)).
- The average sizes of schoolmaster snapper landed in 2006 and lane snapper landed in 2008 were below the minimum legal size.
- In 2009, the average size of harvested gag grouper, red grouper, lane snapper, and mutton snapper was each below the species' minimum legal size limit.
- Size of landed yellowtail snapper declined from 2006 to 2008, indicating a decreasing trend in snapper size over the last few years.
- In 2008, nearly 40% of landed red grouper, 28.4 % of landed hogfish, and 24.1% of landed mutton snapper observed during creel surveys were undersized.
- In 2009, 50% of landed red grouper and 100% of landed gag grouper observed during creel surveys were undersized.
- During the 2009 calendar year, at least one fishing-related regulation violation was observed in 17% of surveys completed.
- From January 1, 2008 through December 31, 2009, at least one undersized fish was observed in 9.5% of hook-and-line trip landings and 20.3% of spearfishing trip landings.

Ault et al. (2007) completed "Fishery Management Analyses for Reef Fish in Biscayne National Park: Bag and Size Limit Alternatives" using BISC creel data from 1995-1998 and 2000-2004. Their findings include:

- Less than 2% of all fishing trips landed more than one mutton snapper
- Nearly 22% of hogfish landed in the 2000-2004 time period were under the legal minimum size limit.
- 82% of spearfishing trips during the 2000-2004 time period landed hogfish.
- The minimum size limit for hogfish would need to be increased from its current 12 inches FL to 22 inches FL to ensure population sustainability.
- During the period spanning 2000-2004, less than 1.4% of surveyed trips fishing the reef area landed a black grouper.
- Increasing the black grouper minimum size limit from 24 inches TL to 48 inches TL would be needed to sustain the black grouper population.

DECISIONS TO BE MADE

Although there is continued discussion concerning the direct correlation between the Ault et al. (2001) site characterization study and the regional stock assessment methods used by FWC, there is agreement that the fishery resources within the park are extremely stressed and need special attention. The purpose of this document is to present the range of alternatives being considered for the BISC FMP, and to identify a preferred alternative for the BISC FMP, which will guide fishery management decisions in BISC for the next five to ten years. The development of the

alternatives and the identification of the preferred alternative were based on a combination of public input (derived from two public comment periods and two series of public meetings, and the input of a FMP Working Group), a multi-agency science-management meeting, and environmental and socioeconomic analyses documented herein.

This final Environmental Impact Statement (EIS) describes the justification, alternatives, affected environment, and impact assessments for potential forms of the FMP, and identifies a preferred alternative that BISC managers, in cooperation with the Florida Fish and Wildlife Conservation Commission, believe results in the best and most equitable balance between the conservation, enjoyment and extractive use of BISC's fishery resources.

OVERVIEW OF ALTERNATIVES

Five alternatives were analyzed for impacts of actions on the environment and are described briefly below. The "Alternatives" section (Chapter 2) provides a complete description of the alternatives. Of the range of alternatives presented, **Alternative 4 (Rebuild and Conserve Park Fisheries Resources) results in the best and most equitable balance between conservation, enjoyment and extractive uses of BISC's fishery resources, and thus is identified as the Preferred Alternative.** Following the descriptions of the alternatives, and concluding the Executive Summary, is a discussion and identification of the Environmentally Preferred Alternative, as required by NEPA. It should be noted that the Preferred Alternative is not the same as the Environmentally Preferred Alternative.

Alternative 1 – Maintain Status Quo

Alternative 1, the no-action alternative, serves as a basis of comparison with the other alternatives. Alternative 1 is characterized by continuing current fisheries management according to the park's enabling legislation, established NPS management policies and existing authorities, and in conjunction with state fishery regulations. No regulatory changes would be triggered by the establishment of the FMP. Regulatory changes would occur only if mandated by the FWC following their normal rule-making process, or through the federal regulatory and public review process.

Alternative 2 – Maintain At or Above Current levels

Under Alternative 2, a minor change from current management strategies would take place. Park fisheries resources and habitat conditions would be maintained at or above current levels. Recreational (per person) harvest (*e.g.*, bag limits), numbers of commercial fishers, and fishing-related habitat impacts (those caused directly or indirectly by fishing activities) would be maintained at or below current levels. Additional park-specific regulations and management actions would be enacted only if park fisheries resources or recreational fishing experience decline, or if fishing-related habitat impacts increase, from current levels. Law enforcement staffing and enforcement strategies, as well as education and coordination efforts, would not change from current levels.

Specific management measures would occur as follows (additional, lesser actions are described in Chapter 2).

- Fishery-targeted fish and invertebrates populations would be maintained at current levels. Park fisheries resources would not likely differ in abundance or average size from those outside the park unless populations decline in areas adjacent to the park. Park-specific management actions would be enacted only if populations or mean sizes in the park declined below current levels.
- Satisfaction of fishers would be maintained at or above 80% [4]. If the level of satisfaction decreased below 80%, BISC would make further efforts to identify characteristics of a fishing outing most important to providing a satisfying experience (*i.e.*, through interviews and surveys), and make subsequent efforts to provide those characteristics (staff and funding dependent).
- New commercial fisheries would not be allowed to develop within the park. The park would continue to allow commercial fishing within its borders, provided that the fisheries were established and occurring when the park was changed from a national monument to a national park and subsequently expanded to its current boundary.
- Future growth in the number of commercial fishermen would be prevented. All commercial fishers would be required to obtain a limited-entry, Special Use Permit from the park Superintendent. The permit would be issued to the individual owner and would name the individuals authorized to engage in commercial fishing activity from the owner's vessel(s). The permit would be transferable and would require annual renewal for each year in which landings are reported.
- BISC would seek to establish an annual permit system for commercial guides operating in the park.
- Shrimp trawlers would be subject to inspection by park staff to ensure that trawl gear is in compliance with FWC regulations. Up to two failed inspections would result in warnings to the permit-holder; a third failed inspection would result in termination of the commercial permit-holder's permit (see above).
- Management actions to reduce the level and impact of debris associated with recreational and commercial fisheries would be considered if an increase above current levels is observed. Such actions could include increased removal efforts by Park staff and partner groups, increased education efforts, or spatial closures. Additionally, BISC would explore the feasibility and effectiveness of establishing a regulation to restrict traps from hardbottom habitat (staff and funding dependent).

<u>Alternative 3 – Improve Over Current levels</u>

Under Alternative 3, a moderate change from current management strategies would occur. Improvement from the current condition of park fisheries resources would be sought through moderate decreases in recreational harvest and limits on spearfishing. Numbers of commercial fishers would remain at current levels or decrease over time, and fishing-related habitat impacts would be reduced. This alternative would require implementation of new regulations governing fishing activities within the park.

Specific management measures would occur as follows (additional, lesser actions are described in Chapter 2). Unless differentiated below, this alternative would result in the same actions described in Alternative 2, as well as in the actions below:

[4] Deemed a minimal acceptable level of satisfaction by BISC / NPS staff.

- Management actions listed below would be enacted (in conjunction with the FWC) to increase the abundance and average size of fishery-targeted fish and invertebrates species within the park by at least 10% over current conditions and over conditions in similar habitat outside the park. Initially, these efforts would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit.
- Spearfishing would be limited to gear lacking a trigger mechanism (*e.g.*, the Hawaiian sling model). The use of air-providing equipment (*e.g.*, scuba and hookah) while spearfishing would be prohibited. These regulations are expected to improve fisheries resources by reducing the harvest of undersized fish, since park data reveal that spearfishers in the park are more than twice as likely as anglers to take at least one undersized fish per trip, likely due to failure to correct for underwater magnification.
- Commercial fishers would be required to obtain a limited-entry, Special Use Permit from the park Superintendent. The permit in this alternative differs from that described in Alternative 2 in that the permit would be non-transferable for the first five years. Permits would require annual renewal, and would be "use or lose", such that a permit could not be renewed if (1) it was not renewed the previous year, or (2) no catch was reported in the previous year.
- BISC would work to establish a trap-free zone north and east of park headquarters at Convoy Point in which deployment of commercial or recreational crab traps would not occur. The purpose of the zone would be to provide a natural viewscape for visitors viewing the park from the park Visitor Center, as well as to avoid conflicts with other recreational activities (*e.g.*, windsurfing, canoeing and kayaking) occurring in this high visitor-use area. Beginning at park headquarters, the zone would range north to the mouth of Mowry Canal (C-103), east to the spoil islands located near the mouth of Mowry Canal, southeast to the mouth of the marked channel leading to Homestead Bayfront marina, and west along the marked channel back to park headquarters. BISC and the FWC would work with the commercial fishing industry to seek voluntary compliance with the trap-free zone; if unsuccessful, BISC and the FWC would explore the possibility of establishing an official closure.
- BISC will seek to have FWC eliminate the two-day recreational lobster sport season in the park to protect coral reef habitat from diver-related damage.
- BISC will seek to have FWC establish coral reef protection areas (CRPAs) to delineate coral reef habitat on which lobster and crab traps could not be deployed. Traps within the CRPAs could be moved outside CRPA boundaries by authorized FWC staff, Park staff, or other authorized personnel.

<u>Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources</u>
Under Alternative 4, a considerable change from current management strategies would occur. Substantial improvement in park fisheries resources status and a further reduction in fishing-related habitat impacts would be sought. Numbers of commercial fishers would decrease over time via establishment of a non-transferable permit system. This alternative would require considerable changes to current fishing regulations within the park.

Specific management measures would occur as follows (additional, lesser actions are described in Chapter 2). Unless differentiated below, this alternative would result in the same actions described in Alternative 3, as well as the actions below.

- Management actions would be enacted (in conjunction with the FWC) to increase the abundance and average size of targeted fish and invertebrate species within the park by at least 20% over current conditions and over conditions in similar habitat outside the park. As in Alternative 3, these efforts initially would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit.
- As in Alternative 3, all commercial fishers would be required to obtain a limited-entry, Special Use Permit from the park Superintendent. The permit in this alternative differs from that described in Alternative 3 in that it would be permanently non-transferable. Permits would require annual renewal, and would be "use or lose", such that a permit could not be renewed if (1) it was not renewed the previous year, or (2) no catch was reported in the previous year.
- As in Alternative 3, BISC would seek to have FWC establish coral reef protection areas (CRPAs) to delineate coral reef habitat on which lobster and crab traps could not be deployed. Traps within the CRPAs could be moved outside CRPA boundaries by authorized FWC staff, Park staff, or other authorized personnel. Additionally, under Alternative 4, the trap number from traps observed within CRPAs would be recorded, and traps with three or more recorded violations could be confiscated from Park waters.
- BISC and FWC would propose to the FWC Commissioners the creation of a no-trawl zone within the Bay, in which commercial shrimp trawling would be prohibited. This zone would serve to protect juvenile fish and invertebrates commonly caught as bycatch in trawls, as well as to protect essential fish habitat. The cooperating agencies would work together to determine the details about this zone. Prior to any possible creation of a no-trawl zone, public comments would be solicited during the FWC's rulemaking process and the FWC Commissioners would need to review and approve the details of the proposed zone.

<u>Alternative 5 (Environmentally Preferred Alternative) – Restore Park Fisheries Resources</u>
Under Alternative 5, a substantial change from current management strategies would occur. Substantial improvement in park fisheries resources status to conditions more representative of pre-exploitation levels and a further decline in fishing-related habitat impacts would be sought. Numbers of commercial fishers would decrease over time via establishment of a non-transferable permit system. Among the five alternatives, this alternative would require the most extreme changes to current fishing regulations within the park.

Specific management measures would occur as follows (additional, lesser actions are described in Chapter 2). Unless differentiated below, this alternative would result in the same actions described in Alternative 4, as well as the actions below.

- Management actions would be enacted (in conjunction with the FWC) to restore the abundance and average size of targeted fish and invertebrate species within the park to

within 20% of historic, pre-exploited levels. As in Alternatives 3 and 4, these efforts initially would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit.

- All spearfishing would be prohibited within the park.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historic, cultural, and natural resources. The "environmentally preferred alternative" is not to be confused with the "preferred alternative," which indicates the alternative chosen by the park to best balance resource protection and visitor use. Based on the analysis below, Alternative 5 is determined to be the environmentally preferred alternative, based on its furtherance of the following national environmental policy goals:

Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations

The no-action alternative (Alternative 1 - Maintain Status Quo) would likely result in further degradation of park fishery resources. Each of the action Alternatives would result in management strategies and actions that would increasingly function to preserve park resources for succeeding generations. Because Alternative 5 is the most restrictive of activities that have the potential to negatively affect park resources, it would best fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings

Two issues addressed in the alternatives which affect the factors in this requirement are fishing-related habitat debris, which affects aesthetics, and the presence of a healthy, intact ecosystem with a full complement of its inherent benthic and motile taxa, which affects aesthetic, productivity, and cultural values. From a habitat debris standpoint, Alternatives 2-5 are roughly equal in meeting this requirement, as all would result in increased efforts to reduce habitat debris if levels of debris increased over current levels. In terms of providing an intact ecosystem, Alternative 5 would do the most to restore the ecosystem in BISC.

Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences

For the fishery management plan, "uses of the environment" corresponds to the harvest or catch and release of fish and invertebrates from park waters, as well as recreational fishing experience. Alternative 1 (Maintain Status Quo) is least restrictive on recreational and commercial fishing activities, and thus allows for the widest range of beneficial uses of the environment (from a visitor experience and use standpoint). However, data suggest that historical and current levels of recreational and fishing pressure, combined with habitat and water quality impacts, have negatively affected the fishery resources in the park. Thus, Alternative 1 does not satisfy the

portion of this requirement that states "without degradation, risk to health or safety, or other undesirable and unintended consequences." Likewise, since Alternative 2 allows for current levels of fishery harvest, it does not meet the "without degradation…" requirement. Alternative 3 would result in moderate restrictions on fishing activity, thus still allowing considerable beneficial use of the environment, while likely satisfying the "without degradation" requirement. Alternative 4 would result in greater restrictions on fishing activity in the park while providing more environmental protection than Alternative 3. Alternative 5 (Restore Park Fisheries Resources) would result in the greatest restrictions on fishing activity in the park, while providing the highest environmental protection of the alternatives. Thus, Alternative 5 would provide for the widest range of beneficial uses of the environment while best minimizing degradation, risk of health or safety, or any other undesirable and unintended consequences.

Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice
Alternative 5 (Restore Park Fisheries Resources) would best preserve the natural aspects of BISC's marine environment through management of marine debris (identical in Alternatives 2-5, with the exception of the potential removal of lobster or crab traps from coral reef protected areas (CRPAs) in Alternatives 4 and 5) and by resulting, through strict fishery restrictions, in the most unimpacted marine environment of all the Alternatives. None of the alternatives would directly affect historic or cultural resources.

Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities
In Alternatives 1 and 2, management actions are deemed insufficient to offset increasing fishing pressure (resulting from increased population) that is as expected over time, ultimately resulting in diminished resource use and a marine ecosystem that is further impacted relative to current conditions. Alternatives 3 and 4 would both result in management actions that would begin to offset increasing fishing pressure, as well as improve existing conditions. Alternative 5 makes the most considerable steps to offset fishing pressure and return the park's fishery resources toward unexploited levels. Thus, Alternative 5 goes the farthest in protecting fishery resources and would best achieve a balance between population and resource.

Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources
None of the alternatives address recycling of depletable resources. Since fishery populations could be considered a renewable resource, and since Alternative 5 goes farthest in protecting fishery resources, Alternative 5 most fully satisfies this requirement.

In conclusion, upon full consideration of the elements of Section 101 of NEPA, **Alternative 5 represents the environmentally preferable alternative for the BISC Fishery Management Plan**.

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1. Purpose and Need for Action

1.1. Introduction and Background

Note: Selected words or terms from the text below are defined in a glossary (see **Appendix 1**).

1.1.1 *Area description and essential habitats*
Located in southeastern Florida, Biscayne National Park (BISC) encompasses an area of 173,000 acres (~270 square miles), of which 95% (~164,000 acres) is marine (see Fig. 1). BISC's boundaries range from the eastern continental shoreline (BISC's western boundary), across Biscayne Bay and numerous keys (islands formed from remnant coral reefs), to the 60-foot depth contour of the Atlantic Ocean (BISC's eastern boundary). The northern boundary of BISC is near the southern extent of Key Biscayne, while the southern boundary is near the northern extent of Key Largo, adjacent to Card Sound. The western edge of BISC serves as the entry point for freshwater inflow (excluding bay-bottom groundwater seeps) to the Biscayne Bay environment via remnant groundwater flow and an extensive network of drainage canals. A gradient of increasing salinity occurs from the western boundary to the eastern, 60-foot depth contour boundary (Ault et al. 2001).

Among national parks, BISC encompasses a unique, sub-tropical ecosystem of national significance. Within BISC's boundaries exists a diversity of habitats, including seagrass meadows, hardbottom communities, expansive coral reefs, sand and mud flats, mangrove fringes, and the water column. Through provision of prey availability and shelter, these habitats provide essential fish habitat (EFH; see Public Law 94-265) for numerous species of ecologically important fish and macro-invertebrates. Included in this total are more than 100 species targeted by commercial and recreational fisheries (see *1.1.4: Current Fishery Policies in BISC*). BISC's waters also provide habitat for several federally listed threatened and endangered species, including the smalltooth sawfish, manatees, sea turtles (loggerheads, greens and hawksbills), and two species of coral (discussed in detail in Chapter 3).

From a regional perspective, BISC's coastal bay and coral reef habitats play a critical role in the function and dynamics of the larger Florida coral reef ecosystem, receiving larvae and juveniles from offshore spawning adults, and acting as a source of production of adult fish and macro-invertebrates that undergo ontogenetic habitat shifts and migrations to habitats outside BISC (Ault et al. 2001). As such, BISC's habitats contribute substantially to Florida's multibillion-dollar tourism and fishing industry. Since BISC's natural resources are intimately related to the broader, regional ecosystem through water movements and animal migrations, degradation of park resources has consequences well beyond its boundaries (Ault et al. 2001).

1.1.2 *Enabling Legislation*
BISC began as Biscayne National Monument, which was established by Congress in 1968 "to preserve and protect for the education, inspiration, recreation and enjoyment of

present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty" (PL 90-606). In the legislative history for the park's 1968 enabling legislation, the Department of the Interior stated "It has been our intention to continue commercial and sport fishing for designated species in conformity with State laws and regulations and regulations of this Department designed to protect natural conditions and to prevent damage to marine life and formations. Such fishing would also be regulated in accordance with sound conservation principles to assure continued protection of the marine ecology (Senate Report 1597, 1968). Congress articulated in BISC's enabling legislation that fishing would be allowed to continue. The Monument was later expanded in 1974, to include approximately 8,738 additional acres of land and water (PL 93-477), and in 1980 to its current size of 173,000 acres (270 square miles) (16 USC Sect. 410gg), when the Monument was re-designated as Biscayne National Park (NPS 2003a). In the legislative history for the 1980 enabling legislation, Congress recognized "the unique and special values" of the resources within BISC, as well as the "vulnerability of these resources to destruction or damage due to easy human access by water" (House Report 96-693, 1979). Congress therefore directed the NPS to "manage this area in a positive and scientific way in order to protect the area's natural resource integrity". Additionally, Congress directed that with respect to lands donated after June 28, 1980, "…the waters within the park shall continue to be open to fishing in conformity with the laws of the State of Florida" (16 USC Sect. 410gg-2). Historically, the NPS has chosen to primarily follow State of Florida fishing regulations within all BISC waters, including some park-specific state regulations[5], and recreational and commercial fisheries have occurred in BISC waters since its founding. A more detailed account of BISC's enabling legislation as it pertains to fishery regulation is provided in **Appendix 2**.

1.1.3. *Fishery Management Directives*

While BISC's enabling legislation establishes that fishing will continue to occur in BISC waters in accordance with State regulations, BISC must also manage its fishery resources according to Park and NPS mandates and legislation. For example, Congress directed that the Secretary of the Interior, after consultation with appropriate officials of the State, may designate species for which, areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which BISC was established (16 USC Sect. 410gg-2). Thus, even though fishing regulations in BISC waters should conform to State regulations, the Secretary of the Interior has the ability to establish additional fishing regulations pertaining strictly to BISC. Complicating this issue, however, is the provision that fishing in expansion areas donated by the State after the Act's effective date must be in conformance with State law. NPS has determined that in order to allow commercial fishing to continue in the monument area a special regulation would need to be promulgated through formal rulemaking. Therefore, in terms of management, Biscayne National Park can be divided into two zones: a) the original monument zone, in which

[5] Regulations in BISC are identical to those in adjacent waters, except for the additional park-specific state regulations: (1) reduced bag limit of lobsters within non-bay Park waters during the two-day lobster sport season, and (2) a ban on sponge and ornamental fish and invertebrate harvest from all BISC waters.

fishing regulations follow State regulations, with the opportunity for the Secretary of the Interior to enforce additional regulations as deemed necessary, and b) the expansion zone, in which fishing regulations are fully consistent with regulations implemented by the State of Florida (see 16 USC Sect. 410gg-2). Due to the complex nature of the legislations, policies, and other management directives, however, it is in the best interest of the public and BISC staff to manage fisheries uniformly within the park to the best extent practicable. Uniform regulations across all of BISC, regardless of the applicable regulatory authority, will allow for the most effective resource management and can ensure that visitors have a high-quality fishing experience.

Pursuant to the sound conservation of fishery resources, BISC must adhere to the following NPS Management Policies (NPS 2006):

- Where harvesting is allowed and subject to NPS control, … harvesting will not unacceptably impact park resources or natural processes, including the natural distributions, densities, age-class distributions, and behavior of:
  (1) harvested species;
  (2) native species that harvested species use for any purpose; or,
  (3) native species that use harvested species for any purpose. (Sec. 4.4.3)
- While Congress has given NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement (enforceable by the federal courts) that NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise (Sec. 1.4.4). Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. (Sec. 1.4.5). For example, a loss of fisheries resources within BISC, due to overfishing at unsustainable levels, could be considered impairment since it would result in lost opportunities for enjoyment of fisheries resources (for both extractive and non-extractive activities), while drastically altering natural resource community composition.

Thus, BISC must balance the existence of recreational and commercial fishing in park waters with its mandate and responsibility to manage its fishery resources in a way that such resources remain unimpaired.

Additionally, a 1995 Executive Order on Recreational Fishing (Executive Order12962) was amended on September 26th, 2008 requiring federal agencies to ensure that "recreational fishing shall be managed as a sustainable activity in national wildlife refuges, national parks, national monuments, national marine sanctuaries, marine protected areas, or any other relevant conservation or management areas or activities under any Federal authority, consistent with applicable law". Thus, BISC must ensure that fishing activities occurring within its boundaries are managed in a sustainable manner and BISC must balance visitor use (*e.g.*, recreational and commercial fishing) with resource protection. The NPS believes that managing fisheries in a way that allows for improvements of at least 20% in both the sizes and numbers of targeted species in the

park will be deemed sustainable, not only in terms of ensuring the persistence of the park's fisheries resources but also in ensuring that fishing can continue for this and future generations. Thus, NPS believes that recreational and commercial harvest of fisheries resources as described under Alternatives 4 and 5 would be sustainable.

1.1.4. *Current Fishery Policies in BISC*

This Fishery Management Plan is designed to guide fisheries policies in the park, yet it will serve hierarchically under the park's General Management Plan (discussed in detail in Section 1.5.). Other fishery-related policies (such as special designations, closures, public use limits, permit requirements and other restrictions) can be imposed under the discretionary authority of the Superintendent via the Superintendent's Compendium, which is updated annually. With regards to fishery management, the Superintendent's Compendium would only be used to address minor and/or short-term issues (*e.g.*, a temporary closure of land-based fishing from the Visitor Center boardwalk and jetty in response to structural damage from a hurricane). It is the intent of the cooperating agencies to use the Fishery Management Plan to develop and implement long-term and major fisheries policies within the Park.

With minor exceptions, fishing in BISC follows State of Florida Fishing Regulations, as determined by the Fish and Wildlife Conservation Commission (FWC). Recreational fishing occurs in multiple habitats in both bay and ocean waters, and targets species such as bonefish, snook, tarpon, permit, blue crabs, stone crabs, snappers, groupers, grunts, barracuda, spadefish, spiny lobster, and triggerfish. Commercial fishing also occurs in both bay and ocean waters, and targets numerous species including invertebrates (lobster, blue crabs, stone crabs, and bait shrimp), food fish (typically members of the snapper/grouper complex; concentrated on yellowtail snapper), and baitfish (*e.g.*, ballyhoo, Spanish sardines, thread herring and pilchards). During the early and mid-1900s, Biscayne Bay supported a thriving commercial sponge industry. In 1991, in an effort to protect the sponge populations, the bay was officially closed to sponge harvesting. Gears used in recreational and commercial fisheries in Park waters, and the types of species targeted by those gears, are presented in Table 1. Park visitors fishing in the park can freely remove as many lionfish as desired since this exotic invasive species is not managed (*e.g.*, this species does not have a minimum size limit, a bag limit, closed season etc.) by NPS or FWC for fisheries purposes. More information about lionfish is provided in section 1.1.5.

To facilitate the assessment of the condition of fishery resources within BISC, fisheries data are gathered by BISC and by independent institutions through a number of fishery-dependent and fishery-independent methods (Table 2). The most regularly performed and longstanding monitoring program is the creel survey (performed weekly since 1976), in which park employees interview fishers returning from fishing trips and collect data on the number, size and species landed, as well as data on spatially explicit fishing effort and catch-per-unit-effort. Additional fisheries-dependent and fisheries-independent data-collection programs are ongoing or have occurred in the past. In 1999 BISC commissioned a Site Characterization study to identify the current status of fishery resources and fishing effort in BISC. This study, completed in 2000 (Ault et al. 2001),

provided comprehensive data on the status of numerous recreationally and commercially harvested species. The Site Characterization study was peer-reviewed by an international team of fisheries experts, who issued recommendations on further / additional analyses (see **Appendix 3**), which have already occurred or are underway or planned (contingent on available funding). In concert with data provided from the collection programs indicated in Table 2, as well as input from a Fishery Management Plan Working Group (discussed subsequently in this section), the Site Characterization provided a troubling assessment of BISC fishery resources. These data, conclusions, and implications for fisheries management in BISC are reported and discussed in the following section.

1.1.5. *Overview of Need for Action: Historic Trends and Current Status of the Fishery*
Data collected in the programs and studies described above suggest that fisheries in BISC have declined from historical levels due to a combination of increasing population and related fishing pressure:

- The human population of Florida has grown exponentially over the past century. The population of Miami-Dade County grew from just under 5000 residents in 1900 to nearly 2.5 million residents in 2010 (U.S Census Bureau 2010 estimate, see Fig 2).
- Muller et al. (2001) identified a statistically significant positive relationship between population size and sales of resident saltwater fishing licenses from 1990 through 1998 (*i.e.*, more people = more recreational fishers).
- NOAA / NMFS Marine Recreational Statistics Survey (MRFSS; see http://www.st.nmfs.gov/st1/recreational/) data show a statistically significant increasing trend for the number of people participating in fishing along the east coast of Florida (NMFS 2005; Fig. 3A), and in the number of fishing trips anglers are taking along the east coast of Florida (NMFS 2005, Fig. 3B).
- The recreational vessel fleet in South Florida (Broward, Collier, Miami-Dade, Monroe and Palm Beach Counties) has grown substantially. The number of licensed vessels grew by 444% between 1964 and 1998 (Ault et al. 2001).
- The commercial fishing fleet in South Florida grew 197% from 1964 to 1998 (Ault et al. 2001).
- In Miami-Dade county, the recreational vessel registrations for 2012 increased approximately 9% compared to the recreational vessel registrations for 2000; in contrast, the county's 2012 registered commercial vessel fleet is 93.5% of what it was in 2000 (Florida Department of Highway Safety and Motor Vehicles 2013).

Perhaps most importantly, in tandem with increases in numbers of fishers harvesting fish and invertebrates from BISC waters, there has been considerable improvement in fishing efficiency associated with the development and continued improvement of technology such as fish finders, depth indicators, global positioning systems, improved vessel and gear design, increased engine horsepower, and radio communications. This combination of increasing numbers of participants utilizing increasingly efficient harvesting methods has likely had synergistic negative impacts on BISC's fishery resources.

A recent issue which has a very strong potential to further affect the park's already-compromised fisheries resources is the invasion of the non-native Indo-Pacific lionfish (*Pterois volitans* and *Pterois miles*). These fish, which contain venomous spines in

several fins, are now abundant in BISC waters. With a combination of a voracious appetite, a lack of predators, and a high reproductive output, this species has high potential to adversely affect native fish community composition, abundance, and/or distributions by preying upon and competing with native species for resources while remaining free of predatory control. The park has implemented a Lionfish Management Plan which calls for continuous removal efforts to minimize the adverse effects of lionfish on native species, ecosystems, and park visitors. Should invasions of other non-native fish occur, they too will be managed using an approach similar to what has been used to manage lionfish.

1.1.6 *Effect on Fishery Resources and Initiation of Fishery Management Plan*

Not surprisingly, the preponderance of available data suggests that numerous fish species in BISC are under considerable fishing pressure and in some cases are regionally overfished or subject to overfishing. For example, seven species of fish that occur in park waters (goliath grouper, Nassau grouper, red grouper, gag grouper, black grouper, red drum, and speckled hind) were listed as overfished or subject to overfishing in South Atlantic waters by the South Atlantic Fishery Management Council in 2003 (NMFS 2003). For more than 20 fished species, data are insufficient to determine whether or not those species are overfished or subject to overfishing. Preliminary analyses from a reef fish visual census performed in 2002 by NOAA/UM-RSMAS indicated that size structures of highly desirable reef fishes (*i.e.*, groupers and snappers) were particularly truncated in BISC, relative to areas with lower fishing pressure (J. Ault and S. Smith, University of Miami, unpublished data). Additionally, in analyses of fishery data solely from BISC waters, Ault et al. (2001) concluded that:

- Seventy-one percent of the 17 individual species for which sufficient data were available appear to be overfished, as defined under the federal Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). An analysis of the Spawning Potential Ratios (SPR) of the fishery-targeted reef fish shows that 4 of 5 grouper species, 5 of 6 snapper species, barracuda, and 2 of 5 grunt species for which there are reliable data are below the SPR that constitutes overfishing as defined in the MSFCMA. Furthermore, all but three of 18 additional species assessed (for which there were less reliable mean length observations) are likely to be overfished.
- For all harvested species analyzed in the study, the average size of fish landed was near the minimum harvest size for the past 25 years, suggesting that a majority of large fish have been removed from the population. For example, the average size of black grouper is now 40% of what it was in 1940 and the spawning stock appears to be less than 5% of its historical maximum.
- For 14 of 35 species analyzed, the minimum size of harvest is lower than the reported minimum size where 50% of individuals are sexually mature. For these species, it appears that most fish are being captured before they ever have a chance to spawn. The minimum harvest size for six of these 14 species is currently set by State regulations. The remaining eight species are unregulated.

The Peer Review report of the Ault et al. (2001) Site Characterization recommended that many conclusions from the Site Characterization be cross-validated. Many of these cross-validations have been made, while others are in process or are planned, contingent

on funding availability. One criticism of the Ault et al. (2001) report is that the report treats fish within BISC at the stock level, but since true fish stocks operate at scales much larger than BISC's area, the use of stock assessment methods is inappropriate to assess a population within a stock. Stocks need to be assessed and managed at the appropriate scale, which would involve large-scale regulations and multi-agency cooperation. The fish populations that occur in BISC should not be viewed as 'stocks', but instead as 'park fisheries resources'. Regardless, all involved parties have agreed that given (1) the apparent condition of BISC's fishery resources, (2) the lack of knowledge regarding many fisheries resources in BISC; (3) BISC's directives to protect *unimpaired* the area's natural resource integrity and to conserve its resources for the recreation and enjoyment of present and future generations; (4) the acknowledgement by the Florida Fish and Wildlife Conservation Commission (FWC) that resources in BISC should be managed to a more conservative standard than resources in surrounding waters, given BISC's status as a national park (FWC 2001; see **Steps in FMP Development** section below); and (5) the lack of an existing management plan containing fishery-specific goals and management triggers, BISC managers feel it is imperative to establish a Fishery Management Plan (FMP) to ensure the wise conservation and management of BISC's fisheries and fishery resources. Furthermore, since the 2001 Ault et al. assessment, other studies and assessments completed by NPS and non-NPS scientists continue to corroborate the findings of the Ault et al. report. The findings of these efforts have been considered in conjunction with the Ault et al. (2001) report during the development of the draft and final versions of the EIS.

Kellison et al. (2011) compared historical (1977-1981) and recent (2006-2007) fish assemblages at seven intensively studied reefs. The findings of this work include:

- 64% of species observed in both time periods were observed less frequently in the recent surveys.
- Compared to historical surveys, mean species richness per recent survey declined at all sites, with declines ranging from 9% to 27% of species lost.
- The mean decline in frequency of occurrence for declining species was greater than the mean increase for increasing species for all trophic guilds but herbivores, for which means were nearly equal.
- The number of species observed per survey declined for all trophic guilds but herbivores.

BISC's creel survey data reveal the following statistics:

- In 2007, one gag grouper was landed for every ~1566 person-hours of fishing effort in suitable grouper habitat and one black grouper was landed for every ~1044 person-hours of fishing effort in suitable grouper habitat. For comparative purposes, consider that in 1995-1998, one black grouper was landed for every 670 hours of effort and from 2000-2004, one black grouper was landed for every 925 hours of effort (see Ault et al (2007)).
- The average sizes of schoolmaster snapper landed in 2006 and lane snapper landed in 2008 were below the minimum legal size.
- In 2009, the average size of harvested gag grouper, red grouper, lane snapper, and mutton snapper was each below the species' minimum legal size limit.

- Size of landed yellowtail snapper declined from 2006 to 2008, indicating a decreasing trend in snapper size over the last few years.
- In 2008, nearly 40% of landed red grouper, 28.4 % of landed hogfish, and 24.1% of landed mutton snapper observed during creel surveys were undersized.
- In 2009, 50% of landed red grouper and 100% of landed gag grouper observed during creel surveys were undersized.
- During 2009, at least one fishing-related regulation violation was observed in 17% of surveys completed.
- From January 1, 2008 through December 31, 2009, at least one undersized fish was observed in 9.5% of hook-and-line trip landings and 20.3% of spearfishing trip landings.

Ault et al. (2007) completed "Fishery Management Analyses for Reef Fish in Biscayne National Park: Bag and Size Limit Alternatives" using BISC creel data from 1995-1998 and 2000-2004. Their findings include:

- Less than 2% of all fishing trips landed more than one mutton snapper
- Nearly 22% of hogfish landed in the 2000-2004 time period were under the legal minimum size limit.
- 82% of spearfishing trips during the 2000-2004 time period landed hogfish.
- The minimum size limit for hogfish would need to be increased from its current 12 inches FL to 22 inches FL to ensure population sustainability.
- During the period spanning 2000-2004, less than 1.4% of surveyed trips fishing the reef area landed a black grouper.
- Increasing the black grouper minimum size limit from 24 inches TL to 48 inches TL would be needed to sustain the black grouper population.

1.2. Steps in FMP Development

In the fall of 2000, BISC began FMP development with the formation of an internal FMP developmental team. Representatives from the BISC / NPS team then approached the Florida Fish and Wildlife Conservation Commission (FWC) in 2001 to determine the feasibility of, and interest in, working cooperatively to develop the FMP. It was determined that such a partnership would be in the best interest of BISC, the FWC, and the fishery resources in BISC. Discussions continued on how to best work cooperatively on the FMP, and a cooperative relationship was formally established in October 2002 in the form of a Memorandum of Understanding (MOU; **Appendix 4**), which outlined both agencies' goal of working together to produce a FMP that would guide the management and conservation of fisheries and fishing experience in BISC over the next five years. Although the MOU was not established until 2002, preliminary FWC involvement began in 2001, when the FMP development team broadened to include representatives from the FWC, Tennessee Valley Authority contractors[6] and fishery scientists with local expertise[7].

[6] To assist in FMP development, particularly in regard to National Environmental Policy Act (NEPA) compliance.

[7] Dr. J. Serafy (NOAA NMFS – Miami), Dr. J. Ault (University of Miami – RSMAS), and Dr. S. Smith (University of Miami – RSMAS).

Hereafter, this development team is referred to as the FMP Technical Committee. During this period, FWC commissioners agreed that resources in BISC should be managed to a more conservative standard than resources in surrounding waters, given BISC's status as a National Park (FWC 2001). Nevertheless, at the request of the FWC the following text was included in the MOU between the FWC and BISC: "FWC and the park agree to seek the least restrictive management actions necessary to fully achieve mutual management goals for the fishery resources of the park and adjoining areas. Furthermore, both parties recognize the FWC's belief that marine reserves (no-take areas) are overly restrictive and that less-restrictive management measures should be implemented during the duration of this MOU. Consequently, the FWC does not intend to implement a marine reserve (no-take area) in the waters of the park during the duration of this MOU, unless both parties agree it is absolutely necessary."

Early discussions on FMP development focused on identifying important management issues and desired future conditions of the fishery resources in BISC. It was quickly acknowledged that public input and involvement would be critical to developing and establishing an effective FMP. Thus, public involvement has been maximized throughout the FMP developmental process. The first public involvement occurred in May 2002, when a public comment period and series of public meetings was held to obtain public opinion on fish and marine-resource issues. Hundreds of comments were received during these meetings and from comment cards returned during the public comment period (April 22 – June 17, 2002). These comments were summarized and used to help guide further FMP development during a FMP Technical Committee meeting held in July 2002. During this meeting, the decision was made to base the FMP on a series of Desired Future Conditions of fishery resources and fishing experience in BISC.

The FMP Technical Committee continued to develop the FMP based on available data and the public comments obtained during the 2002 public comment period, and in April 2003 commenced a second public comment period (March 14th - May 9th, 2003) and series of public meetings to gain public input on (1) the focal fishery issues that had been identified thus far, (2) potential desired future conditions under each issue, and (3) likely management actions that would be undertaken to accomplish the desired future conditions. Again, hundreds of comments were received during the meetings and from correspondence sent directly to BISC. While comments were generally favorable, there was strong public sentiment that FMP development would benefit considerably from input from a focal group of users of the park's fishery resources. BISC and the FWC agreed that such input would be helpful to FMP development. Thus, in response to public support for an advisory process, BISC and the FWC requested in Fall 2003 that a Working Group be formed under the authority of the Florida Keys National Marine Sanctuary Advisory Council (hereafter, SAC)[8]. The SAC granted this request, and BISC,

[8] The working group was formed under the authority of the FKNMS for several reasons. First, BISC was bound by the Federal Advisory Committee Act (FACA), which limits the ability of federal agencies to establish advisory groups over short time spans, and the FKNMS has a FACA exemption in its enabling legislation. Second, the FKNMS borders BISC on BISC's eastern and southern boundaries. Thus, fishery-management decisions in BISC will likely affect fishery resources within the FKNMS. Finally, the FKNMS is a partner organization to the FWC, and thus was a natural partner for FMP development.

FWC and the SAC coordinated efforts to produce a list of potential Working Group participants representing user groups that would potentially be affected by actions under the FMP. Invitations were extended, and the BISC FMP Working Group was formed in January 2004.

The BISC FMP Working Group consisted of recreational[9] and commercial fishers, a marine-life collector, divers, resource managers, scientists, and members of the conservation community (member list included in **Appendix 5**). The Working Group was formed to generate recommendations for the FMP, and met for six full-day meetings during the period of January to October 2004. Over the first two meetings, the Working Group generated the following vision statement to describe their *future* vision of BISC:

> "Biscayne National Park is a national ecological treasure providing premier fishing activities. It is a thriving healthy environment with diverse and abundant marine resources. Fishery resources are sustainable, healthy and resilient, supported by a healthy, natural habitat. Consensus building through educated stakeholder input has built an ethic of mutual respect encouraging the use of science-based management for protection of fisheries resources. Education and outreach efforts have fostered voluntary protection of Park resources by building support for rules and regulations and responsible behavior on the water. Park rules and regulations are enforced effectively and uniformly. These measures allow an enjoyable Park experience."

The Working Group then set forth to identify focal issues for the FMP and actions steps to address those issues. The Working Group finalized their recommendations in October 2004, and presented the recommendations to the SAC, which endorsed the recommendations and forwarded them under FKNMS Superintendent Signature to BISC and the FWC. The recommendations of the Working Group are attached as **Appendix 5**. After receiving the Working Group recommendations, alternatives for the FMP were developed, with the Working Group recommendations forming the core of alternatives 2-4. During the process of developing this plan, additional data (as described in section 1.1.6) have indicated that BISC's fisheries resources have continued to decline. Accordingly, the National Park Service drafted an additional alternative, Alternative 5 (Restore park fisheries resources), to include stronger conservation and rebuilding emphasis. This alternative was developed to ensure that a full range of management options was considered. The alternatives were presented in the Draft Environmental Impact Statement, which was presented to the public in August of 2009, commencing a 60-day public comment period which ended on October 6, 2009 During the public comment period, BISC held three public meetings in Florida City, Miami, and Key Largo, which were attended by 66, 70, and 18 people, respectively. At the end of the public comment period, BISC received a total of 337 individual pieces of correspondence. All correspondence was reviewed by BISC staff and public comments were considered during the development of this Final Environmental Impact Statement.

[9] Including a spearfisher

1.3. Decisions to be Made

Based on public comments as well as the environmental and socioeconomic analyses documented in this Final Environmental Impact Statement (FEIS) and the Draft Environmental Impact Statement (DEIS), the NPS will choose an alternative that will serve as a Fishery Management Plan to guide fishery management decisions in BISC for the next five to ten years.

The analyses conducted for this FEIS will be used to determine what types of fisheries activities are appropriate for the park, at what level they should continue, and management actions that may be implemented to achieve desired future conditions of fishery resources.

It should be noted that the FMP arising from this process is intended to focus on ecosystem management solely as it pertains to fisheries. Following decades of significant recreational and commercial fishing pressure and related habitat impacts, the restoration of BISC's marine ecosystems to historical, "natural" levels[10] is only likely to be approached under Alternative 5. Stringent management tools, such as the establishment of marine reserves[11] to protect and conserve ecosystem biodiversity, function, and services, and to begin to restore fishery-impacted ecosystems to natural levels would likely be required. Discussion of the potential inclusion of a relatively large marine reserve as a management tool under this FMP occurred early in the cooperative development of the project between NPS / BISC and the FWC. The FWC was not in favor of utilizing marine reserves as a fishery management tool, however the FWC recognized that marine reserves might be necessary to fulfill the broad range of park management goals. Thus, NPS / BISC and the FWC agreed upon the following text in their Memorandum of Understanding, indicating that BISC intended to consider marine reserves under its more general, and in-development, General Management Plan:

> "…both parties recognize the FWC's belief that marine reserves (no-take areas) are overly restrictive and that less-restrictive management measures should be implemented during the duration of this MOU. Consequently, the FWC does not intend to implement a marine reserve (no-take area) in the waters of the park during the duration of this MOU, unless both parties agree it is absolutely necessary. Furthermore, the FWC and the park recognize that the park intends to consider the establishment of one or more marine reserves (no-take areas) under its General Management Planning process for purposes other than sound fisheries management in accordance with Federal authorities, management policies, directives and executive orders".

Furthermore, while the MOU does not openly endorse marine reserves, it does state that marine reserves can be considered in situations where both parties agree that use of a no-

[10] e.g., natural size-frequency distributions (including large fish and invertebrates), natural genetic composition of harvested stocks, and natural community composition and structure.
[11] Marine areas where extractive use (e.g., fishing) is prohibited

take zone is necessary to achieve the desired outcome. Because the effects of different management tools are difficult to predict, several of the alternatives do state that spatial closures are one of the many tools that may be needed to reach goals stated by the alternative.

It is important to note that the consideration and implementation of one or more spatial closures in the park is not to be viewed as an alternative in itself, but, rather, as a potential tool to help achieve the goals outlined by that alternative. Marine reserves, however, should not be viewed as a universal solution to fisheries declines, since these spatial closures may just lead to displacement of effort and fail to address the issues of capacity, regulation, and user rights (Beddington et al. 2007). The implementation of marine reserves is generally agreed to be successful when coupled with conventional measures, such as those outlined in several alternatives in this FMP, that regulate fishing mortality (Beddington et al. 2007).

Furthermore, while changes in human activities will be observed immediately as a response to and in compliance with the regulations needed to achieve the goals of the selected alternative, impacts to the fisheries and habitats should not be expected to be observed immediately, even under the environmentally-preferred alternative (Alternative 5). For long-lived, slow-growing fishes, such as some snappers and groupers, it may take years or even decades before a noticeable positive response to a reduction in fishing effort is observed (see Ault et al. 2007). While previous studies of various marine protected areas have revealed that some beneficial effects may be observed within a few years of reserve establishment (Roberts et al. 2001, Polunin and Roberts 1993), other studies have indicated that even these most extreme fisheries resource management methods can take long time periods to fully realize beneficial results (Russ and Alcala 2004). Thus, it should be expected that recovery of overfished fisheries resources should take longer, as various levels of fishing pressure will still exist under all five alternatives. Furthermore, seagrasses and corals can also take years to decades to recover from fishing gear-related damage (Watling and Norse, 1998), and as habitat quality can directly influence fish composition, fish may not respond (via increased abundances and/or sizes) until habitat recovery and improvement has been achieved.

Likewise, it must be acknowledged that, due to the inherent complexity, connectivity, and scale of marine ecosystems, no management plan can guarantee any level of success. While the park represents a large area of marine habitat, most fisheries stocks operate at scales larger than the park. Activities that occur outside of or across park boundaries (*e.g.*, spawning, larval dispersal, large-scale movement of individuals) can be influenced by factors outside of the park's control, yet can affect how well a management plan meets its intended objectives. Ultimately, it is not just what happens within the park, but also what happens upstream of the park and in immediately adjacent waters that can influence the status of fishery resources in the park. For example, if larval supply from upstream waters into the park is poor, then fewer recruits will arrive to the park to benefit from management actions. Similarly, management actions may help to conserve more and/or larger fish within the park, but a fish that leaves Park boundaries is no longer under Park protection. Taking steps to manage the actions directly within the park is a first and

major step, but ideally, cooperation of state and federal agencies governing adjacent waters can help ensure improved fisheries resources in Biscayne National Park.

This final Environmental Impact Statement (EIS) describes the justification, alternatives, affected environment, and impact assessments for potential forms of the FMP, and identifies a preferred FMP alternative that BISC managers, in cooperation with the Florida Fish and Wildlife Conservation Commission, believe results in the best and most equitable balance between the conservation, enjoyment and extractive use of BISC's fishery resources.

1.4. Law Enforcement and Fisheries Management

The enforcement of fishery regulations is a critical component of effective fisheries management. A recent critical review of current problems in marine fisheries management (Beddington et al. 2007) highlights how weaknesses in enforcement can lead to illegal fishing, poor scientific data, and a failure to meet biological targets. As such, law enforcement efforts and potential strategies are considered under this plan. Fishery regulations in BISC are enforced by NPS Rangers and FWC Marine Patrol officers, and potentially by US Coast Guard and Miami-Dade County-commissioned officers. The legal jurisdiction of NPS, FWC and Miami-Dade officers is described in further detail in **Appendix 6**. Due to the limited number of law enforcement rangers and the complexity of law enforcement issues in the park, the capability to significantly improve fisheries resources through law enforcement efforts alone is limited.

1.5. Other Pertinent Environmental Reviews or Documents

BISC is also in the process of developing a new General Management Plan (GMP) designed to serve as the park roadmap for decision-making regarding all park resources for the next 15-20 years. When completed, the FMP will serve hierarchically under the GMP. As with the FMP, considerable public involvement has been undertaken in GMP development, including four sets of public meetings/public comment periods thus far. Information on the in-development BISC GMP can be obtained via the PEPC website (http://parkplanning.nps.gov/bisc). Until BISC's new GMP is implemented, the FMP will tier off the existing (1983) GMP, which states that "the intent of managing commercial and sport fishing within the park will be to sustain a composition of native marine populations similar to that which existed prior to fishing pressures. … If it appears, based on research or regular monitoring, that further restrictions on locations, times, or methods of fishing within the park are warranted, the National Park Service will consult with the state for either revising the state fishing regulations or revising (through the Secretary of the Interior) the park regulations, as provided for in the 1980 legislation." In accordance with this directive, the NPS and the State of Florida are working together to implement this FMP in an effort to improve the status of the park's fisheries resources and to ensure the composition of native marine populations is similar to pre-fishing conditions. Information about the 1983 GMP and the status of the new GMP is available at *http://www.nps.gov/bisc/parkmgmt/planning.htm*

Additionally, future research projects will be critical to (1) guiding adaptive management of fishery resources in BISC, (2) determining success of fishery management efforts, and (3) identifying new focal management and conservation issues. **Appendix 7** contains a list of research and monitoring projects that should be undertaken to maximize understanding, and thus wise management and conservation, of fishery resources in BISC.

1.6. Impact topics: Resources and values at stake in the planning process

Part of the planning process involves understanding the consequences of decision-making and choosing one management option over another. For this reason, the Fishery Management Plan includes an Environmental Impact Statement in which the anticipated impacts of potential management alternatives on park resources and visitors are determined. The impact topics identified for evaluation under the Fishery Management Plan are outlined in Chapter 3 (Affected Environment) and were identified based on federal laws and other legal requirements, Council on Environmental Quality (CEQ) guidelines, NPS management policies, staff subject matter expertise, and issues and concerns expressed by the public and other agencies.

Several impact topics were considered but dismissed from further consideration under this plan, since they would not be affected by any of the alternatives. These impact topics are: energy requirements and conservation potential; terrestrial habitat and terrestrial flora and fauna; urban quality and the design of the built environment; water resources, including water quality and surface water flow, wetlands, floodplains, and navigation on BISC's waters; wild and scenic rivers; and sacred sites / Indian trust resources.

2. Alternatives

2.1 Overview of the Alternatives

In this section, we present five alternatives (one "no-action" and four "action" alternatives) for future fishery management under the FMP in BISC. The range of alternatives identified includes actions that could reasonably be implemented given the legal requirements under which the National Park Service operates. The no-action alternative (Alternative 1 – Maintain Status Quo) is commonly referred to as the status quo alternative, since this is what would occur if no change in specific management approaches or the type of actions the agency has taken in the past was to occur. Each of the action alternatives (Alternatives 2-5) represents differing levels of change from current regulations and management approaches, and thus would result in differing future levels of fishery resources and gear-related habitat impacts in the park (*e.g.*, in the form of species-specific densities and mean lengths of targeted species, and of marine debris associated with commercial and recreational fishing gear). The action alternatives are structured such that each alternative provides a full description of all actions that are different from the previous alternative(s). Actions that do not differ from those in previous alternatives are listed as "the same as in the previous alternative".

Alternative 4 (Rebuild and Conserve Park Fisheries Resources) results in the best and most equitable balance between conservation, enjoyment and extractive uses of BISC's fishery resources, and thus is identified as the Preferred Alternative. An Environmentally Preferred Alternative (Alternative 5) has also been identified, but it should be noted that the Environmentally Preferred Alternative is *not* the same as the Preferred Alternative. The Environmentally Preferred Alternative is the alternative that causes the least damage to the biological and physical environment; it also refers to the alternative that best protects, preserves, and enhances historic, cultural, and natural resources. Through identification of the environmentally preferable alternative, the NPS decision-makers and the public are clearly faced with the relative merits of choices and must clearly state through the decision-making process the values and policies used in reaching final decisions.

Each alternative addresses five essential fishery components: (1) populations of fishery-targeted fish and invertebrates, (2) recreational fishing activity, (3) commercial fishing activity, (4) habitat conditions, and (5) law enforcement, education and coordination. For each component, where appropriate, desired future conditions for fishery resources or fishery-related efforts are listed, as well as management actions that would or would likely be taken to reach those conditions, and monitoring or data-collection efforts that would be necessary to determine desired future conditions have been met.

Within each alternative, "decline" and "increase" are defined as statistically significant decreases and increases, respectively, as identified using the best available data and most reasonable analytical approaches. Fishery-targeted species are those sought for harvest or catch-and-release by recreational or commercial fisheries. Current levels are defined as

levels measured (quantitatively) during 2000-2006 by federal, state, academic and independent researchers.

It is important to note that the alternatives presented in this EIS are concerned with Desired Future Conditions (DFCs) of the park's fisheries resources, not with specific recommended regulatory changes. While the range of tools that could be used to achieve the DFCs of each alternative are suggested, the specific details of the regulatory changes required (*e.g.*, changes to the bag limit or minimum size limit for a certain species) to achieve the DFCs of the implemented alternative would be determined in cooperation with the FWC through their normal rule-making process, which would include additional public involvement and comment. For reasons discussed elsewhere (see section 1.1.2 and also **Appendix 2**), the park would prefer to manage its fisheries resources cooperatively with FWC so that whenever practicable there is a single set of rules applicable to the entire park area. However, it is also possible that fishing regulations could be promulgated and enacted by the NPS, should the FWC and BISC agree such proposed regulations fall outside the state purview.

Some or all of the alternatives will require NPS to promulgate special regulations. NPS Management Policies 2006 (Sections 4.4.3 and 8.2.2.5) require a federal regulation to allow commercial fishing to continue in BISC. Federal regulations are also appropriate under BISC's enabling act with respect to the waters of the original monument, as well as in the areas donated by the State of Florida since June 28, 1980.

Each of the alternatives is described in detail below. Table 3 contains a list of major goals established and actions that would occur under each of the alternatives. Table 4 compares possible management actions that *could* be implemented to achieve the goals of each alternative.

2.2. Alternative 1 - Maintain Status Quo

Alternative 1, the no-action alternative, serves as a basis of comparison with the other alternatives. Alternative 1 is characterized by continuing current fisheries management according to the park's enabling legislation, established NPS management policies and existing authorities, and state fishery regulations. No regulatory changes would be triggered solely by the establishment of the FMP. Regulatory changes would occur only if mandated by the FWC following their normal rule-making process, or through the federal regulatory and public review process. The NPS does not believe that maintaining the status quo will be in compliance with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity. Furthermore, NPS Management Policies 2006 (Sections 4.4.3 and 8.2.2.5) require the NPS to promulgate a special regulation to continue to allow commercial fishing within BISC.

The management strategies described in Alternative 1 represents ongoing efforts, or efforts that would be carried out if sufficient staff and funding support were available. For strategies that would occur only if additional / increased staff and funding support were available, or which would occur at greater levels given sufficient staff and funding support, the term "staff- and funding-dependent" appears in parentheses following the listed strategy. For these strategies, the park would strive to acquire necessary resources via grants, volunteer efforts, the establishment of partnerships, and increases in base funding. Many of these strategies were recommendations of the BISC FMP Working Group.

2.2.1. Populations of fishery-targeted fish and invertebrates - BISC would continue to take steps to collect and utilize the best available data to assess the historical status and monitor the current status of fishery-targeted populations. Data utilized would include, but not be limited to, data generated in annual scuba visual census surveys and creel surveys. NPS / BISC would work with the FWC and South Atlantic Fishery Management Council (SAFMC) to attempt to make regulations as consistent as possible across jurisdictional boundaries. No additional efforts would be made to change the current status of park fisheries resources. Park fish populations would not likely differ in abundance or average size from populations outside the park, and would be free to fluctuate.

2.2.2. Recreational fishing activity - BISC would continue monitoring recreational catch and effort, as well as the percent of recreational fishers who are satisfied with their fishing experience, via creel surveys. BISC would, staff-and funding-dependent, also strive to assess the effect of catch and release fishing on growth and survival of recreationally caught species, particularly those not targeted but often caught by recreational fishers ("recreational bycatch"; *e.g.*, grunts).

2.2.3. Commercial fishing activity - BISC would continue to monitor commercial landings and effort through acquisition of data from the FWC's trip ticket program.

Additionally, BISC would strive to:

- Take steps to promulgate a special regulation to allow commercial fishing in BISC.
- Monitor and assess impacts of bycatch associated with commercial fisheries, particularly roller-frame shrimp trawlers (staff- and funding-dependent).
- Investigate methods to reduce bycatch and gear impacts/damage in roller-frame trawl and other commercial fisheries. Work with commercial fishers to develop and implement recommended changes (staff- and funding-dependent).
- Perform increased outreach and public education to ensure commercial fishers are aware of regulations and potential gear and bycatch impacts (staff- and funding-dependent).

2.2.4. Habitat conditions - BISC would continue to monitor and assess densities of debris associated with recreational and commercial fisheries (*i.e.,* discarded fishing tackle, lost line, derelict lobster and crab traps, and trap debris) through visual surveys, and to partner with other regulatory and private organizations to organize cleanups of park waters. BISC would also:

- Monitor and assess habitat impacts of all commercial and recreational fisheries (staff- and funding-dependent).
- Work with commercial shrimp trawlers to identify areas being trawled to help identify future management actions and areas of user conflicts (staff- and funding-dependent)
- Improve knowledge of benthic habitats via increased mapping efforts; make habitat maps easily available to the public in a format that can be downloaded to GPS units; consider marking fragile areas with buoys / beacons / lights (staff- and funding-dependent).

2.2.5. Law enforcement, education, and communication - BISC would continue to work with the FWC to maximize efficiency of ongoing law enforcement efforts. Additionally, based on ongoing discussions between NPS / BISC and the FWC, BISC would pursue the following steps:

- Develop novel, cooperative approaches to increase the number of fishers checked by law enforcement officers, and increase the public perception of the likelihood of being stopped by law enforcement officers. For example, BISC would pursue establishing interagency fishery-enforcement “blitzes” that would occur on a quarterly, reoccurring basis. These blitzes would be implemented over a 2-day weekend period consisting of coordinated teams of all available law enforcement commissioned officers from the FWC, NPS and, potentially, Miami-Dade County. During these fishery-enforcement blitzes, officers would congregate in several “bottleneck” locations (*e.g.,* near marinas, or on the bay side of reef-to-bay channels) and stop all vessels for fishery enforcement checks. The primary focus of these blitzes would be dedicated fisheries regulations enforcement.
- Explore opportunities to make NPS-written violations trackable through the state law enforcement tracking system, and vice versa. Currently, federal violations may not show up in the state tracking database, and vice versa. NPS and FWC would consider a system under which, where feasible according to concurrent jurisdiction and applicable reciprocity agreements, BISC LE Rangers write citations tiered to State

law and State regulatory authority. This approach would improve information sharing between agencies, and result in citations written by both Federal officers (BISC LE Rangers) and FWC officers for fisheries infractions and boating violations appearing when individual criminal records are requested and accessed.

- Improve communication abilities between NPS BISC and FWC officers. The two groups currently use non-compatible radio communication systems. NPS and FWC would pursue the potential establishment of a system under which BISC LE Rangers are permitted access to the state law enforcement radio communication system.
- Take steps to encourage magistrate courts / judges to treat fisheries and boating enforcement violations / citations as serious cases, and to establish and enforce strict penalties for all violations, particularly for repeat offenders. Steps would include correspondence and meetings with federal prosecutors, in coordination with the FWC.

As fishers become more aware of increased law enforcement efforts, they may be less likely to violate fishing regulations, since losses resulted from detections and successful prosecution will likely exceed the gains expected from violating the regulations (Beddington et al. 2007)

From an educational perspective, BISC would strive to increase educational and outreach efforts, bolstered by increased cooperation with partner groups, including other governmental and non-governmental organizations. Such efforts would include:

- Developing “in-school” programs to educate local youth on park resources, responsible use and management challenges (staff- and funding-dependent).
- Continuing to offer the “Fisheries Education Course”, which reviews and explains fishing regulations, species identification, and responsible fishing practices to the public. This course may also serve as an alternative to paying a fine for first-time fishing violations.
- Adding “Special Regulations Apply” to park signage; create signage that educates regarding marine debris (staff- and funding-dependent).
- Increasing dissemination of information to the public via radio, television, and to hotels / motels (staff- and funding-dependent).
- Encouraging the use of biodegradable fishing materials.
- Sponsoring additional marine debris cleanups (staff- and funding-dependent).

2.3. Alternative 2 - Maintain at or above current levels

Under Alternative 2, a minor change from current management strategies would occur. Park fisheries resources and habitat conditions would be maintained at or above current levels. The NPS does not believe that maintaining targeted species at current levels will be in compliance with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity, nor that continuing to allow commercial fishing in BISC is possible absent a special regulation. Recreational (per person) harvest (*e.g.,* bag limits), numbers of commercial fishers, and fishing-related habitat impacts (those caused directly or indirectly by fishing activities) would be maintained at or below current levels. Additional Park-specific regulations and management actions (see below) would be promulgated (1) to maintain current levels only if park fisheries resources or recreational fishing experience decline, or if fishing-related habitat impacts increase; or (2) to allow continued commercial fishing throughout the park. Law enforcement staffing and enforcement strategies, as well as education and coordination efforts, would not change from current levels.

2.3.1. Populations of fishery-targeted fish and invertebrates – As in Alternative 1, BISC would continue to take steps to collect and utilize the best available data to assess the historical status and monitor the current status of fishery-targeted populations. Data utilized would include, but not be limited to, data generated in visual and creel surveys. NPS / BISC would work with the FWC and SAFMC to attempt to make regulations as consistent as possible across jurisdictional boundaries.

Under this alternative, the abundances and size distributions of fishery-targeted fish and invertebrate populations would be maintained at or above current levels. Park fisheries resources would not likely differ in abundance or average size from those outside the park unless populations decline or increase in areas adjacent to the park. Park-specific management actions would be enacted only if analyses indicated that populations or mean sizes in the park declined below current levels (*e.g.,* through comparison of visual census data).

If abundances and/or size distributions declined, a range of management actions would be considered to reduce harvest and return populations to their current condition. Such actions could include, but would not be limited to: moderate increases in minimum harvest sizes, decreases in bag limits, limiting the number of commercial fishermen, reductions in bycatch beyond those described below, and/or seasonal or spatial closures (including species-specific spawning closures). There would be opportunity for public input and review in determining appropriate management actions. The extent and type of additional regulations would depend on the species and the extent of the decline observed. Upon return to current levels, regulations would be examined and potentially relaxed.

2.3.2. Recreational fishing activity – BISC would perform the same efforts listed in Alternative 1. Additionally:

- Visitor experience (of which recreational fishing experience is a part) is a fundamental component of the National Park Service mission. Thus, BISC would

continue to monitor (via creel surveys) levels of satisfaction with recreational fishing experience. Currently, > 90% of recreational fishers report being satisfied with their experience following fishing outings in BISC (BISC unpublished data). If the level of satisfaction decreased below 80% for any six-month period[12] (indicative of a sustained trend), BISC would make further efforts to identify characteristics of a fishing outing most important to providing a satisfying experience (*i.e.*, through interviews and surveys), and make subsequent efforts to provide those characteristics (staff- and funding-dependent). For example, if a growing percentage of flats fishers reported they were not satisfied with their fishing experience because the flats they were fishing were commonly disturbed by passing motorboats, then BISC would consider methods to decrease such disturbances, including establishment of non-combustion engine use zones (as currently under consideration in BISC's General Management Plan).

2.3.3. Commercial fishing activity – BISC would perform the same efforts listed in Alternative 1. Additionally:

- For any continued commercial fishing in BISC, NPS will codify these requirements through a special regulation. To the extent that this affects the areas of BISC donated by the State of Florida after June 28, 1980, this regulation would also have to be consistent with state regulations.
- New fisheries would not be allowed to develop within the park. The park would continue to allow existing commercial fishing within its borders (based upon data from the FWC[13], the National Marine Fisheries Service, and other available data). The commercial fisheries that are, and would continue to be, permitted within the park are: bait shrimp roller-frame trawl fisheries, blue crab and stone crab pot fisheries, spiny lobster pot and dive fisheries, the ballyhoo lampara net fishery, and pelagic and benthic hook-and-line fisheries (with the exception of multiple-hook "long lines"). All other commercial fisheries, including the "wingnet" shrimp fishery and fisheries that may develop in the future would be prohibited within the park upon implementation of the FMP. Additional restrictions could be placed upon permitted commercial fishing activities if data indicated that fisheries resources are declining.
- Future growth in the number of commercial fishermen would be prevented. All commercial fishers would be required to obtain a limited-entry, Special Use Permit from the park Superintendent. The permit would be issued to the individual owner and would name the individuals authorized to engage in commercial fishing activity from the owner's vessel(s). The permit would be transferable and would require annual renewal for each year in which landings are reported. A deadline for obtaining the permit would be set and communicated to the public via mailings and mass media. To be eligible for the permit, commercial fishers must have reported landings within the last 3 years prior to the year of permit establishment in zones 744.4, 744.5 or 744.8. Eligibility would also require commercial fishers to have met a minimum

[12] Calculations will be made monthly for the preceding six-month period.
[13] FWC data are not available prior to 1983

landings qualifier[14] for one or more of those years. An appeals process would be established for those not meeting the permit criteria, but for whom circumstances may dictate inclusion in the permitted group. Non-permitted commercial fishers would be prohibited.

- As a condition of the permit, shrimp trawlers would be subject to inspection by park staff to ensure that trawl gear is in compliance with FWC regulations (*e.g.,* in regard to horizontal beam length and finger bar spacing). Up to two failed inspections would result in warnings to the permit-holder; a third failed inspection would result in termination of the permit-holder's permit.
- BISC would seek to establish an annual permit system for commercial guides operating in the park.

2.3.4. Habitat Conditions - BISC would perform the same efforts listed in Alternative 1. Management actions to reduce the level and impact of debris associated with recreational and commercial fisheries would be considered if an increase above current levels was observed. Such actions could include increased removal efforts by Park staff and partner groups, increased education efforts, or spatial closures. Additionally:

- BISC would explore the feasibility and effectiveness of establishing a regulation to restrict traps from hardbottom habitat (staff- and funding-dependent).

2.3.5. Law Enforcement, Education and Coordination - BISC would perform the same efforts listed in Alternative 1.

[14] The minimum landings qualifier would be calculated by the FWC, consistent with their methodology in calculating minimum qualifiers for FWC-issued commercial permits (e.g., the blue crab commercial permit).

2.4. Alternative 3 – Improve over current levels

Under Alternative 3, a moderate change from current management strategies would occur, in order to seek a balance between user activities and conservation and management of fishery resources. Improvement from the current condition of park fisheries resources would be sought through decreases in recreational harvest and limits on spearfishing. However, the NPS does not believe that the improvement in fisheries resources that would be achieved by this Alternative would be in compliance with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity, nor that continuing to allow commercial fishing in BISC is possible absent a special regulation. Numbers of commercial fishers would remain at current levels or decrease over time, and fishing-related habitat impacts would be reduced. This alternative would require implementation of new regulations governing fishing activities, including commercial fishing, within the park that would be accomplished through further public input.

2.4.1. Populations of fishery-targeted fish and invertebrates - BISC would perform the same efforts listed in Alternative 2. Additionally:

- Management actions would be enacted (in conjunction with the FWC) to increase the abundance and average size of fishery-targeted fish and invertebrates within the park by at least 10%[15] over current conditions and over conditions in similar habitat outside the park. Initially, these efforts would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit. Analyses to determine whether the 10% increase is reached in the future would utilize the best available data, likely including, but not limited to, data generated from visual census and creel surveys. If the desired 10% improvement was not achieved by initial regulatory changes, BISC would work with the FWC to further adjust the regulations until the best available data suggest that a 10% improvement has been reached.

To achieve the desired increases in fish and invertebrate abundances and sizes under this alternative, a range of management actions would be considered by the park and FWC staff, and new regulations proposed to the FWC for consideration and public comment. Possible actions could include, but would not be limited to: moderate increases in minimum harvest sizes, decreases in bag limits, limiting the number of commercial fishermen, and seasonal or spatial closures (including species-specific spawning closures or marine reserve areas which would be closed to all fishing activities).

[15] Both the 10% improvement target in Alternative 3, and the 20% improvement target in Alternative 4 were chosen because they were determined to be (1) logical recovery goals deemed obtainable using fishery-management approaches (e.g., changes in bag limits and size limits, and the establishment of seasonal or spatial closures), and (2) discernible from a statistical standpoint. The variability associated with abundance and size measurements for fish populations would likely inhibit the discernment of differences of steps less than 10% difference (e.g., a 10% change could likely be discerned from current levels, while a smaller-magnitude 5% change would be difficult to discern. Similarly, a 20% change could likely be discerned from a 10% change).

2.4.2. Recreational Fishing Activity – BISC would perform the same efforts listed in Alternative 2. Additionally:

- Spearfishing would be limited to gear lacking a trigger mechanism (*e.g.*, the Hawaiian sling model). The use of air-providing equipment (*e.g.*, scuba or hookah) while spearfishing would be prohibited. These actions would be taken for several reasons. First, the park's creel data reveal that when compared to their hook and line counterparts, spearfishers in the park are more than twice as likely to take at least one undersized fish per trip, likely due to failure to correct for underwater magnification. Second, the park's current regulations are less restrictive than in surrounding waters. Spearfishing is prohibited in neighboring John Pennekamp Coral Reef State Park, in the upper Keys of neighboring Monroe County, in additional sections of the neighboring Florida Keys National Marine Sanctuary, and in nearby Everglades National Park, yet permitted in BISC, which is a national park. These less restrictive regulations result in increased spearfishing pressure in the park, which the regulatory changes under this alternative would seek to ameliorate. Other, more minor concerns are associated with spearfisher-associated reef and cultural resource damage, and potential behavioral effects on fishes that are targeted by spearfishers. Each of these negative impacts would seek to be decreased in intensity with the proposed actions listed above.
- The two-day recreational lobster sport season would be eliminated in the park, as described in Section 2.4.4. (Habitat Conditions) below.

2.4.3. Commercial fishing

BISC would perform the same efforts listed in Alternative 2. Additionally:

- The limited-entry, Special Use Permit in this alternative differs from that described in Alternative 2 in that the permit would be non-transferable for the first five years. Permits would require annual renewal, and would be "use or lose", such that a permit could not be renewed if (1) it was not renewed the previous year, or (2) no catch was reported in the previous year. Thus, the numbers of commercial fishers would likely decrease over time, but the opportunity for commercial fishing remains intact as long as there is interest. As in Alternative 2, as a condition of the permit, shrimp trawlers would be subject to inspection by park staff to ensure that trawl gear is in compliance with FWC regulations (*i.e.*, in regard to horizontal beam length and finger bar spacing). Up to two failed inspections would result in warnings to the permit-holder; a third failed inspection would result in termination of the permit-holder's permit.
- BISC would also work to establish a trap-free zone north and east of park headquarters at Convoy Point in which deployment of commercial or recreational crab traps would not occur. The purpose of the zone would be to provide a natural viewscape for visitors viewing the park from the park Visitor Center, as well as to avoid conflicts with other recreational activities (*e.g.*, windsurfing, canoeing and kayaking) occurring in this high visitor-use area. Beginning at park headquarters, the zone would range north to the mouth of Mowry Canal (C-103), east to the spoil islands located near the mouth of Mowry Canal, southeast to the mouth of the marked channel leading to Homestead Bayfront marina, and west along the marked channel back to park headquarters. BISC would work with the industry to seek voluntary

compliance with the trap-free zone; if unsuccessful, BISC would explore the possibility of establishing an official closure.

- Any changes to commercial fishing will be done in consultation with the State of Florida at the level required by the relevant statutes and fishery management directives (see section 1.1.3 and Appendix 2).

2.4.4. Habitat Conditions - BISC would perform the same efforts listed in Alternative 2. Additionally:

- The two-day recreational lobster sport season would be eliminated to protect coral reef habitat from diver-related damage. Seagrass and reef groundings have traditionally resulted from the increasingly high numbers of vessels in the park during the sport-season. The frequency of such resource damage would be expected to decline if lobstering efforts are dispersed throughout the regular season rather than concentrated over a highly crowded two-day sport season.
- Roller-frame trawl gear inspections would be initiated by BISC staff (under the commercial permit – see *Commercial Fishing Activity*) to ensure working gear to minimize trawl-related habitat damage.
- Coral reef protection areas (CRPAs) would be established to delineate coral reef habitat on which lobster and crab traps could not be deployed. Traps within the CRPAs could be moved outside CRPA boundaries by authorized FWC or Park staff, or other authorized personnel.

2.4.5. Law Enforcement, Education and Coordination - BISC would perform the same efforts listed in Alternative 2. Additionally, as funding becoame available, BISC would seek to:

- recruit additional law enforcement staff;
- support the following educational efforts:
    a. Place signage and materials in English/Spanish/Creole at public access ramps and fuel docks leading to BISC explaining fishing and general regulations pertaining to vessels using Park waters.
    b. Coordinate with appropriate media outlets to disseminate rules and regulations.
    c. Provide education to schools, clubs, vendors, etc.
    d. Establish community outreach programs focused on area youth;
- coordinate efforts with Everglades National Park and Florida Keys National Marine Sanctuary;
- develop an educational video on rules and regulations pertaining to fishing, boating and habitat protection within the park.

2.5. Alternative 4 (Preferred Alternative) - Rebuild and conserve park fisheries resources

Under Alternative 4, a considerable change from current management strategies would occur to focus on rebuilding and conserving park fisheries resources. By significantly improving the condition of fisheries resources, actions undertaken for this alternative would comply with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity. Substantial improvement in the status of park fisheries resources and a further decline in fishing-related habitat impacts would be sought. Numbers of commercial fishers would decrease over time via establishment of a non-transferable permit system. This alternative would require considerable changes to current fishing regulations within the park, including a special regulation to allow continued commercial fishing in BISC.

2.5.1. Populations of fishery-targeted fish and invertebrates - Management actions would be enacted (in conjunction with the FWC) to increase the abundance and average size of targeted fish and invertebrate species within the park by at least 20% over current conditions and over conditions in similar habitat outside the park. As in Alternative 3, these efforts initially would be focused on frequently harvested species such as grouper, snapper, and hogfish, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit. Analyses to determine whether the 20% increase is reached in the future would utilize the best available data, likely including, but not limited to, data generated from visual census and creel surveys. If the desired 20% improvement is not achieved by initial regulatory changes, BISC will work with the FWC to further adjust the regulations until the best available data suggest that a 20% improvement has been reached.

To achieve the desired increases in fish abundance and size under this alternative, a range of management actions would be considered by the park and FWC, and new regulations proposed to the FWC for consideration and public comment. Possible actions could include, but would not be limited to: considerable increases in minimum harvest sizes (meaning that very few fish will be legally harvestable for several years until resources improve), designation of slot limits, substantial decreases in bag limits, limiting the number of commercial fishermen, and seasonal or spatial closures (including species-specific spawning closures or marine reserve areas which would be closed to all fishing activities).

2.5.2. Recreational Fishing Activity – BISC would perform the same efforts listed in Alternative 3.

2.5.3. Commercial fishing – BISC would perform the same efforts listed in Alternative 3. Additionally:

- The required limited-entry, Special Use permit would be permanently non-transferable. Permits would require annual renewal, and would be "use or lose", such that a permit could not be renewed if (1) it was not renewed the previous year, or (2)

no catch was reported in the previous year. The number of permitted fishers would thus decrease over time, eventually leading to no commercial fishing in BISC.

- A no-trawl zone within the Bay would be proposed for consideration by the FWC. Commercial shrimp trawling would be prohibited in this zone, which would provide protection to targeted shrimp as well as to juvenile fish and invertebrates commonly caught as bycatch in trawls. The no-trawl zone would also serve to protect essential fish habitat. The cooperating agencies would work together to determine the details about this zone. Prior to any possible creation of a no-trawl zone, public comments would be solicited during the FWC's rulemaking process and the FWC Commissioners would need to review and approve the details of the proposed zone.

2.5.4. Habitat Conditions - BISC would perform the same efforts listed in Alternative 3. Additionally:

- With respect to Coral Reef Protection Area (CRPA's) no-trap areas, under Alternative 4 the trap identification number from traps observed within CRPAs would be recorded; traps with three or more recorded violations could be seized from Park waters.

2.5.5. Law Enforcement, Education and Coordination - BISC would perform the same efforts listed in Alternative 3.

2.6 Alternative 5 – Restore park fisheries resources

Under Alternative 5, a considerable change from current management strategies would occur. Substantial improvement in status of parks fisheries resources to conditions more representative of pre-exploitation levels and a further decline in fishing-related habitat impacts would be sought. Actions undertaken for this alternative would comply with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity. Numbers of commercial fishers would decrease over time via establishment of a non-transferable permit system. Of all alternatives presented, this alternative would require the most significant changes to current fishing regulations within the park, including a special regulation to allow continued commercial fishing in BISC.

2.6.1. Populations of fishery-targeted fish and invertebrates - Management actions would be enacted (in conjunction with the FWC) to increase the abundances and average sizes of the park's harvested fish species to within 20% of their historic, unexploited values (based on past data and fisheries models estimates of fishery-harvested species occurring within the park and similar habitat outside the park). As in Alternatives 3 and 4, these efforts initially would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted, but increasingly harvested, species such as grunts and barracuda. Analyses to determine whether a restoration of fishery-harvested species to within 20% of the estimated historical values has been achieved would utilize the best available data for each species, likely including, but not limited to, data generated from visual census and creel surveys.

To achieve the desired increases in fish abundance and size under this alternative, a range of management actions would be considered by the park and FWC, and new regulations proposed to the FWC for consideration and public comment. Possible actions could include, but would not be limited to considerable increases in minimum harvest sizes (meaning that very few fish will be legally harvestable for several years until resources improve), designation of slot limits, substantial decreases in bag limits, limiting the number of commercial fishermen (*i.e.*, through limited entry and lottery system), seasonal or spatial closures (including species-specific spawning closures or marine reserve areas which would be closed to all fishing activities), prohibition of extractive fishing (*i.e.*, only allow catch-and-release fishing), and a temporary moratorium, probably lasting several years, on all fishing activity within the park to allow park fisheries resources to recover.

2.6.2. Recreational Fishing Activity – BISC would perform the same efforts listed in Alternative 4. Additionally:

- All spearfishing would be prohibited within Park boundaries. This action would address the concerns associated with spearfishing as outlined in Alternative 3 and would be consistent with management and conservation policies in other regional marine areas (*e.g.*, Everglades National Park and all parks under the jurisdiction of

the Florida Division of Recreation and Parks, including John Pennekamp Coral Reef State Park, which is adjacent to Biscayne National Park).

2.6.3. Commercial fishing – BISC would perform the same efforts listed in Alternative 4.

2.6.4. Habitat Conditions - BISC would perform the same efforts listed in Alternative 4.

2.6.5. Law Enforcement, Education and Coordination - BISC would perform the same efforts listed in Alternative 4.

2.7. Environmentally preferred alternative

The environmentally preferred alternative is determined by applying criteria identified in Section 101 of the National Environmental Policy Act (NEPA) to each alternative considered. The environmentally preferred alternative causes the least damage to the biological and physical environment and best protects, preserves, and enhances historic, cultural, and natural resources. Based on the analysis below, Alternative 5 (Restore Park Fisheries Resources) is determined to be the environmentally preferred alternative, based on its furtherance of the following national environmental policy goals:

2.7.1. NEPA Section 101 Requirement 1. "Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations."
The no-action alternative (Alternative 1 – Maintain Status Quo) would likely result in further degradation of park fishery resources. Each of the action alternatives would result in management strategies and actions that would function to preserve park resources for succeeding generations. Because Alternative 5 (Restore Park Fisheries Resources) is the most restrictive of activities that have the potential to negatively affect park resources, it would best fulfill the responsibilities of each generation as trustees of the environment for succeeding generations.

2.7.2. NEPA Section 101 Requirement 2. "Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings."
Two issues addressed in the alternatives which affect the factors in this requirement are fishing-related habitat debris, which affects aesthetics, and the presence of a healthy, intact ecosystem with a full complement of its inherent benthic and motile taxa, which affects aesthetic, productivity, and cultural values. From a habitat debris standpoint, Alternatives 2-5 are roughly equal in meeting this requirement, as all would result in increased efforts to reduce habitat debris if levels of debris increased over current levels. In terms of providing an intact ecosystem, Alternative 5 would do the most to restore a healthy ecosystem in BISC.

2.7.3 NEPA Section 101 Requirement 3. "Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences."
For the fishery management plan, “uses of the environment” corresponds to the harvest or catch and release of fish and invertebrates from park waters, as well as the recreational fishing experience. Alternative 1 (Maintain Status Quo) is least restrictive on recreational and commercial fishing activities, and thus allows for the widest range of beneficial uses of the environment (from a visitor experience and use standpoint). However, data suggest that historical and current levels of recreational and fishing pressure, combined with habitat and water quality impacts, have negatively affected the fishery resources in the park. Thus, Alternative 1 does not satisfy the portion of Requirement 3 that states “without degradation, risk to health or safety, or other undesirable and unintended consequences.” Likewise, since Alternative 2 (Maintain At or Above Current levels) allows for current levels of fishery harvest, it does not meet the “without degradation…” requirement. Alternative 3 (Improve Over Current levels) would result in moderate restrictions on fishing activity, thus still allowing considerable beneficial use of the

environment, while likely satisfying the “without degradation” requirement. Alternative 4 (Rebuild and Conserve Park Fisheries Resources) would result in considerable restrictions on fishing activity in the park, while providing increased environmental protection. Alternative 4 provides both increased environmental protection and beneficial use of park resources. Alternative 5 (Restore Park Fisheries Resources) would result in the most severe restrictions on fishing activity in the park, while providing the highest environmental protection of the alternatives. Thus, Alternative 5 would provide for the widest range of beneficial uses of the environment (including non-extractive activities) while best minimizing degradation, risk of health or safety, or any other undesirable and unintended consequences.

2.7.4. NEPA Section 101 Requirement 4. "Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice."
Alternative 5 (Restore Park Fisheries Resources) would best preserve the natural aspects of BISC’s marine environment through management of marine debris (identical in Alternatives 2-5, less the potential removal of lobster or crab traps from coral reef protected areas (CRPAs) in Alternatives 4 and 5) and by resulting, through fishery restrictions, in the most unimpacted marine environment of all the alternatives. None of the alternatives would directly affect historic or cultural resources, although regulations that might be recommended to implement Alternative 5 might reduce overall fishing activity and, therefore, any potential interaction with and destruction of the park’s historic and cultural resources.

2.7.5. NEPA Section 101 Requirement 5. "Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities."
In Alternatives 1 and 2, management actions are deemed insufficient to mitigate increasing fishing pressure (resulting from increased population) that is expected to occur over time, ultimately resulting in diminished resource use and a marine ecosystem that is further impacted relative to current conditions. Alternatives 3 and 4 would both result in management actions that would begin to mitigate increasing fishing pressure and improve existing conditions. Alternative 5 makes the most considerable steps to mitigate fishing pressure and return the park’s fishery resources to unexploited levels. Since Alternative 5 goes the farthest in protecting fishery resources, it would best achieve a balance between population and resource.

2.7.6. NEPA Section 101 Requirement 6. "Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."
None of the alternatives address recycling of depletable resources. Since fishery populations are considered a renewable resource, and since Alternative 5 goes farthest in protecting fishery resources, Alternative 5 most fully satisfies Requirement 6.

2.7.7. Conclusion. In conclusion, upon full consideration of the elements of Section 101 of NEPA, Alternative 5 (Restore Park Fisheries Resources) represents the environmentally preferable alternative for the BISC Fishery Management Plan.

3. Affected Environment

This chapter contains a description of the existing physical, biological, cultural, social, and economic characteristics and resources in Biscayne National Park. The description of these resources serves as the baseline for analyzing and determining the effects of the various alternatives on resources. These resource descriptions are discussed only in as much detail as needed to analyze the effects of plan implementation. The affected environment is described according to the various Park resources.

3.1. Targeted (fished) fish species

More than 100 species of fish are targeted by commercial or recreational fisheries in BISC waters (BISC unpub. data). The most heavily targeted reef species include members of the snapper, grouper and grunt families (commonly referred to as the snapper-grouper complex), including red grouper, black grouper, mutton snapper, mangrove snapper, white grunts and bluestriped grunts. This group includes federal Species of Special Concern goliath grouper (*Epinephelus itajara*), Nassau grouper (*Epinephelus striatus*), and speckled hind (*Epinephelus drummondhayi*). Preliminary analyses indicate that many of these species are overfished according to definitions set forth in the federal Magnuson-Stephens Fishery Conservation and Management Act (Fig. 4). These analyses are undergoing verification. Size-frequency distributions have been truncated as large fish have been selectively removed from the fishery. Additional information highlighting the need for concern regarding fishery resources in BISC is presented in *Section 1.1.6 - Effect on Fishery Resources and Initiation of Fishery Management Plan*. The non-native Indo-Pacific lionfish (*Pterois volitans* and *Pterois miles*) are, to a much lesser extent, also harvested by visitors fishing in the park. Since these lionfish are invasive and have a high likelihood of adversely affecting native fisheries resources, potential impacts to this species from any actions under any of the alternatives are not considered.

3.2. Targeted (fished) invertebrate species

BISC waters provide habitat for several species of invertebrates that are harvested commercially and recreationally. These invertebrates are:

- spiny lobster (*Panulirus argus*), which are harvested commercially by traps and by divers, as well as recreationally by divers
- spotted spiny lobster (*Panulirus guttatus*) and slipper lobster (*Scyllarides nodifer*), which are harvested in low numbers, predominantly by recreational divers
- blue crabs (*Callinectes sapidus*), which are harvested commercially and recreationally with traps
- stone crabs (*Menippe mercenaria*), which are harvested commercially with traps and recreationally (in low numbers) by divers
- shrimp (including brown (*Penaeus aztecus*), pink (*Farfantepenaeus duorarum*), and pinkspotted shrimp (*Farfantepenaeus braziliensis*)), which are harvested by roller-frame trawl.

The invertebrate organisms targeted by fisheries in BISC mature and become legally harvestable with one to three years, depending on species. Annual recruitment (the

addition of offspring from the adult population) for such invertebrates is typically governed by a combination of physical and biological factors affecting larval survival and biological factors (predation and competition) affecting juvenile survival. Commercial and recreational catch has remained relatively constant over the past decade, although landings of lobster and finfish appear to be on a declining trend (Fig. 5A). Intensive creel surveys completed during the popular two-day lobster mini-season event indicate that the number of participants, total number of harvested lobsters, and individual fishing success (defined as the number of lobsters per person per trip) during this event are each variable but stable (Figs 5B and 5C).

3.3. Non-targeted (non-fished) fish and invertebrates

All marine habitat types in BISC (*e.g.*, coral reefs, mangrove edges, seagrasses, mud/sand flats, hardbottom, and the pelagic environment) are utilized by fish and/or lobster, crab and shrimp species. A minimum of 325 species of fish and macro invertebrates occur in BISC waters (Ault et al. 2001). Many species utilize multiple habitats. For example, reef-associated species may utilize reef habitat for shelter and seagrass habitat for feeding grounds. On a longer time scale, fish and invertebrates may sequentially utilize multiple habitats during their progression from birth to juvenile to adult stages. For example, some species of snappers and grunts live in seagrass habitat as early juveniles, migrate to mangrove habitat as later juveniles or early adults, and shift to offshore, coral reef habitat as adults. Many species of fish and crustaceans have larval periods that spend weeks to months in the pelagic environment before settling to bottom habitat. Thus, the existence of fishes and crustaceans is intricately and complexly linked to physical habitat in BISC waters. Additionally, many fish and invertebrate species that utilize habitat in BISC for portions of their life cycle undergo movements, migrations, and ontogenetic habitat shifts that result in their spending significant portions of their life outside the boundaries of BISC. The movement of these motile species has implications for the effectiveness of various fishery management approaches in BISC and at a larger, regional scale.

3.4. Recreational Fishing Experience

At least 30% of visitors to BISC fish recreationally during their visit (Simmons and Littlejohn 2002). Thus, the quality of recreational fishing experience is of considerable importance to managers at BISC. Information collected during public scoping for the FMP indicates that the two most important factors governing whether recreational fishers have a “successful” fishing experience are the size and type of species caught. In essence, fishers want to catch the fish they are targeting, and want to catch large fish. Deemed less important were number of fish caught and number of fishers encountered while fishing. Based on information collected during creel surveys beginning in 2003, approximately 95% of recreational fishers contacted at the conclusion of their fishing outing in BISC report being satisfied with their fishing experience (BISC, unpub. data). Many fishers who indicate they are satisfied with their fishing experience do not catch (1) the species they are targeting, (2) “large” fish, or at times (3) any fish, indicating the potential lack of correlation between a “successful” trip and satisfaction with that trip. Additionally, many fishermen appreciate the ‘family bonding’ aspect of fishing, which allows several generations of family members to participate in fishing activities together

(*e.g.*, grandparents, parents and children fishing together). For this reason, many of today's recreational fishers recognize the importance of ensuring that their grandchildren will be able to experience high-quality fishing experiences with their own children and grandchildren. More stringent fishing regulations instituted in the present will offer the benefit of sustainable fisheries resources for future generations.

3.5. Visitor Use and Experience

BISC is open to the public year-round. Annual visitation for the last five years (2008-2012) averages over 500,000 people (NPS 2013), although this number is almost surely an underestimate (see below). Annual boat launch estimates from four nearby county facilities total 62,000 (Table 5). The data in Table 5 underestimate the true usage of BISC waters and do not reflect boating use originating from other access points to the coastal waters north of Crandon Park and in the keys to the south. Boating is an important recreational activity for many south Florida and Miami-area residents; boater registrations within Dade County alone totaled 60,572 in 2012 (Florida Department of Highway Safety and Motor Vehicles 2013).

Most users are day-use visitors who pursue a variety of activities in dispersed locations. Due to the nature of the park and its resources, most visitors experience the park by boat. Common activities pursued within the park include fishing, snorkeling, scuba diving, water skiing, windsurfing, boating, camping, and overnight stays in private boats. Recreational fishing experience is summarized in a separate section (above). The quality of snorkeling and scuba diving experience is dependent on a number of factors, including weather, water temperature, coral reef community health (discussed in section 3.8.1), and the fish and invertebrate community present.

3.6. Commercial Use of the Park

As discussed in the Introduction and Background section of Chapter 1, the park is utilized by commercial fishers targeting bait shrimp, blue crabs, stone crabs, spiny lobsters, reef fish (primarily yellowtail snapper), and baitfish (primarily ballyhoo). Commercial fishing in the park is governed by regulations established by the FWC. Commercial trips and landings are recorded by a trip ticket program managed by the state of Florida, in which businesses buying catch from commercial fishers are required to collect information on where landings occurred and how much was caught. Prior to 2003, the reporting zone that encompassed BISC (zone 744) also encompassed a large zone of water to the north of BISC, so that it was impossible to determine whether landings in zone 744 occurred in BISC or in non-BISC waters in zone 744. In 2003, the FWC altered the reporting zones to include two zones specific to BISC: one for harvest from the bay portion of BISC (744.4), and one for harvest from the oceanside portion of BISC (744.5). In 2003, 111 permitted commercial operations reported catches from within BISC; in 2012, this number decreased~25% to 84. Since the 2003 reporting, commercial fishing effort (as number of trips) has shown increasing trends for the finfish and blue crab fisheries and decreasing trends for the stone crab, spiny lobster, and bait shrimp fisheries (Fig. 6). Over the time period from 2003-2012, commercial landings have shown, with some year-to-year variability, increasing trends for finfish, blue crab and bait shrimp fisheries and decreasing trends for stone crabs and spiny lobster fisheries (Fig. 6).

The park has a contract with a single concessionaire to operate snorkel, scuba and glass-bottom boat trips to patch reefs and the reef tract (oceanside), and to several sites in the bay.

3.7. Socioeconomics

This section provides an overview of the socioeconomic component of commercial, recreational, and subsistence fishing in BISC. This section is condensed from a full socioeconomic analysis performed for the park (EDAW 2005). The full analysis is not included because of its length. A copy of the final report of the analysis can be obtained via the PEPC website (http://parkplanning.nps.gov).

In this section, the economic interaction of park uses with the surrounding area, primarily Biscayne Bay and surrounding offshore waters, but also the larger economy of Miami-Dade County, is examined. In addition to a general socioeconomic characterization, detailed information on fisheries activity within BISC is presented, along with information on the role of that fishery activity in the larger socioeconomic context.

BISC is partially located within Biscayne Bay and extends into offshore waters east of the keys. Given the nature of the recreational and commercial activities occurring within the park, bay, and offshore area, it was determined that the vast majority of direct economic and social ramifications of these activities are felt within the Miami-Dade County economy. Therefore, for the purpose of this analysis, the socioeconomic study area is defined as Miami-Dade County (see EDAW 2005 for further discussion and justification).

Miami-Dade County has significant populations of many ethnic and minority groups, largely as a result of immigration trends over the last half century. While many groups are represented, the largest, by far, is Hispanic. Miami-Dade County has the highest percentage (57% in 2000) of Hispanic population of any large county in the nation.

Results of the 2000 U.S. Bureau of the Census indicate that the percentage of retirement-age adults is decreasing in Miami-Dade County (13.3% compared to 13.9% in 1990). Conversely, the proportion of the population under 18 years is rising (27.5% up from 24.1% in 1990). There has also been a consequential drop in the median age, countywide. In 2000, Florida as a whole had a higher proportion of retirement-age adults (17.6%), lower under-18 population (24.8%), and higher median age (38.7 years) than Miami-Dade County.

The above statistics, when coupled with other demographic data, depict dynamic changes in Miami-Dade County. Miami-Dade County has the lowest median age among the surrounding counties and is lower than the state. This demographic change has been acutely felt within many of the coastal retirement communities of south Florida, with the median age dropping and the number of resident families with children sharply rising over the previous decade.

As of 2001, slightly less than 1.1 million people made up Miami-Dade County's labor force, having increased 13.5% from 1990. Historically, employment within Miami-Dade County has been dominated by a number of major economic sectors including construction, agriculture, tourism, and trade. Over time, the regional economy has become more service oriented, with an increasing share of employment in service-producing industries and a decreasing share of employment in goods-producing industries.

Miami-Dade County had an average per capita income of $18,497, 14.2% below the Florida average of $21,557 and 14.3% below the national average. In comparison, as of 1990, the average per capita income within Miami-Dade County was approximately 6.8% below that of Florida (which in turn was only marginally above the national average of $14,420) and 5.0% below the national average. In 2000, the per capita income within Miami-Dade County ranked in the top third of all Florida counties. This figure showed little change from 1990, when the county ranked 21st out of the 66 counties in the state. In 2000, the median household income in Miami-Dade County was $35,966, which was 7.3% below Florida's median household income of $38,819. Unemployment levels within Miami-Dade County, while to an extent mirroring the general decline in state and national unemployment levels during the last decade, have continuously ranked above both the state and national averages.

Marine Recreation and the Local Economy

The various economic activities associated with boating and recreational fishing in Miami-Dade County generate considerable contributions to the local economy. While revenue data are available for retail categories specific to boating and fishing activities, such as motorboat and yacht dealers, individuals engaged in recreational fishing and boating purchase a wide variety of gear and supplies. Expenditures can include fishing tackle, bait, clothing, food and beverage supplies, and diving equipment. While these expenditures are made by both resident and non-resident anglers and boaters, the latter group contributes additional economic impact to the economy by bringing "new" money into the county.

Recreational Expenditures

Typical expenditures made by visitors related to recreational fishing and boating activities while visiting coral reefs in Miami-Dade County include such categories as boat fuel, tackle, bait, food and beverages (restaurants and stores), ice, and general shopping. Retail sales based on the aforementioned categories accounted for, on average, 54% of total daily fishing expenditures ($94.91), and 51% ($54.77) of total daily diving expenditures. Total visitor reef-related expenditures amounted to $572 million over a 12-month period, illustrating the overall significance to the economy of retail sales to boating and fishing activities within the county.

Biscayne Bay is considered one of the premier recreation areas of the world, but it also generates a great deal of local economic activity as well. Marine recreation in its many forms is an integral part of the lives of many of the county's residents. Registered pleasure vessels within the county, as of 2002, numbered 54,991, equating to one boat for

every 32 residents (Florida Department of Highway Safety and Motor Vehicles; unpub. data).

As outlined above, the marine recreation industry is of high commercial importance to the local economy. In the case of fishing, the primary economic attribute is "fishing," not fish. Fishing is a recreational experience, and as such the person recreating is willing to pay for many other components or attributes that enhance the recreational experience. Across the county there are many businesses that either directly facilitate or indirectly support the different elements of the marine recreational experience. Marine recreation within the county supports manufacturers, suppliers, and service industries. For example, boat sales and service centers, charter/party operations, marinas, dive-shops, bait/tackle sales are all primary beneficiaries of visitor and resident recreation expenditures. However, secondary expenditure on related support services including restaurants, hotels, food and beverage sales, apparel and general merchandise is also of significant economic value to a wider array of local businesses. The total economic output of the recreational saltwater fishing industry is substantial and supports an extensive number of full and part-time jobs. On a wider economic level, visitor-based recreational expenditure is an "export" industry made more potent given the increased economic value of the "new" money entering the economy. This increased economic value is directly related to the number of times a dollar originally spent by a fishing tourist gets "re-spent" before leaving the county (with the number of times re-spent termed a "multiplier" by economists).

Commercial Boating

For the purposes of this study, commercial boating includes businesses such as party boat operations that charter vessels or rent watercraft. A party boat is defined as a passenger vessel that books clients individually; whereas, a charter boat is defined as a passenger vessel that can be "hired" by a group of persons for exclusive use. These businesses are mostly contracted to transport parties for recreational fishing, snorkeling, or sightseeing activities. There is also a dive boat tour service that operates under a licensed concessionaire agreement that has exclusive rights to diving trips within the park.

On average, visitor boaters spent $75 per person per day on charter boats and $30 per person per day on party boats while visiting the county's reefs to dive, fish, etc. Over a 12-month period during 2000 - 2001, contributions to the county economy of $40.8 million and $343,000 were directly attributable to expenditures for charter/party boat fees and glass-bottom boat operators, respectively. Visitors who used the reefs in Miami-Dade County had a total expenditure of $572 million during that 12-month period.

Another commercial boating use within the bay is represented by several towboat companies that operate within the park. Some are associated with national organizations like SeaTow and Boats/US (EDAW 2003). In addition, the Intracoastal Waterway, a commercial shipping channel, traverses the bay and the park.

The commercial boating component of the county's marine industry is considered a relatively minor but important element given the amount of additional revenue that is consequently generated by the anglers and divers chartering the vessels.

Contributions of BISC to the Local Economy
There are several ways in which the recreational/visitation uses of BISC contribute to the economy of the county: park-related employment and expenditure, commercial activities occurring within park boundaries, and recreational visitation (land and water based).

During 2002, expenditure and employment by the park included approximately $365,000 in costs and marginally over $3 million in wages. The park currently has 48 full-time employees, of which 19 are from the local/surrounding communities. This is a positive attribute, but one of minimal importance to the regional economy.

Land-based recreational visitation within the park occurs mostly via the Visitor Center located at Convoy Point near Homestead, Florida. Two other facilities, Homestead Bayfront Park and Marina and Black Point Marina, are commonly used to gain access to the park. Both are county facilities and have fee-based entrance systems, charge mooring fees, and have limited visitor service facilities. Expenditures by anglers, boaters, and divers entering the park from these and other facilities are discussed below in conjunction with total water-based recreational activities.

There is only minimal expenditure-oriented economic value associated with the Visitor Center. Entrance to the park is free, and many of the most popular activities conducted by visitors, including shoreline fishing, picnicking, windsurfing, and bicycling, have little or no revenue associated with them. What commercial activities there are center around the gift/snack shop and one fee-based dive/boat tour service (operating under a licensed concessionaire agreement) that conducts tours and diving/snorkeling trips. Park visitors who stay in a hotel/motel would generate additional secondary economic service-based benefits. While potentially significant to the Florida City/Homestead economies, such expenditures are of minimal importance to the regional economy.

Water-based recreational visitation includes fishing, boating, and diving within the park. Recreational fishing is among the most popular activities in the park. In 1997, an estimated 50,000 vessels used the park for a variety of activities; by 2004, that estimate had increased to 85,000. Of the 1997 total, it was estimated that almost 30,000 boats participated in fishing activities. Pleasure boating and diving are also important recreational activities within the park. The vast majority of vessels that utilize the park are local (*i.e.*, registered within Miami-Dade County).

A recent study (Johns et al. 2001) estimated expenditures for recreational fishing and diving at the many reefs within the waters of Miami-Dade County. The report concluded that direct resident fishing and diving expenditures totaled $165 million and $110 million, respectively, over the 12-month period of the study. Total, direct visitor expenditures (fishing, boating, and diving/ snorkeling) totaled $572 million over the 12-month period of the study. Using this study as a relatively recent guide to typical daily marine

recreation expenditures within the county, and hence the park, in conjunction with the 1997 boat traffic estimates, it is evident that direct marine recreational expenditure within the park is substantial.

Given the size, nature, and uses of the park, it is intrinsically difficult to accurately place value on all of the recreational resources present; however, the substantial value of marine recreation within the wider economy is evident. This is indicated specifically through the related direct and indirect economic value of expenditures pertaining to recreational fishing, boating, and diving activities to the wider county economy. Given its size and proximity, the role Biscayne Bay (as well as adjacent oceanic waters) plays in creating this value cannot be understated. It must therefore be concluded that BISC, encompassing a large, heavily utilized central portion of the bay, is also of substantial economic benefit to the wider county economy in relation to marine recreation.

Fishing in the Local Social and Economic Context

Commercial Fishing

The larger commercial fishing vessels are located primarily at Black Point Marina and Dinner Key, but fishing vessels are also located at other marinas around the bay. The smaller commercial operations within the bay consist of mainly trailered vessels that gain access from other points in or near the park including Matheson Hammock or Homestead Bayfront Marinas. Commercial fishing continues to be an important local maritime activity for some area residents but overall is declining.

The primary commercial species caught in Miami-Dade County include blue crab, stone crab, spiny lobster, pink shrimp, king mackerel, ballyhoo, and yellowtail snapper. Annual catch totals for the entire Miami-Dade County region fluctuated between 1.3 and 2.2 million pounds for the period between 1990 and 2001. Preliminary 2002 data show that slightly more than 1.2 million pounds were landed during the year and, using statewide average price data, the commercial fishery within the county is valued at approximately $2.5 million (Florida Marine Research Institute; unpub. data). Overall, there has been a continuing decrease in the number of commercially registered fishing vessels and Saltwater Products Licenses issued within Miami-Dade County.

The primary species sought within BISC by commercial fishers include finfish (snapper-grouper complex, mullet) and invertebrates (stone crab, blue crab, spiny lobster, and bait shrimp). Landings from 1990-2001 are presented in Fig. 5. In 1997, the value of the commercial fishery within Biscayne Bay was $1.5 million. Economically, the most important commercial fishery within the bay is the bait shrimp fishery.

Another aspect of commercial fishing within the bay is guided sport fishing, primarily for bonefish. In smaller boats, hired guides take one or two customers, mainly to the flats on the east or west sides of the bay. Estimates of the number of guides actively working in the park varies, with a recent study (EDAW 2003) estimating there were about 12 full-time guides and 36 part-time guides using the area, based on interview data. Full-day rates range from between $375 and $600, depending on the level of experience of the guide (EDAW 2003).

With total revenue of less than $1.6 million (preliminary 2002 data), the falling number of licensed vessels operating within the county, and the limited and partially seasonal employment levels, the commercial fishing industry within the Biscayne Bay area is of relatively limited regional economic importance.

Recreational Fishing

Recreational fishing is among the most popular activities in the park, and recreational users fish both from land-based canals within park boundaries and on boats in park waters. Recreational fishing in the park can be divided into three types: shoreline, inshore, and offshore. Important inshore fisheries exist on the flats (*i.e.*, shallow water sand and coral bottoms) and in deeper waters around coral heads and open water. The offshore fishery occurs outside the limits of the bay in deeper waters near the Gulf Stream. The species sought, fishing technology, and boats for each type of fishing are different. Shoreline fishing takes place from jetties at Convoy Point and Black Point, in the canals that flow into Biscayne Bay, and from the shorelines that are adjacent to these canals.

EDAW (2003) suggests there is a considerable concentration of anglers who use BISC canals and shoreline for recreational fishing. The visitors at the sites are ethnically diverse but do not show a concentration towards a single ethnic group (when compared with the county's demographic profile). Fishers were usually local residents.

An overview of inshore fishing within BISC is available in the park's Ethnographic Overview and Assessment (EDAW 2003) and is summarized in this section. There are guided and unguided inshore fishermen. The unguided fishermen fish within the bay for blue crabs, stone crabs, and a wide variety of finfish, and outside of the bay proper for lobster (as most of the bay is a lobster sanctuary). There is also a guided component of the inshore fishery that focuses on flats fishing for bonefish, tarpon, and other game fish.

EDAW (2003) also provides a brief overview of offshore recreational fishing, which has been summarized in this section. The offshore recreational fishing operations may be usefully classified into two sub-groups that vary in their use of the park, the areas they fish, and the species they target. The first subset is comprised of offshore fishing boats that often go up to 25 miles offshore. This group of vessels consists mainly of larger, diesel-powered boats in the 30- to 50-foot range. Day trips are typical for this group and these boats cruise at 12 to 20 knots and might consume 100 to 150 gallons of diesel per day. The second set of offshore boats comprises what could be considered a "nearshore offshore" fishery that takes place in the open waters outside of, but nearby, the outer keys within the park. This fishing takes place in waters from approximately 10 to 60 feet deep, with the 60-foot depth contour corresponding with the eastern edge of the park. The sea floor in the eastern half of this 4- to 5-mile offshore span is filled with thousands of patch reefs, and there is a continuous reef along the eastern boundary of the park. Recreational fishers reach these reefs primarily from boats launched from Matheson Hammock, Black Point, and Homestead Bayfront marinas, and from Key Largo. Typically, the vessels used are 17 to 30 feet in length.

The offshore sport fishing vessels include individually owned craft as well as sport charter vessels. Limited interview data suggest that perhaps 50% or more of the clients of offshore charter sport vessels are from south Florida and the rest are tourists from outside the area. Some skippers sell portions of the catch for additional income. Offshore charter captains also occasionally take out parties of divers, although the destination of the divers would have to be outside of BISC due to terms of the park concessionaire agreement.

Most offshore fishing guides are apparently long-time area residents whose primary business or employment pursuit is charter fishing. The complexities and expense of obtaining the required licenses apparently tend to discourage part-time participation, as well as the expense of maintaining an offshore fishing boat. Like the inshore fishing guides, many offshore fishing boat captains are members of the Miami Rod and Reel Club.

Subsistence Fishing
Subsistence fishing is commonly understood to refer to those fishers using simplistic equipment such as a traditional "cane-and-pole" gear, and who fish solely for food. Subsistence fishing occurs from the jetty at Convoy Point, and along the flood control canals that flow from the mainland to the bay.

3.8. Benthic Habitats and Communities

3.8.1. Coral Reef

Coral reefs are among the most diverse and biologically complex ecosystems on earth. Reefs provide economic and environmental benefits to millions of people as areas of natural beauty and recreation, sources of food, jobs, chemicals, pharmaceuticals and shoreline protection. Now under threat from multiple stresses, coral reefs are deteriorating worldwide at alarming rates, driven by interactive effects of coral bleaching, disease, and a variety of human activities including shoreline development, water pollution, boat groundings, overharvesting, destructive fishing practices, and global climate change (Bellwood et al. 2004). Sustained downward trends in coral reef health suggest that these areas are in peril (United States Coral Reef Task Force 2000; Bellwood 2004, Pandolfi et al. 2005).

The park's eastern boundary follows the 60-ft (18.3-m) depth contour. In the park, the reef environment extends eastward from the keys to the outer edge of the coral reef tract. The salinities of the reef area are oceanic and have very little seasonal variability. Bottom substrates are a mosaic of seagrass, hard bottom, and bare bottom communities; however, coral reefs are the most prominent feature. Two types of coral reef communities are present in the reef system, inshore patch reefs and the offshore platform reef (reef tract).

The patch reefs are comprised of living masses of coral heads and soft corals rising directly from the bottom in water typically 10 to 20 feet deep. These reefs may rise to within two to three feet of the water surface, and range in size from individual coral

heads to masses in excess of 150 feet across. The bottom surrounding the reefs is usually flat and covered with seagrass, although there is typically a bare sand halo around the reef resulting from grazing by fish. These patch reefs provide habitat to a large variety of fish and other marine life.

The Florida reef tract is underlain by Pleistocene coralline limestone (Shinn et al. 1989). The hard bottom is part of the outer bank reef system, which is an elongated feature whose long axis is oriented parallel to the continental shelf edge (north-south). The hard bottom formations within BISC include a bank reef with seaward spur and groove features and a transitional reef (Jaap 1984) that lacks well-defined spurs and grooves. Although this reef system may have supported a fringing elkhorn coral (*Acropora palmata*) in the recent geological past, it is now a series of limestone ridges with minimal Holocene deposition (Shinn 1988). The hard bottom is composed of a substrate matrix of encrusted and lithified limestone-secreting organisms, primarily corals, algae, and bryozoans, that has developed on pre-existing bedrock facies. The bank reef topography is quite variable within the reef matrix as a result of disproportional erosional processes occurring over a geological time scale (1.6 million years).

Coral reefs support an abundance of reef fish species. The number and abundance of reef fish species is known to be directly related to substrate and habitat complexity in the form of vertical relief and number of interstices (Luckhurst and Luckhurst 1978; Dennis and Bright 1988). Substrate and epibiotal complexity are important to reef fishes because they provide shelter from predation as well as spawning sites and foraging areas. Soft corals, hard corals, and sponges, the dominant epibiotal components of the hard bottom formations, are not the primary food source for most reef fish, but they do provide valuable habitat for numerous invertebrates that are prey for fish. As reported in the SAFMC habitat plan (SAFMC 1998), densities of octocoral colonies from patch reefs within BISC exceed densities of stony coral colonies on the same reefs. Furthermore, the fish communities associated with these octocoral-dominated reefs are very diverse (214 species), suggesting that ocotocorals are an important habitat component that provide not only refuge but a place for recruits to settle.

Within the park, the coral reefs have been negatively affected by human-related impacts associated with boating, fishing, snorkeling and diving activities. Boat groundings on patch reefs occur frequently, resulting in severe and long-term damage at the grounding site. Anchors from recreational boaters damage coral habitat. A BISC Mooring Buoy and Marker Plan, has been developed and will address grounding and anchor damage issues. Corals have been destroyed and damaged directly by recreational divers and snorkelers, and this issue is being addressed under the park's General Management Plan (GMP). The reef is littered with fishing tackle from recreational and commercial fishing. Fishing line and lines from crab and lobsters traps become entwined in the reef, resulting in damage to coral. Preliminary surveys by FWC Fish and Wildlife Research Institute (FWRI) staff indicate that the density of fishing-related marine debris is greater in BISC than in any other area surveyed throughout the Florida Keys (T. Matthews, FWRI, unpub. data).

3.8.2. The Bay

The topography of the bay is a basin, with shallow areas ranging from 0 to 2 meters depth along the mainland (western side of the bay) and the leeward island shorelines (eastern side of the bay), and deeper areas, ranging from 2 to 4 meters, in the central portion of the bay (Ault et al. 2001). The substrate within the Bay consists mostly of shell and calcium carbonate fragments (see Lewis et al. 2000). The bay is relatively enclosed body of water with limited exchange with the offshore area (Voss et al. 1969). The bay is largely affected by atmospheric conditions, and thus experiences seasonal changes in temperature and salinity. Seasonal salinity patterns in the bay highlight three broad regions with respect to magnitude and variability of salinity. The first region is located in the eastern bay adjacent to the Atlantic Ocean and is characterized by near oceanic salinities (32 – 36 parts per thousand) that vary little throughout the year. The mid-basin region shows variability based on the wet and dry season. It is characterized by somewhat lower average salinities (20 – 28 parts per thousand) during the peak wet season (July – September). The third broad area is located on the western side of the bay, which is a lower salinity region with high variability caused by the freshwater discharges from drainage canals (Ault et al. 2001).

Benthic habitats of the bay include seagrass, hard bottom, and bare (soft sediment) bottom.

Seagrass habitats typically consist of sandy or silt-clay sediments vegetated by turtle grass (*Thalassia testudium*), shoal grass (*Halodule wrightii*), and/or manatee grass (*Syringodium filiforme*). Seagrass meadows are highly productive, and serve as nursery grounds for shrimp, lobster, and many species of fish. Calcareous green algae typical of seagrass communities occur in these seagrass beds and include representatives of the genera *Halimeda*, *Penicillus*, and *Udotea*, among others.

A major threat to seagrass communities is the scarring from boat propellers (Fig. 7). South Florida's population continues to grow at a rapid pace (see Fig. 2). This increased population has resulted in increased boat registration in Miami-Dade, Broward, Monroe, Palm Beach, Lee and Collier counties, which combined are home to more than 200,000 registered vessels. In addition to the increase in registered vessels, the average size and horsepower of the vessels has increased. The increasing numbers and size of vessels has resulted in increased damage to seagrass communities. Sargent et al. (1995) reports that approximately 11,200 acres of seagrasses in Miami-Dade County show light, moderate or severe scarring by boat propellers.

The hard bottom is characterized by a foundation of oolitic limestone covered by a thin sediment layer populated with a variety of soft corals and sponge species, which provide habitat for fish and various kinds of invertebrates, including lobster, shrimp, crabs, worms, brittle stars, and sea urchins (Milano 1983). Hard bottom habitat is one of the most common habitat classes found within the park (Lewis et al. 2000). Such habitat is typically unvegetated, but may include solitary hard corals, soft corals, macroalgae and sponges (Voss and Voss 1955, Lewis et al. 2000). At least 16 species of gorgonian octocorals have been documented at sites within BISC, and these octocorals are one of

the dominant sessile biota of hard bottom habitats (Voss and Voss 1955). Lewis et al. (2000) estimate that hard bottom habitat covered nearly 14,000 hectares of seafloor occurring between the mainland and the patch reef system.

The bare (soft sediment) bottom is generally devoid of vegetation and large benthic organisms. This community is typically found in deeper portions and along the eastern side of the bay near the keys. Bare habitat is particularly prominent in the northeast corner of the park in the cut north of and eastward of Soldier Key (Lewis et al. 2000) A variety of macro-organisms, micro-organisms, and meiobenthic fauna, including worms, mollusks, tunicates, nematodes, crabs, shrimp, amphipods, clams, snails and sea cucumbers, utilize these unvegetated and unconsolidated substrates.

3.8.3. The Mangrove Shoreline

The mainland shoreline of the park is almost entirely mangroves. Three species of mangroves exist in BISC: red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*) and black mangrove (*Avicennia germinans*). Mangroves filter water moving from the mainland to the ocean, and provide a barrier to mainland environments from the effects of storms. Mangroves are important as a nutrient source and primary producer in estuarine and marine waters where they reside. The detritus provided by decomposition of mangrove leaves is the food base for micro-crustaceans and other detrital processors that are consumed by macro-crustaceans, small fishes and other first order predators. These animals in turn are the prey of larger fish species, such as snook (*Centropomus* spp.), snappers (*Lutjanus* spp.), grunts (Haemulids) and jacks (*Caranx* spp.). In addition, mangroves provide important physical habitat for a wide variety of species, including those listed above (Serafy 2003). The USFWS (1999) estimates that at least 1300 species of animals rely on mangroves for important habitat. Mangroves provide important juvenile habitat for some species (*e.g.*, snappers and grunts) that eventually make ontogenetic shifts to coral reef habitats (*e.g.*, Chittaro et al. 2004).

Within the park, mangroves (predominantly red mangroves) are found along the mainland shoreline and along the perimeter of many keys. There are several “overwash” keys in the southern portion of the park made up nearly entirely of mangroves.

Due to coastal development, mangrove communities throughout the State have been reduced. These areas were targeted for development and often dredged and filled to create waterfront property. The mainland shoreline within the park represents the longest unbroken chain of mangroves along the east coast of Florida.

3.9. Threatened or Endangered Species

Biscayne National Park provides constant, common, occasional or potential habitat for numerous species listed as threatened or endangered under the Endangered Species Act (7 U.S.C. 136; 16 U.S.C. 460 et seq. (1973)). The species that potentially could be affected by actions under any of the alternatives are discussed below. Additionally, several listed species were determined to not be affected by actions under any of the alternatives, and thus are not further considered. These species include (1) terrestrial

species, (2) two species of birds (piping plover *Charadrius melodus*, and wood stork *Mycteria americana*) (but see Avifauna discussion in section *3.11*), (3) whales, and (4) Johnson's seagrass (*Halophila johnsonii*). For whales, BISC oceanside waters are included in the habitat range of five threatened or endangered whale species: finback (*Balaenoptera physalus*), humpback (*Megaptera novaeangliae*), right (*Eubalaena glacialis*), sei (*Balaenoptera borealis*), and sperm (*Physeter macrocephalus*). Nevertheless, because of the relatively shallow waters of BISC, whales are rarely, if ever, sighted within BISC's boundaries. The BISC wildlife observation database, which dates to the early 1980s, includes no sightings of live whales in park waters. Similarly, Johnson's seagrass is excluded from further discussion because its southernmost distribution is reported to be north of BISC boundaries. Thus, because this species of seagrass does not occur within the park, the proposed management plans would not affect its distribution and status.

3.9.1. Florida manatee

The Florida manatee (*Trichechus manatus latirostris*) is a distinct subpopulation of the West Indian manatee. The manatee is a federally listed endangered species (USFWS 1999). The manatee can be found in fresh, brackish and marine habitats. During the winter, cold temperatures concentrate the manatee population in peninsular Florida. In the summer, their range expands as far north as Rhode Island on the East Coast and as far west as Louisiana on the Gulf Coast. Mortality data collected since 1974 indicates a clear trend of increasing numbers of manatee deaths over time (FWC 2005).

Within the park, manatees are found mainly in nearshore waters, with densities greatest in the winter. Surveys by the Miami-Dade Department of Resource Management indicate that the park's winter manatee population averages 100 animals (Keven Mayo, DERM, pers. comm.). Within nearshore waters, areas with freshwater input (*e.g.*, Black Point and Convoy Point) have the greatest concentration of animals. The park, in cooperation with the State of Florida and Miami-Dade County, has implemented a manatee slow-speed zone extending 1000 feet from shore from Turkey Point (south of BISC headquarters) to Black Point (north of BISC headquarters). Slow-speed zones provide boat operators time to react when manatees are observed, reducing the potential occurrence of boat-manatee collisions (DERM 1995).

3.9.2. Sea turtles

Five sea turtle species are documented to utilize BISC waters (BISC, unpublished data), or have ranges that overlap with BISC: loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), Kemp's Ridley (*Lepidochelys kempii*), green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*). The hawksbill, Kemp's Ridley and leatherback were listed as endangered in 1970. The loggerhead was listed as threatened in 1978 in accordance with the Endangered Species Act of 1973. The green sea turtle was listed as endangered in 1978. Internationally, all species of sea turtles are considered endangered by the International Union of Conservation of Nature and Natural Resources (IUCN) and listed in Appendix I of the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The most commonly observed turtle in the park is the loggerhead. Loggerheads, greens and hawksbills have been documented to nest in the park, although hawksbill nesting has not been documented since 1990 and only one green sea turtle nest has been documented. Sea turtle nesting activity has been documented on Elliott Key, Boca Chita Key, Sands Key, and Soldier Key, although the latter three keys represent historic nesting sites and do not appear to be used in recent years. The southeastern U.S. nesting aggregation of loggerheads is one of the two largest loggerhead nesting aggregations in the world (the other being in Oman), and is of paramount importance to the survival of the species (NMFS and FWS 2008). Leatherback and Kemp's Ridley sea turtles are not known to nest in the park and are only rarely seen in park waters.

During turtle nesting season, the park performs nesting surveys three to seven times per week, depending on availability of staff and boats. When a nest is identified, it is protected from potential predators with a self-releasing screen that allows hatchlings to emerge when hatching occurs. After hatching occurs, nests are excavated to determine number of hatchlings and hatching success (number of hatched eggs divided by the total number of eggs).

From 1991 through 2012 the park has documented 237 sea turtle nests and 405 "false crawls", which occur when a turtle leaves the water to nest but returns to the water without laying eggs. Factors that may contribute to the occurrence of a false crawl include the presence on nesting beaches of coral rubble, marine debris, rocks or vegetation. In many instances no obvious reason can be determined why the emergence did not result in nesting.

A major threat to turtle nesting in the park is predation by raccoons. From 1991 to 2012, nearly 57% of nests have been partially or totally consumed by raccoon predators. The highest annual predation rate, 91.7% of nests predated, was observed in 2006. The increased incidence of raccoon predation is likely due to increased raccoon population size on Elliott Key, as documented by Gaines and Beck (2003). Additionally, it is possible that camping activity on Elliott Key may alter turtle nesting behavior and/or damage nests, although such an interaction has never been observed or reported. In 2007 and 2008, predation by raccoons on sea turtle nests was completely absent, likely accountable by the increased frequency of beach monitoring (daily surveys to identify and protect new nests) combined with the reduced numbers of raccoons present due to successful trapping efforts in recent years.

Sea turtles in BISC may be injured or killed from collisions with boats (Fig. 8A). On average, 1.4 turtles per year are reported or found by BISC staff to have been killed from collisions with boats (BISC unpublished data). It is likely that additional, undocumented turtle deaths from boat collisions occur and that boat collisions are responsible for many other documented stranded sea turtles whose cause of death could not be determined due to condition or location of the turtle. Sea turtles may be injured or drown from entanglement in marine debris (BISC unpublished data; Fig. 8B and 8C), and are also susceptible to being collected as bycatch during recreational (*e.g.*, hook-and-line) and commercial (*e.g.*, lampara net) fishing activities.

3.9.3. American crocodile

The American crocodile (*Crocodylus acutus*) is one of two crocodilians endemic to the United States (the second is the American alligator, *Alligator mississippiensis*). The American crocodile inhabits coastal waters of South Florida, the Caribbean, Mexico, Central America and northern South America. South Florida represents the northern limits of the American crocodile's range. Crocodiles were listed as endangered throughout their range in 1975 and critical habitat was established for the species in 1979 (USFWS 1999). The inclusion of the species on the Threatened and Endangered species list and the related protection of crocodile habitat were required because of documented population declines most likely associated with habitat alterations and direct human disturbances (USFWS 1984). Because of subsequent habitat protection efforts and increases in crocodile population sizes, in 2007, the US Fish and Wildlife Service reclassified the crocodile population in Florida from endangered to threatened status.

A portion of the park was included in the crocodile critical habitat designation that occurred in 1979. The designated critical habitat in the park includes all land and water within an area encompassed by a line beginning at Turkey Point, traveling southeast to the southernmost point of Elliott Key, and southwest from that point along the eastern shorelines of the keys to the park boundary (USFWS 1999).

The current distribution of crocodiles is limited to extreme south Florida, including coastal areas of Miami-Dade, Monroe, Collier and Lee Counties. The greatest concentration of crocodiles near the park is within the cooling canals of the Turkey Point Nuclear Electrical Generating Facility (adjacent to BISC), where significant nesting activity occurs. Nesting activity has not been documented in BISC. Nevertheless, BISC provides important habitat for sub-adult (2 to 8 year-old) and adult crocodiles. The combination of the nesting area at Turkey Point and the refugia of coastal areas of the park for sub-adults have been essential to the survival of the species in Florida (Mazzotti and Cherkiss 1998).

3.9.4 American Alligator

The American alligator (*Alligator mississippiensis*) occurs throughout the Southeastern United States and through parts of Central America. In Florida, alligators are abundant in the central and southern portions of the state.

The declining abundance of alligators during the late 1950s and early 1960s led to the 1967 classification of the Florida alligator population as endangered throughout its range. Federal and international regulations imposed during the 1970s and 1980s helped control trade of alligator hides, and illegal hunting of alligators was checked. The Florida alligator population responded immediately to protection and was reclassified as threatened in 1977 and again as threatened because of its similarity in appearance to the American crocodile (*Crocodylus acutus*) in 1985 (Neal 1985).

American alligators primarily utilize freshwater swamps and marshes as habitat, but are also found in rivers, lakes and smaller bodies of water. They can tolerate a moderate

degree of salinity for short periods of time, being occasionally found in brackish water around mangrove swamps. In BISC, alligator distribution is typically limited to flood-control canals and portions of the eastern bay near the mouths of flood-control canals.

3.9.5. Smalltooth sawfish

Smalltooth sawfish (*Pristis pectinata*) is one of two species of sawfish that inhabit U.S. waters (the second species is the largetooth sawfish, *Pristis perotteti*). Smalltooth sawfish commonly reach 18 ft (5.5 m) in length, and may grow to 25 ft (7 m) (NOAA 2005a). Little is known about the life history of these animals, but they may live up to 25-30 years and mature after about 10 years. Like many elasmobranchs, smalltooth sawfish are ovoviviparous, meaning the mother holds the eggs inside of her until the young are ready to be born, usually in litters of 15 to 20 pups.

Sawfish species inhabit shallow coastal waters of tropical seas and estuaries throughout the world. They are usually found in shallow waters very close to shore over muddy and sandy bottoms. Smalltooth sawfish have been reported in both the Pacific and Atlantic Oceans, but the U.S. population is found only in the Atlantic. Historically, the U.S. population was common throughout the Gulf of Mexico from Texas to Florida, and along the east coast from Florida to Cape Hatteras. The current range of this species has contracted to peninsular Florida, and smalltooth sawfish are relatively common only in the Everglades region at the southern tip of the state. No accurate estimates of abundance trends over time are available for this species. However, available records, including museum records and anecdotal fisher observations, indicate that this species was once common throughout its historic range and that smalltooth sawfish have declined dramatically in U.S. waters over the last century.

Sawfish are extremely vulnerable to overexploitation because of their propensity for entanglement in nets, their restricted habitat, and low rate of population growth. The decline in smalltooth sawfish abundance has been caused primarily by bycatch in various fisheries, including being entangled in trawl nets and being caught on hook-and-line. Degradation of the mangrove shorelines used by both juvenile and adult sawfish (NMFS, 2006) is a secondary factor contributing to smalltooth sawfish decline.

Although sightings are very rare, smalltooth sawfish have been observed from various areas of the park, including in marked channels and very close to coastlines. From 1998 through 2009, a total of nine encounters in BISC were reported. Information is lacking regarding historical abundance or distribution in the waters of BISC.

3.9.6 Acroporid corals and other stony corals proposed for listing under the ESA

Staghorn coral (*Acropora cervicornis*) and elkhorn coral (*A. palmata*) were listed as threatened species under the Endangered Species Act in May of 2006 (FR Doc. 06-4321, Vol. 71, No. 89. Additionally, the reef areas within BISC are included in the designated Critical Habitat for the two Acroporid species. In BISC, Acroporid corals currently occur at relatively low densities throughout the reef tract. Acroporid skeletons, primarily *A. cervicornis* make up a large percentage of the unconsolidated sediments surrounding the reefs. Through the 1980s, both *A. palmata* and *A. cervicornis* were common, with *A.*

palmata found mostly on higher-energy reefs, and *A. cervicornis* on lower-energy reefs. Additionally, *A. palmata* was more common in the southern portion of the BISC reef tract, with decreasing abundance to the north, while *A. cervicornis* was more common in the northern portion of the BISC reef tract, with decreasing abundance to the south. Neither species was found in or westward of the calmer "backreef" area of Hawk Channel, or on high-energy or deeper banking reef areas. By the late 1980s *A. cervicornis* colonies had decreased in abundance to the extent that they were difficult to find, and colonies of *A. palmata* occurred only in small clusters on a few reefs in the southern portion of the BISC reef tract. By the early- to mid-1990s, abundance of *A. palmata* colonies had decreased to the extent that some researchers (Lirman, Porter, personal communication) believed the species no longer occurred in BISC.

During the late 1990s and into the 21st century, *Acropora* species seem to be increasing in abundance in BISC (R. Curry, pers. observ.). Individual colonies of *A. cervicornis* and *A. palmata* are being observed more frequently and on more reefs. The apparent resurgence of the Acroporid populations in BISC seems to be retarded by both disease and predation by a corallivorous snail.

At the time of this document's publication, the National Marine Fisheries Service (NMFS) is proposing that elkhorn and staghorn corals be reclassified under the Endangered Species Act (ESA) from threatened to endangered. Additionally, five other stony coral species, pillar coral (*Dendrogyra cylindrus*), boulder star coral (*Montastraea annularis*), star coral (*M. franksi*), mountainous star coral (*M. faveolata*), and cactus coral (*Mycetophyllia ferox*) are being newly proposed as endangered and two other stony coral species, elliptical star coral (*Dichocoenia stokesii*) and Lamarck's sheet coral (*Agaracia lamarcki*) are being newly proposed as threatened. The impacts of actions to species affected by these proposed changes and new listings are analyzed in Chapter 4.

3.10. Marine Wildlife

Marine wildlife include the bottlenose dolphin (*Tursiops truncatus*), the Florida manatee (*Trichecus manatus*; see *Endangered or Threatened Species* section for discussion), and several species of sea turtles (see *Endangered or Threatened Species* section for discussion). The bottlenose dolphin is common in the inshore waters throughout the state of Florida, including Biscayne Bay. In 1990, NOAA/NMFS initiated an ongoing dolphin research project to make inferences about the status of the dolphin population in Biscayne Bay using photo-identification methodology (see http://www.sefsc.noaa.gov/dolphin/dolphinpartner1.jsp). Reliable estimates of population size and growth or decline trajectories have yet to be made. Overall species health has since been promoted by federal protection via the Marine Mammal Protection Act of 1972 (16 U.S.C. § 1361 et seq.). Dolphins feed primarily on fish. Individual and group behavior (including feeding) is likely negatively affected by combustion-powered boats (Lusseau 2003).

3.11. Avifauna

BISC provides habitat for more than 175 species of birds (BISC unpublished data), and is recognized as a Globally Important Bird Area by the American Bird Conservancy (see http://www.abcbirds.org/iba/). Many species are permanent residents of the park, other species migrate through the area, and still others are seasonal (typically, winter or summer) residents. The bay has several areas where migratory species roost or forage. Bird rookeries occur on the mainland in the mangrove shoreline and on several islands. A series of islands in Sandwich Cove serves as an important roosting area for birds, with populations appearing to be stable. The Arsenicker Keys in the southwest corner of the park are used for roosting and/or nesting by a variety of birds, including pelicans, cormorants, and the bald eagle (*Haliaeetus leucocephalus*). In recent years bald eagle nesting activity has been observed on West Arsenicker Key. Nesting has historically been observed along the southern end of Sands Key, and on the ocean side of Elliott Key south of Petrel Point (BISC unpublished data). Fish are typically an important component of the bald eagle diet. Many birds swim and/or wade in BISC's habitats to feed on marine fauna, primarily fishes and crustaceans. These species include great blue herons (*Ardea herodias*), little blue herons (*Egretta caerulea*), tricolor herons (*Egretta tricolor*), American egrets (*Ardea egretta*), snowy egrets (*Egretta thula*), reddish egrets (*Egretta rufescens*), double-crested cormorants (*Phalacrocorax auritus*), mergansers (*Mergus* spp.), various diving ducks (subfamily Aythyinae), American white pelicans (*Pelicanus erythrorhynchos*), brown pelicans (*Pelicanus occidentalis*), ospreys (*Pandion haliaetus*), terns (subfamily Sterninae), belted kingfishers (*Ceryle alcyon*), black skimmers (*Rynchops nigra*), bald eagles (*Haliaeetus leucocephalus*), magnificent frigatebirds (*Fregata magnificens*), gulls (*Larus* spp.), herons (family Ardeidae), roseate spoonbills (*Platalea ajaja*), white ibis (*Eudocimus albus*), glossy ibis (*Plegadis falcinellus*), oystercatchers (*Haematopus palliates*), grackles (*Quiscalus* spp.), rails (*Rallus* sp. and *Coturnicops* sp.), hawks (*Buteo* spp. and *Accipter* spp.), and falcons (*Falco* spp.). Of these species, the following are listed as Species of Special Concern by the state of Florida Fish and Wildlife Conservation Commission: oystercatchers, black skimmers, reddish egrets, snowy egrets, little blue herons, tricolored herons, and ospreys. BISC has an Avian Conservation Implementation Plan that serves as guidance to identify, document, and undertake bird conservation activities in the park and with neighboring communities, organizations, and adjacent landowners (NPS 2003b).

3.12. Ecologically Critical Areas

The President's Council on Environmental Quality guidelines (CEQ 1978) for implementing the National Environmental Policy Act requires an analysis of resources that would be considered ecologically critical areas. Ecologically critical areas in BISC include:

- Essential Fish Habitat (EFH), established and defined by the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265), and as identified by the South Atlantic Fishery Management Council (SAFMC 1998) ; and

- Habitat Areas of Particular Concern (HAPC's), as defined by the National Oceanic and Atmospheric Administration (2002) and identified by the South Atlantic Fishery Management Council.

EFH is defined by Congress as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The EFH guidelines under 50 CFR 600.10 further interpret the EFH definition as follows:

Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; *substrates* includes sediment, hard bottom, structures underlying the waters, and associated biological communities; *necessary* means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Habitat Areas of Particular Concern (HAPC's) are described in the rules as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. In general, HAPC include high value intertidal and estuarine habitats, offshore areas of high habitat value or vertical relief, and habitats used for migration, spawning, and rearing of fish and invertebrates. HAPC's are designed to help provide additional focus for conservation efforts (NOAA 2002).

The South Atlantic Fishery Management Council has identified Biscayne Bay, including Biscayne National Park, as EFH and HAPC for spiny lobster and coral (SAFMC 1998). Areas which meet the criteria for EFH-HAPCs for coral, coral reefs, and live/hard bottom include Biscayne Bay, specifically BISC, and the areas east of the park's keys. Additionally, BISC contains habitat classified as EFH under Fishery Management Plans (SAFMC 1998) for Penaeid shrimp, the snapper-grouper complex, and coastal pelagic fishes.

3.13. Cultural Resources

The National Park Service recognizes and manages five basic types of cultural resources: archeological sites, cultural landscapes, ethnographic resources, museum objects, and structures. The park does not have any designated cultural landscapes, therefore cultural landscapes will not be considered within the scope of this document. Data collected from creel surveys and visual fish surveys are eventually stored in the archives of the South Florida Collections Management Center; however, this would be common to all alternatives. Museum objects and structures associated with the park are all located on terrestrial sites, and would not be impacted either directly or indirectly by any of the alternatives listed in this document; therefore, museum objects and structures will not be considered within the scope of this document.

The lands and waters of BISC are rich with archeological remains that represent the cultural history of southern Florida and the Florida Keys. As of 2004, archeological surveys had revealed 98 archeological sites, including shipwrecks and other historic maritime activity areas, Native American sites, and the remains of pioneer settlements.

Of those 98 sites, 71 sites (predominantly shipwrecks) are submerged and may be affected by actions under one or more of the alternatives. Preliminary surveys of 42 submerged sites from 2002 - 2004 indicated that the structural integrity of archeological sites was damaged or affected by numerous fishing-related threats, including anchor damage, lobster trap debris, hook-and-line gear, fishing nets, and spears from spearfishers (Fig. 9).

From an ethnographic standpoint, one of the principal cultural resources of the park is fishing (commercial and recreational). Commercial and recreational fishing have occurred in waters now within BISC boundaries for more than a century (Smith 1896). Commercial and recreational fisheries were described in section *1.1.4* (*Current Fishery Policies in BISC*), and in more detail in section *3.7* (*Socioeconomic Resources*). Commercial and recreational fishers in BISC consist of members of multiple ethnic groups. None of the commercial or recreational fisheries are heavily skewed towards a particular ethnic group (EDAW 2005; GT Kellison, personal observation).

3.14. Aesthetic resources

BISC was established to protect and preserve "…a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty" (PL 90-606). Visitors visit BISC to, among other activities, boat through its pristine waters and snorkel or scuba dive over or through its diverse benthic habitats. Negative impacts to aesthetic resources include the introduction of non-natural materials and the damage of habitats by anthropogenic activities. Non-natural materials include marine debris, including derelict commercial or recreational fishing gear, as well as functional commercial or recreational fishing gear such as lobster and crab traps and trap buoys.

4. Environmental Consequences

Chapter 4 is a discussion of the environmental consequences of each of the alternatives on the components of the Affected Environment discussed in Chapter 3. In this chapter, for each component of the Affected Environment, the methods by which that component could be affected by actions under the FMP are first discussed generally. The likely effects of actions under each alternative are then discussed sequentially (*i.e.*, the effects of actions under Alternative 1 are discussed first, followed by the effects of actions under Alternatives 2, 3 4, and 5, respectively).

Additionally, to meet the requirements of NEPA, an EIS must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality (CEQ) guidelines for evaluating cumulative effects states that "…the most devastating environmental effects may result not from the direct effects of a particular action, but from the combination of individually minor effects of multiple actions over time" (CEQ 1997).

The CEQ regulations for implementing NEPA define cumulative effects as "…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Cumulative effects are linked to incremental actions or policy changes that individually may have small outcomes, but that, in the aggregate and combined with other factors, can result in greater environmental effects on the affected environment. At the same time, the CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action on the universe. Analyses should focus on those effects that are truly meaningful. In this chapter, cumulative effects are discussed as related to actions that could affect fishery resources in BISC (through, for example, habitat impacts), and the likelihood that those impacts would increase in the future given predicted area population growth and visitor-use trajectories, as discussed in Chapters 1 and 3 of this document.

In this chapter the effects of actions, including cumulative effects, are discussed as quantitatively as possible; however, in nearly all cases the ability to predict effects on components of the Affected Environment is limited to qualitative determinations. Thus, for each component (or sub-component), an assessment is made as to whether the actions under each alternative would have an adverse, negligible, or beneficial effect on that component. Table 6 contains the criteria used to determine these effects. For each component (or subcomponent) for which a negative effect is determined, the effect is further classified as Minor, Moderate or Major. Table 7 contains the criteria used to differentiate between Minor, Moderate and Major negative effects. Distinct criteria are used for natural resources, visitor use and experience / aesthetic resources, socioeconomic resources, and cultural resources. Where possible, the likely duration of potential effects is estimated as "short-term" (defined as lasting two years or less) or "long-term" (defined as lasting more than two years).

The concluded effect (and the Minor, Moderate or Major description of the effect, if the effect is negative) is presented with the heading for each alternative (*e.g.*, Alternative 1 (Adverse; Major; Long Term), and also following the discussion of effects for each alternative. Table 8 lists the effects of each alternative on components of the Affected Environment.

Following Section 7 of the Endangered Species Act (7 U.S.C. 136; 16 U.S.C. 460 et seq. (1973)), Federal Agencies are required to ensure that their actions do not jeopardize the continued existence of listed endangered and threatened species or areas of critical habitat. Thus, in addition to being assigned a ranking of adverse, negligible, or beneficial, as described above, threatened and endangered species and critical habitats were also assigned an effect determination as defined by the US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). Effect determinations, as shown in Table 6, are 'no effect (NE)', 'may affect- is not likely to adversely affect (NLAA)', and 'may affect- is likely to adversely affect (LAA)'. A ranking of NE is used when a listed species will not be affected by a proposed action. A ranking of NLAA is assigned when all effects are beneficial, insignificant, or discountable. The LAA ranking is assigned to those instances when all adverse effects cannot be avoided. It is worth noting that LAA is the appropriate ranking when a combination of beneficial and adverse effects is anticipated, even if the net effect is positive or neutral. Table 9 lists the Endangered Species Act Section 7 effects of each alternative on components of the Affected Environment.

Following is a discussion of the effects of actions under the alternatives, as well as cumulative effects, on the components of the affected environment.

4.1. Targeted (fished) fish species

Populations of targeted fish species, including Species of Special Concern, may be affected by commercial and recreational fishing, both of which may be altered in intensity through actions proposed in the alternatives.

4.1.1 Alternative 1 - Maintain Status Quo (Adverse; Major; Long-term)

Under Alternative 1, fishery management would continue in its current form. Management actions would not lead to increases in the abundance or mean size of targeted species in the park relative to areas outside the park.

The abundance and mean size of targeted species in the park could decrease relative to areas outside the park, if fishing pressure inside the park grows faster than fishing pressure outside the park. Fishing pressure would continue to increase, due both to increasing human population growth and continued increases in fishing efficiency (via technological advancements in gear and equipment). Increases in fishing pressure would likely be particularly focused on frequently harvested species such as grouper, snapper, and hogfish, and catch-and-release species such as permit and bonefish. Harvest of traditionally non-targeted species such as grunts (Haemulids) would likely continue to increase as other more preferable species become overharvested.

As more fish were caught, and as fishers targeted the largest individuals, the density (number per unit area) and average length of fish would likely decrease for frequently harvested species such as grouper, snapper, and hogfish (see, *e.g.*, Friedlander and DeMartini 2002, Graham et al. 2005). For these species, the average size of harvestable fish would be equal to or marginally greater than the minimum legal size at harvest. There would be few large fish, as is the case now (Ault et al. 2001; BISC unpublished data). Furthermore, because there is evidence that larger fish may contribute disproportionately more individuals to the next year-class than smaller fish, it could take longer for overfished fisheries resources to recover (if given the chance to do so) than if many large fish were available.

The decrease in abundance and size of targeted species would be exacerbated by "bycatch", which refers to non-target species that are caught and released, or target species that are caught but cannot be kept due to fishing regulations (*e.g.*, undersized fish), and thus are released. The effect of catch-and-release on post-release growth, mortality and fitness is poorly understood for most species. Nevertheless, it is without doubt that there is at least some mortality arising from recreational bycatch (see, for example, Diggles and Ernst 1997). Thus, as the number of fishers increases with increasing human population size, the mortality of fish released as bycatch would increase. Commercial bycatch, particularly during trawling, would result in unintentional removal of juveniles of targeted species living in commercially trawled seagrass habitats, which would further exacerbate the decrease in abundance and size of targeted species by removing individuals that could otherwise mature and become breeding members of the population.

Cumulative effects: Factors such as the abundance and size of targeted fish species could be affected by future changes in fishing effort and fishery regulations for waters outside the park, since populations of fish tend to operate at spatial scales larger than BISC's area (due, for example, to larval supply over relatively large spatial scales). For example, if a targeted fish species was protected by strict fishery regulations in BISC waters, but subject to overfishing in waters adjacent to BISC, then abundance of that species would likely decline over time in BISC. Recreational fishing pressure is increasing in all of South Florida waters, which would be expected to have a negative effect on fished species in BISC. However, such effects may be offset by changes in state or federal fishery regulations in waters outside BISC. Without knowing how fishery regulations will change in waters outside BISC, it is impossible to determine the direction or magnitude of cumulative effects associated with this change.

The abundance of targeted fish species also could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, making the eastern portion of the bay more estuarine than its present status. The establishment of additional estuarine habitat along the eastern portion of the bay would provide juvenile habitat for species such as red drum, spotted seatrout, and snook, which could positively affect the adult abundance of those species over time. In contrast, the loss of marine habitat (due to its conversion to estuarine conditions) would result in a loss of juvenile habitat for some species (*e.g.*, grunts, snappers, and barracuda), which could negatively affect the adult abundances of those species over time.

Thus, the cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted fish species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would make no changes to current fishery management activities, Alternative 1 is anticipated to have a major and adverse effect on targeted fish species.

Summary: Overall effects of actions in Alternative 1 on targeted (fished) fish species would likely lead to a substantial decrease in mean density or length of targeted fish populations, which would occur for the foreseeable future. Thus, Alternative 1 would likely have a major, long term negative impact, and could potentially lead to impairment. <u>(Adverse; Major; Long-term)</u>.

<u>4.1.2. Alternative 2 - Maintain At or Above Current levels (Adverse; Minor; Long-term)</u>
Under Alternative 2, the abundance and mean size of individuals of targeted fish species would be maintained at current levels. The effects of increased human population growth, improved technology and increased recreational bycatch would be offset by

management actions designed to maintain park fishery populations at current levels. By maintaining abundances and sizes of targeted fish species at current levels, Alternative 2 could result in BISC's resources being perceived as being in better or worse condition than resources outside of BISC, depending upon whether mean size and abundance of targeted fish species declined or improved in areas outside the park.

The establishment of the commercial permit system and decision to limit commercial fisheries in the park to those already existing could help to maintain the abundance and mean size of individuals of targeted species at current levels. However, this effect could be offset if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system, or if effort was displaced to upstream non-park waters that may supply larval recruits to park waters. Even though most commercial fishers in the park target invertebrates (spiny lobsters, blue and stone crabs, and shrimp), commercial bycatch, particularly during trawling, would be expected to continue. This would result in unintentional removal of juveniles of targeted species living in commercially trawled seagrass habitats, further exacerbating the decrease in abundance and size of targeted species by removing individuals that could otherwise mature and become breeding members of the population. The establishment of the commercial guide permit could help to maintain the abundance and mean size of individuals of targeted species at current levels if some guides decided not to fish in BISC due to the permit requirement. However, this effect could be offset if the remaining commercial guides increased their fishing effort, which would not be prohibited under the permit system.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted fish species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers slightly greater protection to targeted fishes than does Alternative 1, adverse impacts to targeted fish species are anticipated to be less than those under Alternative 1.

Summary: Overall effects of actions in Alternative 2 on targeted (fished) fish species would likely lead to minimal change (within the range of natural variation) in mean density or length of targeted fish populations. Due to effects of current and future anthropogenic impacts, including fishing pressure, this alternative would result in the maintenance for the foreseeable future of the heavily impacted fisheries resources and altered (relative to unfished) conditions that exist at present. Thus, Alternative 2 would likely have a minor, long-term negative impact on targeted fish species <u>(Adverse; Minor; Long-term),</u> and would not impact the resource to the extent it would cause impairment.

<u>4.1.3. Alternative 3 – Improve Over Current levels (Beneficial; Minor; Long-term)</u>
Under Alternative 3, the abundance and mean size of individuals of targeted species would be increased by 10% over current levels. The effects of increased human population growth, improved technology and increased recreational bycatch would be

offset by management actions designed to increase park fishery populations by 10% over current levels. These actions geared at improving abundances and sizes of targeted species by 10% could result in targeted species within the park being in better condition than those same species occurring outside the park if mean size and abundance remained at current levels or declined in areas outside the park, or to similar mean size and abundance within versus outside the park if mean size and abundance increased in areas outside the park.

The abundance and size of targeted fish species would likely be positively affected by the limitation of spearfishing to spears with no trigger mechanisms and to free diving (*i.e.*, the prohibition of spearfishing with an air source), assuming the regulatory changes result in a decreased number of spearfishers in the park. The abundance and size of targeted fish species could also be positively affected if the (1) commercial permit system and (2) commercial guide permit requirement resulted in decreases in the number of permitted commercial fishers and guides, respectively, and related decreases in commercial fishing pressure. However, this effect could be offset if the remaining permitted fishers and guides increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit systems, or if effort was displaced to upstream non-park waters that may supply larval recruits to park waters. Even though most commercial fishers in the park target invertebrates (spiny lobsters, blue and stone crabs, and shrimp), a reduction in commercial fishing efforts, which could be realized by the limited-entry, limited-transferability, use-or-lose conditions of the commercial permit, could reduce the amount of commercial bycatch, particularly during trawling. A reduction in bycatch could leave more surviving finfish to mature and become breeding members of the population. The Commercial Permit System would help fund additional Park Rangers and lead to increased enforcement efforts. Greater adherence to fishing regulations would be anticipated to follow, which would be expected to result in increases in sizes and numbers of targeted species.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted fish species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers greater protection to targeted fishes than do previous alternatives, minor beneficial impacts to targeted fishes, such as increased abundances or sizes, are anticipated under Alternative 3.

Summary: Overall effects of actions in Alternative 3 on targeted (fished) fish species would likely lead to an increase (~ 10%) in mean density or length of some targeted fish populations for the foreseeable future. Thus, Alternative 3 would likely have a minor, long-term positive impact on targeted fish species, and thus would not cause impairment <u>(Beneficial; Minor; Long-term)</u>.

4.1.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Moderate; Long-term)

Under Alternative 4, the abundance and mean (individual) size of populations of targeted fish species would be increased by 20% over current levels. The effects of increased human population growth, improved technology and increased recreational bycatch would be offset by management actions designed to increase park fishery populations by 20% over current levels. These actions geared at improving abundances and sizes of targeted species by 20% could result in targeted species within the park being in better condition than those same species occurring outside the park if mean size and abundance remained at current levels or declined in areas outside the park, or to similar mean size and abundance within versus outside the park if mean size and abundance increased in areas outside the park.

The abundance and size of targeted fish species would likely be positively affected by the limitation of spearfishing to spears with no trigger mechanisms and to free diving (*i.e.*, the prohibition of spearfishing with an air source), assuming the regulatory changes result in a decreased number of spearfishers in the park. The abundance and size of targeted fish species would be positively affected by the commercial permit system, which would result in decreases in the number of permitted commercial fishers over time due to the "non-transferable clause", and related decreases in commercial fishing pressure. However, this effect could be offset if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system, or if effort was displaced to upstream non-park waters that may supply larval recruits to park waters. Even though most commercial fishers in the park target invertebrates (spiny lobsters, blue and stone crabs, and shrimp), a reduction in commercial fishing efforts, which could be realized by the limited-entry, non-transferability, use-or-lose conditions of the commercial permit, could reduce the amount of commercial bycatch, particularly during trawling. A reduction in bycatch could leave more surviving finfish to mature and become breeding members of the population. Additionally, the establishment of a no-trawling area within the bay, as proposed in this alternative, could be expected to have beneficial effects, both direct and indirect, on targeted fish species. The no-trawl zone, if implemented, could directly benefit many fisheries-targeted species by reducing their chances of early mortality due to becoming bycatch. Indirectly, the prohibition of trawling in the specified area could reduce benthic habitat impacts, including damage to and/or removal of seagrasses, macroalgae, and sponges that are critical as sources of food and refuge for early developmental stages of many targeted fish species. The abundance and size of targeted fish species would be positively affected by the commercial guide permit system, which could result in decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in fishing pressure. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system. The Commercial Permit System would help fund additional Park Rangers and lead to increased enforcement efforts. Greater adherence to fishing regulations would be anticipated to follow, which would be expected to result in increases in sizes and numbers of targeted species.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted fish species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that Alternative 4 offers greater protection to targeted fishes than do all previous alternatives, moderate beneficial impacts to targeted fishes, such as increased abundances or sizes, are anticipated under this alternative.

Summary: Overall effects of actions in Alternative 4 on targeted (fished) fish species would likely lead to an increase in mean density or length of targeted fish populations, and thus are concluded to be positive. Overall effects of actions in Alternative 4 on targeted (fished) fish species would likely lead to an appreciable increase (~ 20%) in mean density or length of some targeted fish populations for the foreseeable future. Thus, Alternative 4 would likely have a moderate, long-term positive impact on targeted fish species, and thus would not cause impairment (Beneficial; Moderate; Long-term).

4.1.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Major; Long-term)

Under Alternative 5, the abundances and mean (individual) sizes of fishery-harvested species would be restored to within 20% of the historic, pre-exploitation levels. The effects of increased human population growth, improved technology and increased recreational bycatch would be offset by substantial management actions designed to substantially improve the park's fishery-harvested species to be more representative of environmental conditions prior to intense fishing pressure. These actions designed to restore fisheries inside the park could result in targeted species within the park being in better condition than those same species occurring outside the park if mean size and abundance remained at current levels or declined in areas outside the park. Furthermore, because Alternative 5 would seek to restore abundances and mean (individual) sizes of fishery-harvested species to within 20% of the historic, pre-exploitation levels, the mean size and abundance of harvested species in the park could be greater than those outside the park, as mean sizes and abundances increase outside the park, but likely would not be restored to the extent that park resources would be restored under Alternative 5.

The abundance of harvested fish species would be positively affected by the prohibition of spearfishing within the park, which could result in fewer fish harvested from the park. The abundance and size of targeted fish species would be positively affected by the commercial permit system, which would result in decreases in the number of permitted commercial fishers over time due to the "non-transferable clause", and related decreases in commercial fishing pressure. However, this effect could be offset if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system, or if effort was displaced to upstream non-park waters that may supply larval recruits to park waters. The abundance and size of targeted fish species would be positively affected by the commercial guide permit system, which could result in decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in fishing pressure. However, this effect could

be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system. The Commercial Permit System would help fund additional Park Rangers and lead to increased enforcement efforts. Greater adherence to fishing regulations would be anticipated to follow, which would be expected to result in increases in sizes and numbers of targeted species. Additionally, the establishment of a no-trawling area within the bay, as proposed in this alternative, could be expected to have beneficial effects, both direct and indirect, on targeted fish species. The no-trawl zone, if implemented, could directly benefit many fisheries-targeted species by reducing their chances of early mortality due to becoming bycatch. Indirectly, the prohibition of trawling in the specified area could reduce benthic habitat impacts, including damage to and/or removal of seagrasses, macroalgae, and sponges that are critical as sources of food and refuge for early developmental stages of many targeted fish species.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted fish species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that Alternative 5 offers substantially greater protection to targeted fishes than do all other alternatives, major beneficial impacts to targeted fishes, such as increased abundances or sizes, are anticipated under this alternative.

Summary: Overall effects of actions in Alternative 5 on targeted (fished) fish species would likely lead to an increase in mean density or length of harvested fish populations, and thus are concluded to be beneficial. Overall effects of actions in Alternative 5 on targeted (fished) fish species would likely lead to an appreciable improvement (to within 20% of historic, unexploited levels) in mean density or length of some harvested fish populations for the foreseeable future. Thus, Alternative 5 would likely have a major, long-term beneficial impact on targeted fish species, and thus would not cause impairment (Beneficial; Major; Long-term).

4.2. Targeted (fished) invertebrate species

Populations of targeted invertebrate species (*e.g.*, Caribbean spiny lobster, shrimp, blue crab, stone crab) may be affected by commercial and recreational fishing, both of which may be altered in intensity through actions proposed in the alternatives.

4.2.1. Alternative 1 - Maintain Status Quo (Adverse; Negligible to Minor; Long-term)

Under Alternative 1, fishery management would continue in its current form. Populations of targeted invertebrate species would continue to be harvested under current levels of fishing effort and given the declining trends observed in the catch of many invertebrates (see Figures 5 and 6), it should be expected that landings of targeted invertebrates could continue to decline. However, invertebrate landings and population dynamics could also fluctuate on an annual basis due to physical and biological mechanisms underlying the strength of annual recruitment classes.

Cumulative effects: The abundance of targeted invertebrate species could be affected by future changes in fishing effort and fishery regulations for waters outside the park, since invertebrate populations tend to operate at spatial scales larger than BISC's area (due, for example, to larval supply over relatively large spatial scales). For example, if a targeted invertebrate species was protected by strict fishery regulations in BISC waters, but subject to overfishing in waters adjacent to BISC, then abundance of that species would likely decline over time in BISC. Recreational fishing pressure is increasing in all of South Florida waters, which would be expected to have a negative effect on fished species in BISC. However, such effects may be offset by changes in state or federal fishery regulations in waters outside BISC. Without knowing how fishery regulations will change in waters outside BISC, it is impossible to determine the direction or magnitude of cumulative effects associated with this change.

The abundance of targeted invertebrate species also could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, making the eastern portion of the bay more estuarine than its present status. The establishment of additional estuarine habitat along the eastern portion of the bay would provide improved habitat for blue crab, which could beneficially affect the adult abundance of this species over time. In contrast, the loss of marine habitat (due to its conversion to estuarine conditions) could (depending on the spatial extent of salinity change) result in a loss of juvenile habitat for spiny lobsters, which could adversely affect the adult abundance of spiny lobster over time.

Thus, the cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making.

However, given that this alternative would make no changes to current fishery management activities, Alternative 1 is anticipated to have a negligible to minor adverse effect on targeted invertebrate species.

Summary: Overall effects of actions in Alternative 1 on targeted (fished) invertebrate species would not cause impairment yet could likely lead to declines in landings of targeted invertebrates, although natural variability would also influence invertebrate landings and their populations overall. Thus, effects are concluded to be negligible to minor, adverse, and long-term (Adverse; Negligible to Minor; Long-term).

4.2.2. Alternative 2 - Maintain At or Above Current levels (Negligible)

Under Alternative 2, the commercial permit system and the decision to limit commercial fisheries in the park to those already existing would help to maintain numbers of commercial fishers at current levels, although permitted fishers would not be restricted from increasing their fishing effort. These actions would help to maintain the abundance and mean size of individuals of fished invertebrates at current levels. No other actions under Alternative 2 would affect populations of targeted invertebrate species.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers limited protection to targeted invertebrates, little change in vertebrate populations is anticipated under this alternative.

Summary: Overall effects of actions in Alternative 2 on targeted (fished) invertebrate species would not cause impairment and would likely lead to minimal change (within the range of natural variation) in mean density (# per unit area) or size of individuals of invertebrate populations. Thus, effects are concluded to be neutral (Negligible).

4.2.3. Alternative 3– Improve Over Current levels (Negligible)

Under Alternative 3, the abundance and size of targeted invertebrate species could be positively affected if the commercial permit system resulted in reduced commercial fishing effort (*e.g.*, decreases in the number of permitted commercial fishers). However, this effect could be offset if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system.

The elimination of the two-day recreational lobster sport season would result in a considerable reduction in the amount of lobsters harvested prior to the regular recreational and commercial lobster season; however, the eliminated landings would likely be re-distributed to commercial or recreational landings during the regular season, and thus have no net effect on lobster abundance. Furthermore, since recreational harvest of invertebrates is minor in scale relative to commercial harvest, any reduction in

recreational effort would likely be small. The Commercial Permit System would help fund additional Park Rangers and lead to increased enforcement efforts. Greater adherence to fishing regulations would be anticipated to follow, which would be expected to result in increases in sizes and/or numbers of targeted invertebrate species. For discussion of impacts to invertebrate habitat, see section 4.8.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers limited protection to targeted invertebrates, little change in vertebrate populations is anticipated under this alternative.

Summary: Overall effects of actions in Alternative 3 on targeted (fished) invertebrate species would not cause impairment and would likely lead to minimal change (within the range of natural variation) in mean density (# per unit area) or size of individuals of invertebrate populations. Thus, effects are concluded to be neutral (Negligible).

4.2.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)

Under Alternative 4, the elimination of the two-day recreational lobster sport season would result in a considerable reduction in the amount of lobsters harvested prior to the regular recreational and commercial lobster season; however, the eliminated landings would likely be re-distributed to commercial or recreational landings during the regular season, and thus have no net effect on lobster abundance. Furthermore, since recreational harvest of invertebrates is minor in scale relative to commercial harvest, any reduction in recreational effort would likely be small. The abundance and size of targeted invertebrate species would be positively affected by the commercial permit system, which would result in decreases in the number of permitted commercial fishers over time due to the "non-transferable clause," and related decreases in commercial fishing pressure. However, this effect could be offset to some extent if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system. The possibility of trap seizure from CRPA zones (given repeated violations) could result in fewer traps deployed, potentially resulting in fewer invertebrates harvested and thus potentially having a positive effect on the abundance and size of targeted invertebrate species. The Commercial Permit System would help fund additional Park Rangers and lead to increased enforcement efforts. Greater adherence to fishing regulations would be anticipated to follow, which would be expected to result in increases in sizes and numbers of targeted species. Additionally, the establishment of a no-trawling area within the bay, as proposed in this alternative, could be expected to have beneficial effects, both direct and indirect, on targeted invertebrate species. The no-trawl zone, if implemented, could directly benefit targeted invertebrates (shrimps) by reducing their harvest. Indirectly, the prohibition of trawling in the specified area could reduce benthic habitat impacts, including damage to and/or removal

of seagrasses, macroalgae, and sponges that are critical as sources of food and refuge for early developmental stages of many fisheries-targeted invertebrate species. For discussion of impacts to invertebrate habitat, see section 4.8.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that Alternative 4 offers greater protection to targeted invertebrates than do all previous alternatives, minor beneficial impacts to targeted invertebrates, such as increased abundances or sizes, are anticipated under this alternative.

Summary: Overall effects of actions in Alternative 4 on targeted (fished) invertebrate species would likely lead to slight increases for the foreseeable future in mean density (# per unit area) or mean size of individuals of invertebrate populations. Thus, Alternative 4 would likely have a minor, long-term positive impact on targeted invertebrates in BISC, and thus would not cause impairment (Beneficial; Minor; Long-term).

4.2.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Minor; Long-term)
Under Alternative 5, the elimination of the two-day recreational lobster sport season would result in a considerable reduction in the amount of lobster harvest prior to the regular recreational and commercial lobster season; however, the eliminated landings would likely be re-distributed to commercial or recreational landings during the regular season, and thus have no net effect on lobster abundance. The abundance and size of targeted invertebrate species would be positively affected by the commercial permit system, which would result in decreases in the number of permitted commercial fishers over time due to the “non-transferable clause”, and related decreases in commercial fishing pressure. However, this effect could be offset to some extent if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system. The possibility of trap seizure from CRPA zones (given repeated violations) could result in fewer traps deployed, potentially resulting in fewer invertebrates harvested and thus potentially having a positive effect on the abundance and size of targeted invertebrate species. Potential substantial increases to the minimum size limits for recreationally-targeted species (*e.g.*, spiny lobster, stone crab, blue crab) might reduce the levels of recreational harvest for some targeted invertebrate species. Nevertheless, since recreational harvest of invertebrates is minor in scale relative to commercial harvest, any effect of the reduction in recreational effort would likely be small. The Commercial Permit System would help fund additional Park Rangers and lead to increased enforcement efforts. Greater adherence to fishing regulations would be anticipated to follow, which would be expected to result in increases in sizes and/or numbers of targeted invertebrate species. Additionally, the establishment of a no-trawling area within the bay, as proposed in this alternative, could be expected to have beneficial effects, both direct and indirect, on targeted invertebrate species. The no-trawl zone, if implemented, could directly benefit

targeted invertebrates (shrimps) by reducing their harvest. Indirectly, the prohibition of trawling in the specified area could reduce benthic habitat impacts, including damage to and/or removal of seagrasses, macroalgae, and sponges that are critical as sources of food and refuge for early developmental stages of many fisheries-targeted invertebrate species. For discussion of impacts to invertebrate habitat, see section 4.8.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to targeted invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that Alternative 5 offers substantially greater protection to targeted invertebrates than do all other alternatives, minor beneficial impacts to targeted invertebrates, such as increased abundances or sizes, are anticipated under this alternative.

Summary: Overall effects of actions in Alternative 5 on targeted (fished) invertebrate species would likely lead to slight increases for the foreseeable future in mean density (# per unit area) or mean size of individuals of invertebrate populations. Thus, Alternative 5 would likely have a minor, long-term positive impact on targeted invertebrates in BISC, and thus would not cause impairment (Beneficial; Minor; Long-term).

4.3. Non-targeted (non-fished) fish and invertebrates

Populations of non-targeted fish and invertebrate species may be affected directly or indirectly by commercial and recreational fishing, both of which may be altered in intensity through actions proposed in the alternatives. Direct impacts result when non-targeted fish and invertebrate species are caught as bycatch by commercial or recreational fishers. Indirect impacts result from the harvest of targeted species from park waters, which in turn may affect reef community structure due to ecological cascades caused by harvesting predators, prey, or competitors in the food web (Pinnegar et al. 2000, Dulvy et al. 2004). In most cases, the effects of fishing via ecological cascades on coral reef communities are very difficult to separate from the effects of other environmental factors, particularly if there are no comparable control sites for comparison where fishing is not allowed.

4.3.1. Alternative 1 - Maintain Status Quo (Adverse; Major; Long-term)

Under Alternative 1, fishery management would continue in its current form. Commercial fishing pressure in the park would likely remain relatively constant, as it has over the past several decades. Recreational fishing pressure would likely continue to increase as area population increased. An increase in recreational fishing pressure would lead to increased bycatch, and thus have negative impacts on non-target populations. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would continue at current levels, and would likely increase as recreational fishing levels increase.

Cumulative effects: Populations of non-targeted fish and invertebrate species could be affected by changes in fishing effort or fishing regulations in waters outside of BISC, since many fish and invertebrate populations tend to operate at spatial scales larger than BISC's area (due, for example, to larval supply over relatively large spatial scales). If, for example, fishing effort increased (as is expected) in waters outside BISC, then population sizes of fishery-targeted fish and invertebrates could change in BISC over time, which could result in changes in populations of non-targeted fish and invertebrate species through ecological cascades. However, the magnitude and direction of such changes is impossible to predict.

The abundance of non-targeted fish and invertebrate species also could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, making the eastern portion of the bay more estuarine than its present status. The establishment of additional estuarine habitat along the eastern portion of the bay would provide improved habitat for non-fishery-targeted species such as some livebearers (Poecilidae), killifish (Cyprinodontidae), and mojarras (Gerridae), resulting in increased populations sizes of these species. In contrast, the loss of marine habitat (due to its conversion to estuarine conditions) would result in a loss of habitat for some marine species such as other species

of killifish (Cyprinodontidae) and mojarras (Gerridae), though there would still be large portions of the bay where such habitat is available. This loss of habitat could negatively affect the adult abundance of these species over time.

Thus, the cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to non-targeted fish and invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would maintain the *status* quo, Alternative 1 is anticipated to have a major and adverse effect on non-targeted fish and invertebrate species.

Summary: Overall effects of actions in Alternative 1 on non-targeted fish and invertebrate species would likely lead to substantial alterations in mean density (# per unit area) of populations of non-targeted organisms, and thus community structure, for the foreseeable future. Thus, Alternative 1 would likely have a major, long-term negative impact on targeted fish species, and could cause impairment over time (Adverse; Major; Long-term).

4.3.2. Alternative 2 - Maintain At or Above Current levels (Adverse; Minor; Long-term)
Under Alternative 2, the commercial permit system, commercial guide permit requirement, and decision to limit commercial fisheries in the park to those already existing would help to maintain numbers of commercial fishers at current levels, although permitted fishers and guides would not be restricted from increasing their fishing effort. Thus, bycatch associated with the commercial fishery could decrease (if the number of commercial fishers declined, or if the number remained constant but effort per fisher declined), increase (if effort per commercial fisher increased), or remain constant (if numbers and effort of commercial fishers remained constant). It is probably most likely that numbers and effort would remain constant, leading to no effect on bycatch. Recreational fishing pressure would likely continue to increase as area population increased. An increase in recreational fishing pressure would lead to increased recreational bycatch, and thus have negative impacts on non-target populations. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely continue at current levels, and would likely increase as recreational fishing levels increase (even though populations of targeted species would be maintained at current levels under this alternative, it is likely that recreational fishing pressure would continue to increase, with stricter regulations requiring more catch-and-release of target species).

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to non-targeted fish and invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative

would do little to mitigate increasing human population, recreational activities, and habitat use, minor adverse impacts to non-targeted fish and invertebrate species are anticipated under Alternative 2.

Summary: Overall effects of actions in Alternative 2 on non-targeted fish and invertebrate species would likely lead to minor alterations in mean density (# per unit area) of populations of non-targeted organisms, and thus community structure, for the foreseeable future. Thus, Alternative 2 would likely have a minor, long-term negative impact on targeted fish species, and would not impact the resource to the extent it would cause impairment (Adverse; Minor; Long-term).

4.3.3. Alternative 3– Improve Over Current levels (Negligible)

Under Alternative 3, the abundance of non-targeted species could be positively affected if the commercial permit system resulted in decreases in the number of permitted commercial fishers, and related decreases in commercial fishing pressure and thus commercial bycatch. However, this effect could be offset if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system. The abundance of non-targeted species could be positively affected by the commercial guide permit system, which could result in decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in fishing pressure. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system.

Very minor decreased recreational bycatch could occur as a result of spearfishing restrictions. However, further increases in recreational fishing pressure (with increasing local human population growth) would be possible, which would have a negative effect on non-targeted populations. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely continue at current levels, and would likely increase as recreational fishing levels increase (even though populations of targeted species would be improved by 10% under this alternative, it is likely that recreational fishing pressure would continue to increase, with stricter regulations requiring more catch-and-release of target species).

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to non-targeted fish and invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. Negligible impacts to non-targeted fish and invertebrate species are anticipated.

Summary: Overall effects of actions in Alternative 3 on non-targeted fish and invertebrate species would likely lead to minimal change in mean density (# per unit area) of populations of non-targeted organisms, and minimal change in community composition

due to ecological cascades, and thus are concluded to be neutral and not causing impairment (Negligible).

4.3.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Negligible)

Under Alternative 4, the mean density of non-targeted species would be positively affected by the commercial permit system, which would result in decreases in the number of permitted commercial fishers over time due to the "non-transferable clause", and related decreases in commercial fishing pressure. However, this effect could be offset to some extent if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system. The mean density of non-targeted species could be positively affected by the commercial guide permit system, which could result in decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in fishing pressure. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system.

As in Alternative 3, very minor decreased recreational bycatch could occur as a result of spearfishing restrictions, resulting in decreased bycatch and thus a positive effect on the abundance of non-targeted populations. However, further increases in recreational fishing pressure (with increasing local human population growth) would be possible, which would have a negative effect on non-targeted populations. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely continue at current levels, and would likely increase as recreational fishing levels increase (even though populations of targeted species would be improved by 20% under this alternative, it is likely that recreational fishing pressure would continue to increase, with stricter regulations requiring more catch-and-release of target species). The establishment of a no-trawling area within the Bay, as proposed in this alternative, could be expected to have beneficial effects, both direct and indirect, on non-targeted fish and invertebrate species. The no-trawl zone, if implemented, could directly benefit many non-targeted species by reducing their chances of early mortality from bycatch. Indirectly, the prohibition of trawling in the specified area could reduce benthic habitat impacts, including damage to and/or removal of seagrasses, macroalgae, and sponges that are critical as sources of food and refuge for early developmental stages of many non-targeted fish and invertebrate species.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to non-targeted fish and invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. Negligible impacts to non-targeted fish and invertebrate species are anticipated.

Summary: Overall effects of actions in Alternative 4 on non-targeted fish and invertebrate species would likely lead to minimal change in mean density (# per unit area) of populations of non-targeted organisms, and minimal change in community composition due to ecological cascades, and thus are concluded to be neutral and not causing impairment (Negligible).

4.3.5. Alternative 5 – Restore Park Fisheries Resources (Negligible)

Under Alternative 5, the mean density of non-targeted species would be positively affected by the commercial permit system, which would result in decreases in the number of permitted commercial fishers over time due to the "non-transferable clause", and related decreases in commercial fishing pressure. However, this effect could be offset to some extent if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system. The mean density of non-targeted species could be positively affected by the commercial guide permit system, which could result in decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in fishing pressure. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system.

As in Alternative 3, very minor decreased recreational bycatch could occur as a result of spearfishing restrictions, resulting in decreased bycatch and thus a positive effect on the abundance of non-targeted populations. However, further increases in recreational fishing pressure (with increasing local human population growth) would be possible, which would have a negative effect on non-targeted populations. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely continue at current levels, and would likely increase as recreational fishing levels increase (even though under this alternative, populations of targeted species would be returned to within 20% of their pre-exploitation status, it is likely that recreational fishing pressure would continue to increase, with stricter regulations requiring more catch-and-release of target species). The establishment of a no-trawling area within the Bay, as proposed in this alternative, could be expected to have beneficial effects, both direct and indirect, on non-targeted fish and invertebrate species. The no-trawl zone, if implemented, could directly benefit many non-targeted species by reducing their chances of early mortality from bycatch. Indirectly, the prohibition of trawling in the specified area could reduce benthic habitat impacts, including damage to and/or removal of seagrasses, macroalgae, and sponges that are critical as sources of food and refuge for early developmental stages of many non-targeted fish and invertebrate species.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to non-targeted fish and invertebrate species because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that Alternative 5 would take steps to mitigate increasing human population, recreational activities, and habitat use, negligible impacts to non-targeted fish and invertebrate species are anticipated.

Summary: Overall effects of actions in Alternative 5 on non-targeted fish and invertebrate species would likely lead to minimal change in mean density (# per unit area) of populations of non-targeted organisms, and minimal change in community composition due to ecological cascades, and thus are concluded to be neutral and not causing impairment (Negligible).

4.4. Recreational Fishing Experience

Recreational fishing experience may be affected by numerous factors, including the characteristics of fish populations, fish regulations, weather, and boat performance. Factors potentially influenced under the FMP include the mean size and abundance of targeted fish species, as well as the ability to have a relatively "solitary" fishing experience (*i.e.*, not surrounded by other fishers or boaters). Surveys of recreational fishers indicate that the ability to catch large fish and the ability to catch target species are most important to recreational fishers. The potential reduction in commercial fishers via the establishment of a commercial permit in Alternatives 2-5 is not considered in this analysis to have an effect on the ability of recreational fishers to have a relatively "solitary" fishing experience, since the number of commercial fishers operating in the park is minor relative to the number of recreational fishers.

4.4.1. Alternative 1 - Maintain Status Quo (Adverse; Moderate; Short-term, Adverse; Moderate; Long-term)

The effects of the actions proposed under Alternative 1 would be dependent upon population trends. No actions that would occur under Alternative 1 would be expected to directly and immediately affect recreational fishing experience in the park. If fishing effort increased (as it is expected to do given local increases in human population), then mean size and abundance of targeted species would likely decrease below current levels, and the frequency of having a "solitary" fishing experience would likely decrease, negatively affecting recreational fishing experience. These adverse effects would be consistent in terms of both short-term and long-term results.

Cumulative effects: As indicated in the cumulative effects discussion under sections 4.1.1.1 and 4.2.1.1, the abundance and size of targeted fish and invertebrate species could be affected by future changes in fishing effort and fishery regulations for waters outside the park. Changes in the abundance and size of targeted fish and invertebrates have the potential to affect recreational fishing experience, which would likely improve as size and abundance increased, and decline as size and abundance decreased. If changes (or lack thereof) in fishing effort and fishing regulations in waters outside BISC resulted in an increase in size and abundance in those waters, size and abundance in BISC waters could also increase, positively affecting recreational fishing experience. If changes (or lack thereof) in fishing effort and fishing regulations in waters outside BISC resulted in a decrease in size and abundance in those waters, size and abundance in BISC waters could also decrease, negatively affecting recreational fishing experience. Without knowing how fishery regulations will change in waters outside BISC, it is impossible to determine whether such cumulative effects will occur.

The abundance of targeted fish and invertebrate species also could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, making the eastern portion of the

bay more estuarine than its present status. Since more than 70% of Florida's fishery-targeted species utilize estuaries during at least one life stage (FDEP 2007), the establishment of additional estuarine habitat along the eastern portion of the bay would provide improved habitat for fishery-targeted species such as gray snapper, gag grouper, spiny lobster, blue crab, pink shrimp, red drum, spotted seatrout, tarpon, and snook, which could positively affect the adult abundance of this species over time, in turn improving recreational fishing experience.

Thus, the cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the recreational fishing experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would make no changes to current fishery regulations, Alternative 1 is anticipated to have a moderate adverse effect on recreational fishing experience if park fisheries resources decline further due to lack of adequate protection.

Summary: Overall, it is likely that the lack of actions under Alternative 1 would have an appreciable, long-term negative effect on recreational fishing experience in the park, although this decline may not be detectable from satisfaction surveys due to the shifting baseline effect, in which people base their opinions of acceptable levels of resource on their initial experience with that resource, and are not aware of previous, greater levels of that resource. Thus, Alternative 1 would likely have a moderate, short-term adverse impact and a moderate, long-term adverse impact on recreational fishing experience in the park (Adverse; Moderate; Short-term, Adverse; Moderate; Long-term).

4.4.2. Alternative 2 - Maintain At or Above Current levels (Adverse; Minor; Short-term, Adverse; Minor; Long-term)

Under Alternative 2, efforts would be undertaken to keep the mean size and abundance of targeted species from falling below current levels. Given likely increases in fishing pressure, these efforts would require more conservative recreational regulations, likely including increased minimum harvest sizes and reduced bag limits. Although the overall effect of these regulatory changes would be to maintain current fishery conditions, recreational fishing experience would likely decrease under this scenario due to the stricter regulations. These short-term adverse effects would not improve long-term effects, as regulations would need to become even stricter than those proposed under this alternative to maintain fisheries resources at current levels when the population of recreational fishers is expected to continue growing. If fishing effort increased (as it is expected to do given local increases in human population), the frequency of having a "solitary" fishing experience would likely decrease, adversely affecting both the long-term and short-term recreational fishing experience.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the recreational fishing experience because not enough information is known about the direction and magnitude

of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would minimally restrict fishing activity (compared to the current situation) while likely not offering enough protection to substantially improve the park's fishery resources, Alternative 2 is anticipated to have a minor adverse effect on the recreational fishing experience.

Summary: Overall, the actions under Alternative 2 would likely lead to a detectable but insubstantial negative effect on recreational fishing experience in the park for the foreseeable future. Thus, Alternative 2 would likely have a minor, short-term adverse impact and a minor, long-term adverse impact on recreational fishing experience in the park (Adverse; Minor; Short-term, Adverse; Minor; Long-term).

4.4.3. Alternative 3– Improve Over Current levels (Adverse; Minor; Short-term, Beneficial; Minor; Long-term)

Under Alternative 3, efforts would be undertaken to increase the mean size and abundance of targeted species by 10% over current levels. Given likely increases in fishing effort, these efforts would require changes in recreational regulations to a greater extent than would occur under Alternative 2 (*i.e.*, more restrictive regulations than in Alternative 2). Regulatory changes could include moderate changes to size and bag limits, limited entry commercial permit system, and seasonal or spatial closures. Although the overall effect of these regulatory changes would be to improve fishery conditions, which would positively affect recreational fishing experience, the considerably stricter regulations necessary to accomplish the 10% increase would negatively affect recreational short-term and long-term fishing experience. However, long-term benefits would be expected if these regulation changes resulted in improved status of fisheries resources. The discontinuation of the two-day recreational lobster sport season would result in a decrease of boaters on the water and a corresponding increase in the degree of solitude of fishing experiences during that two-day period, improving recreational fishing experience for those two days, but removing the lobster-fishing sport season opportunity for those who enjoy it. Spearfishing gear restrictions would adversely affect the spearfishing experience, but the long-term effects of the restrictions would be expected to result in increased abundances and sizes of fish over the long-term. Spearfishing gear restrictions could result in a decrease in numbers of fishers if spearfishers decided to spearfish elsewhere.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the recreational fishing experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would minimally restrict fishing activity (compared to the current situation) in order to protect and improve the park's fishery resources, Alternative 3 is anticipated to have a long-term minor beneficial effect on recreational fishing experience.

Summary: Overall, the actions under Alternative 3 would likely lead to a minor negative effect on recreational fishing experience in the park for the short-term future, although proposed regulations would be expected to result in long-term benefits as fisheries resources improve. Thus, Alternative 3 would likely have a minor, short-term adverse impact and a minor, long-term adverse impact on recreational fishing experience in the park (Adverse; Minor; Short-term, Beneficial; Minor; Long-term).

4.4.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Adverse; Minor; Short-term, Beneficial; Moderate; Long-term)

Under Alternative 4, efforts would be undertaken to increase the mean size and abundance of targeted species by 20% over current levels. Given likely increases in fishing effort, these efforts would require changes in recreational regulations to a greater extent than would occur under Alternative 3 (*i.e.*, more restrictive regulations than in Alternative 3). In some cases, minimum harvest size for currently harvested species may be increased to an extent that very few individuals are legally harvestable for several years until resources recover. Should slot limits be implemented, many of the largest fishes would no longer be harvestable, which would negatively affect short-term recreational fishing experience (particularly for those whose recreational fishing experience is dependent on the size of fish harvested), but would help ensure long-term sustainability of the resources and thus could translate into more abundant and larger catches in the long-term future. Implementation of closed areas would likely be necessary, which would reduce the fishable area within the park. Although the overall effect of these regulatory changes would be to improve fishery conditions (particularly for those whose experience is dependent on catching "large" fish), which would positively affect recreational fishing experience, the significantly stricter regulations necessary to accomplish the 20% increase would negatively affect short-term recreational fishing experience (particularly for those whose recreational fishing experience is dependent on the number of fish harvested). However, a long-term moderate beneficial effect could be expected, since the strict regulations would allow for recovery of fisheries resources, which could translate into more abundant and larger catches in the long-term future. The discontinuation of the two-day recreational lobster sport season would result in fewer boaters on the water and a corresponding increase in the degree of solitude of fishing experiences during that two-day period, improving recreational fishing experience for those two days, but removing the lobster-fishing sport season opportunity for those that enjoy it. Spearfishing gear restrictions would adversely affect the spearfishing experience, but the long-term effects of the restrictions would be expected to result in increased abundances and sizes of larger fish over the long-term. Spearfishing gear restrictions could result in a decrease in numbers of fishers if spearfishers decided to spearfish elsewhere. The establishment of a no-trawl zone in the bay (geared at commercial trawlers), as proposed in this alternative, could positively impact the recreational fishing experience if the no-trawl zone resulted in healthier fisheries resources and habitat.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the recreational fishing

experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative's considerable restrictions on fishing activity (compared to the current situation) would be expected to improve and sustain park's fishery resources for future generations, Alternative 4 is anticipated to have a long-term moderate beneficial effect on recreational fishing experience.

Summary: Overall, the actions in Alternative 4 have both long-term beneficial effects and short-term adverse effects on the recreational fishing experience. Due to the likelihood of implementing a variety of very strict fishing regulations to achieve desired goals, the fishing experience of many individuals may be adversely affected. However, over the long term, the stringent regulations would be expected to improve fisheries resources in the park, thereby offering long-term beneficial effects (*e.g.*, increased degree of solitude and the opportunity to catch more and larger fish once harvested species protected under stronger regulations have begun to recover). (Adverse; Minor; Short-term, Beneficial; Moderate; Long-term).

4.4.5. Alternative 5 – Restore Park Fisheries Resources (Adverse; Minor; Short-term, Beneficial; Major; Long-term)

Under Alternative 5, efforts would be undertaken to improve the mean sizes and abundances of harvested species to within 20% of their historic, unexploited levels. Given likely increases in fishing effort, these efforts would require changes in recreational regulations to a greater extent (*i.e.*, more restrictive) than would occur under Alternatives 3 and 4. In some cases, minimum harvest size for currently harvested species may be increased to an extent that very few individuals are legally harvestable for several years until resources recover. Should slot limits be implemented, many of the largest fishes would no longer be harvestable, which would negatively affect short-term recreational fishing experience (particularly for those whose recreational fishing experience is dependent on the size of fish harvested), but would help ensure long-term sustainability of the resources and thus could translate into more abundant and larger catches in the long-term future. Implementation of closed areas would very likely be required by this alternative, which would reduce the fishable area within the park Although the overall effect of these regulatory changes would be to improve fishery conditions in the long term, (particularly for those whose experience is dependent on catching "large" fish), which would positively affect long-term recreational fishing experience, the significantly stricter regulations necessary to accomplish the return of harvested species to within 20% of historic levels would negatively affect recreational fishing experience for many years (particularly for those whose recreational fishing experience is dependent on the number of fish harvested). Furthermore, some additional extreme regulatory measures, such as temporary moratoriums on fishing activity, only allowing catch-and-release fishing, and spatial and seasonal closures, which may be needed to achieve the goals of Alternative 5, may severely impede a fisher's ability to catch as many fish as desired when and where he/she wants, thereby adversely affecting a

fisher's experience. However, following several years of strict regulations, fishers may begin to observe that many harvested species, due to the ability to recover under stricter regulations, are now more plentiful and larger, which can lead to an improved long-term fishing experience for those whose fishing success is measured by the size and/or number of fish caught. The discontinuation of the two-day recreational lobster sport season would result in fewer boaters on the water and a corresponding increase in the degree of solitude of fishing experiences during that two-day period, improving recreational fishing experience for those two days, but removing the lobster-fishing sport season opportunity for those that enjoy it. The prohibition of spearfishing may negatively impact the fishing experience for those who enjoy the spearfishing experience. The establishment of a no-trawl zone in the bay (geared at commercial trawlers), as proposed in this alternative, could positively impact the recreational fishing experience if the no-trawl zone resulted in healthier fisheries resources and habitat.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the recreational fishing experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative's substantially restricted fishing regulations (when compared to the current situation) would be expected to greatly improve and sustain park's fishery resources for future generations, Alternative 5 is anticipated to have a long-term major beneficial effect on recreational fishing experience.

Summary: Overall, the actions in Alternative 5 have both long-term major beneficial effects and short-term minor adverse effects on the recreational fishing experience. Due to the likelihood of implementing a variety of very strict fishing regulations to achieve desired goals, the fishing experience of many individuals may be adversely affected. However, over the long term, the stringent regulations would be expected to greatly improve fisheries resources in the park, thereby offering long-term beneficial effects (*e.g.,* increased degree of solitude and the opportunity to catch more and larger fish once harvested species protected under stronger regulations have begun to recover). <u>(Adverse; Minor; Short-term, Beneficial; Major; Long-term)</u>.

4.5. Visitor Use and Experience

Visitor use and experience could be affected in several ways by actions proposed under one or more of the alternatives. Discussion will focus on snorkeling and scuba diving experience, as the fishing experience was already discussed above and other visitor experiences are unlikely to be directly affected by actions under the alternatives. Discussion will also focus solely on potential fishing-related impacts to snorkel and scuba diving experience. The discussion assumes that snorkelers and scuba divers primarily utilize reef or hardbottom habitat, and does not include discussion of potential effects of the alternatives on other habitats (*e.g.*, bay seagrass).

Snorkeling and scuba diving experiences can be affected by the (1) structure and diversity of the fish and invertebrate community, although the relationship between structure, diversity and experience is not clear, (2) size of fish and invertebrates seen (experience would be expected to improve as the frequency of "large" animals increased), (3) amount of fishing-related marine debris (experience would be expected to decrease with increasing amounts of marine debris), and (4) amount of fishing-related habitat damage (experience would be expected to decrease with increasing amounts of fishing-related habitat damage). The structure and diversity of the fish and invertebrate communities in BISC can be affected by fishing via ecological cascades; however, the relationships between fishing pressure, structure and diversity are complex, and will depend on multiple factors (*e.g.*, species consistency and size distribution of species harvested, community structure of non-targeted fish and invertebrates, and abiotic variability). With respect to the size of fish, since fishing efforts typically target large fish, fishing tends to result in reductions in the mean size of targeted species (*e.g.*, Dulvy et al. 2004, Harris et al. 2004). Preliminary data indicate that, as of 2003, mean sizes of targeted groupers and snappers in the park are smaller than mean sizes elsewhere in the Keys (J. Ault and S. Smith, University of Miami, pers. comm.). With respect to fishing-related habitat damage, damage may occur from fishing gear deployed, intentionally or unintentionally, over hardbottom or reef habitat, or from snorkeling or diving lobster fishers and spearfishers.

<u>4.5.1. Alternative 1 - Maintain Status Quo (Adverse; Moderate; Long-term)</u>

No actions that would occur under Alternative 1 would be expected to affect snorkeling and scuba diving experience in the park. If fishing effort increased (as it is expected to do given local increases in human population), then mean individual size of targeted species would likely decrease below current levels, and levels of fishing-related marine debris and fishing-related habitat damage would likely increase over current levels.

Cumulative effects: Cumulative effects would be the same as for recreational fishing experience. Changes in the abundance and size of targeted fish and invertebrates have the potential to affect visitor use and experience, which would likely improve as size and abundance increased. If changes (or lack thereof) in fishing effort and fishing regulations in waters outside BISC resulted in an increase in size and abundance in those waters, size and abundance in BISC waters could also increase, positively affecting snorkeling and scuba diving experience. If changes (or lack thereof) in fishing effort and fishing regulations in waters outside BISC resulted in a decrease in size and abundance in those

waters, size and abundance in BISC waters could also decrease, negatively affecting snorkeling and scuba diving experience. Without knowing how fishery regulations will change in waters outside BISC, it is impossible to determine whether such cumulative effects will occur.

The abundance of targeted fish and invertebrate species, and thus snorkeling and scuba diving experience, also could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, making the eastern portion of the bay more estuarine than its present status. The establishment of additional estuarine habitat along the eastern portion of the bay would provide improved habitat for many fishery-targeted species such as gag grouper, gray snapper, spiny lobster, blue crab, red drum, spotted seatrout, and snook, which could positively affect the adult abundance of these species over time. Since some of these estuarine-dependent species do occur, in later life stages, in the habitats frequented by snorkelers or divers, it is possible that increases in abundance of these species would beneficially affect snorkeling and scuba diving experience.

Thus, the cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the visitor use and experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would make no changes to current fishery regulations, Alternative 1 is anticipated to have a moderate adverse effect on visitor use and experience if park fisheries resources decline further due to lack of adequate protection.

Summary: Overall, the lack of actions in Alternative 1 would have an appreciable negative effect on snorkeling and scuba diving experience in the park for the foreseeable future. Thus, Alternative 1 would likely have a moderate, long-term negative impact on visitor use and experience in the park (Adverse; Moderate; Long-term).

4.5.2. Alternative 2 - Maintain At or Above Current levels (Negligible)

Under Alternative 2, efforts would be undertaken to keep the mean size and abundance of targeted species from falling below current levels, resulting in a neutral effect on snorkeling and scuba diving experience in the park. Actions would be taken to reduce marine debris levels if they increased above current levels. Additionally, the establishment of the commercial permit system could reduce the number of commercial fishers in the park, which could lead to a reduction in the amount of fishing-related marine debris (*e.g.*, derelict traps). However, this effect could be offset if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the visitor use and experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. Given that this alternative would only minimally restrict fishing activity (compared to the current situation), Alternative 2 is anticipated to have a negligible effect on visitor use and experience.

Summary: Overall, it is likely that the actions under Alternative 2 would lead to a relative maintenance of current conditions, having a negligible effect on snorkeling and scuba diving experience in the park (Negligible).

4.5.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
Under Alternative 3, efforts would be undertaken to increase the mean size and abundance of targeted species by 10% over current levels, resulting in a positive effect on snorkeling and scuba diving experience in the park. As in Alternative 2, actions would be taken to reduce marine debris levels if they increased above current levels. Additionally, the establishment of the commercial permit could reduce the number of commercial fishers in the park, which could lead to a reduction in the amount of fishing-related marine debris (*e.g.*, derelict traps). However, this effect could be offset if the remaining permitted fishers increased their individual fishing effort, which would not be prohibited (unless in violation of state law) under the permit system. The establishment of Coral Reef Protection Areas would result in a decrease in reef-associated habitat damage. The discontinuation of the two-day recreational lobster sport season would result in a reduction in habitat damage. If the proposed regulations to prohibit spearfishers from using spearguns with trigger mechanisms and surface air supply resulted in fewer spearfishers in the park, a reduction in habitat damage (due to stray spears, as shown in Figure 9) might be expected, as well as increased numbers and sizes of fish that can be observed by snorkelers and divers.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to visitor use and experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would minimally restrict fishing activity (compared to the current situation) in order to protect and improve the park's fishery resources, Alternative 3 is anticipated to have a minor beneficial effect on visitor use and experience.

Summary: Overall, the actions in Alternative 3 would likely result in a slight increase, for the foreseeable future, in mean size of targeted species, and a decrease in habitat damage and fishing-related marine debris. Thus, Alternative 3 would likely have a minor, long-

term beneficial impact on snorkeling and scuba diving experience in the park (Beneficial; Minor; Long-term).

4.5.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Moderate; Long-term)

Under Alternative 4, efforts would be undertaken to increase the mean size and abundance of targeted species by 20% over current levels, resulting in a positive effect on snorkeling and scuba diving experience in the park. As in Alternatives 2 and 3, actions would be taken to reduce marine debris levels if they increased above current levels. Additionally, the establishment of the commercial permit system with a "forever non-transferable" clause would reduce the number of commercial fishers in the park over time (although the reduction may not occur for one or more decades), which would lead to a reduction in the amount of fishing-related marine debris (*e.g.,* derelict traps). The establishment of Coral Reef Protection Areas would result in a decrease in reef-associated habitat damage. The discontinuation of the two-day recreational lobster sport season could result in a reduction in habitat damage. If the proposed regulations to prohibit spearfishers from using spearguns with trigger mechanisms and surface air supply resulted in fewer spearfishers in the park, a reduction in habitat damage (due to stray spears, as shown in Figure 9) might be expected, as well as increased numbers and sizes of fish that can be observed by snorkelers and divers.

Cumulative effects: Cumulative effects would be the same as in Alternative 1. Impacts to visitor use and experience may occur, but these impacts cannot be accurately predicted because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making.

Summary: Overall, the actions in Alternative 4 would likely result in an appreciable increase, for the foreseeable future, in mean size of targeted species, and an appreciable decrease in habitat damage and fishing-related marine debris. Thus, Alternative 4 would likely have a moderate, long-term positive impact on snorkeling and scuba diving experience in the park (Beneficial; Moderate; Long-term).

4.5.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Moderate; Long-term)

Under Alternative 5, efforts would be undertaken to improve the mean sizes and abundances of harvested species to within 20% of their historic, unexploited levels. As in Alternatives 2 through 4, actions would be taken to reduce marine debris levels if they increased above current levels. Additionally, the establishment of the commercial permit system with a "forever non-transferable" clause would reduce the number of commercial fishers in the park over time (although the reduction may not occur for one or more decades), which would lead to a reduction in the amount of fishing-related marine debris (*e.g.,* derelict traps). The establishment of Coral Reef Protection Areas would result in a decrease in reef-associated habitat damage. The discontinuation of the two-day

recreational lobster sport season and the prohibition of spearfishing would result in a reduction in habitat damage (*e.g.,* due to stray spears, as shown in Figure 9).

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to visitor use and experience because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative's substantially restricted fishing regulations (when compared to the current situation) would be expected to greatly improve and sustain park's fishery resources and underwater habitat quality, Alternative 5 is anticipated to have a long-term major beneficial effect on visitor use and experience.

Summary: Overall, the actions in Alternative 5 would likely result in an appreciable increase, for the foreseeable future, in mean size of targeted species, and an appreciable decrease in habitat damage and fishing-related marine debris. Thus, Alternative 5 would likely have a moderate, long-term positive impact on snorkeling and scuba diving experience in the park (Beneficial; Moderate; Long-term).

4.6. Commercial Use of the Park

Because the effects of the alternatives on commercial fishers were described in detail in Chapter 2, they will not be further discussed in this section. Discussion here will focus on effects of the actions under one or more of the alternatives on use of the park by the contracted concessionaire, Biscayne National Underwater Park (BNUP). BNUP operates snorkel, scuba and glass-bottom boat trips to patch reefs and the reef tract (oceanside) and to sites in the bay. The business potential for BNUP increases with positive visitor experiences and decreases with negative visitor experiences. As described in the previous "Visitor Use and Experience" section, visitor experience is dependent on factors such as the abundance and diversity of the fish and invertebrate community, the size of fishes and invertebrates seen, the amount of fishing-related marine debris, and the amount of fishing-related habitat damage. Thus, the effects (including cumulative effects) of actions under the alternatives would be the same as those analyzed for the "Visitor Use and Experience" section – alternatives having negative effects on visitor use and experience would have a negative effect on the business potential of BNUP (and thus commercial use of the park), those having a neutral effect on visitor use would have a neutral effect on BNUP (and thus commercial use of the park), and those having a positive effect on visitor use would have a positive effect on BNUP (and thus commercial use of the park). For justification of each alternative-specific determination of environmental consequences, see discussion under section 4.5, Visitor Use and Experience.

4.6.1. Alternative 1 - Maintain Status Quo (Adverse; Moderate; Long-term)

Overall, the lack of actions in Alternative 1 would have an appreciable negative effect on visitor use and experience in the park, and thus an appreciable negative effect on the business potential of BNUP and commercial use of the park. This effect would occur for the foreseeable future. Thus, Alternative 1 would likely have a moderate, long-term adverse impact on commercial use of the park.

4.6.2. Alternative 2 - Maintain At or Above Current levels (Negligible)

The actions (or lack of actions) in Alternative 2 would have a neutral impact on visitor use and experience in the park, and thus a neutral effect on the business potential of BNUP (and thus commercial use of the park).

4.6.3. Alternative 3 – Improve Over Current levels (Beneficial; Minor; Long-term)

Overall, the actions in Alternative 3 would likely result in a slight increase, for the foreseeable future, in visitor use and experience in the park, and thus a positive effect on the business potential of BNUP and commercial use of the park. Thus, Alternative 3 would likely have a minor, beneficial, and long-term impact on commercial use of the park.

4.6.4. Alternative 4 (Preferred Alternative)– Rebuild and Conserve Park Fisheries Resources (Beneficial; Moderate; Long-term)

Overall, the actions in Alternative 4 would likely result in an appreciable increase, for the foreseeable future, in visitor use and experience in the park, and thus a positive effect on the business potential of BNUP and commercial use of the park. Thus, Alternative 4

would likely have a beneficial, moderate, and long-term impact on commercial use of the park.

4.6.5. Alternative 5 – Rebuild and Conserve Park Fisheries Resources (Beneficial; Moderate; Long-term)

Overall, the actions in Alternative 5 would likely result in an appreciable increase, for the foreseeable future, in visitor use and experience in the park, and thus a positive effect on the business potential of BNUP and commercial use of the park. Thus, Alternative 5 would likely have a beneficial, moderate, and long-term impact on commercial use of the park.

4.7. Socioeconomics

Socioeconomic impacts could occur because of actions under one or more of the alternatives that affect the numbers of recreational and commercial fishers, the profitability of commercial fishers and guides, the suppliers of recreational and commercial fishers, and other components of the local and regional social and economic structure, as described below.

4.7.1. Alternative 1 - Maintain Status Quo (Negligible)

Alternative 1 represents a continuation of existing fisheries management measures and policies employed within the park. Under this alternative, the current variety and extent of commercial and recreational fishing activities within the park, including guided sport fishing, would continue to occur, or may gradually decline if the fisher is no longer able to catch the targeted species. No regulatory changes would be specifically triggered under this alternative. Data pertaining to populations of fishery-targeted fish and invertebrates, recreational catch and effort, and habitat conditions would continue to be gathered and monitored by BISC. Commercial landings would continue to be monitored through the State of Florida FWC trip ticket system. No short-term effects on the fisheries within the park are anticipated. Under this alternative, commercial and recreational fishing activities within the park would remain unaffected, although the ability of fishers to successfully catch fish will likely decline.

Commercial fishing activities within the park would remain unaffected. From a long-term perspective, the protracted fluctuations in commercial landings over the last several decades and the contraction of the commercial fishing fleet operating within the park as noted in the affected environment section may continue. Such ongoing conditions would represent a negligible economic impact to the region as a whole, but could be considered adverse on either a fishery sector basis or a more localized level within the park-adjacent communities that serve as the residential base for commercial fishermen, homeport for vessel operations, or the location of support activities for the industry, including fish buying/wholesaling/distributing operations and vessel support businesses.

Recreational fishing activities within the park would remain unaffected. Guided sport fishing activities, and commercial boating activities related to recreational fishing activities (primarily charter boats) would also be unaffected under this alternative. The recreational fisheries within the park would continue to attract significant numbers of tourists and residents alike, and these levels of recreational fishing activity and related regional economic expenditure are anticipated to continue.

Expenditures related to commercial and recreational fishing activities within the park can include frequently recurring expenditures such as fishing tackle, bait, boat fuel, clothing, food and beverage supplies, and ice, and are made by both resident and non-resident anglers. They also include less frequent but more substantial expenditures on vessels, engines, trailers, and the like, along with maintenance, repair, and storage/moorage-associated expenditures. Support businesses significantly contribute to the local and regional economy. Under this alternative, commercial and recreational fishing activities

within the park would remain largely unaffected. Expenditures within the various support businesses would remain similarly unaffected.

Communities near Biscayne National Park that support commercial and recreational fishing activities would remain unaffected by this alternative. No short-term effects to the local or regional economy are anticipated. The regional economic impacts as a result of this alternative would be negligible.

Cumulative effects: This alternative continues all current management measures that seek to preserve and improve the natural resources within the park. However, a long-term, significant increase in both local and tourist visitation levels may result in increased pressures on park fisheries, impacting and degrading the ongoing sustainability of the fisheries of the park and their role as a valuable social and economic resource to the region.

Summary: Overall, communities near Biscayne National Park that support commercial and recreational fishing activities would remain unaffected by this alternative. No short-term effects to the local or regional economy are anticipated. The regional economic impacts as a result of this alternative would be negligible. Thus, Alternative 1 would likely have a neutral effect on socioeconomic resources (Negligible).

4.7.2. Alternative 2 - Maintain At or Above Current levels (Negligible)

Alternative 2 would represent only a minor change from current management strategies. Under this alternative, the current variety and extent of commercial and recreational fishing activities within the park, including guided sport fishing, would continue to occur. The primary focus of this alternative is to maintain park fisheries resources and habitat condition at or above current levels, while keeping the recreational harvest and numbers of commercial fishers at or below current levels. No regulatory changes would be specifically triggered under this alternative. Similarly to Alternative 1, data pertaining to populations of fishery-targeted fish and invertebrates, recreational catch and effort, and habitat conditions would continue to be gathered and monitored by Biscayne National Park. Commercial landings would continue to be monitored through the State of Florida FWC trip ticket system. This alternative seeks to maintain existing abundances and size distributions of fishery-targeted fish and invertebrates. This alternative would seek to eliminate the potential negative effects of Alternative 1 related to a long-term loss of fisher and subsequent decline in success of fishing activities.

Recreational fishing activities within the park would remain unaffected on a short-term basis. Guided sport fishing activities, and commercial boating activities related to recreational fishing activities (primarily charter boats) would also be unaffected under this alternative. The recreational fisheries within the park would continue to attract significant numbers of tourists and residents, and these levels of recreational fishing activity and related regional economic expenditure are anticipated to continue. The primary management measures related to recreational fishing activities under this alternative concern a continuation of monitoring the levels of visitor and resident satisfaction of the recreational fishing experience within the park. Specifically, if

satisfaction levels fall below 90 percent (as measured via creel surveys of recreational fishers), Biscayne National Park would endeavor to ascertain the characteristics associated with a satisfactory experience and seek to implement them, if practicable.

While the extent and nature of the measures that would be implemented to improve the recreational fishing experience are unknown, any improvement to the recreational fishing experience within Biscayne National Park, assuming no detriment to the underlying fishery resource would occur as a result, is to be considered a long-term positive social and economic impact to the region. As described in the affected environment section, however, very different recreational fisheries occur in different parts of the park. If area closures were implemented, very different groups would be affected as, for example, shoreline fishery closures would have a greater impact on residents of adjacent communities, while offshore closures would have a greater impact on a more dispersed population. No short-term effects to the local or regional economy are anticipated. The regional economic impacts as a result of this alternative would be negligible.

As described in the Alternative 1 discussion, expenditures related to commercial and recreational fishing activities within the park can include fishing tackle, bait, boat fuel, clothing, food and beverage supplies, and ice and are made by both resident and non-resident anglers. They also include less frequent but more substantial expenditures on vessels, engines, trailers, and the like, along with maintenance, repair, and storage/moorage-associated expenditures. Support businesses significantly contribute to the local and regional economy.

Commercial fishing activities within the park would remain unaffected on a short-term basis. The current variety and extent of commercial fishing activities within the park would continue to occur. Under this alternative, no new commercial fisheries would be allowed to develop within the park, and future numerical growth of commercial fishermen would be prevented. However, on both a short- and long-term basis, impacts related to these measures themselves are considered minor and unlikely to be significant. The imposition of a requisite permit for commercial fishers operating within the park, while incrementally economically adverse to said fishers, is considered a minor localized impact and a negligible regional economic impact.

In relation to commercial fishing activities, potential management measures under this alternative designed to maintain existing abundances and size distributions of fishery-targeted fish and invertebrates could involve increasing minimum harvest sizes, decreasing bag limits, limiting the number of commercial fishers and/or limiting the areas fished within the park. Impacts to commercial fishing activities from these measures, while potentially significant from the perspective of the fishers themselves and to a lesser extent from communities where they are primarily located, would again only represent a negligible economic impact to the region as a whole. As described in the affected environment section, different fisheries take place within different areas of the park. If area closures were considered, which is unlikely, different fisheries (and groups of fishermen and related businesses) would be more or less affected depending upon which areas were closed.

Under this alternative, commercial and recreational fishing activities within the park would remain unaffected on a short-term basis. Long-term impacts related to support services through implementation of potential management actions under this alternative are considered to be minor. Additionally, the recreational fisheries within the park would continue to attract significant numbers of tourists and residents, and these levels of recreational fishing activity and related regional economic expenditure are anticipated to continue. Expenditures within the various support businesses would remain similarly unaffected.

Cumulative effects: This alternative would represent only a minor change from current management strategies that seek to preserve and improve the natural resources within the park. However, a long-term, significant increase in both local and tourist visitation levels may result in increased pressures on park fisheries, impacting and degrading the ongoing sustainability of the fisheries of the park and their role as a valuable social and economic resource to the region.

Summary:
Communities that support commercial and recreational fishing activities could potentially experience minor long-term impacts under this alternative, although increases in recreational fishing participation in tandem with increases in local or regional population size could counteract any negative impacts. No short-term effects to the local or regional economy are anticipated. The regional economic impacts as a result of this alternative would be negligible. Overall, Alternative 2 would likely have a neutral effect on socioeconomic resources (Negligible).

4.7.3. Alternative 3– Improve Over Current levels (Adverse; Minor; Long-term)
Alternative 3 would represent a moderate change from current management strategies. Under this alternative, the variety and extent of commercial and recreational fishing activities within the park would be partially curtailed. The primary focus of this alternative is to improve park fisheries resources of fishery-targeted fish and invertebrates within the park by at least 10 percent above current levels. Several regulatory changes would be specifically triggered under this alternative. Similar to Alternatives 1 and 2, data pertaining to populations of fishery-targeted fish and invertebrates, recreational catch and effort, and habitat conditions would continue to be gathered and monitored by Biscayne National Park. Commercial landings would continue to be monitored through the State of Florida FWC trip ticket system. This alternative seeks to improve existing abundances and size distributions of fishery-targeted fish and invertebrates. To do this, park-specific management actions would be implemented to raise the specific population to their targeted levels.

Under this alternative, the extent and nature of recreational fishing activities within the park would be slightly curtailed on both a short- and long-term basis. Guided sport fishing activities and commercial boating activities related to recreational fishing activities (primarily charter boats) would not be specifically affected under this alternative.

Potential measures to raise fishery populations to their targeted level include increases in minimum harvest sizes, decreases in bag limits, numerical limitation of commercial fishers, and seasonal and/or spatial closures of park areas. While the exact extent and nature of the measures that would be implemented to increase populations to the targeted conditions are unknown, these measures may impact the levels of recreational fishing activities to varying extents within the park. Given the lack of specificity concerning the potential measures (*e.g.*, changes in minimum size and bag limits, the temporal and spatial extent of the park areas that could be closed, or the practicality of numerically limiting recreational fishers), actual impacts to recreational fishing activities are difficult to forecast. As described in the affected environment section, however, very different recreational fisheries occur in different parts of the park. If area closures were implemented, which could be considered, very different groups would be affected. For example, shoreline fishery closures would have a greater impact on residents of adjacent communities, while offshore closures would have a greater impact on a more dispersed population.

Other specific measures related to recreational fishing activities under this alternative include limiting spearfishing to gear lacking a trigger mechanism, prohibiting the use of supplied air equipment (SCUBA or hookah) during spearfishing, and the elimination of the two-day recreational lobster sport season. While spearfishing would continue to be allowed, the mandated equipment restrictions would limit the popularity of the activity and incrementally decrease indirect revenues for businesses that service the spearfishers (such as dive shops). The recreational lobster sport season, while short, is a very popular event that generates a peak of diving activity (and related expenditures at local dive shops). The elimination of the season would substantially reduce recreational fishing within the park over the two-day event.

It is anticipated that even with the additional restrictions in place under this alternative, the recreational fisheries within the park would continue to attract significant numbers of tourists and residents, and significant levels of recreational fishing activity and related regional economic expenditure are anticipated to continue. Recreational fishing activities would continue to provide long-term positive social and economic impacts to the region. Minor short-term effects to the local or regional economy are anticipated. The regional economic impacts as a result of this alternative could range from minor to negligible.

Commercial fishing activities within the park would be moderately affected on both a short-and long-term basis. BISC would work to establish a no-trap zone north and east of Convoy Point in which deployment of commercial or recreational crab traps would not occur. This would directly impact relatively few fishermen. The remaining variety and extent of commercial fishing activities within the park would continue to occur. Additional potential management measures under this alternative designed to increase existing abundances and size distributions of fishery-targeted fish and invertebrates to the stated goals could involve increasing minimum harvest sizes and limiting the number of commercial fishers and/or areas fished within the park. The impact to commercial fishing activities through these measures would be dependent on the specifics and

severity of the restrictions chosen. As described in the affected environment section, different fisheries take place within different areas of the park. If areas were closed, different fisheries (and groups of fishermen and related businesses) would be more or less affected, depending upon which areas were closed.

Under this alternative, no new commercial fisheries would be allowed to develop within the park, and future numerical growth of commercial fishermen would be prevented and possibly reduced through a temporarily non-transferable, "use-or-lose" commercial permit. It is worth noting that previous experience has shown that upon the introduction of a commercial entry limitation permit system, permit holders under threat of losing their permit typically modify their activities, including increasing effort over previously anticipated levels, to keep the permit valid to optimize future returns and/or retain flexibility in decision-making. In effect, the potential measures designed to numerically reduce permit levels through attrition may not, in fact, have the desired effect at least in the short term. The imposition of a fee for the commercial permit, while incrementally economically adverse from the perspective of the fishers themselves and to a lesser extent from communities where they are primarily located, is considered to be a minor localized impact and a negligible regional economic impact.

On both a short- and long-term basis, the significance of the impacts related to these measures is somewhat lessened given the recent contraction of the commercial fishing fleet operating within the park noted in the affected environment section. While the continuation or marked increase of such a decline would represent a negligible economic impact to the region as a whole, it could be potentially significant on an individual operation, fishery sector, or a localized level in the communities that are home to the fishermen, vessels, or related support service activities.

Expenditures related to commercial and recreational fishing activities within the park can include fishing tackle, bait, boat fuel, clothing, food and beverage supplies, and ice, and are made by both resident and non-resident anglers. They also include less frequent but more substantial expenditures on vessels, engines, trailers, and the like, along with maintenance, repair, and storage/moorage-associated expenditures. Support businesses significantly contribute to the local and regional economy.

Under this alternative, commercial and recreational fishing activities within the park may be moderately affected on a short- and long-term basis. Long-term impacts related to commercial fishing support services through implementation of potential management actions under this alternative are considered to be minor.

The recreational fisheries within the park would continue to attract significant numbers of tourists and residents alike, and levels of recreational fishing activity and related regional economic expenditure are anticipated to remain significant. However, several of the park-specific management actions could potentially significantly affect levels of expenditures by recreational fishers among a variety of support businesses. These include impacts to specific support businesses such as dive shops through the gear

restrictions to spearfishing, and the elimination of the 2-day recreational lobster sport season.

Additionally, any impacts related to the potential numerical reduction of recreational fishers, or potential seasonal and/or spatial closures of park areas would be felt across a wide variety of support businesses. Again, given the lack of specificity concerning these potential measures, the extent of actual impacts to the support services sector is difficult if not impossible to calculate.

Cumulative effects: This alternative would represent a moderate change from current management strategies that seek to preserve and improve the natural resources within the park. However, a long-term, significant increase in both local and tourist visitation levels may still result in increased pressures on park fisheries, impacting and degrading the ongoing sustainability of the fisheries of the park and their role as a valuable social and economic resource to the region.

Summary: Communities that support commercial and recreational fishing activities could potentially experience both short- and long-term minor impacts under this alternative. The regional economic impacts as a result of this alternative would be minor, and would occur for the foreseeable future. The effects of actions under Alternative 3 are likely to have a slight negative effect on socioeconomic resources in BISC, and a neutral effect on regional socioeconomic resources. Thus, in general, Alternative 3 would likely have a minor, long-term negative effect on socioeconomic resources (Adverse; Minor; Long-term).

4.7.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Adverse; Minor; Long-term)

Alternative 4 would represent a considerable change from current management strategies. Under this alternative, the variety and extent of commercial and recreational fishing activities within the park would be partially curtailed. The primary focus of this alternative is to improve park fisheries resources of fishery-targeted fish and invertebrates within the park by at least 20 percent above current levels. Several regulatory changes would be specifically triggered under this alternative. Similar to Alternatives 1, 2, and 3, data pertaining to populations of fishery-targeted fish and invertebrates, recreational catch and effort, and habitat conditions would continue to be gathered and monitored by Biscayne National Park. Commercial landings would continue to be monitored through the State of Florida FWC trip ticket system. This alternative seeks to significantly improve existing abundances and size distributions of fishery-targeted fish and invertebrates. To do this, park-specific management actions would be implemented to raise the specific population to their targeted levels.

Under this alternative, the extent and nature of recreational fishing activities within the park would be partially curtailed. Guided sport fishing activities and commercial boating activities related to recreational fishing activities (primarily charter boats) would not be specifically affected under this alternative.

Potential measures to raise fishery populations to their targeted level include increases in minimum harvest sizes, decreases in bag limits, numerical limitation of commercial fishers, and seasonal and/or spatial closures of park areas, including potentially establishing MPA's. While the exact extent and nature of the measures that would be implemented to increase populations to the targeted conditions are unknown, these measures may impact the levels of recreational fishing activities to varying extents within the park. Given the lack of specificity concerning the potential measures (for instance, the temporal and spatial extent of potential closed areas, or the practicality of numerically limiting recreational fishers) actual impacts to recreational fishing activities are difficult if not impossible to calculate.

Other specific measures related to recreational fishing activities under this alternative include limiting spearfishing to gear lacking a trigger mechanism, prohibiting the use of supplied air equipment (SCUBA or hookah) during spearfishing, and the elimination of the 2-day recreational lobster sport season. While spearfishing would continue to be allowed, the mandated equipment restrictions would limit the popularity of the activity and incrementally decrease indirect revenues for businesses that service the spearfishers (such as dive shops). The recreational lobster sport season, while short, is a very popular event that generates a peak of diving activity (and related expenditures at local dive shops). The elimination of the season would substantially reduce recreational fishing within the park over the 2-day event.

It is anticipated that even with the considerable additional restrictions in place under this alternative, the recreational fisheries within the park would continue to attract significant numbers of tourists and residents, and significant levels of recreational fishing activity and related regional economic expenditure are anticipated to continue. Recreational fishing activities would remain a long-term positive social and economic impact to the region. As described in the affected environment section, however, very different recreational fisheries occur in different parts of the park. If area closures were implemented, very different groups would be affected. For example, shoreline fishery closures would have a greater impact on residents of adjacent communities, while offshore closures would have a greater impact on a more dispersed population. Aside from these potential group-specific impacts, only minor short-term effects to the local or regional economy are anticipated. The regional economic impacts as a result of this alternative could range from minor to negligible.

Commercial fishing activities within the park would be moderately affected on both a short-and long-term basis by spatial restrictions. BISC would work to establish a zone north and east of Convoy Point in which deployment of commercial or recreational crab traps would not occur. This would directly impact relatively few fishermen. The remaining variety and extent of commercial fishing activities within the park would continue to occur. Additional potential management measures under this alternative designed to increase existing abundances and size distributions of fishery-targeted fish and invertebrates to the stated goals could involve increasing minimum harvest sizes, limiting the number of commercial fishers and/or areas fished within the park. The

impact to commercial fishing activities through these measures would be dependent on the specifics and severity of the restrictions chosen.

Under this alternative, no new commercial fisheries would be allowed to develop within the park, and future numerical growth of commercial fishermen would be prevented and possibly reduced through a permanently non-transferable, "use-or-lose" commercial permit. It is worth noting that previous experience has shown that upon the introduction of a commercial entry limitation permit system, permit holders under threat of losing their permit typically modify their activities, including increasing effort over previously anticipated levels, to keep the permit valid to optimize future returns and/or retain flexibility in decision-making. In effect, the potential measures designed to numerically reduce permit levels through attrition may not, in fact, have the desired effect at least in the short term, but the feature of making the permits permanently non-transferable may limit this type of short-term "fishing for permit history" behavior. Further, on a short-term basis, the significance of the impacts related to these measures may be ameliorated to a degree, if both overall commercial landings continue to fluctuate over time and the commercial fishing fleet operating within the park continues its trend of decline as noted in the affected environment section.

On a long-term basis, an eventual complete cessation of commercial fishing activity within the park would be predicted under this alternative as a result of implementation of the permanently non-transferable, "use-or-lose" commercial permit. Specific details related to the potential permit system are not available at this point. However, the introduction of such a non-transferable permit system based on individual permit holders would eventually lead to the complete loss of commercial fishing activity within the park over the course of a generation, as currently active fishermen exit the fishery through retirement or otherwise are unable to continue fishing. While the eventual cessation of commercial fishing within Biscayne National Park would represent a negligible economic impact to the region as a whole, it would be potentially significant on an individual operation, fishery sector, or a localized level in the communities that are home to the fishermen, vessels, or related support service activities. It would also represent the end of a traditional way of life for at least some individuals and families.

The imposition of a fee for the commercial permit, while incrementally economically adverse from the perspective of the fishers themselves and to a lesser extent from communities where they are primarily located, is considered to be a minor localized impact and a negligible regional economic impact.

As described in the affected environment section, different fisheries take place within different areas of the park. If areas of the park were closed to commercial fishing, different fisheries (and groups of fishermen and related businesses) would be more or less affected. Until potential area closures are specified, impacts cannot be more closely defined.

Expenditures related to commercial and recreational fishing activities within the park can include fishing tackle, bait, boat fuel, clothing, food and beverage supplies, and ice and

are made by both resident and non-resident anglers. They also include less frequent but more substantial expenditures on vessels, engines, trailers, and the like, along with maintenance, repair, and storage/moorage associated expenditures. Support businesses significantly contribute to the local and regional economy.

Under this alternative, commercial and recreational fishing activities within the park may be moderately affected on a short- and long-term basis. Long-term impacts related to commercial fishing support services through implementation of potential management actions under this alternative are considered to be minor given contraction of the commercial fishing fleet operating within the park.

The recreational fisheries within the park would continue to attract significant numbers of tourists and residents alike, and levels of recreational fishing activity and related regional economic expenditure are anticipated to remain significant. However, several of the park-specific management actions could potentially significantly affect levels of expenditures by recreational fishers among a variety of support businesses. These include impacts to specific support businesses such as dive shops due to the prohibition of spearfishing and the elimination of the 2-day recreational lobster sport season.

Additionally, any impacts related to the potential numerical reduction of recreational fishers, or seasonal and/or spatial closures of park areas, would be felt across a wide variety of support businesses. Successfully increasing abundance and sizes of fishes may increase non-extractive park uses, such as SCUBA diving and snorkeling, and thus increase the economic impact of those activities. Given the lack of specificity concerning these potential measures, the extent of actual impacts to the support services sector is difficult to calculate.

Cumulative effects: This alternative would represent a considerable change from current management strategies that seek to preserve and improve the natural resources within the park. However, a long-term, significant increase in both local and tourist visitation levels may still result in increased pressures on park fisheries impacting/degrading the ongoing sustainability of the fisheries resource of the park and its role as a valuable social and economic resource to the region.

Summary:
Communities that support commercial and recreational fishing activities could potentially experience both short- and long-term impacts under this alternative. The regional economic impacts as a result of this alternative would be minor. The effects of actions under Alternative 4 are likely to have a slight to appreciable negative effect on local socioeconomic resources (depending on what regulatory changes occur) for the foreseeable future, and a neutral effect on regional socioeconomic resources. Thus, in general, Alternative 4 would likely have a minor, long-term negative effect on socioeconomic resources (Adverse; Minor; Long-term).

4.7.5. Alternative 5 – Restore Park Fisheries Resources (Adverse; Minor; Long-term)
Alternative 5 would represent a considerable change from current management strategies. Under this alternative, the variety and extent of commercial and recreational fishing activities within the park would be partially curtailed. The primary focus of this alternative is to improve the abundances and sizes of fishery-targeted fish and invertebrates to within 20 percent of historic, unexploited levels. Several regulatory changes would be specifically triggered under this alternative. Similar to the other four alternatives, data pertaining to populations of fishery-targeted fish and invertebrates, recreational catch and effort, and habitat conditions would continue to be gathered and monitored by Biscayne National Park. Commercial landings would continue to be monitored through the State of Florida FWC trip ticket system. This alternative seeks to significantly improve existing abundances and size distributions of fishery-targeted fish and invertebrates. To do this, park-specific management actions would be implemented to raise the specific population to their targeted levels.

Under this alternative, the extent and nature of recreational fishing activities within the park would be substantially impacted due to efforts to increase abundance and size of targeted species. Guided sport fishing activities and commercial boating activities related to recreational fishing activities (primarily charter boats) would not be specifically affected under this alternative.

Potential measures to raise fishery populations to their targeted level include substantial increases in minimum harvest sizes (which could effectively turn the fishery into a catch-and-release only fishery for several years), decreases in bag limits, limited entry for commercial fishers, seasonal and/or spatial closures, and a temporary moratorium on all fishing activity in BISC. While the exact extent and nature of the measures that would be implemented to increase populations to the targeted conditions are unknown, these measures may impact the levels of recreational fishing activities to varying extents within the park. Given the lack of specificity concerning the potential measures (for instance, the temporal and spatial extent of potential closed areas, or the practicality of numerically limiting recreational fishers) actual impacts to recreational fishing activities are difficult to calculate. However, because strict regulation changes reducing the returns a fisher receives from a day of fishing might discourage many fishers, indirect revenues for businesses for businesses that service fishers might suffer.

Other specific measures related to recreational fishing activities under this alternative include prohibiting spearfishing, and the elimination of the 2-day recreational lobster sport season. The prohibition of spearfishing would reduce the levels of recreational fishing activity within the park as well as incrementally decrease indirect revenues for businesses that previously serviced the spearfishers. The recreational lobster sport season, while short, is a very popular event that generates a peak of diving activity and related expenditures at local dive shops. The elimination of the season would substantially reduce recreational fishing within the park over the 2-day event.

It is anticipated that even with the considerable additional restrictions in place under this alternative, the recreational fisheries within the park would continue to attract significant

numbers of tourists and residents, and significant levels of recreational fishing activity and related regional economic expenditure are anticipated to continue. Recreational fishing activities would remain a long-term positive social and economic impact to the region. As described in the affected environment section, however, very different recreational fisheries occur in different parts of the park. If area closures were implemented, very different groups would be affected. For example, shoreline fishery closures would have a greater impact on residents of adjacent communities, while offshore closures would have a greater impact on a more dispersed population. Aside from these potential group-specific impacts, only minor short-term effects to the local or regional economy are anticipated. The regional economic impacts as a result of this alternative could range from minor to negligible.

Commercial fishing activities within the park would be moderately affected on both a short-and long-term basis by spatial restrictions. BISC would work to establish a zone north and east of Convoy Point in which deployment of commercial or recreational crab traps would not occur. This would directly impact relatively few fishermen. The remaining variety and extent of commercial fishing activities within the park would continue to occur. Additional potential management measures under this alternative designed to increase existing abundances and size distributions of fishery-targeted fish and invertebrates to the stated goals could involve increasing minimum harvest sizes, limiting the number of commercial fishers and/or areas fished within the park. The impact to commercial fishing activities through these measures would be dependent on the specifics and severity of the restrictions chosen.

Under this alternative, no new commercial fisheries would be allowed to develop within the park, and future numerical growth of commercial fishermen would be prevented and possibly reduced through a permanently non-transferable, “use-or-lose” commercial permit. It is worth noting that previous experience has shown that upon the introduction of a commercial entry limitation permit system, permit holders under threat of losing their permit typically modify their activities, including increasing effort over previously anticipated levels, to keep the permit valid to optimize future returns and/or retain flexibility in decision-making. In effect, the potential measures designed to numerically reduce permit levels through attrition may not, in fact, have the desired effect at least in the short term, but the feature of making the permits permanently non-transferable may limit this type of short-term “fishing for permit history” behavior. Further, on a short-term basis, the significance of the impacts related to these measures may be ameliorated to a degree, if both overall commercial landings continue to fluctuate over time and the commercial fishing fleet operating within the park continues its trend of decline as noted in the affected environment section.

On a long-term basis, an eventual complete cessation of commercial fishing activity within the park would be predicted under this alternative as a result of implementation of the permanently non-transferable, “use-or-lose” commercial permit. Specific details related to the potential permit system are not available at this point. However, the introduction of such a non-transferable permit system based on individual permit holders would eventually lead to the complete loss of commercial fishing activity within the park

over the course of a generation, as currently active fishermen exit the fishery through retirement or otherwise are unable to continue fishing. While the eventual cessation of commercial fishing within Biscayne National Park would represent a negligible economic impact to the region as a whole, it would be potentially significant on an individual operation, fishery sector, or a localized level in the communities that are home to the fishermen, vessels, or related support service activities. It would also represent the end of a traditional way of life for at least some individuals and families.

The imposition of a fee for the commercial permit, while incrementally economically adverse from the perspective of the fishers themselves and to a lesser extent from communities where they are primarily located, is considered to be a minor localized impact and a negligible regional economic impact.

As described in the affected environment section, different fisheries take place within different areas of the park. If areas of the park were closed to commercial fishing, different fisheries (and groups of fishermen and related businesses) would be more or less affected. Until potential area closures are specified, impacts cannot be more closely defined.

Expenditures related to commercial and recreational fishing activities within the park can include fishing tackle, bait, boat fuel, clothing, food and beverage supplies, ice, and lodging. These expenditures are made by both resident and non-resident anglers. They also include less frequent but more substantial expenditures on vessels, engines, trailers, and the like, along with maintenance, repair, and storage/moorage associated expenditures. Support businesses significantly contribute to the local and regional economy.

Under this alternative, commercial and recreational fishing activities within the park may be moderately affected on a short- and long-term basis. Long-term impacts related to commercial fishing support services through implementation of potential management actions under this alternative are considered to be minor given contraction of the commercial fishing fleet operating within the park. Additionally, it should be considered that in light of increasing fishing regulations that might decrease fishing effort, park users may opt to expend their funds and efforts on alternate park activities, such as boating, snorkeling, swimming, and diving. In this case, indirect revenues for businesses that provide goods and services related to these non-fishing activities may be increased.

The recreational fisheries within the park would continue to attract significant numbers of tourists and residents alike, and levels of recreational fishing activity and related regional economic expenditure are anticipated to remain significant. However, several of the park-specific management actions could potentially significantly affect levels of expenditures by recreational fishers among a variety of support businesses. These include impacts to specific support businesses such as dive shops due to the prohibition of spearfishing and the elimination of the 2-day recreational lobster sport season.

Additionally, any impacts related to the potential numerical reduction of recreational fishers, or seasonal and/or spatial closures of park areas, would be felt across a wide variety of support businesses. Again, given the lack of specificity concerning these potential measures, the extent of actual impacts to the support services sector is difficult to calculate. Furthermore, should fishing activity be replaced by alternative park use activities, impacts may be negligible or compensated. Successfully increasing abundance and sizes of fishes may increase non-extractive park uses, such as SCUBA diving and snorkeling, and thus increase the economic impact of those activities.

Cumulative effects: This alternative would represent a considerable change from current management strategies that seek to preserve and improve the natural resources within the park. However, a long-term, significant increase in both local and tourist visitation levels may still result in increased pressures on park fisheries impacting/degrading the ongoing sustainability of the fisheries resource of the park and its role as a valuable social and economic resource to the region.

Summary:
Communities that support commercial and recreational fishing activities could potentially experience both short- and long-term adverse impacts under this alternative. The regional economic impacts as a result of this alternative would be minor. The effects of actions under Alternative 5 are likely to have a slight to appreciable negative effect on local socioeconomic resources (depending on what regulatory changes occur) for the foreseeable future, and a neutral effect on regional socioeconomic resources. Thus, in general, Alternative 5 would likely have a minor, long-term adverse effect on socioeconomic resources (Adverse; Minor; Long-term).

4.8. Benthic Habitats and Communities

4.8.1. Coral Reef

The coral reef and the benthic organisms that comprise the reef can be affected both directly and indirectly by actions proposed under the FMP. Direct impacts include damage from five factors: (1) stone crab and lobster traps and trap debris, (2) hook-and-line debris, (3) snorkelers and divers, including lobster harvesters and spearfishers, (4) boat groundings on shallow reefs, and (5) anchor damage to reefs. Indirect impacts result from the harvest of targeted species from park waters, which in turn may affect reef community structure due to ecological cascades and phase shifts caused by removal of predators, prey, or competitors in the food web by fishing (Pinnegar et al. 2000, Dulvy et al. 2004). In most cases, the effects of fishing via ecological cascades on coral reef communities are very difficult to separate from the effects of other environmental factors, particularly if there are no comparable control sites for comparison where fishing is not allowed.

4.8.1.1. Alternative 1 - Maintain Status Quo (Adverse; Moderate; Long-term)

Under Alternative 1, damage to coral reefs in BISC from traps, trap debris, hook-and-line debris, snorkelers and divers, boat groundings, and anchor damage would continue at current levels, and could increase if the activities causing each of the five factors increased, as would be possible under Alternative 1, given human population growth trends and predictions. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would continue at current levels, and would likely increase as recreational fishing levels increase (as they are predicted to do; see chapter 1).

Cumulative effects: Changes in fishing effort and fishing regulations in waters outside BISC could alter reef fish and invertebrate community structure in those waters, which in turn could affect reef fish community structure in BISC waters due to reproductive connections between fish or invertebrates in waters outside BISC and those in BISC, or to movement of fish or invertebrates across park boundaries. Such a change in community structure could affect the coral reef and the benthic organisms that comprise the reef through ecological cascades. Without knowing how fishing effort and fishery regulations will change in waters outside BISC, it is impossible to determine whether such cumulative effects will occur.

The coral reef and the benthic organisms that comprise the reef could also be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, and potentially alter water quality on the coral reef tract. It is unlikely that the reef tract will directly experience the impacts of CERP-produced salinity changes. However it is possible that responses to salinity changes by larval and juvenile stages of fishes and invertebrates in the bay could

eventually translate into beneficial changes in occurrences and abundances of these species as adults on the reef tract. These changes cannot be predicted, however, since the type, magnitude, and direction of such hydrological changes are currently unknown.

Thus, the cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the coral reef and the benthic organisms that comprise the reef because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would make no changes to current fishery management activities, Alternative 1 is anticipated to have a moderate adverse effect on coral reefs.

Summary: Overall effects of actions (or lack thereof) in Alternative 1 on coral reefs would likely lead to an appreciable increase in impacts over time. Thus, Alternative 1 would likely have a moderate, long-term adverse impact on coral reefs in BISC, although this impact would be unlikely to result in impairment of the resource over time (Adverse; Moderate; Long-term).

4.8.1.2. Alternative 2 - Maintain At or Above Current levels (Negligible)

Under Alternative 2, damage to coral reefs from traps, trap debris, and hook-and-line debris would be maintained at or below current levels, since debris associated with commercial and recreational fishing would be maintained at or below current levels under this alternative, and since numbers of commercial fishers would be capped at current levels under the proposed permit system. Damage to coral reefs from snorkelers and divers, boat groundings, and anchor damage would continue at current levels, and could increase if the activities causing each of the five factors increased, as would be possible under Alternative 2, given human population growth trends and predictions. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely remain at current levels, as fished populations would be maintained at current levels under this Alternative.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to coral reefs because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers minimal potential to reduce impacts to coral reefs, Alternative 2 is anticipated to have negligible effects on coral reefs.

Summary: Overall effects of actions (or lack thereof) in Alternative 2 on coral reefs would likely lead to a minimal potential for change in impacts from current levels, and thus are concluded to be neutral and not cause impairment (Negligible).

4.8.1.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
Under Alternative 3, damage from traps, trap debris, and hook-and-line debris would be maintained as in Alternative 2 (although damage could be reduced slightly if the number of commercial fishers decreased), and for factor 1 could be further reduced due to the establishment of Coral Reef Protection Areas (CRPA's). Damage from divers and snorkelers would be reduced as the number of divers is reduced via the termination of the two-day recreational lobster sport season and by restrictions on spearfishing. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely decrease from current levels, as the abundance and population density of fished populations would be increased by 10% under this Alternative.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to coral reefs because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers minimal changes to current fishing-related activities, minor beneficial impacts to coral reefs are anticipated under Alternative 3.

Summary: Overall effects of actions in Alternative 3 on coral reefs would likely lead to a slight decrease in impacts for the foreseeable future. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on coral reefs (Beneficial; Minor; Long-term).

4.8.1.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Moderate; Long-term)
Under Alternative 4, damage to coral reefs from traps, trap debris, and hook-and-line debris initially would be the same as under Alternative 3. Over a period of years, damage would likely decrease relative to that under Alternative 3 due to a decrease in the number of commercial fishers as a result of the permanently non-transferable commercial permit system. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely decrease moderately from current levels, as the abundance and population density of fished populations would be increased by 20% under this Alternative.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to coral reefs because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers considerable changes to current fishing-related activities, moderate beneficial impacts to coral reefs are anticipated under Alternative 4.

Summary: Overall effects of actions in Alternative 4 on coral reefs would likely lead to an appreciable decrease in impacts for the foreseeable future. Thus, Alternative 4 would

not cause impairment and would likely have a moderate, long-term beneficial effect on coral reefs (Beneficial; Moderate; Long-term).

4.8.1.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Moderate; Long-term)

Under Alternative 5, damage to coral reefs from traps, trap debris, and hook-and-line debris initially would be the same as under Alternatives 3 and 4. Over a period of years, damage would likely decrease relative to that under Alternatives 3 and 4 due to a decrease in the number of commercial fishers as a result of the permanently non-transferable commercial permit system. Damage from snorkelers and divers would be reduced to a greater extent than in Alternatives 3 and 4 due to the prohibition of spearfishing. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely decrease moderately from current levels, as the abundance and population density of fished populations would be improved to be more representative of historic, unexploited levels.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to coral reefs because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers the most considerable changes to current fishing-related activities, moderate beneficial impacts to coral reefs are anticipated under Alternative 5.

Summary: Overall effects of actions in Alternative 5 on coral reefs would likely lead to an appreciable decrease in impacts for the foreseeable future. Thus, Alternative 5 would not cause impairment and would likely have a moderate, long-term beneficial effect on coral reefs (Beneficial; Moderate; Long-term).

4.8.2. The Bay

The benthic habitats of the bay and associated benthic organisms are affected by three main factors that may be altered in intensity through actions proposed in the alternatives. These factors are damage associated with (1) roller-frame shrimp trawls, (2) blue crab and stone crab traps and trap debris, and (3) vessel groundings.

Roller-frame trawling activity is typically concentrated over seagrass beds, where impacts to the grass and benthos are relatively minor as long as the roller mechanisms on the trawls are functional (J. Serafy, NOAA NMFS, pers. comm.). If hardbottom areas are trawled, hardbottom benthos such as sponges and corals (hard and soft) are dislodged from the hardbottom, resulting in their mortality. Regrowth in trawled areas can take years (Tilmant 1979). Similarly, in mixed-seagrass / hardbottom areas, trawling can have a significant negative impact on the benthos.

Crab traps, particularly those lost or abandoned by trap owners, and trap debris can injure or kill seagrass and hardbottom benthos (sponges and corals) by blocking light or by smothering grass or organisms on which traps sit (Ault 1997).

Boats operating in shallow waters can scar seagrass beds, and grounded boats attempting to "power off" grass flats can create large "blow-outs" (Fig. 7). Both types of injury can take years to recover, or may not recover without restoration efforts.

4.8.2.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)
Under Alternative 1, damage to benthic habitats of the bay from roller frame trawling, crab traps and trap debris, and vessel groundings would continue at current levels, and could increase if the activities causing each of the three factors increased, as would be possible under Alternative 1, given human population growth trends and predictions.

Cumulative effects: The benthic habitats of the bay could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, which in turn would likely result in the change of nearshore seagrass communities from those characteristic of high salinities to those characteristic of estuarine salinities (*i.e.*, a change in the structure, but not coverage or function, of nearshore seagrass communities), and the potential loss of some sponge and coral species from relatively nearshore hardbottom habitats.

Thus, the cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the bay because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would make no changes to current fishery management activities, Alternative 1 is anticipated to have a minor adverse effect on the bay.

Summary: Overall effects of actions in Alternative 1 on benthic habitats and associated benthic organisms of the bay would likely lead to a slight increase in impacts to these habitats and associated organisms for the foreseeable future. Thus, Alternative 1 would likely have a minor, long-term adverse impact on benthic habitats and associated benthic organisms of the bay (Adverse; Minor; Long-term), and would not impact the resource to the extent it would cause impairment.

4.8.2.2. Alternative 2 – Maintain At or Above Current Levels (Negligible)
Under Alternative 2, damage to benthic habitats of the bay from roller frame trawling would likely remain at or below current levels, since numbers of commercial fishers (and therefore roller-frame trawlers) would be capped at current levels under the proposed permit system (although the permitted trawlers could increase their trawling frequency

under the permit system, which would have the same effect as an increase in number of trawlers). Additionally, NPS would implement a trawl inspection program under this Alternative (as well as under Alternatives 3 and 4), which would help to minimize trawl damage to benthic habitats. Damage to benthic habitats from crab traps and trap debris would be maintained at current levels under this alternative, since debris associated with commercial and recreational fishing would be maintained at or below current levels (although the number of fished traps, which can also damage the benthos, would not be affected). Damage to benthic habitats of the bay from vessel groundings would continue at current levels, and could increase if the number of park visitors increased as expected given current population growth trends.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the bay because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers minimal potential to reduce impacts to the bay, Alternative 2 is anticipated to have negligible effects on the bay.

Summary: Overall effects of actions in Alternative 2 on benthic habitats and associated benthic organisms of the bay would likely lead to minimal potential for a change in impacts to these habitats and associated organisms, and thus are concluded to be neutral and not causing impairment (Negligible).

4.8.2.3. Alternative 3 – Improve Over Current levels (Negligible)

Under Alternative 3, damage to benthic habitats of the bay from roller frame trawling would be the same as described for Alternative 2. Damage to benthic habitats from crab traps and trap debris could decrease if the number of commercial permits declined due to the 5-year non-transferable clause, although this effect could be offset if remaining commercial fishers increased the number of traps they fished. The non-trap-deployment zone around park headquarters at Convoy Point would potentially decrease habitat damage associated with traps within the zone, but any traps that would have been in the zone would likely be re-deployed outside the zone, causing habitat damage there and balancing the decrease of habitat damage in the zone.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the bay because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers minimal changes to current fishing-related activities, negligible impacts to the bay are anticipated under Alternative 3.

Summary: Overall effects of actions in Alternative 3 on benthic habitats and associated benthic organisms of the bay would likely lead to minimal potential for a change in

impacts to these habitats and associated organisms, and thus are concluded to be neutral and not causing impairment (Negligible).

4.8.2.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Moderate; Long-term)

Under Alternative 4, damage to benthic habitats of the bay from roller frame trawling would be reduced if the proposed no-trawl zone was created. Damage to benthic habitats from crab traps and trap debris would decrease over time due to the eventual loss of the commercial non-transferable permits. The non-trap-deployment zone around park headquarters at Convoy Point would have the same effect (neutral) as described under Alternative 3.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the bay because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers considerable changes to current fishing-related activities, minor beneficial impacts to the bay are anticipated under Alternative 4.

Summary: Overall effects of actions in Alternative 4 on benthic habitats and associated benthic organisms of the bay would likely lead to a slight decrease in impacts to these habitats and associated organisms for the foreseeable future. Thus, Alternative 4 would not cause impairment and would likely have moderate, long-term beneficial effect on benthic habitats and associated benthic organisms of the bay (Beneficial; Moderate; Long-term).

4.8.2.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Moderate; Long-term)

Under Alternative 5, damage to benthic habitats of the bay from roller frame trawling would be reduced if the proposed no-trawl zone was created. As in Alternative 4, damage to benthic habitats from crab traps and trap debris would decrease over time due to the eventual loss of the commercial non-transferable permits. The non-trap-deployment zone around park headquarters at Convoy Point would have the same effect (neutral) as described under Alternative 3.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to the bay because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers considerable changes to current fishing-related activities, particularly the proposed creation of a no-trawl zone, moderate beneficial impacts to the bay are anticipated under Alternative 5.

Summary: Overall effects of actions in Alternative 5 on benthic habitats and associated benthic organisms of the bay would likely lead to a slight decrease in impacts to these habitats and associated organisms for the foreseeable future. Thus, Alternative 5 would not cause impairment and would likely have a moderate, long-term beneficial effect on benthic habitats and associated benthic organisms of the bay (Beneficial; Moderate; Long-term).

4.8.3. The Mangrove Shoreline

Mangrove habitats would not be directly affected by actions in any of the alternatives.

4.8.3.1. Alternatives 1-5 (Negligible)

None of the actions proposed under Alternatives 1-5 would affect the structure or function of mangrove habitats, resulting in neutral effects (and no impairment) of each of the alternatives on mangrove resources.

4.9. Threatened or Endangered Species

4.9.1. Florida manatee

Manatees may be affected in two ways by actions occurring under one or more of the alternatives. First, manatees may be injured or killed from being hit by boats. A large proportion of manatees observed in the park have propeller scars on their "backs" (dorsal sides; GT Kellison, pers. observation). Second, behavior (*e.g.*, feeding or mating) of manatees may be affected by noise from combustion-powered boats (suggested by Nowacek 2005), which may directly or indirectly affect individual or population health. However, most manatee sightings within BISC occur during the winter months, which coincides with reduced recreational and guide fishing activity. Thus, this plan would have only minor effects on manatees.

4.9.1.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)

No actions that would occur under Alternative 1 would be expected to affect manatees in the park. Manatees would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. If park use increased (as it is expected to do given local increases in human population), then boat activity would likely continue to increase, resulting in increases in both boat-related injuries and potential alteration of behaviors affecting individual or population health.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, although no actions in Alternative 1 would adversely affect manatees, the lack of actions in Alternative 1 on manatee populations in the park is likely to result in a slight increase for the foreseeable future in boat-manatee collisions and in behavioral alterations affecting individual or population health. Thus, Alternative 1 would likely have a minor, long-term negative effect on manatees (Adverse; Minor; Long-term), but would not impact the resource to the extent it would cause impairment.
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.1.2. Alternative 2 - Maintain At or Above Current levels (Adverse; Minor; Long-term)

As in Alternative 1, manatees would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. These negative effects would likely increase if park visitation increased, as it is likely to do. The establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in manatee impacts via collision or disturbance. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if the reduction in guides was equal to or less than increases in fishing activity related to area population growth.

No other actions that would occur under Alternative 2 would be expected to affect manatees in the park.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, although no actions in Alternative 2 would adversely affect manatees, the lack of actions in Alternative 2 on manatee populations in the park is likely to result in a slight increase for the foreseeable future in boat-manatee collisions and in potential behavioral alterations affecting individual or population health. Thus, Alternative 2 would likely have a minor, long-term negative effect on manatees (Adverse; Minor; Long-term), but would not impact the resource to the extent it would cause impairment.
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA)

4.9.1.3 Alternative 3– Improve Over Current levels (Negligible)
Under Alternative 3, manatees would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. The implementation of commercial permit system could decrease the number of commercial fishers potentially reducing the frequency of boat-manatee interactions in the park. It is also possible that recreational boaters could continue to increase in tandem with local human population size, and that remaining commercial fishers could increase their on-water activity, both of which could increase boat-manatee interactions. As in Alternative 2, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in manatee impacts via collision or disturbance. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if the reduction in guides was equal to or less than increases in fishing activity related to area population growth. The discontinuation of the two-day spiny lobster recreational season would result in a decrease in numbers of boaters in BISC waters during those two days, and thus result in potential decreases in boat-manatee collisions and potential alterations of manatee behavior that directly affect individual or group population health. However, this could be offset if lobster fishing efforts were increased during the regular season in response to the closed mini-season.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, while the effects of actions under Alternative 3 on manatees in BISC are difficult to predict, they would most likely not impair on manatee populations in the park (Negligible).
Endangered Species Act Section 7 Effect Determination: May affect, not likely to adversely affect (NLAA).

4.9.1.4 Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)
Under Alternative 4, manatees would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. The number of commercial fishers would almost surely decline over time, due to the “forever non-transferable” commercial permit. This reduction in number of commercial fishers could likely result in a decrease in interactions between commercial vessels and manatees, although the effects of

commercial fishers on manatees will be negligible since there are only a few commercial fishers operating in the park. As in Alternatives 2 and 3, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in manatee impacts via collision or disturbance. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system or if the reduction in guides was equal to or less than increases in fishing activity related to area population growth. As in Alternative 3, the discontinuation of the two-day spiny lobster recreational season would result in a decrease in numbers of boaters in BISC waters during those two days, and thus result in likely decreases in boat-manatee collisions and potential alterations of manatee behavior that directly affect individual or group population health.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of actions under Alternative 4 are likely to have a slight positive effect on manatee populations in BISC for the foreseeable future. Thus, Alternative 4 would not cause impairment and would likely have a minor, long-term positive effect on manatees (Beneficial; Minor; Long-term).
Endangered Species Act Section 7 Effect Determination: May affect, not likely to adversely affect (NLAA).

4.9.1.5 Alternative 5 – Restore Park Fisheries Resources (Beneficial; Minor; Long-term)
Under Alternative 5, manatees would continue to be adversely affected by boat traffic (via collision and disturbance) in the park. The number of commercial fishers would almost surely decline over time, due to the “forever non-transferable” commercial permit. This reduction in number of commercial fishers would likely result in a decrease in interactions between commercial vessels and manatees. As in Alternatives 2 -4, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in manatee impacts via collision or disturbance. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if the reduction in guides was equal to or less than increases in fishing activity related to area population growth. As in Alternative 3, the discontinuation of the two-day spiny lobster recreational season would result in a decrease in numbers of boaters in BISC waters during those two days, and thus result in likely decreases in boat-manatee collisions and potential alterations of manatee behavior that directly affect individual or group population health. Additionally, the prohibition of spearfishing in the park could result in a reduction in boaters in the park, further reducing boat-manatee collisions and potential alterations of manatee behavior that directly affect individual or group population health.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of actions under Alternative 5 are likely to have a slight beneficial effect on manatee populations in BISC for the foreseeable future. Thus,

Alternative 5 would not cause impairment and would likely have a minor, long-term beneficial effect on manatees (Beneficial; Minor; Long-term).
Endangered Species Act Section 7 Effect Determination: May affect, not likely to adversely affect (NLAA).

4.9.2 Sea turtles
Sea turtles may be affected in three ways by actions managed under one or more of the alternatives. First, sea turtles may be injured or killed from being hit by boats (Fig. 8A). Second, feeding, mating and nesting behavior of sea turtles may be affected by noise from combustion-powered boats, directly or indirectly affecting individual or population health. Third, sea turtles may be injured or killed from fouling with fishing gear. For example, sea turtles may become tangled in the buoy lines of crab and lobsters traps, and subsequently drown (Fig. 8C). The effects of these actions on sea turtles were reviewed by the National Marine Fisheries Service (NMFS) as part of their Threatened and Endangered Species Section 7 formal consultation (See Chapter 5.2 for more details). NMFS issued a Biological Opinion (see **Appendix 10**) in which it was determined that the nature and extent of activities carried out in the park will result in "take" (which is broadly defined as the act of harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any such conduct) of sea turtles and that this take will occur under all alternatives. However, anticipated impacts will be at a level that will not jeopardize the continued existence of sea turtles. Implementation of the Terms and Conditions set forth in NMFS' Biological Opinion (see Section 5.5 and **Appendix 10**) will minimize the extent of take. Implementation of Alternative 4 (the Preferred Alternative) is expected to result in a reduction in impacts to sea turtles when compared to the environmental baseline.

4.9.2.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)
No actions that would occur under Alternative 1 would be expected to change the status of effects to sea turtles in the park. Sea turtles would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. If park visitation increased (as is expected given local increases in human population), then boat activity would likely continue to increase, resulting in increases in both boat-related injuries and potential alteration of behaviors affecting individual or population health. Because Leatherback and Kemp's Ridley sea turtles are rarely seen in the park, these species would be less likely to be affected than Loggerhead, Hawksbill and Green sea turtles.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, although no actions in Alternative 1 would adversely affect sea turtles, the lack of actions under Alternative 1 would have a slight adverse effect on sea turtle populations in BISC for the foreseeable future. Thus, Alternative 1 would likely have a minor, long-term negative effect on sea turtle populations, but would not impact the resource to the extent it would cause impairment (Adverse; Minor; Long-term).
Endangered Species Act Section 7 Effect Determinations: May affect, is likely to adversely affect (LAA) Loggerhead, Hawksbill and Green sea turtles, but is not likely to

jeopardize their continued existence; May affect, not likely to adversely affect (NLAA) Leatherback and Kemp's Ridley sea turtles.

4.9.2.2. Alternative 2 - Maintain At or Above Current levels (Negligible)
As in Alternative 1, sea turtles would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. These negative effects would likely increase if park visitation increased, as it is likely to do. The establishment of the commercial permit system could result in a reduction in number of commercial fishers in the park, which could lead to (1) a reduction in boat-turtle collisions and (2) a reduction in lobster and crab traps, and thus a reduction in the frequency of turtle-trap fouling interactions. However, this effect could be offset if remaining commercial fishers increased their fishing activity. The establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-turtle collisions. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. The plan to take action to maintain fishing gear-associated debris at or below current levels (*i.e.*, action is taken if debris densities rise above current levels) would have at worst a neutral effect on the frequency of turtle-trap fouling interactions, and possibly a positive effect (if debris densities were reduced below current levels). Because Leatherback and Kemp's Ridley sea turtles are rarely seen in the park, these species would be less likely to be affected than Loggerhead, Hawksbill and Green sea turtles.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the benefits of actions in Alternative 2 are likely to counter the adverse effects likely associated with increasing human population growth and related increase in park usage. Thus, Alternative 2 would not cause impairment and would most likely have a negligible effect on sea turtle populations in the park (Negligible). Endangered Species Act Section 7 Effect Determinations: May affect, is likely to adversely affect (LAA) Loggerhead, Hawksbill and Green sea turtles, but is not likely to jeopardize their continued existence; May affect, not likely to adversely affect (NLAA) Leatherback and Kemp's Ridley sea turtles.

4.9.2.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
As in previous alternatives, under Alternative 3 sea turtles would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. The establishment of a commercial permits could decrease the number of commercial fishers, potentially reducing the frequency of boat-turtle collisions in the park, and decreasing the frequency of turtle-trap fouling interactions from lobster or crab traps. However, it is also possible that recreational boaters could continue to increase in tandem with local human population size, which could increase boat-turtle interactions associated with recreational fishers. The establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-turtle interactions. However, this effect could be offset if

the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. The discontinuation of the two-day spiny lobster recreational season would result in a decrease in numbers of boaters in BISC waters during those two days, and thus result in potential decreases in boat-turtle collisions and potential alterations of turtle behavior that directly affect individual or group population health. As in Alternative 2, the plan to take action to maintain fishing gear-associated debris at or below current levels (*i.e.*, action is taken if debris densities rise above current levels) would have at worst a neutral effect on the frequency of turtle-trap fouling interactions, and possibly a positive effect (if debris densities were reduced below current levels). Because Leatherback and Kemp's Ridley sea turtles are rarely seen in the park, these species would be less likely to be affected than Loggerhead, Hawksbill and Green sea turtles.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, while the effects of actions under Alternative 3 on sea turtle populations in BISC are difficult to predict, they would most likely lead to a slightly beneficial effect for the foreseeable future. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on sea turtle populations in BISC (Beneficial; Minor; Long-term).
Endangered Species Act Section 7 Effect Determinations: May affect, is likely to adversely affect (LAA) Loggerhead, Hawksbill and Green sea turtles, but is not likely to jeopardize their continued existence; May affect, not likely to adversely affect (NLAA) Leatherback and Kemp's Ridley sea turtles.

4.9.2.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)

Under Alternative 4, sea turtles would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. The number of commercial fishers would almost surely decline over time, due to the "forever non-transferable" commercial permit, resulting in reductions in interactions between commercial vessels and sea turtles, and in turtle-trap fouling interactions. As in Alternatives 2 and 3, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-turtle interactions. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. The discontinuation of the two-day spiny lobster recreational season and the plan to take action to maintain fishing gear-associated debris at or below current levels would have the same effect as described in Alternative 3. The creation of a no-trawl zone in the bay, as proposed in this alternative, could be beneficial to sea turtles by improving forage grounds within the zone. Because Leatherback and Kemp's Ridley sea turtles are rarely seen in the park, these species would be less likely to be affected than Loggerhead, Hawksbill and Green sea turtles.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of actions under Alternative 4 are likely to have a slight beneficial effect on sea turtle populations in BISC for the foreseeable future. Thus, Alternative 4 would not cause impairment and would likely have a minor, long-term beneficial effect on sea turtle populations in BISC (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determinations: May affect, is likely to adversely affect (LAA) Loggerhead, Hawksbill and Green sea turtles, but is not likely to jeopardize their continued existence; May affect, not likely to adversely affect (NLAA) Leatherback and Kemp's Ridley sea turtles.

4.9.2.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Minor; Long-term)
Under Alternative 5, sea turtles would continue to be negatively affected by boat traffic (via collision and disturbance) in the park. The number of commercial fishers would almost surely decline over time, due to the "forever non-transferable" commercial permit, resulting in reductions in interactions between commercial vessels and sea turtles, and in turtle-trap fouling interactions. As in Alternatives 2- 4, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-turtle interactions. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. The discontinuation of the two-day spiny lobster recreational season and the plan to take action to maintain fishing gear-associated debris at or below current levels would have the same effect as described in Alternatives 3-4. Additionally, the prohibition of spearfishing in the park could result in a reduction in boaters in the park, thus further reducing boat-sea turtle collisions and alterations of sea turtle behavior that directly affect individual or group population health. The creation of a no-trawl zone in the bay, as proposed in this alternative, could be beneficial to sea turtles by improving forage grounds within the zone. Because Leatherback and Kemp's Ridley sea turtles are rarely seen in the park, these species would be less likely to be affected than Loggerhead, Hawksbill and Green sea turtles.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of actions under Alternative 5 are likely to have a slight beneficial effect on sea turtle populations in BISC for the foreseeable future. Thus, Alternative 5 would not cause impairment and would likely have a minor, long-term beneficial effect on sea turtle populations in BISC (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determinations: May affect, is likely to adversely affect (LAA) Loggerhead, Hawksbill and Green sea turtles, but is not likely to jeopardize their continued existence; May affect, not likely to adversely affect (NLAA) Leatherback and Kemp's Ridley sea turtles.

4.9.3 American crocodile
Interactions with boats may alter the behavior (*e.g.*, feeding, mating, and nesting) of crocodiles, potentially resulting in negative impacts on the individual or population (see for example, USFWS 1984). Actions considered under the alternatives thus may affect populations of crocodiles in the park by altering the numbers of boaters in park waters.

4.9.3.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)
No actions that would occur under Alternative 1 would be expected to affect crocodiles in the park. Crocodiles would continue to be disturbed at current levels by boat traffic in the park. If park use increased (as it is expected to do given local increases in human population), then boat activity would likely continue to increase, resulting in potential increases in boat-related alteration of behaviors affecting individual or population health.

Cumulative effects: Crocodiles could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, making the eastern portion of the bay more estuarine than its present status. The establishment of additional estuarine habitat along the eastern portion of the bay would provide improved juvenile habitat for American crocodiles, and potential related increases in population abundance.

Summary: Overall, although no actions in Alternative 1 would adversely affect American crocodiles, the lack of actions in Alternative 1 on crocodile populations in the park is likely to result in a slight increase for the foreseeable future in potential behavioral alterations affecting individual or population health. Thus, Alternative 1 would likely have a minor, long-term adverse effect on American crocodiles in BISC (Adverse; Minor; Long-term), but would not impact the resource to the extent it would cause impairment. Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.3.2. Alternative 2 - Maintain At or Above Current levels (Negligible)
As in Alternative 1, crocodiles would continue to be disturbed at current levels by boat traffic in the park. Disturbances would likely increase if park visitation increased, as it is likely to do. The establishment of the commercial permit system and commercial guide permit system could result in a reduction in number of commercial fishers or guides in the park, which could lead to a reduction in boat-crocodile interactions, and thus a reduction in boat-related alteration of behaviors affecting individual or population health. This effect could be offset if the remaining commercial fishers or guides increased their commercial fishing or guiding activity, and thus their time on the water. No other actions that would occur under Alternative 2 would be expected to affect crocodiles in the park.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, the benefits of actions in Alternative 2 are likely to counter the adverse effects likely associated with increasing human population growth and related increase in park usage. Thus, Alternative 2 is likely to have a neutral effect (no adverse effect or impairment) on crocodile populations in the park (Negligible).

Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.3.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
Under Alternative 3, the establishment of commercial permits systems could decrease the number of commercial fishers, potentially reducing the frequency of boat-crocodile interactions in the park, and thus reducing the potential alteration of behaviors affecting individual or population health. It is possible that numbers of recreational boaters could continue to increase in tandem with local human population size, which could increase boat-crocodile interactions, and thus an increase in potential alteration of behaviors affecting individual or population health. The establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-crocodile interactions. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. The discontinuation of the two-day spiny lobster recreational season would result in a decrease in numbers of boaters in BISC waters during those two days, and thus result in potential decreases in alterations of crocodile behavior that directly affect individual or group population health.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, while the effects of actions under Alternative 3 on crocodiles in BISC are difficult to predict, they would most likely lead to a slightly beneficial effect for the foreseeable future on crocodile populations in the park. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on crocodile populations in the park (Beneficial; Minor; Long-term).
Endangered Species Act Section 7 Effect Determination: May affect, not likely to adversely affect (NLAA).

4.9.3.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)
Under Alternative 4, crocodiles may be affected by boat traffic (disturbance) in the park. The number of commercial fishers would almost surely decline over time, due to the "forever non-transferable" commercial permit. This reduction in number of commercial fishers would likely result in a decrease in interactions between commercial vessels and crocodiles, and thus a decrease in the potential alteration of behaviors affecting individual or population health. As in alternatives 2 and 3, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-crocodile interactions. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. As in Alternative 3, the discontinuation of the two-day spiny lobster recreational season would result in a decrease in numbers of boaters in BISC waters during those two days, and thus result in potential decreases in boat-

crocodile collisions and alterations of crocodile behavior that directly affect individual or group population health.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, the effects of actions under Alternative 4 are likely to have a slight beneficial effect on crocodile populations in BISC for the foreseeable future. Thus, Alternative 4 would not cause impairment and would likely have a minor, long-term beneficial effect on crocodile populations in BISC (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determination: May affect, not likely to adversely affect (NLAA).

4.9.3.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Minor; Long-term)
Under Alternative 5, crocodiles may be affected by boat traffic (disturbance) in the park. The number of commercial fishers would almost surely decline over time, due to the "forever non-transferable" commercial permit. This reduction in number of commercial fishers would likely result in a decrease in interactions between commercial vessels and crocodiles, and thus a decrease in the potential alteration of behaviors affecting individual or population health. As in alternatives 2 - 4, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-crocodile interactions. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. As in Alternative 3, the discontinuation of the two-day spiny lobster recreational season would result in a decrease in numbers of boaters in BISC waters during those two days, and thus result in potential decreases in boat-crocodile collisions and alterations of crocodile behavior that directly affect individual or group population health. Additionally, the prohibition of spearfishing in the park could result in a reduction in boaters in the park, thus further reducing potential alterations of crocodile behavior that directly affect individual or group population health.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, the effects of actions under Alternative 5 are likely to have a slight beneficial effect on crocodile populations in BISC for the foreseeable future. Thus, Alternative 5 would not cause impairment and would likely have a minor, long-term positive effect on crocodile populations in BISC (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determination: May affect, not likely to adversely affect (NLAA).

4.9.4 American alligator
Alligators would not be directly affected by actions in any of the alternatives.

4.9.4.1 Alternatives 1-5 (Negligible)

None of the actions proposed under Alternatives 1-5 would be expected to affect alligator populations in BISC, resulting in neutral effects (no impairment) of each of the alternatives on alligators (Negligible).
Endangered Species Act Section 7 Effect Determination: No Effect (NE).

4.9.5. Smalltooth sawfish
The primary factors affecting smalltooth sawfish within BISC is bycatch from various fishing gear including hook-and-line and trawls. Gill nets have historically contributed to sawfish bycatch as well, but have been prohibited throughout state waters since 1995. Since smalltooth sawfish can be caught on hook-and-line, this species could be negatively affected if commercial and/or recreational hook-and-line fishing effort increased. Smalltooth sawfish can easily become entangled in netting gear directed at other commercial species, often resulting in serious injury or death. Since smalltooth sawfish can be entangled in netting gear, this species could be negatively affected by commercial trawling efforts. Assuming sawfish would be released following an accidental catch, the fish could still suffer stress and injury associated with being caught. Sawfish sightings and catch-and-release events in BISC are both very rare, although up to 30 catch-and-release events are reported annually in nearby Everglades National Park (T. Schmidt, NPS EVER, pers. comm.). An additional threat to smalltooth sawfish is habitat degradation, particularly with respect to changes in salinity, temperature and nutrient regimes resulting from modifications of natural freshwater flows into estuarine and marine waters through construction of canals and other controlled devices.

<u>4.9.5.1. Alternative 1 - Maintain Status Quo (Negligible)</u>
No actions that would occur under Alternative 1 would be expected to affect sawfish in the park. If fishing effort increased, as is likely given local population growth trends, sawfish “catches” by recreational fishers could increase, although since sawfish are so rare in BISC, the likelihood of increased catches is very low.

Cumulative effects: Smalltooth sawfish could be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, making the eastern portion of the bay more estuarine than its present status. The establishment of additional estuarine habitat along the eastern portion of the bay could provide improved habitat for smalltooth sawfish, which could result in increased presence of smalltooth sawfish (and possibly increased interactions of the species with recreational and commercial fishing gear).

Summary: Overall, although no actions in Alternative 1 would adversely affect American sawfish, the lack of actions in Alternative 1 could possibly result in an increase for the foreseeable future in potential hook-and-line catches affecting individual or population health. However, given the scarcity of smalltooth sawfish observations in BISC,

Alternative 1 would likely have a negligible effect on sawfish in BISC, and would not impact the resource so as to cause impairment (Negligible).
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.5.2. Alternative 2 - Maintain At or Above Current levels (Negligible)
As in Alternative 1, smalltooth sawfish could be affected by increases in hook-and-line fishing efforts, although any effects are unlikely given the rarity of smalltooth sawfish in BISC. No other actions that would occur under Alternative 2 would be expected to affect sawfish in the park.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, Alternative 2 could potentially result in an increase for the foreseeable future in potential hook-and-line catches affecting individual or population health. However, given the scarcity of smalltooth sawfish observations in BISC, Alternative 2 would likely have a negligible effect on sawfish in BISC, and would not impact the resource so as to cause impairment (Negligible).
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.5.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
Under Alternative 3, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides operating in the park (if guides decided to fish elsewhere), and, therefore, subsequent decreases in bycatch of sawfish on hook-and-line. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if recreational fishing activity within the park increased, as it is likely to do. Similarly, the number of sawfish "catches" by recreational fishers could increase or decrease, depending on whether the level of fishing effort increased in correlation with local increasing population growth. However, given the scarcity of smalltooth sawfish occurrences within the park, the chances of accidental catches are unlikely.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, while the effects of actions under Alternative 3 on sawfish in BISC are difficult to predict, they would most likely lead to a slightly positive effect for the foreseeable future on sawfish populations in the park. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on sawfish populations in the park (Beneficial; Minor; Long-term).
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.5.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)
The number of commercial fishers would almost surely decline over time, due to the "forever non-transferable" commercial permit. This reduction in number of commercial fishers would likely result in a decrease in commercial fishing activity, and therefore, a reduction in smalltooth sawfish bycatch. As in Alternatives 2 and 3, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in accidental catch of smalltooth sawfish. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, the effects of actions under Alternative 4 are likely to have a slight positive effect on sawfish populations in BISC for the foreseeable future. Thus, Alternative 4 would not cause impairment and would likely have a minor, long-term beneficial effect on sawfish populations in BISC (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.5.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Minor; Long-term)
Smalltooth sawfish could benefit from the reduced fishing pressure that will likely result from recreational fishers responding to and complying with the more stringent fishing regulations that Alternative 5 may require (*e.g.*, increased minimum size limits, closed seasons/areas in the park). The establishment of these stricter regulations could result in substantially less fishers in Park waters, and therefore a decrease in accidental catch of Smalltooth sawfish. The number of commercial fishers would almost surely decline over time, due to the "forever non-transferable" commercial permit. This reduction in number of commercial fishers would likely result in a decrease in commercial fishing activity, and therefore, a reduction in smalltooth sawfish bycatch. As in Alternatives 2 - 4, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in accidental catch of Smalltooth sawfish. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do.

Cumulative effects: Cumulative effects would be the same as in Alternative 1.

Summary: Overall, the effects of actions under Alternative 5 are likely to have a slight beneficial effect on sawfish populations in BISC for the foreseeable future. Thus, Alternative 5 would not cause impairment and would likely have a minor, long-term beneficial effect on sawfish populations in BISC (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA)

4.9.6 Acroporid corals and other stony corals proposed for listing under the ESA
Because of their similar life-histories, habitat requirements, and threat susceptibility, *Acropora cervicornis* (staghorn coral), *A. palmata* (elkhorn coral), and all proposed stony corals are considered as a single group (termed "listed and proposed stony corals") for analysis of environmental consequences of the alternatives. These analyses also include designated Critical Habitat. The effects of alternatives are as described previously for the coral reef (see section 4.7.1).

Listed and proposed stony corals can be affected both directly and indirectly by actions proposed under the FMP. Direct impacts include damage from five factors: (1) stone crab and lobster traps and trap debris, (2) hook-and-line debris, (3) snorkelers and divers, including lobster harvesters and spearfishers, (4) boat groundings on shallow reefs, and (5) anchor damage to reefs. Indirect impacts result from the harvest of targeted species from park waters, which in turn may affect reef community structure due to ecological cascades caused by removal by fishing of predators, prey, or competitors in the food web (Pinnegar et al. 2000, Dulvy et al. 2004). In most cases, the effects of fishing via ecological cascades on coral reef communities (and specific species) are very difficult to separate from the effects of other environmental factors, particularly if there are no comparable control sites for comparison where fishing is not allowed.

<u>4.9.6.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)</u>
Under Alternative 1, damage to listed and proposed stony corals from traps, trap debris, hook-and-line debris, snorkelers and divers, boat groundings, and anchor damage would continue at current levels, and could increase if the activities causing each of the five factors increased, as would be possible under Alternative 1, given human population growth trends and predictions. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would continue at current levels, and would likely increase as recreational fishing levels increase (as they are predicted to do; see Chapter 1).

Cumulative effects: Changes in fishing effort and fishing regulations in waters outside BISC could alter reef fish and invertebrate community structure in those waters, which in turn could affect reef fish community structure in BISC waters due to reproductive connections between fish or invertebrates in waters outside BISC and those in BISC, or to movement of fish or invertebrates across park boundaries. Such a change in community structure could affect listed and proposed stony corals through ecological cascades. Without knowing how fishing effort and fishery regulations will change in waters outside BISC, it is impossible to determine whether such cumulative effects will occur.

Listed and proposed stony corals could also potentially be affected by actions occurring under the Comprehensive Everglades Restoration Plan (CERP; see http://www.evergladesplan.org/). Under CERP, the amount and method of freshwater delivery and flow from the mainland to Biscayne Bay is expected to change over the next several decades, from the current state of being delivered in pulses through flood-control

channels, to a more natural, constant, broad influx. This change in freshwater delivery and flow will likely alter salinity gradients in the bay, and, although unlikely, could potentially alter water quality on the coral reef tract. However, the effects (if any) of CERP-related changes in water quantity and quality on listed and proposed stony corals cannot be predicted, since the type, magnitude and direction of the potential changes are currently unknown.

Furthermore, the continued existence of listed and proposed stony corals could be threatened by diseases and changes in water quality related to global warming, including increased sea surface temperatures and sea level rise. Elevated sea surface temperatures could be expected to increase the occurrence of coral bleaching, since many corals expel their photosynthetic symbiotic zooxanthellae when temperatures exceed a threshold value. Rising sea level could affect light penetration, which could thus affect photosynthetic abilities of existing listed and proposed stony corals as well as limit possibilities for range expansion by new recruits.

Thus, the cumulative effects of other ongoing and planned projects and environmental conditions warming make it difficult to accurately predict impacts to listed and proposed stony corals because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative would make no changes to current fishery management activities, Alternative 1 is anticipated to have a minor adverse effect on listed and proposed stony corals.

Summary: Overall effects of actions (or lack thereof) in Alternative 1 on listed and proposed stony corals would likely lead to a slight increase in impacts over time. Thus, Alternative 1 would likely have a minor, long-term adverse impact on listed and proposed stony corals in BISC, but would not impact the resource to the extent it would cause impairment (Adverse; Minor; Long-term).
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.6.2. Alternative 2 - Maintain At or Above Current levels (Negligible)
Under Alternative 2, damage to listed and proposed stony corals from traps, trap debris, and hook-and-line debris would be maintained at current levels, since debris associated with commercial and recreational fishing would be maintained at or below current levels, and since numbers of commercial fishers would be capped at current levels under the proposed commercial permit system. Damage to coral reefs from snorkelers and divers, boat groundings, and anchor damage would continue at current levels, and could increase if the activities causing each of the five factors increased, as would be possible under Alternative 2, given human population growth trends and predictions. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely remain at current levels, as fished populations would be maintained at current levels under this alternative.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to listed and proposed stony corals because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers minimal potential to reduce impacts to coral reefs, Alternative 2 is anticipated to have negligible effects on listed and proposed stony corals.

Summary: Overall effects of actions (or lack thereof) in Alternative 2 on listed and proposed stony corals would likely lead to a minimal potential for change in impacts from current levels, and thus are concluded to be neutral and not causing impairment (Negligible).
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.6.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
Under Alternative 3, damage from traps, trap debris, and hook-and-line debris would be maintained as in Alternative 2 (although damage could be reduced slightly if the number of commercial fishers decreased during the 5-year non-transferable permit window), and for factor 1 could be further reduced due to the establishment of Coral Reef Protection Areas (CRPAs). Damage from snorkelers and divers would be reduced as the number of divers is reduced via the termination of the two-day recreational lobster sport season and by restrictions on spearfishing. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely decrease from current levels, as the abundance and population density of fished populations would be increased by 10% under this Alternative.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to listed and proposed stony corals because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers minimal changes to current fishing-related activities, minor beneficial impacts to listed and proposed stony corals are anticipated under Alternative 3.

Summary: Overall effects of actions in Alternative 3 on listed and proposed stony corals would likely lead to a slight decrease in impacts for the foreseeable future. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on listed and proposed stony corals (Beneficial; Minor; Long-term).
Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.6.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)

Under Alternative 4, damage to listed and proposed stony corals from traps, trap debris, and hook-and-line debris initially would be the same as under Alternative 3. Over a period of several years, damage would likely decrease relative to that under Alternative 3 due to a decrease in the number of commercial fishers as a result of the permanently non-transferable commercial permit system. A reduction in spearfishing-related habitat damage could also be expected to result from the proposed restrictions on spearfishing, although this might be offset by a possible increase in snorkeling and diving activities in a no-take marine protected area, should one be created. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely decrease moderately from current levels, as the abundances and sizes of fished populations would be increased by 20% under this alternative.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to listed and proposed stony corals because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers considerable changes to current fishing-related activities, minor beneficial impacts to listed and proposed stony corals are anticipated under Alternative 4.

Summary: Overall effects of actions in Alternative 4 on listed and proposed stony corals would likely lead to a slight decrease in impacts for the foreseeable future. Thus, Alternative 4 would not cause impairment and would likely have a minor, long-term beneficial effect on listed and proposed stony corals (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.9.6.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Minor; Long-term)

Under Alternative 5, damage to listed and proposed stony corals from traps, trap debris, and hook-and-line debris related to commercial fishing would initially be similar to what is described under Alternative 4. As with Alternative 4, over a period of several years, damage would likely decrease relative to that under Alternative 3 due to a decrease in the number of commercial fishers as a result of the permanently non-transferable commercial permit system. The establishment of stringent recreational fishing regulations could lead to a reduction of recreational fishers in the park, which could reduce the damage associated with traps, trap debris, hook-and-line debris, boat groundings, and anchor damage. Damage from snorkeling and diving would be reduced to a greater extent than other alternatives, due to the prohibition of spearfishing, although this might be offset by a possible increase in snorkeling and diving in a no-take marine protected area, should one be created. Ecological impacts in the form of ecological cascades due to the harvest of components of the marine food web would likely decrease moderately from current levels, as the abundance and sizes of harvested species would be improved to within 20% of historic, unexploited levels under this alternative.

Cumulative effects: As in Alternative 1, cumulative effects of other ongoing and planned projects make it difficult to accurately predict impacts to listed and proposed stony corals because not enough information is known about the direction and magnitude of these possible influential factors. For example, because there is great uncertainty regarding the timing and impacts of CERP, analyses would only be speculative and not useful for decision-making. However, given that this alternative offers considerable changes to current fishing-related activities, minor beneficial impacts to listed and proposed stony corals are anticipated under Alternative 5.

Summary: Overall effects of actions in Alternative 5 on listed and proposed stony corals would likely lead to a slight decrease in impacts for the foreseeable future. Thus, Alternative 5 would not cause impairment and would likely have a minor, long-term beneficial effect on listed and proposed stony corals (Beneficial; Minor; Long-term). Endangered Species Act Section 7 Effect Determination: May affect, likely to adversely affect (LAA).

4.10. Marine Wildlife

Potential effects of the actions proposed under the alternatives on the Florida manatee and on sea turtle species occurring in BISC are discussed in the *Threatened and Endangered Species* section. Thus, the potential effects of actions proposed under the alternatives are limited in this section to a discussion of the bottlenose dolphin (*Tursiops truncatus*).

Individual and group behavior (including feeding) of bottlenose dolphins is likely negatively affected by combustion-powered boats (Lusseau 2003). Thus, actions that would affect the number of combustion-powered boats have the potential to affect dolphins in the park.

4.10.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)

No actions that would occur under Alternative 1 would be expected to affect dolphins in the park. Dolphins would continue to be disturbed at current levels by boat traffic in the park. If park use increased (as it is expected to do given local increases in human population), then boat activity would likely continue to increase, resulting in potential increases in boat-related alteration of behaviors affecting individual or population health.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, although no actions in Alternative 1 would adversely affect bottlenose dolphins, the lack of actions in Alternative 1 on dolphin populations in the park is likely to result in an increase for the foreseeable future in behavioral alterations affecting individual or population health, and thus is determined to be negative. Thus, Alternative 1 would likely have a minor, long-term adverse effect on dolphin populations in BISC (Adverse; Minor; Long-term), but would not impact the resource to the extent it would cause impairment.

4.10.2. Alternative 2 - Maintain At or Above Current levels (Adverse; Minor; Long-term)

As in Alternative 1, dolphins would likely continue to be disturbed at current levels by boat traffic in the park. Disturbance would likely increase if park visitation increased, as it is likely to do. The establishment of the commercial permit system and the commercial guide permit system could result in a reduction in number of commercial fishers and guides in the park, which could lead to a reduction in boat-dolphin interactions, and thus a reduction in potential boat-related alteration of behaviors affecting individual or population health. No other actions that would occur under Alternative 2 would be expected to affect dolphins in the park.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: As with Alternative 1, although no actions in Alternative 2 would adversely affect bottlenose dolphins, the lack of actions in Alternative 2 is likely to result in an increase for the foreseeable future in behavioral alterations affecting individual or population health. Thus, Alternative 2 would likely have a minor, long-term adverse

effect on dolphin populations in BISC, but would not impact the resource to the extent it would cause impairment (Adverse; Minor; Long-term).

4.10.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
Under Alternative 3, the number of combustion-powered boats could be reduced through three possible mechanisms. First, the discontinuation of the two-day recreational lobster sport season would result in a marked decrease in boats in the park during that two-day period. Thus, considerably fewer boat-dolphin interactions would be expected on those two days. Second, the commercial fishing permit could lead to a decrease in the number of commercial fishers over time, reducing the amount of boat-dolphin interactions. This effect could be offset if the remaining commercial fishers increased their commercial fishing efforts. Third, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in boat-dolphin interactions. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of the actions under Alternative 3 would likely result in a slight decrease for the foreseeable future in human activities likely to alter behaviors affecting individual or population health of bottlenose dolphins. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on dolphin populations in BISC (Beneficial; Minor; Long-term).

4.10.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)
Under Alternative 4, the number of combustion-powered boats would be reduced through the same mechanisms described under Alternative 3, with the likely reduction in numbers of commercial fishers being even greater than described under Alternative 3 because of the “forever non-transferable” commercial permit clause in Alternative 4.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of the actions under Alternative 4 would likely result in a slight decrease for the foreseeable future in human activities likely to alter behaviors affecting individual or population health of bottlenose dolphins. Thus, Alternative 4 would not cause impairment and would likely have a minor, long-term beneficial effect on dolphin populations in BISC (Beneficial; Minor; Long-term).

4.10.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Moderate; Long-term)
Under Alternative 5, the number of combustion-powered boats would be reduced through the same mechanisms described under Alternative 4. Additionally, the prohibition of spearfishing in the park under Alternative 5 could lead to a reduction in the number of

boaters, leading to fewer interactions between boats and dolphins. Furthermore, it is possible that the number of combustion-powered boats (and subsequent boat-dolphin interactions) could be reduced if recreational fishers decide to fish elsewhere in response to and in compliance with the more stringent fishing regulations required to meet this alternative's goals for fisheries resources in the park.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of the actions under Alternative 5 would likely result in a moderate decrease for the foreseeable future in human activities likely to alter behaviors affecting individual or population health of bottlenose dolphins. Thus, Alternative 5 would not cause impairment and would likely have a moderate, long-term beneficial effect on dolphin populations in BISC (Beneficial; Moderate; Long-term).

4.11. Avifauna

Park avifauna, including the species of special concern noted in section 3.11, may be affected in three ways by actions occurring under one or more of the alternatives. First, birds are often fouled by fishing gear (typically hook-and-line), which can impede feeding and movement and cause injury and death (Fig. 10). Second, human activities may alter avian behavior that directly affects individual or group population health. For example, combustion-driven boats may disturb bird nesting, roosting or feeding habitats (Bratton 1990, Burger 1998). Third, many birds in BISC utilize fish for food, and would be affected if actions in the alternatives affected target food populations. Although most fish species that are targeted by birds for prey are not also targeted by recreational or commercial fishers, it is possible that fishing efforts could indirectly affect populations of species that are preyed on by birds through ecological cascades. For non-fishery-targeted prey species, it is effectively impossible to predict how changes in fishing effort would be manifest via ecological cascades; thus this potential mechanism is not discussed in the analysis below. Recreationally and commercially targeted fish and invertebrate species that may be preyed on by birds are most likely targeted by birds during their juvenile stages; thus, if the abundance of adults of these fish and invertebrate species were reduced to such an extent that the number of their offspring (juveniles) was reduced, then bird species could be negatively affected. Additionally, roller-frame trawlers could reduce densities of prey species through harvest as bycatch, and ballyhoo fishers could reduce prey availability through direct harvest of available prey.

None of the alternatives would result in actions governed by the Migratory Bird Treaty Act [*i.e.*, the taking, (intentional) killing, possession, transportation, and importation of migratory birds, their eggs, parts and nests].

<u>4.11.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)</u>

No actions that would occur under Alternative 1 would be expected to affect avifauna in the park. Avifauna would continue to be negatively affected by fouling from fishing gear, and by boat traffic and associated engine noise in the park. If park use increased (as it is expected to do given local increases in human population), then recreational fishing and boat activity would likely continue to increase, resulting in decreased densities (due to fouling-related mortalities) and potential increases in alteration of behaviors affecting individual or population health. If populations of commercially and recreationally targeted fish and invertebrate species were reduced to the point of recruitment limitation (Armsworth 2002), as could potentially happen under Alternative 1, then the number of juveniles would be limited, which would negatively affect the diet of birds preying on those juveniles.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, although no actions in Alternative 1 would adversely affect avifaunal populations in BISC, the lack of actions in Alternative 1 is likely to result in a slight increase for the foreseeable future in fouling injury and mortality, an increase in potential behavioral alterations affecting individual or population health, and potentially in a reduction in available prey. Thus, Alternative 1 would likely have a minor, long-term

adverse effect on avifaunal populations in BISC (Adverse; Minor; Long-term), but would not impact the resource to the extent it would cause impairment.

4.11.2. Alternative 2 - Maintain At or Above Current levels (Adverse; Minor; Long-term)
As in Alternative 1, avifauna would continue to be negatively affected by fouling from fishing gear and by likely disturbance by boat traffic and associated engine noise. These negative effects would likely increase if fishing pressure and park visitation increased, as it is likely to do. The goal to maintain fished populations at current levels would make it unlikely that any fished populations would be reduced to the point of recruitment limitation (Armsworth 2002); thus, avifaunal prey in the form of juveniles of fished species would not likely be reduced in abundance or density, resulting in a neutral effect on avifauna. The establishment of the commercial fishing permit could result in a reduction in the number of commercial fishers in the park (if commercial fishers decided not to obtain a permit), resulting in a reduction in the amount of roller-frame trawlers and thus a reduction in trawl bycatch and baitfish harvest. Such a reduction could be offset if remaining trawlers increased their trawling activity, which would be legal under the permit system. The establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in disturbances of birds by boats. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: As in Alternative 1, although no actions in Alternative 2 would adversely affect avifaunal populations in BISC, the lack of actions in Alternative 2 is likely to result in a slight increase for the foreseeable future in fouling injury and mortality, and in behavioral alterations affecting individual or population health. The establishment of a commercial permit could result in a decrease, increase, or no change in bycatch. Thus, Alternative 2 would likely have a minor, long-term adverse effect on avifaunal populations in BISC, but would not impact the resource to the extent it would cause impairment (Adverse; Minor; Long-term).

4.11.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
Under Alternative 3, avifauna would continue to be negatively affected by fouling from fishing gear and by likely disturbance by boat traffic and associated engine noise. The establishment of the commercial permit system could decrease the number commercial fishers. It is possible that recreational boaters (and fishers) could continue to increase in tandem with local human population size, which could lead to an increase in avifaunal fouling from fishing gear. A reduction in commercial fishers could result in a decrease in roller-frame trawl-related bycatch and a decrease in baitfish harvest, and thus an increase in available avifaunal prey (although such a reduction could be offset if remaining trawlers increased their trawling activity, which would be legal under the permit system). As in Alternative 2, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in disturbances of birds by boats. However, this effect could be

offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. The discontinuation of the two-day spiny lobster recreational season would result in a decrease (during those two days) of numbers of boaters in BISC waters, and thus a decrease in potential alterations of avian behavior that directly affect individual or group population health.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, while the effects of actions under Alternative 3 on the avifauna of BISC are difficult to predict, they would most likely lead to a slightly beneficial effect on park avifauna for the foreseeable future. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on avifaunal populations in BISC (Beneficial; Minor; Long-term).

4.11.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Minor; Long-term)

Under Alternative 4, the number of commercial fishers would almost surely decline over time, due to the "forever non-transferable" commercial permit. This reduction in number of commercial fishers would likely result in a decrease in roller-frame trawl-related bycatch and in a decrease in baitfish commercial harvest, potentially increasing the abundance of avifaunal prey. Similarly, the creation of a no-trawl zone in the bay, as proposed in this alternative, could improve avifaunal prey within that zone, although if trawling efforts were increased outside that zone, these beneficial impacts would be negated. As in Alternatives 2 and 3, the establishment of the permit system for commercial guides could result in minor decreases in the number of guides (if guides decided to fish elsewhere), and related decreases in disturbances of birds by boats. However, this effect could be offset if the remaining permitted guides increased their guiding activity, which would not be prohibited under the permit system, or if park visitation increased, as it is likely to do. As in Alternative 3, the discontinuation of the two-day spiny lobster recreational season would result in a decrease (during those two days) of numbers of boaters in BISC waters, and thus a likely decrease in alterations of avian behavior that directly affect individual or group population health.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of actions under Alternative 4 are likely to lead to a slight beneficial effect for the foreseeable future on the avifauna of BISC. Thus, Alternative 4 would not cause impairment and would likely have a minor, long-term beneficial effect on avifaunal populations in BISC (Beneficial; Minor; Long-term).

4.11.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Minor; Long-term)

Under Alternative 5, the expected effects to avifauna are the same as described under Alternative 4. Additionally, the prohibition of spearfishing in the park could result in a reduction in boaters in the park, as those that desire to spearfish will have to pursue this activity elsewhere. Thus, a reduced number of boaters could potentially reduce

alterations of avian behavior that directly affect individual or group population health. Furthermore, it is possible that the number of combustion-powered boats could be reduced (if recreational fishers decide to fish elsewhere in response to and in compliance with the more stringent fishing regulations required to meet Alternative 5 goals for fisheries resources in the park), likely leading to a decrease in alterations of avian behavior that directly affect individual or group population health.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Overall, the effects of actions under Alternative 5 are likely to lead to a slight beneficial effect for the foreseeable future on the avifauna of BISC. Thus, Alternative 5 would not cause impairment and would likely have a minor, long-term beneficial effect on avifaunal populations in BISC (Beneficial; Minor; Long-term).

4.12. Ecologically Critical Areas

The function of habitats within BISC as Essential Fish Habitat (EFH) or Habitat Areas of Particular Concern (HAPC) would not be considerably or significantly affected by the actions under any of the alternatives. While actions (or lack of actions) under each alternative could affect habitat quality or quantity, effects would be insignificant given the spatial coverage and quality of habitats within BISC.

4.12.1. Alternatives 1, 2 and 3 (Negligible)

Overall, alternatives 1 through 3 would have a neutral effect (not causing impairment) on ecologically critical areas. No cumulative effects would be anticipated under any of these alternatives (Negligible).

4.12.2. Alternatives 4 and 5 (Beneficial; Minor; Long-term)

The no-trawl zone, as proposed under these two alternatives, could lead to enhanced EFH for shrimp and many finfish. No cumulative effects would be anticipated under these two alternatives (Beneficial; Minor; Long-term).

4.13. Cultural Resources

Cultural resources in the park may be affected by several of the actions under one or more of the alternatives. Because the actions considered do not affect terrestrial resources, only submerged archeological and ethnographic resources are considered in this analysis. From a submerged cultural resource standpoint, BISC is home to 71 known submerged cultural resource sites (predominantly shipwrecks), which can be affected by anchor damage, fouling from commercial and recreational fishing gear, and damage from spearfishers and snorkeling or diving lobster harvesters. From an ethnographic standpoint, fishing is considered a cultural resource. Thus, ethnographic resources could be affected if actions under the alternatives resulted in, for example, restrictions or participant limitations on traditional commercial or recreational fisheries.

4.13.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)

No actions that would occur under Alternative 1 would be expected to directly and immediately affect submerged archeological or ethnographic resources in the park. If fishing effort increased (as it is expected to do given local increases in human population), then fishing-related impacts to submerged archeological resources would be expected to increase, causing adverse effects to these resources. No actions would be expected to affect the ethnographic resource of fishing.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: It is likely that the lack of actions under Alternative 1 would have a slight adverse effect for the foreseeable future on submerged archeological resources in the park. Thus, Alternative 1 would likely have a minor, long-term adverse effect on submerged archeological resources in BISC, but would not impact the resource to the extent it would cause impairment. No effects on museum objects, cultural landscapes, or structures are expected from Alternative 1. Alternative 1 would not result in impacts to cultural resources to the extent it would cause impairment. (Adverse; Minor; Long-term)

4.13.2. Alternative 2 - Maintain At or Above Current levels (Adverse; Minor; Short-term, Beneficial; Minor; Short-term)

Under Alternative 2, as in Alternative 1, if fishing effort increased (as it is expected to do given local increases in human population), then adverse fishing-related impacts to submerged archeological resources would be expected to increase. The establishment of the commercial permit could lead to a decrease in the number of commercial fishers in the park, which in turn would likely lead to a reduction in the deployment of lobster or crab traps that could damage submerged resources (either through deployment on the submerged archeological site, which is unlikely, or through being moved by tides, current, or other means onto a submerged site). These beneficial effects could be offset if the remaining commercial fishers increased their commercial fishing activity and if other fishing-related impacts increased due to increasing human population. Action would be taken to reduce densities of marine debris if densities rose above current levels; this approach would result in a neutral effect on submerged archeological resources in the park. No actions would be expected to affect the ethnographic resource of fishing.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: The decrease in commercial fishers would have a minor adverse short-term, and possibly long-term, effect on ethnographic resources. This alternative would likely have a short-term minor adverse effect on ethnographic resources and a short-term beneficial effect on archeological resources due to a reduction in commercial fishing gear impacts on archeological sites. Both effects could be offset by an increase in commercial fishing activity. Actions to reduce marine debris if they increase over current levels are expected to have a neutral effect on archeological resources. No effects on museum objects, cultural landscapes, or structures are expected from Alternative 2. Alternative 2 would not result in impacts to cultural resources to the extent it would cause impairment. (Adverse; Minor; Short-term, Beneficial; Minor; Short-term)

4.13.3. Alternative 3– Improve Over Current levels (Adverse; Negligible; Long-term, Beneficial; Minor; Long-term)

Under Alternative 3, the limitation of spearfishing to non-trigger-mechanism spears and no air supply would likely reduce previously documented spearfishing-related damage to submerged archeological resources (see Figure 9), if the regulatory changes lead to a reduced number of spearfishers in the park. Similarly, the discontinuation of the two-day recreational lobster sport season would reduce the number of lobster harvesters harvesting from submerged archeological sites during those two days, and thus reduce damage to those sites. The establishment of the commercial permit would likely lead to a decrease in the number of commercial fishers in the park over time, which in turn could lead to a reduction in the deployment of lobster or crab traps that could damage submerged resources (either through deployment on the submerged archeological site, which is unlikely, or through being moved by tides, current, or other means onto a submerged site). These beneficial effects could be offset to a degree if remaining commercial fishers increased their commercial fishing activity. As in Alternative 2, action would be taken to reduce densities of marine debris if densities rose above current levels; this approach would result in a neutral effect on submerged archeological resources in the park. From an ethnographic cultural resource perspective, the traditional practice of recreational fishing would be slightly limited by the change in spearfishing regulation and the elimination of the lobster two-day sport season.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Alternative 3 would have gear restrictions on spearfishing and an elimination of lobster mini-season. These actions are expected to have a slight reduction for the foreseeable future in damage to submerged archeological resources within BISC, causing beneficial, minor, long-term effects on archeological resources. Alternative 3 would also cause slight restrictions on traditional fishing activities due to the establishment of a permit system for commercial fishers. These restrictions would cause negligible to minor, short-term adverse effects on ethnographic resources and minor, long-term beneficial effects on archeological resources due to reduction in impacts from fishing gear. Both the beneficial and adverse impacts to ethnographic and submerged

archeological resources from the permit system might be offset due to local human population growth. Actions to reduce marine debris if they increase over current levels are expected to have a neutral effect on archeological resources. No effects on museum objects, cultural landscapes, or structures are expected from Alternative 3. Alternative 3 would not result in impacts to cultural resources to the extent it would cause impairment (Adverse; Negligible; Long-term, Beneficial; Minor; Long-term).

4.13.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Adverse; Minor; Long-term, Beneficial; Minor; Long-term)

As with Alternative 3, the discontinuation of the two-day recreational lobster sport season would reduce the number of lobster harvesters harvesting from submerged archeological sites, and thus reduce damage to those sites. Similarly, the limitation of spearfishing to non-trigger-mechanism spears and no air supply would likely reduce previously documented spearfishing-related damage to submerged archeological resources (see Figure 9), causing minor, long-term beneficial effects on submerged archeological resources. The establishment of the commercial permit, with its "forever non-transferable" clause, would lead to a decrease in the number of commercial fishers in the park over time, which in turn would lead to a reduction in the deployment of lobster or crab traps that could damage submerged archeological resources (either through deployment on the submerged archeological site, which is unlikely, or through being moved by tides, current, or other means onto a submerged site). As in Alternatives 2 and 3, action would be taken to reduce densities of marine debris if densities rose above current levels; this approach would result in a neutral effect on submerged archeological resources in the park. The permanently non-transferable commercial permit may lead to the elimination of commercial fishing from park waters over time. These changes would adversely affect the ethnographic resource of fishing in park waters, but have a beneficial long-term effect on submerged archeological resources due to a decrease in discarded fishing gear.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: As with Alternative 3, Alternative 4 would have gear restrictions on spearfishing and an elimination of lobster mini-season. These actions are expected to have a slight reduction for the foreseeable future in damage to submerged archeological resources within BISC, causing beneficial, minor, long-term effects on archeological resources. Alternative 4 would also implement slight restrictions on traditional fishing activities due to the establishment of a permit system for commercial fishers. This restriction would cause negligible to minor short-term adverse effects on ethnographic resources and minor, long-term beneficial effects on submerged archeological resources due to reduction in impacts from fishing gear. The establishment of a nontransferable commercial permit may lead to the elimination of commercial fishing within the park, which would have both minor, long-term adverse effects on ethnographic resources and moderate, long-term beneficial impacts on submerged archeological resources. The implementation of stricter fishing regulations are expected to have minor, short-term, adverse effects on ethnographic resources, but as described in the recreational fishing experience section, these restrictions on fishing restrictions are hoped to sustain fishing

for future generations, thus having a long-term, minor, beneficial effect on ethnographic resources. Actions to reduce marine debris if they increase over current levels are expected to have a neutral effect on archeological resources. No effects on museum objects, cultural landscapes, or historic structures are expected from Alternative 4. Alternative 4 would not result in impacts to cultural resources to the extent it would cause impairment. (Adverse; Minor; Long-term, Beneficial; Minor; Long-term)

4.13.5. Alternative 5 – Restore Park Fisheries Resources (Adverse; Minor; Short-term, Beneficial; Minor; Long-term, Adverse; Minor; Long-term)

Under Alternative 5, the prohibition of spearfishing would substantially reduce spearfishing-related damage to submerged archeological resources, which have been previously documented (see Figure 9). As in Alternatives 3 and 4, the discontinuation of the two-day recreational lobster sport season would reduce the number of lobster harvesters harvesting from submerged archeological sites, and thus reduce damage to those sites. The establishment of the commercial permit, with its "forever non-transferable" clause, would lead to a decrease in the number of commercial fishers in the park over time, which in turn would lead to a reduction in the deployment of lobster or crab traps that could damage submerged archeological resources (either through deployment on the submerged archeological site, which is unlikely, or through being moved by tides, current, or other means onto a submerged site). As in Alternatives 2 - 4, action would be taken to reduce densities of marine debris if densities rose above current levels; this approach would result in a neutral effect on submerged archeological resources in the park. From an ethnographic resource perspective, the traditional practice of recreational fishing would be limited by the prohibition of spearfishing, the elimination of the lobster two-day sport season, and the potential reduction of recreational fishers resulting from implementation of stricter fishing regulations needed to achieve fisheries resources restoration goals. As in Alternative 4, the permanently non-transferable commercial permit would lead to the elimination of commercial fishing from park waters over time. These changes would adversely affect the ethnographic resource of fishing in park waters.

Cumulative effects: No cumulative effects would be anticipated under this alternative.

Summary: Alternative 5 proposes elimination of lobster mini-season (as does Alternatives 3 and 4), as well as park-wide prohibition of spearfishing. These actions are expected to have a slight reduction for the foreseeable future in damage to submerged archeological resources within BISC, causing beneficial, minor, long-term effects on submerged archeological resources. Alternative 5 would cause slight restrictions on traditional fishing activities due to the establishment of a permit system for commercial fishers. This restriction would cause negligible to minor short-term adverse effects on ethnographic resources and minor, long-term beneficial effects on submerged archeological resources due to reduction in impacts from fishing gear. Both the beneficial and adverse impacts to cultural resources from the permit system might be offset due to local human population growth. The establishment of a nontransferable commercial permit may lead to the elimination of commercial fishing within the park, which would have both minor, long-term adverse effects on ethnographic resources and

moderate, long-term beneficial impacts on submerged archeological resources. The implementation of stricter fishing regulations are expected to have minor, short-term, adverse effects on ethnographic resources, but as described in the recreational fishing experience section, these restrictions on fishing restrictions are hoped to sustain fishing for future generations, thus having a long-term, minor, beneficial effect on ethnographic resources. Actions to reduce marine debris if they increase over current levels are expected to have a neutral effect on submerged archeological resources. No effects on museum collections, cultural landscapes, or historic structures are expected from Alternative 5. Alternative 5 would not result in impacts to cultural resources to the extent it would cause impairment. (Adverse; Minor; Short-term, Beneficial; Minor; Long-term, Adverse; Minor; Long-term).

4.14. Aesthetic Resources

Negative impacts to aesthetic resources include the introduction of non-natural materials and the damage of habitats by anthropogenic activities. Actions (or lack of actions) that result in non-natural materials occurring on or in BISC's waters or in the damage of habitats by anthropogenic activities negatively affect BISC's aesthetic resources. Non-natural materials relevant to the FMP include commercial and recreational fishing debris. Consequences of anthropogenic activities relevant to the FMP include benthic habitat damage from fishing gear, lobster divers, spearfishers, and boat groundings.

4.14.1. Alternative 1 - Maintain Status Quo (Adverse; Minor; Long-term)

No actions that would occur under Alternative 1 would be expected to affect aesthetic resources in the park. If fishing effort increased (as it is expected to do given local increases in human population), then fishing-related marine debris would be expected to increase over current levels, as would debris-related habitat damage and boat groundings.

Cumulative effects: Changes in state or federal regulations governing commercial fisheries could affect the amount of gear-related benthic damage or debris, and thus aesthetic resources. However, since the direction and magnitude of potential regulatory changes are unknown, their effect is impossible to predict.

Summary: The lack of actions in Alternative 1 would likely have a slight adverse effect for the foreseeable future on aesthetic resources in the park. Thus, Alternative 1 would likely have a minor, long-term adverse effect on aesthetic resources in BISC, but would not impact the resource to the extent it would cause impairment (Adverse; Minor; Long-term).

4.14.2. Alternative 2 - Maintain At or Above Current levels (Negligible)

Under Alternative 2, actions would be taken to reduce marine debris levels if they increased above current levels, resulting in a neutral impact on aesthetic resources. If park visitation and fishing effort increased (as is expected given local increases in human population), the number of boat groundings would likely increase, having a negative effect on aesthetic resources. The establishment of the commercial permit system could reduce the number of commercial fishers in the park, which could lead to a reduction in the amount of fishing-related marine debris (*e.g.*, derelict traps), having a positive impact on aesthetic resources. This effect could be offset if remaining commercial fishers increased their commercial fishing activity.

Cumulative effects: Cumulative effects would be the same as in Alternative 1. Cumulative effects on aesthetic resources may occur, but their direction and magnitude are not possible to predict.

Summary: Overall, it is likely that actions under Alternative 2 would combine to have a neutral effect (not causing impairment) on aesthetic resources in the park (Negligible).

4.14.3. Alternative 3– Improve Over Current levels (Beneficial; Minor; Long-term)
As in Alternative 2, under Alternative 3 actions would be taken to reduce marine debris levels if they increased above current levels, resulting in a neutral impact on aesthetic resources. BISC would establish a non-trap-deployment zone around park headquarters at Convoy Point, improving aesthetic resources in the immediate area. The establishment of the commercial permit system could reduce the number of commercial fishers in the park, which could lead to a reduction in the amount of fishing-related marine debris (*e.g.*, derelict traps), having a positive effect on aesthetic resources. This effect could be offset if remaining commercial fishers increased their commercial fishing activity. The establishment of Coral Reef Protection Areas would result in a decrease in reef-associated habitat damage, positively affecting aesthetic resources. The discontinuation of the two-day recreational lobster sport season would result in a reduction in habitat damage, as would the spearfishing rule change to limit spearfishers to spears without trigger mechanisms and to no surface air supply, assuming the regulations resulted in fewer spearfishers in the park. Both of these actions would therefore have a positive impact on aesthetic resources in the park.

Cumulative effects: Cumulative effects would be the same as in Alternative 1. Cumulative effects on aesthetic resources may occur, but their direction and magnitude are not possible to predict.

Summary: Overall, the actions in Alternative 3 would likely result in a slight decrease for the foreseeable future in non-natural debris and benthic habitat damage in BISC. Thus, Alternative 3 would not cause impairment and would likely have a minor, long-term beneficial effect on aesthetic resources in the park (Beneficial; Minor; Long-term).

4.14.4. Alternative 4 (Preferred Alternative) – Rebuild and Conserve Park Fisheries Resources (Beneficial; Moderate; Long-term)
As in Alternatives 2 and 3, under Alternative 4 actions would be taken to reduce marine debris levels if they increased above current levels, resulting in a neutral impact on aesthetic resources. As in Alternative 3, BISC would establish a non-trap-deployment zone around park headquarters at Convoy Point, improving aesthetic resources in the immediate area. The establishment of the commercial permit system with a “forever non-transferable” clause would reduce the number of commercial fishers in the park over time, which would lead to a reduction in the amount of fishing-related marine debris (*e.g.*, derelict traps), having a positive effect on aesthetic resources. The establishment of Coral Reef Protection Areas would result in a decrease in reef-associated habitat damage, positively affecting aesthetic resources. As in Alternative 3, the discontinuation of the two-day recreational lobster sport season and regulations limiting spearfishers to spears without trigger mechanisms and to no surface air supply would result in a reduction in habitat damage, having a positive impact on aesthetic resources in the park.

Cumulative effects: Cumulative effects would be the same as in Alternative 1. Cumulative effects on aesthetic resources may occur, but their direction and magnitude are not possible to predict.

Summary: Overall, the actions in Alternative 4 would likely result in a moderate decrease for the foreseeable future in non-natural debris and benthic habitat damage. Thus, Alternative 4 would not cause impairment and would likely have a moderate, long-term beneficial effect on aesthetic resources in the park (Beneficial; Moderate; Long-term).

4.14.5. Alternative 5 – Restore Park Fisheries Resources (Beneficial; Moderate; Long-term)

As in Alternatives 2 - 4, under Alternative 5 actions would be taken to reduce marine debris levels if they increased above current levels, resulting in a neutral impact on aesthetic resources. As in Alternatives 3 and 4, BISC would establish a non-trap-deployment zone around park headquarters at Convoy Point, improving aesthetic resources in the immediate area. As in Alternative 4, the establishment of the commercial permit system with a "forever non-transferable" clause would reduce the number of commercial fishers in the park over time, which would lead to a reduction in the amount of fishing-related marine debris (*e.g.*, derelict traps), having a beneficial effect on aesthetic resources. The establishment of Coral Reef Protection Areas, assuming enforcement, would result in a decrease in reef-associated habitat damage, beneficially affecting aesthetic resources. The discontinuation of the two-day recreational lobster sport season and the prohibition of spearfishing would result in a reduction in habitat damage, having a positive impact on aesthetic resources in the park.

Cumulative effects: Cumulative effects would be the same as in Alternative 1. Cumulative effects on aesthetic resources may occur, but their direction and magnitude are not possible to predict.

Summary: Overall, the actions in Alternative 5 would likely result in a moderate decrease for the foreseeable future in non-natural debris and benthic habitat damage. Thus, Alternative 5 would not cause impairment and would likely have a moderate, long-term beneficial effect on aesthetic resources in the park (Beneficial; Moderate; Long-term).

4.15. Other Compliance Requirements

The following is a list of mandatory topics that must be covered in a NPS environmental impact statement. Where relevant, additional information on these topics is covered in Chapter 2 of this document.

4.15.1. Possible conflicts between the proposed action and land use plans, policies, or controls for the area concerned (including local, state, or Indian tribe) and the extent to which your park will reconcile the conflict

No conflicts between the proposed action and land use plans, policies, or controls for the area concerned would arise under any of the alternatives considered, although further degradation of park fishery resources would likely occur under Alternative 1. The Fishery Management Plan (FMP) is written to tier off the past (1983) and developing General Management Plans (GMP). Special efforts have been made to insure consistency between the FMP and the planning documents contained within the GMP.

4.15.2. Natural or depletable resource requirements and conservation potential

The actions proposed under Alternatives 1 and 2 fail to promote the conservation and wise management of the park's fishery resources, although enjoyment (through fishing) of those resources is favored. The actions proposed in Alternative 3, Alternative 4 (the Preferred Alternative), and Alternative 5 (the Environmentally Preferred Alternative) promote the conservation and wise management of the park's fishery resources in balance with the enjoyment of those resources by the public.

4.15.3. Environmental justice (EO 12898) (socially or economically disadvantaged populations)

Potential socioeconomic effects of actions under the alternatives were discussed previously in this document. Socially or economically disadvantaged populations would not be adversely impacted by any of the alternatives presented in this document.

4.15.4. Public health and safety

Limiting spearfishing to Hawaiian slings under Alternatives 3 and 4 and prohibiting spearfishing under Alternative 5 could potentially improve public safety by decreasing spearfishing-related injuries.

5. Consultation and Coordination

5.1. History of Public Involvement

Throughout the planning process, the planning team gathered public input on issues, proposed actions, and alternatives. The scoping process included public meetings, newsletters, updates via the BISC web site (http://www.nps.gov/bisc), and BISC FMP Working Group meetings. These were used to identify the issues, alternatives, and impact topics to be considered for planning and to keep the public informed and involved throughout the planning process.

In April 2002, a newsletter describing the FMP planning effort and its purpose was sent to the public, media, federal, state, and county agencies, and other organizations. On April 24th, 2002 a notice of intent announcing the beginning of the planning process and EIS development was published in the *Federal Register*.

The schedule for the first round of public meetings was included in the April 2002 newsletter. Meetings were also advertised in area newspapers and by a BISC press release posted on the BISC web site and distributed by e-mail to the public, media, federal, state, and county agencies, and other organizations. Public workshops were held from May 14th through May 16th at three locations: Miami (14th), Homestead (15th), and Key Largo (16th). The meetings were held to obtain public opinion on fish and marine resource issues, management approaches, and recreational fishing experience. An additional meeting was held in Miami on April 13th with commercial fishers to gain insight on commercial fishers' perspectives on fish and marine resource issues and management approaches. Hundreds of comments were received during the workshops and commercial meeting, and from comment cards returned during the public comment period (April 22 – June 17, 2002). These comments were summarized and used to help guide further FMP development during a FMP Technical Committee meeting held in July 2002.

In March 2003 a second newsletter was sent to the public, media, federal, state, and county agencies, and other organizations, describing progress in FMP development and plans for a second public comment period and series of public meetings. The schedule for the first round of public meetings was included in the March newsletter. Meetings were also advertised in area newspapers and by a BISC press release posted on the BISC web site and distributed by e-mail to the public, media, federal, state, and county agencies, and other organizations. Public workshops were held from May 8th through May 10th at three locations: Miami (8th), Homestead (9th), and Key Largo (10th). Again, hundreds of comments were received during the workshops, and from comment cards returned during the public comment period (March 14th - May 9th, 2003). While comments were generally favorable, there was strong public sentiment that FMP development would benefit considerably from the input of a focal group of users of the park's fishery resources. BISC and the FWC agreed that such input would be helpful to FMP development. Thus, in response to public support for an advisory process, BISC and the FWC requested in Fall 2003 that a Working Group be formed under the authority

of the Florida Keys National Marine Sanctuary Advisory Council (hereafter, SAC). The SAC granted this request, and BISC, FWC and the SAC coordinated to produce a list of potential Working Group participants representing user groups that would potentially be affected by actions under the FMP. Invitations were extended, and the BISC FMP Working Group was formed in January 2004.

The BISC FMP Working Group consisted of recreational and commercial fishers, a marine-life collector, divers, scientists, resource managers, and members of the conservation community (member list included in **Appendix 5**). The Working Group was formed to generate recommendations for the FMP, and met for six full-day meetings during the period of January to October 2004: January 27th, February 23rd, March 23rd, April 19th, May 17th and October 6th. The meetings were open to the public, and included opportunity for public comment. During those meetings, administered by a professional facilitator, the Working Group identified issues on which they thought the FMP should focus, and recommended fishery management goals and methods of accomplishing those goals (*e.g.*, through regulatory changes and education). The Working Group finalized their recommendations in October 2004, and presented the recommendations to the SAC, which endorsed the recommendations and forwarded them under FKNMS Superintendent Signature to BISC and the FWC. The recommendations of the Working Group are attached as **Appendix 5**. Working group documents, including a member list and transcripts of each meeting, can be accessed via http://www.sfrpc.com/institute/bnpfmp.htm.

The recommendations of the Working Group were considered by the park during the development of alternatives. Many of the recommendations were incorporated, either intact or with modifications, into the park's Preferred Alternative.

The Draft Environmental Impact Statement (DEIS) was presented to the public in August of 2009, which commenced a 60-day comment period. During this comment period, public meetings were held in Florida City, Miami, and Key Largo. 337 individual submissions (written and verbal correspondence) were received during the public comment period. All correspondence was reviewed and content was considered in the development of the Final Environmental Impact Statement (FEIS).

5.2. Agencies, Major Organizations, and Experts Consulted

In the spring of 2001, representatives from BISC briefed the FWC in Tallahassee regarding the results of the Ault et al. (2001) Site Characterization and the need to develop a FMP to guide interagency decision-making concerning fisheries management in BISC. Efforts to establish a Memorandum of Understanding (MOU) to cooperatively develop a FMP for BISC began.

Over the course of summer and fall of 2001, a FMP Technical Committee was formed to guide development of the FMP. The Technical Committee was comprised of NPS national, regional and BISC representatives, FWC staff, Tennessee Valley Authority contractors, and ad hoc members representing the National Marine Fisheries Service, University of Miami – Rosenstiel School of Marine and Atmospheric Sciences, and the FWC-Florida Marine Research Institute. The FMP Technical Committee began scheduling and taking part in regularly-scheduled (typically monthly) conference calls to discuss and guide FMP development.

On November 1st, 2001, BISC representatives attended an FWC Commission Meeting in Key Largo and made a presentation to FWC Commissioners outlining progress in FMP development. BISC Superintendent (at that time) Linda Canzanelli stressed the importance of partnering with the FWC to the success of the FMP. FWC Commissioner H. Hedgepeth urged FWC staff to work towards a solid, well-defined agreement between BISC and FWC to ensure that management goals and objectives do not change as leadership changes. Commissioner J. Morris commented that park resources could be managed to a more conservative standard than elsewhere in Florida because the park was established for resource protection.

On Aril 4th, 2002, the BISC FMP and the in-development MOU between BISC and the FWC were discussed before the FWC Commissioners at an FWC meeting in Tallahassee, FL. Dr. R. Crabtree, Chief of Marine Fisheries for the FWC at that time, advised the commissioners that he and the Marine Fisheries staff recommended approval of the MOU for the Executive Director's signature, and that, after completion of the MOU, staff would begin working with the park Service to develop a fishery management plan that is consistent with FWC objectives. Commissioner Q. Hedgepeth clarified that the Commission has agreed that fishery conservation and management standards within BISC should be higher than those in non-National Park waters.

In July of 2002, the FMP Technical Committee met to consider public comments generated from the May 2002 public meetings and public comment period, to determine issues on which the FMP would be based, and to determine the developmental process to be followed.

On October 10th, 2002, the five-year MOU between NPS / BISC and the FWC was finalized (see **Appendix 4**). The MOU outlined each agency's role, function and responsibilities in developing the interagency FMP for BISC. The MOU was renewed for

an additional five years in September of 2007 and then again, although with minor changes, for an additional two years in October of 2012.

On March, 27th, 2003, BISC representatives attended an FWC Commission meeting in Tallahassee, FL. BISC Assistant Superintendent (at that time) Monika Mayr updated the FWC Commission on progress in FMP and BISC General Management Plan (GMP) development, and indicated that a second public comment period was in process to gain input on the plan, with a series of public meetings planned for April.

On October 21st, 2003, BISC representatives addressed the Florida Keys National Marine Sanctuary Advisory Council (SAC), and requested that a working group be formed under the authority of the SAC to make recommendations on the BISC FMP, as well as sections of the GMP pertinent to fisheries. The SAC voted to grant this request, and SAC member Jack Curlett was chosen to chair the Working Group. The role of the Working Group in FMP development is described in the "History of Public Involvement" (section 5.1). Working group recommendations were presented to the SAC on October 19th. The SAC voted to endorse the Working Group recommendations, with an addendum that the SAC "strongly recommends the establishment of well-designed Research Natural Areas (RNA) as a part of the development of the Biscayne National Park General Management Plan". Recommendations were then forwarded, via a letter from Florida Keys National Marine Sanctuary Superintendent Billy Causey dated October 27th, 2004, to BISC and the FWC for consideration.

On November 27-28, 2007, BISC hosted a multi-agency meeting attended by representatives of BISC, National Park Service Southeast Regional Offices (SERO), National Park Service Water Management Division (WMD), National Park Service Inventory and Monitoring (I&M), National Marine Fisheries Service Southeast Fisheries Science Center, Florida Fish and Wildlife Conservation Commission (FWC), FWC's Fish and Wildlife Research Institute (FWRI), and the University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS). At this meeting, scientists and managers together provided a comprehensive summary of the latest status of fisheries-related resources within the park, as well as the status of relevant recent and ongoing research and monitoring projects related to the park's fisheries resources. The results of this meeting included an agreement of the final set of Alternatives to be included in the FMP Draft Environmental Impact Statement and recommendations for future steps of the FMP development and its implementation.

On March 11, 2010, representatives of BISC and the FWC met in Tallahassee to review all of the public comments received during the 2009 Draft Environmental Impact Statement Public Comment Period. The cooperating agencies jointly developed responses to the various issues and concerns expressed by members of the public. These responses included explanations on the cooperating agencies' views on marine reserve zones, the selection of Alternative 4 as the Preferred Alternative, and the phasing out of commercial fishing.

On August 17, 2010, the FWC's then Chairman, Rodney Barretto, signed a document addressed to BISC's then superintendent Mark Lewis entitled "Intent to initiate Commission rulemaking following approval of Fishery Management Plan Final Environmental Impact Statement by National Park Service". This letter not only indicated that the FWC intends to initiate Commission rulemaking following the acceptance of the Fishery Management Plan FEIS, but also reaffirmed the FWC's commitment to continue to work with the park as stipulated in the Memorandum of Understanding between the two cooperating agencies. On February 3, 2014, a second document that was addressed to BISC superintendent Brian Carlstrom and entitled "Intent to initiate Commission rule making following approval of Fishery Management Plan Record of Decision issuance by National Park Service" was signed by FWC Chairman Richard Corbett and reaffirmed the FWC's intentions to continue working cooperatively with the NPS for fishery management within the park.

Threatened and Endangered Species Consultation and Coordination

The US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) were consulted multiple times during 2004 and 2005 regarding possible effects of actions in the preferred alternative on species listed as Threatened or Endangered under the Endangered Species Act (7 U.S.C. 136; 16 U.S.C. 460 et seq. (1973)). Additional consultation was sought in 2007 with special focus on marine species and critical habitats. Concurrence from USFWS was received and consultation was completed in November of 2009. Formal consultation with NMFS was completed in September of 2012 with the issuing of a Biological Opinion (see **Appendix 10**) as part of a programmatic consultation that considered the impacts of the park's proposed General Management Plan (GMP) and all plans, including this Fishery Management Plan (FMP), which tier under the GMP. NMFS determined that implementation of the GMP is likely to adversely affect green, loggerhead, and hawksbill sea turtles but is not likely to jeopardize their continued existence. As part of the Biological Opinion, NMFS issued Terms and Conditions (see Chapter 5.5 and **Appendix 10**) with which the NPS must comply in order to be exempt from liability for take of sea turtles and other protected species.

The state of Florida Fish and Wildlife Conservation Commission (FWC) was consulted in 2005 regarding state-listed species (threatened, endangered, and species of special concern).

Related communications regarding these consultations are presented in Chapter 5.5 and are available as part of the Administrative Record for this document.

Cultural Resources Consultation and Coordination

The State of Florida Division of Historical Resources was consulted regarding possible effects of actions in the preferred alternative on historic properties. Mr. Frederick P. Gaske, Director and State Historic Preservation Officer, determined that actions in the preferred alternative will have no adverse effect on historic properties. A letter stating the

finding of no adverse effect is presented in Chapter 5.5 and is available as part of the Administrative Record for this document.

Socioeconomic Consultation and Coordination
EDAW, Inc. of San Diego, California was contracted to complete a socioeconomic assessment related to Biscayne National Park's developing fisheries management plan. The final report, entitled "Biscayne National Park: Fishery Management Plan Socioeconomic Report" was produced in May, 2005. The report included thorough summaries of demographics, land use and jurisdictions, the local economy, and fishing in the local social and economic context, as well as analyses of socioeconomic impacts that could be anticipated from various alternatives of the fisheries management plan. This report guided NPS staff in the writing of Chapters 3.7 and 4.7 of this document.

5.3. List of Preparers

National Park Service
Todd Kellison, (past) Fisheries Biologist, Biscayne National Park
Vanessa McDonough, Fishery & Wildlife Biologist, Biscayne National Park
Rick Clark, (past) Chief of Resource Management, Biscayne National Park
Elsa Alvear, Chief of Resource Management, Biscayne National Park
Linda Canzanelli, (past) Superintendent, Biscayne National Park
Mark Lewis, (past) Superintendent, Biscayne National Park
Brian Carlstrom, Superintendent, Biscayne National Park
Monika Mayr, (past) Assistant Superintendent, Biscayne National Park
Myrna Palfrey, (past) Assistant Superintendent, Biscayne National Park
Sula Jacobs, (past) Assistant Superintendent, Biscayne National Park
Howard Tritt, (past) Biological Science Technician, Biscayne National Park
Jim Tilmant, (past) Fisheries Program Leader, NPS Water Resources Division (WRD)
Jim Long, (past) Fisheries Biologist, Southeast Regional Office (SERO)
Ben West, Regional Chief of Planning and Compliance, Southeast Regional Office (SERO)

Florida Fish and Wildlife Conservation Commission
Dr. Roy Crabtree, (past) Director, Division of Marine Fisheries Management
Mark Robson, (past) Director, Division of Marine Fisheries Management
Jessica McCawley, Director, Division of Marine Fisheries Management
Melissa Recks, Biological Scientist
Robert Palmer, (past) Biological Scientist
Andrew Strelcheck, (past) Biological Scientist
William Teehan, (past) Biological Scientist

Tennessee Valley Authority
Mary Brown, (past) Biologist
Gary Hickman,(past) Biologist

5.4. List of Recipients

Federal Agencies
National Park Service
NOAA- Florida Keys National Marine Sanctuary
NOAA- Coral Reef Task Force
NOAA- National Marine Fisheries Service Southeast Fisheries Science Center
NOAA- South Atlantic Fisheries Management Council
US Fish and Wildlife Service
EPA- Environmental Protection Agency
Everglades National Park
U.S Geological Survey
U.S. Coast Guard

Elected Officials
Mayor of Homestead
Mayor of Florida City
Mayor of Miami
Miami-Dade County Commissioners
Monroe County Commissioners
Governor of Florida
State Representatives
State Senators
U.S. Representatives
U.S. Senators

State Agencies
Bill Baggs Cape Florida State Park
Florida Fish and Wildlife Conservation Commission (FWC)
Florida Fish and Wildlife Research Institute (FWRI)
Florida Department of Environmental Protection
John Pennekamp Coral Reef State Park
South Florida Water Management District

Local Agencies/Institutions
University of Miami Rosenstiel School of Marine and Atmospheric Science
University of Florida
Florida International University
Southeast Florida Coral Reef Initiative

Organizations
Active Divers Association
American Fisheries Society
Amy Slate's Amoray Dive Resort
Atlantic Gamefish Foundation
Austin's Dive Center

Biscayne Bay Foundation
Biscayne Bay Wingnet Association
Biscayne National Underwater Park
CCA Florida
Center for Marine Conservation
Citizens for a Better South Florida
Community Partners
Defenders of Wildlife
Divers Direct Outlet Store
Environmental Defense Fund
Federation of Fly Fishermen
Fishin' Buddy
Fishing Rights Alliance
Florida Audubon Society
Florida Bay Outfitters
Florida Collector
Florida Keys Commercial Fishermen's Association
Florida Keys Guide Association
Florida Power and Light
Florida Scuba News
Florida Sea Base High Adventure
Florida Skin Divers Association
International Game Fish Association
Islamorada Dive Association
Holiday Diver
Hook and Line Fishermen, Inc.
Keys Association of Dive Operators
National Association of Black Scuba Divers
National Fish and Wildlife Foundation
National Hispanic Environmental Council
National Parks Conservation Association
Natural Resources Defense Council
Ocean Divers
Organized Fishermen of Florida
Quiescence Diving Services, Inc
Reef Environmental Education Foundation
Reefkeeper International
Reef Relief
R/V Coral Reef II
Slate's Dive Center
Sierra Club
South Dade Anglers
South Florida Freedivers
South Florida National Parks Trust
South Florida Sports Fishermen Club
The Nature Conservancy

The Ocean Conservancy
Tropical Audubon Society
Underwater Society of America
World Wildlife Fund
Youth Fishing Foundation

5.5 Correspondence received from Federal, State, Local, and tribal agencies

The following pages represent correspondence received from federal, state, local, and tribal agencies in response to our public comment period and required agency consultations, and include responses to consultation requests as required by federal and state laws.

1086

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

November 23, 2009

To: Mark Lewis, Superintendent, Biscayne National Park, Homestead, Florida
Attention: Vanessa McDonough

for From: Paul Souza, Field Supervisor, South Florida Ecological Services Office, Vero Beach, Florida

Subject: Fishery Management Plan Environmental Impact Statement; Service Federal Activity Code: 41420-2009-FA-0592; Service Consultation Code: 41420-2009-I-0434

The Fish and Wildlife Service (FWS) has reviewed the letter received August 10, 2009, and other information submitted by the National Park Service (NPS) for the project referenced above. This letter is submitted in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*) and the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. 1461 *et seq.*).

PROJECT DESCRIPTION

The NPS is proposing to implement a Fishery Management Plan for Biscayne National Park, and has prepared a draft Environmental Impact Statement (EIS) for the plan. A total of five alternatives have been proposed in the draft EIS. The alternatives were based on public input, inter-agency meetings, and environmental and socioeconomic analyses. The preferred alternative is to "Rebuild and Conserve Park Fisheries Resources." This alternative would include: changes in current fishing regulations in waters of the park including increases in minimum size limits, slot limits, decreases in bag limit, seasonal and spatial closures; elimination of lobster mini-season in the park; spear gun restrictions; and the implementation of a commercial fisherman and recreation boat permit system. The proposed Fishery Management Plan would be implemented through close collaboration with the Florida Fish and Wildlife Conservation Commission. The project site is located in Biscayne National Park, Miami-Dade County, Florida.

THREATENED AND ENDANGERED SPECIES

The NPS has determined that the proposed Fishery Management Plan "may affect, but is not likely to adversely affect" the endangered West Indian manatee (*Trichechus manatus*), federally listed sea turtles, and the threatened American crocodile (*Crocodylus acutus*). The FWS concurs with this determination.

This letter fulfills the requirements of section 7 of the Act and further action is not required. If modifications are made to the project, if additional information involving potential effects to

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listed species becomes available, or if a new species is listed, reinitiation of consultation may be necessary.

Thank you for allowing us to provide these comments and for your cooperation and effort in protecting federally listed species. If you have any questions regarding this project, please contact Winston Hobgood at 772-562-3909, extension 306.

cc: electronic copy only
FWC, Tallahassee, Florida (Mary Ann Poole)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505
(727) 824-5312; FAX 824-5309
http://sero.nmfs.noaa.gov

F/SER31:KL

SEP 19 2012

Mr. Mark Lewis
Superintendent, Biscayne National Park
National Park Service
9700 SW 328th Street
Homestead, FL 33133

Re: Biscayne National Park General Management Plan

Dear Mr. Lewis:

Enclosed is the National Marine Fisheries Service's (NMFS) biological opinion (opinion) based on our review of impacts associated with the Biscayne National Park General Management Plan (GMP). This opinion is based on project-specific information provided in the draft environmental impact statement as well as NMFS' review of published literature. This opinion analyzed the project effects on sea turtles, smalltooth sawfish, elkhorn and staghorn corals, and designated critical habitat for elkhorn and staghorn corals. We believe that the implementation of the GMP is likely to adversely affect green, loggerhead, and hawksbill sea turtles but is not likely to jeopardize their continued existence.

We look forward to further cooperation with you on other National Park Service projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Kelly Logan, consultation biologist, by e-mail at Kel.Logan@noaa.gov or (954) 356-6790.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.P
Ref: P/SER/2011/03871

11.4 Terms and Conditions

In order to be exempt from liability for take prohibited by Section 9 of the ESA, BNP must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

The following terms and conditions implement RPM No. 1.

BNP must require compliance with the most current careful release protocols including any updates to these requirements. BNP must include information specifying handling and/or resuscitation requirements that fishers must implement for any sea turtles taken, as stated in 50 CFR 223.206(d)(1-3), as mandatory conditions of the NPS Special Use Permits issued to commercial fishermen and recreational boaters. The conditions in the recreational boating permits are applicable only if the permittees engage in fishing activities in the Park.

BNP must also require as mandatory conditions of the NPS Secial Use Permits that all fishermen take the following actions to safely handle and release an incidentally caught smalltooth sawfish:

Leave the sawfish, especially the gills, in the water as much as possible.
Do not remove the saw (rostrum) or injure the animal in any way.
Remove as much fishing gear as safely possible, from the body of the animal.
If it can be done safely, untangle any line wrapped around the saw.

BNP will display educational signage regarding smalltooth sawfish (http://www.flmnh.ufl.edu/fish/education/sawfishsign.pdf) wherever practical on BNP property, including along the jetty/boardwalk areas of Convoy Point and Black Point, explaining the possibility of their capture by hook-and-line and spiny lobster traps, and what to do in the event of a hooking or entanglement within BNP.

BNP will also suggest to Miami-Dade County officials that they install similar signage at all marinas and vessel entry points that are owned/operated by the county.
This signage must identify the telephone and e-mail contact information where an individual may report a sawfish incidental capture or sighting to the National Sawfish Encounter Database.

BNP will also display educational signage regarding sea turtles (http://sero.nmfs.noaa.gov/sf/pdfs/Sea Turtle_Release Protocols April2011.pdf.) wherever practical on BNP property, including along the jetty/boardwalk areas of Convoy Point and Black Point, explaining the possibility of their capture by hook-and-line and spiny lobster traps, and what to do in the event of a hooking or entanglement within BNP.

BNP will also suggest to Miami-Dade County officials that they install similar signage at all marinas and vessel entry points that are owned/operated by the county.

The signs must warn anglers to avoid casting in the direction of sighted sea turtles, to avoid the possibility of their capture.

Signs must clearly display the 24-hour phone number for the Florida Sea Turtle Strandings Hotline [1-888-404-3922] and e-mail (Allen.Foley@MyFWC.com).
Signs should clearly direct anglers to immediately call the Florida Sea Turtle Strandings Hotline to report any turtle catch and request assistance if necessary.

BNP will install monofilament recycling bins and educational signage wherever practical on BNP property, including along the jetty/boardwalk areas of Convoy Point and Black Point to reduce the risk of turtle or sawfish entanglement in or ingestion of marine debris within BNP.

BNP will also suggest to Miami-Dade County officials that they install similar bins and signage at all marinas and vessel entry points that are owned/operated by the county.

Monofilament recycling bins must:

Be constructed and labeled according to the instructions provided at: http://mrrp.myfwc.com/media/1517/MRRPProtocol.pdf.

Be maintained in working order and emptied frequently so that they do not overflow.

The following terms and conditions implement RPM No. 2

BNP will coordinate with the STSSN and State of Florida to monitor sea turtle strandings. If stranding trends show a significant increase in spiny lobster trap gear and/or hook-and-line related strandings, this may represent new information that would require reinitation of Section 7 consultation.

BNP, in collaboration with the SEFSC, must submit STSSN stranding reports (which will be forwarded to NMFS by the STSSN), including the information below, that show evidence of trap and/or hook-and-line gear entanglements of sea turtles to NMFS by May 1 of each year.

The STSSN report must include information on: species, sex, date (day, month, and year), location where the take occurred (latitude and longitude, if possible) the animal condition and disposition, and the curved and/or straight carapace length (when available).

These reports must be forwarded to the Assistant Regional Administrator for Protected Resources, Southeast Regional Office, Protected Resources Division (PRD), 263 13th Avenue South, St. Petersburg, Florida 33701.

BNP will include, as mandatory conditions of its Special Use Permits for commercial fishing and boating, that permit holders report any accidental hooking or other incidental fishing interaction with sea turtles or sawfish, or any accidental vessel strike of a sea turtle, resulting from their permitted activity.

The following terms and conditions implement RPM No. 3

BNP will enforce the slow speed zones and will attach the Vessel Strike Avoidance Measures (enclosed) to the NPS Special Use Permits.

BNP will display educational materials wherever practical on BNP property, including along the jetty/boardwalk areas of Convoy Point and Black Point, alerting boaters to the presence of sea turtles and educating them regarding the effects of vessel strikes.

BNP will also suggest to Miami-Dade County officials that they install similar vessel strike avoidance signage at all marinas and vessel entry points around the park that are owned/operated by the county.

The following terms and conditions implement RPM No. 4

BNP will distribute (as part of the NPS Secial Use Permits) outreach material describing the appearance and likely habitat of *Acropora*, and inform fishers that there are potential civil penalties for damage caused to corals from placement of traps or traps mobilized in storms, to aid fishers in avoiding potential interactions with these species.

BNP will recommend to FWCC that new closed areas be established where trapping is prohibited. If agreed upon by the FWCC, then BNP must work with FWCC to accomplish this action. This will reduce the likelihood of spiny lobster traps affecting *Acropora*.

BNP will conduct *Acropora* surveys prior to installation of any mooring buoys or markers in accordance with the Recommended Survey Protocol for *Acropora* spp. in Support of Section 7 Consultation (Revised October 2007) (Attachment D).

Mooring buoys and/or markers will be installed in sandy substrate wherever possible and anchor pins will be used in any area where a buoy/marker must be installed into hardbottom. Anchor pins must NOT be installed directly in/on *Acropora* colonies.

12 Conservation Recommendations

NMFS believes the following conservation recommendations further the conservation of listed species. NMFS strongly recommends that these measures be considered and implemented by the COE, and requests to be notified of their implementation.

1. Gather data on the species and numbers of hook-and-line captures within BNP that would help to determine the makeup of majority of marine fauna found at the site.

2. Gather data documenting the numbers, size, species, locations, behavior, etc., of all threatened and endangered species observed within BNP by BNP patrons. Continue public outreach and education on smalltooth sawfish and sea turtles, in an effort to minimize interactions, injury, and mortality.

3. Provide funding to directed research on smalltooth sawfish that will help further our understanding about the species, i.e., implement a relative abundance monitoring program which will help define how spatial and temporal variability in the physical and biological environment influence smalltooth sawfish, in an effort to predict long-term changes in smalltooth sawfish distribution, abundance, extent, and timing of movements.

4. Provide NMFS' Southeast Region PRD with data collected and any resulting publications from all restoration and monitoring concerning elkhorn and staghorn corals, including any research that is not covered by this programmatic opinion.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
National Marine Sanctuary Program
Southeast Atlantic, Gulf of Mexico and Caribbean Region
33 East Quay Rd
Key West, FL 33040
(305) 809-4670 Voice (305) 293-5011 Fax

ML 10/13
ERM 10/16/09

September 25, 2009

Superintendent Mark Lewis
Biscayne National Park
Attention: Fisheries Management Plan
9700 SW 328th Street
Homestead, Florida 33033-5634

Dear Superintendent Lewis:

The National Oceanic and Atmospheric Administration, and specifically the Office of National Marine Sanctuaries and the National Marine Fisheries Service are pleased to have the opportunity to comment on the Biscayne National Park Fishery Management Plan Draft Environmental Impact Statement (November 2008). We commend you for the development of this Fishery Management Plan (FMP) and Draft Environmental Impact Statement (DEIS) through a cooperative effort between Biscayne National Park and the Florida Fish and Wildlife Conservation Commission.

In addition, we appreciate the extensive public process you conducted to identify the preferred alternative and the range of alternatives based on public input, interagency meetings, and the environmental and socioeconomic analyses. NOAA's Office of National Marine Sanctuaries and the staff of the Florida Keys National Marine Sanctuary (FKNMS) were pleased to be involved in the public process through the Fishery Management Plan Working Group that was established under the authority of the FKNMS Sanctuary Advisory Council (SAC). Jack Curlett, a FKNMS SAC recreational fishing representative, who chaired the working group, described the process as cohesive, very open and productive. The working group members were very dedicated and met routinely over a nine month timeframe. Each of their facilitated meetings had time for public comment. Chairman Curlett gave briefings and updates on the working group's progress at each FKNMS SAC meeting. Ultimately, the FKNMS SAC approved the working group's recommendations to the Biscayne National Park. Those recommendations were a blend of Alternative 3 and 4. Through the FMP Working Group activities, the FKNMS managers felt very engaged in your process.

Specific Comments:

- NOAA supports the Biscayne National Park's Preferred Alternative – Alternative 4 Rebuild and Conserve Park Fisheries Resources (the preferred alternative) as contained in the FMP-DEIS.
- Alternative 4 contains a number of protection and conservation measures that when implemented will result in protection of critical marine habitats and species.
- Under Alternative 4, management actions would be enacted in conjunction with the Florida Fish and Wildlife Conservation Commission (FWC) to increase within the park the abundance and average size of select fish and invertebrate species by 20% or more. These management actions would benefit fish habitat in several ways, including:
    - Improving knowledge and maps of benthic habitats, which will enhance communications among mangers and the public, especially with regard to the location of sensitive areas.
    - Reducing the likelihood of divers inadvertently damaging fish habitat.
    - Minimizing damage to fish habitat from roller-frame trawl gear.
    - Minimizing damage to fish habitat by establishing coral reef protection areas (CRPAs) to delineate coral reef habitat on which lobster and crab traps could not be deployed.
- The proposed action to limit spearfishing to gear without a trigger mechanism and eliminating the use of compressed air is an excellent first step. To the south of Biscayne National Park, spearfishing has been prohibited since December 1960 for a distance of 20 miles down the reef tract in the Key Largo Existing Management Area of the Florida Keys National Marine Sanctuary and the John Pennekamp Coral Reef State Park. The state waters beyond Pennekamp Park for another 20 miles also have a prohibition on spearfishing. Since BNP was open to spearfishing, there was considerable poaching and spillover of spearfishers into sanctuary waters. The actions proposed in Alternative 4 will help lessen this problem.
- The proposed action to manage "recreational boat use" is an excellent step toward managing this activity in a way that will result in improved resource protection. We will be observing the implementation of this management tool and are keen to know if it is successful.
- The measures to establish trap-free zones are an excellent application of marine spatial planning and will help protect and conserve important marine habitats.
- The proposed management action to increase the abundance and average size of targeted fish and invertebrate species within the park by 20% is a laudable goal. However, under traditional fisheries management practices, targets or goals like this for many species are not being attained. The FKNMS has implemented a comprehensive marine zoning plan for the 2900 square nautical miles under the co-trustee jurisdiction with the State of Florida in which a network of no-take areas have been implemented for various purposes. The larger Ecological Reserves have been set aside to protect the habitat and biodiversity of significant, contiguous habitats in the coral reef ecosystem of the Florida Keys. As the BNP begins the development of its General Management Plan, NOAA encourages the BNP to consider these marine zones as a management tool. Scientists monitoring the effects of the two Ecological Reserves in the FKNMS have recorded very positive results in a very short time-span. The FKNMS would like to collaborate with the BNP in a process to consider our contiguous boundary in the northern portion of the FKNMS and whether or not an Ecological Reserve should be established to complement our

management as we did with the Dry Tortugas National Park when we established the Tortugas Ecological Reserve and the park's Research Natural Area.

- The BNP and the FKNMS have similar co-trustee arrangements with the State of Florida. Since 60% of the FKNMS is in state waters, the FKNMS works closely with the State of Florida Department of Environmental Protection and the Fish and Wildlife Conservation Commission. Like the park, the FKNMS collaborates with the FWC on any regulatory change that will affect fishing in state waters. In addition, the FWC is the primary law enforcement partner for the sanctuary and is familiar with enforcement issues in both of our protected areas.

Again, NOAA applauds your proposed actions to better manage the fisheries resources of the BNP and the critical habitats that sustain them. Your preferred Alternative 4 contains a number of innovative management tools for the coastal and marine environments of South Florida. Our mutual cooperative efforts with the Florida Reef Resilience Program, the universities in the area, as well as the Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas, including their Aquatic Preserves and the Southeast Florida Coral Reef Initiative (SEFCRI) will surely be enhanced by your Fishery Management Plan and our future joint activities.

Sincerely,

Billy D. Causey, Ph.D.
Regional Director
Southeast Region
Office of National Marine Sanctuaries

Flower Garden Banks
National Marine Sanctuary
4700 Avenue U, Bldg 216
Galveston, TX 77551

Florida Keys
National Marine Sanctuary
33 East Quay Road
Key West, FL 33040

Gray's Reef
National Marine Sanctuary
10 Ocean Science Circle
Savannah, GA 31411

October 6, 2009

Mr. Mark Lewis
Superintendent
Biscayne National Park
9700 SW 328th Street
Homestead, FL 33033

RE: Biscayne National Park Fishery Management Plan (FMP) and Draft Environmental Impact Statement (DEIS), CEQ No. 20090286

Dear Mr. Lewis:

Pursuant to National Environmental Policy Act (NEPA) Section 102(2)(C) and the Clean Air Act (CAA) Section 309, the U.S. Environmental Protection Agency (EPA) has reviewed the referenced Biscayne National Park FMP and DEIS. Consistent with EPA's rating system, EPA rates this proposed action as "EC-1" as in "Environmental Concerns" with the recommendation that additional information be provided in the final EIS to better explain the environmental impacts. The EC aspect of this rating is based on two things: 1) the DEIS as written does not fully explain whether the need will be addressed and no detrimental environmental impact will occur to the fishery resource and 2) the DEIS states the Park's fishery resources are extremely stressed and need special attention.[1]

Background

The Biscayne National Park (Park) is located in southeast Florida and encompasses an area of 173,000 acres (290 mi^2) of which 164,000 acres (95 percent) constitute a diversity of marine habitats: sea grass meadows, hard-bottom communities, expansive coral reefs, sand and mud flats, mangrove fringes, and the water column. Within the Park are over 100 species targeted by commercial and recreational fisheries. Economically the bait shrimp fishery followed by guided sport fishing, primarily for bonefish, are the most important commercial fisheries within Biscayne Bay (Bay). Estimates are that 12 full-time guides and 36 part-time guides use the Park.

This Park has been designated by the South Atlantic Fishery Management Council (SAFMC) as Essential Fish Habitat (EFH) and a Habitat Area of Particular Concern (HAPC) for spiny lobster and coral (elkhorn and staghorn corals) and EFH for penaeid shrimp, the snapper-grouper complex, and coastal pelagic fishes. The Park also provides habitat for Endangered Species Act (ESA)-listed species: smalltooth sawfish, manatees, sea turtles (loggerhead, green, and hawksbills), bald eagles, and Acroporid corals. Additionally, most of the Bay is a lobster sanctuary.

[1] P. vii

The Park's coastal bay and coral reef habitat play a critical role in the function and dynamics of the larger Florida Keys coral reef ecosystem as it provides a safe harbor for larvae and juveniles from offshore spawning adults and produces adult fish and macroinvertebrates that migrate and replenish habitats outside the Park. The Park's mainland shoreline is almost entirely mangroves and is the longest unbroken chain of mangroves along Florida's east coast. The US Fish and Wildlife Service (FWS) estimated at least 1,300 species rely on mangroves for important habitat. Additionally, two types of coral reef communities are present in the park: inshore patch reefs and the offshore platform reef tract.

Congress established the Biscayne National Monument (Monument) to preserve and protect a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty for the education, inspiration, recreation and enjoyment of present and future generations.[2] The Monument was expanded to include 8,738 additional acres of land and water into its current size and re-designated as the Biscayne National Park. Congress also recognized the unique and special values of the Park's resources and their vulnerability to destruction and damage due to the easy human access by water. Congress directed NPS to manage this area in a positive and scientific way in order to protect the area's natural resource integrity and to keep the Park waters open to fishing in conformity with Florida's laws. Additionally, the Park's enabling legislation provides for the continued allowance of fishing.

Purpose and Need

According to the DEIS, the Park's fishery resources are extremely stressed and need special attention.[3] Numerous fish species within the Park are under considerable fishing pressure and in some cases are regionally *overfished* or subject to *overfishing* as defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). Seven species of fish (five grouper species: goliath, Nassau, red, gag, and black groupers, red drum, and speckled hind) are listed as *overfished* or subject to *overfishing* in South Atlantic waters by the SFMC. Data are insufficient to determine the fishery status for over 20 fished species. Of the 17 species for which fishery data are available, 71 percent appear to be *overfished*. Four of five grouper species, five of six snapper species, barracuda, and two of five grunt species are below the spawning potential ratios that constitute *overfishing*.

The size structures of highly desirable reef fishes (i.e., groupers and snappers) are particularly truncated in the Park relative to outside areas with lower fishing pressure. For 14 of 35 analyzed species, the minimum size harvest is lower than the reported minimum size where 50 percent of individuals are sexually mature. Over the past 25 years, the average size landed was near the minimum size for all harvested species. For example, the average black grouper is now 40 percent of its 1940 measurements and its spawning stock appears to be less than 5 percent of its historical maximum. These are clear indicators that current harvesting levels are not sustainable for these species.

[2] P. 1
[3] P. vii

Alternatives

To accomplish its purpose, the proposed action evaluated five alternatives: 1) maintaining the status quo (no action), 2) maintain Park fisheries at or above current levels, 3) improve Park fisheries over current levels, 4) rebuild and conserve Park fishery Resources, and 5) restore Park fishery resources. Alternative 4 is the preferred alternative while Alternative 5 is the environmentally preferred alternative. According to the DEIS, the preferred alternative's proposed management actions would offset the effects of increased human population growth, improved fishing technology, and increased recreational bycatch by increasing park fishery populations by at least 20 percent over current levels. The environmentally preferred alternative's proposed management actions would offset the effects of increased human population growth, improved fishing technology, and increased recreational bycatch by increasing park fishery populations to within 20 percent of the historic, pre-exploitive levels.

EPA Concerns and Recommendations

As acknowledged in the DEIS, Park fishery resources are stressed from regional overfishing. One of the main indicators of such fishing pressure is that large specimens have been selectively extracted[4] such that mature, large and fecund females are no longer providing their significant contribution to recruitment. At least 14 fishery species[5] are being harvested at a size before they average sexual maturity (size of first maturity), so that these species cannot sustain their population. However based on the current reduced population levels, fishery stocks must not only sustain the existing population but actually expand (restore) it back to sustainable levels. Consequently the FMP should contain fishery management measures than result in restoration to sustainable populations.

According to the DEIS, implementation of any of the action alternatives (3-5) may improve the fishery resources of the Park above current levels. However, EPA recommends the Park restore fishery stocks to sustainable levels, at a minimum, consistent with language in EO 12962.[6] Therefore, EPA's primary concern with the DEIS is that the varying levels (percentages) of recovery presented for the alternatives – including the preferred alternative – are not related back to sustainability.

We offer the following recommendations for your consideration in the Final EIS (FEIS):

Recommendation: EPA recommends that the National Park Service (NPS)/Park define a *sustainable* level of harvest for the Park in its selected preferred alternative and discuss how to implement it in the FMP. EPA particularly recommends that popular impacted fishery species – such as the grouper-snapper complex, hogfish and spiny lobster – be brought back to a sustainable level of harvest. Alternatively, the Park may wish to select a recovery at a level *beyond* the defined level of sustainability to enhance the Park experience for visitors (i.e., more fish for fishers to catch-and-release and more fish/other marine life for divers to observe in the wild in their natural habitat).

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[4] P. 30
[5] P. vi.
[6] … *recreational fishing shall be managed as a sustainable activity in national wildlife refuges, national parks, national monuments, national marine sanctuaries, marine protected areas, or any other relevant conservation or management areas or activities under any Federal authority…*

Recommendation: because as written, the DEIS/FMP appears unclear how its alternatives meet the proposed action's purpose and need, resolve the fishery impacts, contains inconsistencies, and lacks sufficient environmental information to support its conclusions, EPA has provided the detailed enclosed comments for consideration in the FEIS.

For example, the alternatives presented and evaluated appear to represent an escalation of fishery management measures for commercial and recreational fishery restrictions that are primarily focused on the invertebrates, not the finfish. For example, the DEIS states that most "commercial fishers in the park target invertebrates (spiny lobsters, blue and stone crabs, and shrimp), and decreases in the number of commercial fishers would likely have minimal effects on the mean size and abundance of targeted fish species in the park."[7] However alternatives 2, 3, 4, and 5 implement a commercial permit system, the details of which are omitted from the DEIS, leading EPA to assume that the purpose of the commercial permit is to reduce the number of commercial fishers, which would be expected to reduce the impacts to targeted invertebrates.

However according to the DEIS despite using different management actions, Alternative 1[8] (no action), Alternative 2 (current status) and Alternative 3 (10 percent improvement),[9] all have the same environmental impacts, i.e., *would not cause impairment, would likely lead to minimal change in mean density or size of individuals of invertebrate populations* upon the Park's invertebrate species. Yet both Alternative 2 and 3 implement a commercial permit system and Alternative 3 adds the recreational-user permit system, establishes a crab-trap-free zone, and bans the two-day recreational lobster sport season.

Furthermore because the DEIS appears to convey numerous unsupported "ifs" in its analysis, it is unclear what the environmental impacts will be. For example in the DEIS discussion of Alternatives 3 & 4, the abundance and size of targeted fish could be positively affected *if* the recreational use permit system resulted in decreased fishing effort. Similarly in Alternative 4, *if* the non-transferable commercial-use permit system results in decreased fishing effort in the Park, then size and abundance of targeted species could increase. Also, *if* the commercial guide permit system resulted in decreased fishing effort in the park, then size and abundance of targeted species could increase.

Consequently, EPA recommends the FEIS better clarify how the alternatives protect the finfish, address the inconsistencies, and provide sufficient environmental information to support its conclusions.

Recommendation: Alternatives 4 and 5 may rapidly restore the Park's fishery resource to the maximum extent of the action alternatives presented. Although EPA generally supports these two alternatives, not all aspects of Alternative 5 may be needed for a reasonable Park recovery. Moreover, consistent with EO 12962, we also believe that the level of restoration should be a harvest that is "sustainable" – if not a lesser harvest resulting in a larger fishery resource and a greater Park experience (we note that the DEIS does not relate the levels of restoration for Alternatives 3-5 to a sustainable harvest). Accordingly, EPA has provided several fishery management measures in the enclosed comments that should be considered for whatever final

[7] P. 56
[8] P. 61
[9] P. 62

preferred alternative is selected in the FEIS (these measures include commercial fishing/permits, size limitations, sport spearfishing/lobstering, catch-and-release fishing, coordination outside the Park, performance measures and monitoring, and enforcement). For the FEIS, NPS and the Park may wish to amend Alternative 4 or 5 to include these measures, or consider adding a hybrid "4/5" alternative bracketed by Alternatives 4 and 5.

Recommendation: To determine an appropriate metric to define a "sustainable" harvest, EPA recommends consultation with the National Marine Fishery Service (NMFS), FWS, NPS, their state counterparts such as the Florida Fish and Wildlife Conservation Commission (FWC), and the Park staff. If relevant for the commercial and/or recreational fisheries of the Park, such a metric of sustainability might be a traditional harvest level such as the Maximum Sustainable Yield (MSY) for each stressed fishery species within the Park. EPA would consider MSY as the minimum target for Park recovery. Ideally, the level of harvest could be further reduced beyond an MSY recovery to restore populations to above sustainable levels such as the Optimum Yield (OY) to increase the Park experience.

Recommendation: To the extent feasible, commitments should be made in the Record of Decision (ROD) – but preferably in the FEIS – for the implementation of fishery management measures that reach the recovery goals of each alternative presented, particularly for the preferred alternative in the FEIS. Moreover, the monitoring, performance measures and enforcement of the fishery management measures of the selected FMP should be further discussed in more detail in the FEIS and ROD. FEIS should also address the societal/economic impacts to commercial fishers, especially if there are any fishers from minority and/or low-income populations. Impacts to any subsistence fishers using the Park should also be addressed.

Recommendation: The FEIS should explain any possible unintended environmental consequences to stressed Park fisheries associated with the preferred alternative's commercial permit's non-transferrable clause. The concern is that the "non-transferable clause" could have the unintended consequence in encouraging more people to apply for permits than otherwise would have because of the intent to decrease the number of permit holders, and to force "use" as defined in the DEIS to maintain the permit when the permit holders otherwise would not have such pressure to fish. Consequently, a permit-induced pressure may occur causing depleted fishing stocks additional fishing pressures that may hinder any and all of the goals represented by Alternatives 2 – 5.

Recommendation: The FEIS should explain using environmental information how the proposed recreational-user permit system will realize a positive impact on the size and abundance of targeted invertebrate species populations. In its explanation, the FEIS should address the following DEIS statements: 1) most commercial fishers in the Park target invertebrates,[10] 2) approximately 30 percent of the Park's visitors are recreational fishermen,[11] and 3) the recreational harvest of invertebrates is minor in scale relative to commercial harvest such that any effect of the reduction in recreational effort would likely be small.[12]

[10] P. 56
[11] P. 31
[12] P. 62

Recommendation: The FEIS discuss whether a disproportionate burden is being placed on the recreational fisher by implementing a recreational-user permit and eliminating the recreational lobster sport season when the commercial fisher appears to have the greater fishery impacts. And if a disproportionate burdened is indeed being placed on the recreational fisher, the rational for this burden placement should be discussed.

Recommendation: The FEIS should discuss how implementing alternatives 2 and 3 would realize the same invertebrate impacts as the no action alternative. This finding appears to contradict the DEIS finding that the implementation of a recreational-use permit system (Alternative 3) could discourage recreational harvesters of targeted invertebrate species from harvesting in the park, and therefore, realizing a positive impact on the size and abundance of these populations.[13] Additionally, it reinforces the concern that recreational users may be disproportionately burdened by the implementation of Alternative 3, having the recreational-user permit, does not appear to realize any different impact than Alternatives 1 and 2. This issue is raised as the preferred alternative appears to build upon Alternative 3 actions, which in turn appears to build upon Alternative 2 actions, which in turn builds upon Alternative 1 actions.

Thank you for the opportunity to review this DEIS/FMP. Should you have questions regarding these comments, please contact Beth Walls (at 404-562-8309 or walls.beth@epa.gov) or Chris Hoberg (at 404-562 – 9619 or hoberg.chris@epa.gov) of my staff.

Sincerely,

Heinz J. Mueller, Chief
NEPA Program Office
Office of Policy and Management

Enclosure: EPA detailed comments

[13] P. 61

EPA Comments on NPS BISC FMP/DEIS

EPA-Recommended Fishery Management Measures

Although EPA supports Alternatives 4 and 5 as providing the greatest fishery benefit of the action alternatives presented in the DEIS, we recommend that NPS and the Park consider amending Alternative 4 or 5 in the FEIS to include these measures, or consider adding a hybrid alternative bracketed by Alternatives 4 and 5, as appropriate. We offer the following comments and fishery management measures, several of which are already considered in some form in the DEIS:

Commercial Fishing

EPA recommends that no new commercial fishing be allowed in the Park (not even through a limited entry or lottery system proposed in Alternative 5[1]) and that all existing commercial fishing within the Park be phased out on a fairly rapid timetable.

If infeasible from a fisher impact perspective, some limited and enforced exceptions to minimize these societal impacts (especially any Environmental Justice (EJ) fishers) could be considered: 1) designation of exclusion zones on traditional fishing grounds within the Park that are defined by the NPS/Park staff, but no or minimal shrimp boat trawling (and only in designated sandy areas previously trawled) due to bycatch[2] and Biscayne Bay bottom impacts; 2) continuance of some charter/party boat trips to provide the Park with some continued revenue, but only with the stipulation that all trips and catches would be limited in terms of the number of trips per week, catch per species per day, catch minimum size limits, and any other measures that should be identified in the FMP, based on studies and recommendations by the resource agencies and the Park staff (also see EPA's suggested fishery management measures provided below), 3) continuance of limited use of traps (spiny lobster and stone/blue crabs) but only outside designated CRPAs or similar hard- or live-bottom areas including seagrasses such as *Thallassia* beds. Some of these measures could be tried on a voluntary basis; however, if unsuccessful, they should become mandatory and enforced within a short timeframe so that recovery can proceed.

Commercial Permits

EPA recommends that any commercial fishing require a limited-entry, Special Use Permit subject to renewal each year. All permits would be non-transferable and would be subject to a

[1] P. 26

[2] Bycatch can include juveniles of commercial and ecological species, common marine species that are part of the Park ecology and visitor experience (starfish, brittle stars, puffers, sea urchins, etc.), endangered sea turtles (Note: all shrimp nets must be equipped with Turtle Exclusion Devices or TEDs approved and inspected by FWS), and broken pieces of endangered Acroporid corals. All bycatch should be released in the event some specimens (e.g., certain fish and hard shelled mollusks and crabs) could survive the trauma of trawl capture.

use-or-lose policy where permits would become invalid and non-renewable (after the one-year term) if there were no recorded landings or – as a fallback – only insignificant recorded landings were made at a threshold level determined by the resource agencies and BISC staff. Permit monies could be used by the Park for enforcement of the FMP or other similar uses such as compliance assistance, monitoring or onboard observers (e.g., charter/party boats, commercial vessels), and education of fishers and other visitors regarding recovery, compliance and conservation.

Size Limitations

EPA recommends, consistent with several of the DEIS alternatives, that the resource agencies and the BISC staff designate and enforce minimum size limits (fork length for finfish and carapace width for crustaceans) for all target species of concern within the Park. Existing limitations may need to be increased for recovery. The selected FMP should document and detail such size limitations. Implementation of a minimum size would help ensure that only specimens greater than the average size of first maturity are harvested. It is clear that such size designations cannot be less restrictive than any local, existing, federal FMP for specific commercial and/or sport species; however, they could be more restrictive for the purposes of Park recovery.

Other Fishery Management Measures

EPA recommends in addition to minimum size limitations, that the resource agencies and Park staff also consider implementing other management measures as necessary to quickly restore stocks to sustainable levels or above. We note that several potential management measures were provided for Alternatives 2[3], 3[4], 4[5] and 5[6] that would be considered by the Park and FWC.

EPA considers such detail essential to the FMP. In general, these are effective and traditional measures including increasing minimum harvest sizes, bag limits, seasonal or spatial closures, prohibition of extractive fishing (catch-and-release only), temporary moratoriums, etc. The FEIS should fully describe the measures to be implemented and provide more certainty as to what measures will be, or will likely be, implemented. The prospective ROD should state this with even more certainty and detail. To the extent feasible, commitments should be made in the ROD (preferably the FEIS) that these measures will be implemented to reach the recovery goals of each alternative presented (particularly for the preferred alternative at the FEIS stage).

With regard to implementing fees for permits or fishing license stamps (e.g., a $2 recreational fishing license stamp for Alternative 2), we note that such monies can be useful to enforcement and education (as discussed above) but do not necessarily restore the resource *per se* from a fishery management standpoint. That is, although subsistence and some recreational

[3] P. 17
[4] P. 20
[5] P. 24
[6] P. 26

fishers may be discouraged from Park fishing by a user fee, the additional cost for permits/licenses will likely just become the "cost of doing business" unless the fees are prohibitive, and therefore still allow continued overfishing within the Park.

Sport Spearfishing

EPA recommends that spearfishing be reduced by disallowing the use of SCUBA gear by fishers (snorkel free diving only) to limit the spearfishing effort and specifically the spearing of large specimens like grouper in deeper waters. We agree that the elimination of spearfishing proposed by Alternative 5 would be an effective fishery management measure, but may not be needed for a reasonable recovery.[7]

Target species may also need to be restricted to more abundant species (species to be determined by resource agencies and Park staff) instead of hogfish and other popular species. Minimum size and bag restrictions should be designated and enforced for all species spearfished, especially if spearing hogfish and other popular species was still allowed. Size restrictions may need to be increased while per-day bag limits decreased.

Sport Lobstering

EPA recommends if the Park is not designated as trap-free, trap use should nevertheless be limited and only allowed in designated exclusion areas outside trap-free CRPAs. If sport (by hand) collection of spiny lobster (*Panulirus argus*) is allowed as a fallback within the Park, we recommend (similar to spearfishing) that only snorkel free diving be allowed for collection (no SCUBA) to reduce harvests. State of Florida minimum carapace widths (or larger if so determined by the resource agencies and Park staff) would also apply. The Park may also wish to designate a minimum carapace width for a similar but smaller congenor, the spotted lobster (*P. guttatus*). It may also noteworthy that conscientious hand collection of lobsters could avoid the illegal collection of "shorts" more so than traps which are less selective.

Sport Catch-and-Release Species

EPA recommends stressed recreational species such as grouper become more catch-and-release species to reduce the extraction of fecund females that promote stock recovery in addition to traditional catch-and-release species in the Park such as bonefish and tarpon. This approach would maintain the Park's fishing experience by allowing fishers to still catch fish, but release them to also maintain the snorkeling experience for other Park visitors and educators. However, studies should be conducted to determine the survivorship of catch-and-release specimens, since not all species will necessarily survive the trauma of capture or being rapidly raised to the

[7]From a safety perspective, however, there are benefits to eliminating spearfishing since it is a potentially dangerous sport (spear shooting, use conflicts with snorkelers, etc.) and can also be a shark attractant due to blood releases and dispersion in the water column.

surface from deeper waters (although Biscayne Bay is not deep). If survivorship is high, catching and releasing specimens might still be possible after bag limits or fishing quotas have been reached.

Although not popular with sport fishers, the use of circle hooks (instead of J-hooks) could also be tried to increase the survivorship of catch-and-release specimens. If any existing commercial fishers are allowed to use hook-and-line gear within the Park, circle hooks would likely increase the survivorship of their bycatch of non-target species or undersized specimens of target species (regulatory discards).

Outside Park Coordination

EPA recommends the Park FMP must be coordinated with local State and County regulations and local federal FMPs regulating the same species since species inhabiting Biscayne Bay do not honor Park boundaries so that Park management measures are not inconsistent and less restrictive (as suggested above, the Park measures could nevertheless be more restrictive for the purposes of Park recovery).

Park Fisher Satisfaction

EPA recommends the minimum acceptable level of fisher satisfaction deemed appropriate by Park/NPS staff, i.e., 90%,[8] may be unrealistic during a rebuilding period intended to restore fishery stocks since harvesting sacrifices would have to be made to achieve recovery, i.e., less/no commercial and recreational landings can be expected for a longer time until recovery (e.g., pg. 26 suggests that a temporary moratorium could probably last several years). However, this need not be an issue for all visitors. We note that there apparently is a subset of visitors that do not require a large harvest in order to have a satisfactory Park experience. Based on creel surveys in the Park beginning in 2003, the level of satisfaction for Park fishers is still about 95%.[9]

Monitoring and Performance Measures

EPA strongly recommends establishing a monitoring system with specific performance measures in order to measure success of the selected FMP. Under Alternative 5, for example, we note[10] that determining achievement of the recovery goal "…would utilize the best available data for each species, likely including, but not limited to, data generated from visual census and creel surveys." We do agree with the continued use of creel surveys (started at the Park in 2003) as a general performance measure, but note that such information is primarily qualitative (data for species, size and enumeration of finfish/shellfish landed). Moreover, creel census interviews of fishers may or may not be factual for certain measures such as catch-per-unit-of-effort (C/E),

[8] P. viii
[9] P. 31
[10] P. 26

since fishers may tend to minimize the effort (their fishing time) for their catches.[11] We therefore suggest that fishery studies also be used to better confirm increases in defining stock population factors such as numbers, size, fecundity and sustainable harvest. Such studies and associated performance measures should be coordinated with NMFS, FWS, FWC and other resource agencies.

FMP Enforcement

EPA recommends the FEIS summarize enforcement information along with license, permit and other Park user fees/requirements. The proposed use for enforcement monies collected should also be addressed. Beyond appropriate fishery management measures and monitoring, enforcement is key to Park recovery. We appreciate that *Law Enforcement* was addressed in Chapter 2. However, this discussion primarily related to educational and signage improvements more so than increases in enforcement rangers, fines, or tolerance limits, etc.

Alternatives Analysis

NEPA procedures must insure that environmental information is of high quality and reflects accurate scientific analyses to foster excellent action.[12] As written, the DEIS/FMP does not yet appear to clearly describe how the alternatives evaluated meet the identified need and resolve the fishery impacts, how the selection of the preferred alternative is supported, and how numerous conclusions are substantiated. Consequently, EPA recommends the FEIS better clarify the issues and perceived inconsistencies and provide sufficient environmental information to support all conclusions as identified in the comments below. The following comments identify examples focused on the finfish and invertebrate sections of the DEIS which may be replicated throughout the DEIS, e.g., the Acroporid corals, endangered and threatened species, etc., sections; and consequently, may not identify all incidences.

Alternative 1

This alternative is the no action alternative. Since most commercial fishers in the Park target invertebrate (spiny lobster, blue and stone crabs, and shrimp)[13] and approximately only 30% of the Park's visitors are recreational fishermen,[14] it is unclear how the implementation of this alternative will realize the following.

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[11] If fisher interview information during a creel survey does contain minimized effort data, the current fishery status of the Park may be even more impacted than anticipated since the C/E ratio of creel surveys would be higher than actual conditions.

[12] 40 CFR § 1500.1(c)
[13] P. 56
[14] P. 31

- Would not cause impairment to targeted invertebrate species and would likely lead to minimal change in mean density or size of individuals of invertebrate populations.[15]

  EPA recommends the FEIS provide sufficient information to clarify how the status quo would not impair targeted invertebrate species since according to the DEIS most of the commercial fishers target invertebrate species and the other alternatives implement a commercial permitting system to reduce the number of commercial fishers presumably to reduce the number target invertebrates fished. The no action alternative does not stop the existing commercial fishing pressure to increase or continue and since their primary target is invertebrates, why wouldn't invertebrate abundance and size distributions be affected?

- Increase the harvest of non-traditionally targeted species as the preferred finfish species abundance declines.[16]

  EPA recommends the FEIS provide sufficient information to clarify how the status quo would increase the harvest of non-traditionally targeted species as the preferred finfish species abundance declines. The FEIS should explain why finfish species abundance will decline when the commercial fishers actually target invertebrates not finfish[17] and only 30% of the fishers are recreational fishermen,[18] implying that 70% are commercial.

- Would likely lead to a substantial decrease in mean density or length of targeted finfish populations, which the DEIS states would occur for the foreseeable future and have a major, long term negative impact on and potentially lead to impairment of targeted finfish species resources.[19]

  EPA recommends the FEIS provide sufficient information to clarify how the status quo would lead to a substantial decrease in mean density or length of targeted finfish populations. The status quo would allow commercial fishery to continue and the DEIS has stated that decreases in the number of commercial fishers would likely have minimum affect on the mean size and abundance of targeted finfish species in the Park.[20]

- **EPA recommends** the DEIS discussion be expanded in the FEIS beyond recreational fishery impacts to include commercial fishery impacts including bycatch. For example the DEIS states that recreational fishing pressure would likely continue to increase as human population increases and would lead to increased by-catch resulting in negative impacts to non-target fish populations.[21] As written it is unclear whether this would be significant, particularly when compared to commercial fishery impacts.

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[15] P. 61
[16] P. 53
[17] P. 56
[18] P. 31
[19] P. 54
[20] P. 56
[21] P. 65

Alternative 2

This alternative commits to offset the effects of increased human population growth, improved fishing technology, and increased recreational bycatch by management actions designed to maintain Park fishery populations at or above current levels.

***Management actions designed to maintain current fishery levels*:**

The DEIS addresses management actions designed to maintain Park fishery populations at current levels; however, it is silent as to what these management actions are and does not provide any environmental information supporting their use. Moreover, it is unclear how maintaining Park fishery populations at current levels complies with EO 12962.

EPA recommends the DEIS discussion be expanded in the FEIS to describe the management actions use with supporting environmental data to show their potential affects toward meeting the proposed action's need and purpose and achieving with EO 12962's mandate.

Impacts of maintaining current fishery levels:

The DEIS explains the potential environmental impacts of this alternative: 1) could lead to increased abundance and mean size within the Park if abundance and size decreased outside the park and 2) could lead to decreased abundance and size within the Park if abundance and size increase outside the park.[22] However, it is unclear how the proposed management actions designed to maintain the Park's existing fishery populations would cause these impacts.

EPA recommends the FEIS explain how the proposed management actions designed to maintain the Park's existing fishery populations would cause the above described impacts.

It is also unclear how the proposed management actions would likely lead to minimum change in mean density or length of targeted fin-fish populations, would help to maintain the abundance and mean size of invertebrates,[23] for the foreseeable future, would result in the maintenance of the heavily impacted fishery resources and altered conditions that exist at present, and would likely have minor, long-term negative impact on targeted finfish species and would not cause impairment of the resource.[24]

EPA recommends the FEIS provide sufficient environmental information to explain how the proposed management actions will lead to the above described improvements and prevent impairment of the resource.

[22] P. 54
[23] P. 61
[24] P. 55

Prohibiting new commercial fisheries:

The DEIS states that new commercial fisheries would not be allowed to develop within the park. Commercial fisheries that would be allowed to continue: bait shrimp roller-frame trawl, blue and stone crab pot, spiny lobster pot and dive, ballyhoo purse seine, and pelagic and benthic hook-n-line, but no multiple-hook "long lines." The prohibited commercial fishery is the wingnet shrimp fishery, and if data indicate declining resources, additional restrictions could be placed on permitted fisheries.[25] It is unclear how prohibiting new fisheries, i.e., the wingnet shrimp fishery, will achieve the objectives of this alternative or meet the identified need for the proposed action.

EPA recommends the FEIS explain how prohibiting new fisheries, i.e., the wingnet shrimp fishery, while allowing existing fisheries will achieve the objectives of this alternative or meet the identified need for the proposed action.

Furthermore it appears that existing data documents declining resources and therefore supports the need for additional restrictions on permitted fisheries. Seven species of fish are listed as *overfished* or subject to *overfishing* in South Atlantic waters by the SAFMC. Of the 17 species for which fishery data are available, 71% appear to be *overfished*. Four of five grouper species, five of six snapper species, barracuda, and two of five grunt species are below the spawning potential ratios that constitute *overfishing*.

EPA recommends the FEIS explain how the proposed prohibition of new commercial fisheries and the continued allowance of existing commercial fisheries will achieve any population recovery of targeted finfish species.

***Commercial permit system*:**

The DEIS does not explain how the limited-entry, transferable, special-use permit will work or how it will accomplish the maintenance of Park fishery populations at current levels. This alternative contains a commitment to implement management actions designed to maintain the existing fishery status but it is unclear what management steps will be taken to achieve this should the proposed commercial permit system fail.

EPA recommends the FEIS explain how the commitment to implement management actions designed to maintain the existing fishery status will be achieved should the proposed commercial permit system realize no change, e.g., "no action" alternative results.

EPA recommends the FEIS explain how this alternative would maintain "current" levels of finfish or only have "minor" negative impacts to targeted finfish species and not cause impairment to the finfish species resource when, according to the DEIS, decreases in the number of commercial fishers would likely have minimal effects on the mean size and abundance of targeted finfish species in the Park.[26]

[25] P. 17
[26] P. 56

Alternative 3

This alternative commits to offsetting the effects of increased human population growth, improved fishing technology, and increased recreational bycatch by management actions designed to increase park fishery populations by at least 10 percent over current levels.

***Management actions designed to increase current fishery levels*:**

The DEIS addresses management actions designed to increase park fishery populations by a minimum of 10 percent; however, it is silent as to what these management actions are and does not provide any environmental information supporting their use. It is also unclear how the differences between Alternatives 2 and 3 management actions will achieve their respective commitments, e.g., Alternative 3's proposed 10-percent increase in fishery populations. Moreover, it is unclear how the proposed 10-percent increase complies with EO 12962.

EPA recommends the FEIS discuss what management actions will be used and provide environmental information supporting their use and effectiveness toward achieving the commitment to implement management actions designed to increase park fishery populations by at least 10 percent over current levels.

EPA recommends the FEIS compare the differences between Alternatives 2 and 3 management actions and provide environmental information supporting how they will achieve their respective commitments, e.g., Alternative 3's proposed 10-percent increase in fishery populations.

EPA recommends the FEIS discuss how the proposed 10-percent increase achieves EO 12962's mandate.

***Impacts of increasing current fishery levels by 10 percent*:**

According to the DEIS, the potential environmental impacts of this alternative would lead to increased abundance and mean size within the Park if abundance and size remained at current levels or declined in areas outside the Park, or to similar mean size and abundance within versus outside the Park if mean size and abundance increased in areas outside the Park.[27] It is unclear how these impacts would be caused by the proposed management actions designed to increase the Park's existing fishery populations. Environmental data supporting these conclusions appears to be lacking.

EPA recommends the FEIS discuss how these impacts would be caused by the proposed management actions under this alternative and include environmental data supporting these impact conclusions.

It is also unclear how the proposed management actions would likely lead to an increase of approximately 10 percent in mean density and length of some targeted fish populations for the

[27] P. 55

foreseeable future and would likely have a minor, long-term positive impact on targeted finfish species and would not cause impairment of this resource.[28]

EPA recommends the FEIS explain how the determination *likely lead to an increase of approximately 10 percent in mean density and length of some targeted fish populations for the foreseeable future and would likely have a minor, long-term positive impact on targeted finfish species* was made, include supporting environmental information, and identify which targeted fish populations would benefit from the proposed management actions under this alternative.

***Commercial permit system*:**

The DEIS states that the proposed limited-entry, limited-transferable, special-use commercial permit system and commercial guide permit would result in decreases in commercial fishing pressure which could positively affect abundance and size of targeted finfish species.[29]

EPA recommends the FEIS explain how limiting the transferability of the permit (the distinction between Alternative 2 and 3 commercial permits) gains any increase in abundance and size of any finfish fishery and provide environmental data supporting the anticipated effectiveness of using the proposed limited transferable commercial permit.

EPA recommends the FEIS explain whether there is any difference between the commercial guide permit proposed under Alternative 2 and the one proposed under this alternative and provide environmental data supporting the anticipated comparative effectiveness of using the commercial guide permit as proposed in each alternative.

EPA recommends the FEIS explain how this proposed alternative would likely have a minor, long-term positive impact on targeted fish species, since according to the DEIS most of the commercial fishers target invertebrate species and decreases in the number of commercial fishers would likely have minimal effects on the mean size and abundance of targeted finfish species in the Park.[30] It would be expected that a decrease in commercial fishing pressure could positively affect the abundance and size of targeted invertebrate species but this expectation is absent without explanation from the DEIS.

EPA recommends the FEIS explain how the commitment to implement management actions designed for a 10 percent increase in fishery populations will be achieved should the proposed commercial permit system realize no change, i.e., the “no action” alternative or “maintains the existing fishery status,” i.e., Alternative 2.

[28] P. 56
[29] P. 56
[30] P. 56

***Recreational-user permit system*:**

This alternative discusses the establishment of a recreational-use permit system and the DEIS states its implementation could discourage recreational harvesters of targeted invertebrate species from harvesting in the park, and therefore, realizing a positive impact on the size and abundance of these populations.[31]

EPA recommends the FEIS explain how the proposed recreational-user permit system will realize a positive impact on the size and abundance of targeted invertebrate species populations. In its explanation, the FEIS should address the following DEIS statements: 1) most commercial fishers in the Park target invertebrates,[32] 2) approximately 30 percent of the Park's visitors are recreational fishermen,[33] and 3) the recreational harvest of invertebrates is minor in scale relative to commercial harvest such that any effect of the reduction in recreational effort would likely be small.[34]

Given that since most of the commercial fishers target invertebrates and the impact of recreational invertebrate harvest is minor in scale compared to the commercial invertebrate fishery, the DEIS is unclear how the recreational-use permit system realizes a positive impact on the size and abundance of these populations when compared to the commercial permit system. These issues should be discussed in the FEIS.

Additionally, it is also unclear if a disproportionate burden is being placed on the recreational fisher when the commercial fisher appears to have the greater fishery impacts. And if a disproportionate burdened is indeed being placed on the recreational fisher, the rational for this burden placement is not discussed.

EPA recommends the FEIS discuss whether a disproportionate burden is being placed on the recreational fisher when the commercial fisher appears to have the greater fishery impacts. And if a disproportionate burdened is indeed being placed on the recreational fisher, the rational for this burden placement should be discussed.

Recreational lobster sport season eliminated:

This alternative proposes the elimination of the two-day recreational lobster sport season that proceeds the commercial and recreational lobster season. According to the DEIS the elimination of the two-day recreational lobster sport season would result in a considerable reduction in the amount of lobsters harvested prior to the regular recreational/commercial season; however the eliminated landings would likely be redistributed to commercial and recreational landings "in season."[35]

[31] P. 61
[32] P. 56
[33] P. 31
[34] P. 62
[35] P. 61

EPA recommends the FEIS discuss using environmental information whether this conclusion assumes those lobsters that would have been fished during the sport season would definitely be fished during the regular season and provide environmental information to support this assumption.

The elimination of the sport season would appear to diminish the number of days where lobster fishing is allowed facilitating a reduction in the catch. It is unclear whether the number of lobsters typically harvested by recreational fishers during the two-day sport season as compared to the number harvested during the regular season by both commercial and recreational fishers is actually considerable. These issues should be discussed in the FEIS.

EPA recommends the FEIS explain with environmental data how the conclusion that eliminating the sport season would result in a considerable reduction in the number of harvested lobsters prior to the regular season.

EPA recommends the FEIS discuss whether a disproportionate burden is being placed on the recreational fisher when the commercial fisher appears to have the greater fishery impacts. And if a disproportionate burdened is indeed being placed on the recreational fisher, the rational for this burden placement should be discussed.

***Spearfishing limitations*:**

This alternative proposes limiting spearfishing efficiencies by prohibiting spears with trigger mechanisms and the use of SCUBA while engaged in spearfishing. The DEIS notes the Park's existing regulations are less restrictive than in surrounding waters in that spearfishing is prohibited in the neighboring John Pennekamp Coral Reef State Park, in sections of Florida Keys National Marine Sanctuary, and the Everglades National Park.[36]

EPA recommends the FEIS discuss how limiting spearfishing efficiencies would likely increase sizes using environmental information, e.g., indicating how spearfishing impacts the Park's fishery, how common is spearfishing in the Park, what is the average size of their catch, and how would the Park know if reductions in spearfishing achieve the desired goal? How does the Park know whether spearfishing is the problem as opposed to commercial fishery bycatch or guided fishing? Is this the only mechanism being used to address the status of overfished finfish? The DEIS, as written, is unclear what other mechanisms are being used.

***Invertebrate impacts*:**

According to the DEIS despite using different management actions, Alternative 1[37] (no action), Alternative 2 (current status) and Alternative 3 (10 percent improvement),[38] all have the same environmental impacts, i.e., *would not cause impairment, would likely lead to minimal change in mean density or size of individuals of invertebrate populations* upon the Park's

[36] P. 20
[37] P. 61
[38] P. 62

invertebrate species. Yet both Alternative 2 and 3 implement a commercial permit system and Alternative 3 adds the recreational-user permit system, establishes a crab-trap-free zone, and bans the two-day recreational lobster sport season.

EPA recommends the FEIS discuss how implementing alternatives 2 and 3 would realize the same invertebrate impacts as the no action alternative. This finding appears to contradict the DEIS finding that the implementation of a recreational-use permit system could discourage recreational harvesters of targeted invertebrate species from harvesting in the park, and therefore, realizing a positive impact on the size and abundance of these populations.[39] Additionally, it reinforces the concern that recreational users may be disproportionately burdened when implementation of Alternative 3, having the recreational-user permit, does not realize any different impact than Alternatives 1 and 2.

Alternative 4

This alternative commits to offset the effects of increased human population growth, improved fishing technology, and increased recreational bycatch by management actions designed to increase park fishery populations by at least 20 percent over current levels.[40]

***Management actions designed to increase current fishery levels*:**

The DEIS discusses management actions designed to increase park fishery populations by 20 percent for this alternative; however, it is silent as to what these management actions are and does not provide any environmental information supporting their use.

EPA recommends the FEIS discuss what management actions will be used and provide environmental information supporting their use and effectiveness toward achieving the commitment to implement management actions designed to increase park fishery populations by at least 20 percent over current levels.

EPA recommends the FEIS compare the differences between Alternatives 3 and 4 management actions and provide environmental information supporting how they will achieve their respective commitments, e.g., Alternative 3's proposed 10-percent increase in fishery populations versus Alternative 4's proposed 20-percent increase in fishery populations.

EPA recommends the FEIS discuss how the proposed 20-percent increase achieves EO 12962's mandate.

***Impacts of increasing current fishery levels by 20 percent*:**

The DEIS explains the potential environmental impacts of this alternative would lead to increased mean size and abundance of targeted species within the Park relative to other areas

[39] P. 61
[40] P. 56

outside the Park, regardless of trends outside the Park.[41] It is unclear how these impacts would be caused by the proposed management actions designed to increase the Park's existing fishery populations. Additionally it is unclear how Alternative 4's impacts are different than those associated with Alternatives 2 and 3. Environmental data supporting these conclusions appear to be lacking.

EPA recommends the FEIS discuss how these impacts would be caused by the proposed management actions under this alternative and include environmental data supporting these impact conclusions.

It is also unclear how the proposed management actions would likely lead to an appreciable increase of approximately 20 percent in mean density and length of some targeted fish populations for the foreseeable future and would likely have a moderate, long-term positive impact on targeted finfish species.[42]

EPA recommends the FEIS explain how the determination *likely lead to an increase of approximately 20 percent in mean density and length of some targeted fish populations for the foreseeable future and would likely have a minor, long-term positive impact on targeted finfish species* was made, include supporting environmental information, and identify which targeted fish populations would benefit from the proposed management actions under this alternative.

***Commercial permit system*:**

The DEIS states that the abundance and size of targeted invertebrate species would be positively affected by the commercial permit system which would result in decreases in the number of permitted commercial fishers over time due to the "non-transferable" clause and associated decreases in commercial fishing pressure.

EPA recommends the FEIS explain how the "non-transferable" clause of the permit (the distinction between Alternative 3 and 4 commercial permits) gains any increase in abundance and size of any finfish fishery[43] and provide environmental data supporting the anticipated effectiveness of using the proposed limited transferable commercial permit. The explanation should include how long it will take for "drop-in" fishermen numbers to occur.

EPA recommends the FEIS explain how would the non-transferable permit system work? Would it be issued per person, company, or per boat? If a company were to reorganize into a new company, i.e., change the name, would the permit be transferable? If a permit holder (company) were to be purchased by another company, would the permit be transferable? Would a permit holder be able to sell his permit to a third party before the permit expires and would that party be allowed to renew? Will permits be granted to all who apply? If the boat is permitted, then if the boat were "rented" to other for fishing purposes, how would this realize a decrease in number of fishermen? This information is important to the affected fishers and Park users and

[41] P. 56
[42] P. 57
[43] P. 57

their ability to participate in the NEPA process associated with the proposed action. And it is informative in the determination of how long it could take for a "drop in" fishermen to occur.

EPA recommends the FEIS explain any possible unintended environmental consequences to stressed Park fisheries associated with the preferred alternative's commercial permit's non-transferrable clause. One aspect of this issue is whether the universe of permit applicants could be larger than the current universe of fishermen and therefore realizing an increase in fishing pressure to meet the "use" requirements of the permit in order to both obtain and keep the permit? The concern is that the "non-transferable clause" could have the unintended consequence in encouraging more people to apply for permits than otherwise would have, because of the intent to decrease the number of permit holders, and to force "use" as defined in the DEIS when the permit holders otherwise would not have such pressure to fish. Consequently, a permit-induced pressure may occur causing depleted fishing stocks additional fishing pressures that may hinder any and all of the goals represented by Alternatives 2 – 5. The FEIS should address this concern with environmental information to support its conclusions.

EPA recommends the FEIS discuss how this alternative will achieve its commitment to implementing management actions designed for a 20 percent increase in fishery populations but is unclear what management steps will be taken to achieve this should the proposed commercial permit system fail.

EPA recommends the FEIS explain how the commitment to implement management actions designed for a 20 percent increase in fishery populations will be achieved should the proposed commercial permit system realize no change, i.e., the "no action" alternative, "maintains the existing fishery status," i.e., Alternative 2, or increases fishery populations by at least 10 percent, i.e., Alternative 3.

EPA recommends the FEIS explain how this proposed alternative would likely have a minor, long-term positive impact on targeted fish species, since according to the DEIS most of the commercial fishers target invertebrate species and decreases in the number of commercial fishers would likely have minimal effects on the mean size and abundance of targeted finfish species in the Park.[44] It would be expected that a decrease in commercial fishing pressure could positively affect the abundance and size of targeted invertebrate species but this expectation is absent from the DEIS.

Alternative 5

This alternative commits to offset the effects of increased human population growth, improved fishing technology, and increased recreational bycatch by management actions designed to substantially increase park fishery populations to within 20 percent of the historic, pre-exploitive levels.[45]

[44] P. 56
[45] P. 57

***Management actions designed to increase current fishery levels*:**

The DEIS discusses management actions designed to increase park fishery populations to within 20 percent of historic, pre-exploitive levels; however, it is silent as to what these management actions are and does not provide any environmental information supporting their use. It is also unclear how the differences between the Alternatives 3, 4, and 5 management actions will achieve their respective commitments. Moreover while it is unclear how the proposed 20-percent of historic, pre-exploitive levels complies with EO 12962, EPA agrees that by the nature of Alternative 5's description is likely to meet EO 12962.

EPA recommends the FEIS discuss what management actions will be used and provide environmental information supporting their use and effectiveness toward achieving the commitment to implement management actions designed to increase park fishery populations within 20 percent of historic levels.

EPA recommends the FEIS compare the differences between Alternatives 3, 4, and 5 management actions and provide environmental information supporting how they will achieve their respective commitments, e.g., Alternative 3's proposed 10-percent increase in fishery populations versus Alternative 4's proposed 20-percent increase in fishery populations, and Alternative 5.

***Impacts of increasing current fishery levels within 20 percent of historic levels*:**

The DEIS explains the potential environmental impacts of this alternative would lead to increased mean size and abundance of harvested species within the Park relative to other areas outside the Park if mean size and abundance remained at current levels or declined in areas outside the park and would likely lead to increased mean size and abundance of harvested species in the park relative to areas outside the Park even if mean size and abundance increased outside the Park.[46] It is unclear what this language means and how these impacts would be caused by the proposed management actions designed to increase the Park's existing fishery populations. Additionally it is unclear how Alternative 5's impacts are different than those associated with Alternatives 2, 3, and 4.

EPA recommends the FEIS discuss how these impacts would be caused by the proposed management actions under this alternative, include environmental data supporting these impact conclusions, and describe how they will realize a difference in impacts from those described for the other alternatives.

It is also unclear how the proposed management actions would likely lead to an appreciable increase of approximately 20 percent of historic levels in the mean density and length of some targeted fish populations for the foreseeable future. The DEIS is unclear how this determination was made and does not identify which targeted fish populations would benefit from the proposed management actions. These issues should be discussed in the FEIS.

[46] P. 58

EPA recommends the FEIS explain how the determination *likely lead to an increase of approximately 20 percent of historic levels in the mean density and length of some targeted fish populations for the foreseeable future* was made, include supporting environmental information, and identify which targeted fish populations would benefit from the proposed management actions under this alternative.

General Observation

Since the DEIS appears to convey numerous unsupported "ifs" in its analysis, it is unclear what the impacts will be. For example in the DEIS discussion of Alternatives 3 & 4, the abundance and size of targeted fish could be positively affected *if* the recreational use permit system resulted in decreased fishing effort. Similarly in Alternative 4, *if* the non-transferable commercial-use permit system results in decreased fishing effort in the Park, then size and abundance of targeted species could increase. Also, *if* the commercial guide permit system resulted in decreased fishing effort in the park, then size and abundance of targeted species could increase. While mentioned here, in the Alternative 5 analysis, this observation is not unique to Alternative 5.

EPA recommends the FEIS provide more concrete analysis supported with environmental information in lieu of the DEIS' "if" analysis.

The DEIS indicates Alternative 5 would likely lead to an increase in mean density or length of harvested finfish populations and lead to an appreciable improvement in mean density or length of some (but does not identify which ones) harvested fish populations for the foreseeable future and therefore would likely have a major, long-term beneficial impact on targeted fish species and would not cause impairment.[47]

EPA recommends the FEIS explain its statement: [p]*otential substantial increases to the minimum size limits for recreationally-targeted species might reduce the levels of recreational harvest for some targeted invertebrate species*,[48] in context of the apparently conflicting statement, [n]*evertheless, since recreational harvest of invertebrates is minor in scale relative to commercial harvest, any effect of the reduction in recreational effort would likely be small*.[49]"

EPA recommends the FEIS explain its conclusion using environmental information that Alternative 5 would likely lead to slight increases for the foreseeable future in mean density or size of individuals of invertebrate populations and would likely have a minor, long term impact on targeted invertebrates and not cause impairment[50] because as written, it appears to be a stand alone, unsubstantiated conclusory statement.

[47] P. 59
[48] P. 63
[49] P. 62 & 63
[50] P. 64

***Spearfishing prohibition*:**

This alternative prohibits spearfishing without explaining how this prohibition would positively affect the abundance of targeted fisheries. The DEIS states that the abundance of harvested finfish species would be positively affected by the prohibition of spearfishing within the Park which could result in fewer fish harvested from the park.[51]

EPA recommends the FEIS discuss how the spearfishing prohibition would positively affect abundance of targeted of targeted species. For example, how many "primitive" spear fishers fish in the Park and what is the degree of their impact to Park fisheries? The discussion should provide environmental information to describe primitive spearfishing's impact to the abundance and size of targeted finfish species, and consequently, making clear the corresponding positive impacts associated with its reduction.

While the elimination of spearfishing as proposed by Alternative 5 may be an effective fishery management measure, the DEIS is unclear as written whether it is necessary to fishery recovery[52] when compared to the spearfishing limitations proposed under Alternatives 3 and 4. The Alternative 3 and 4 spearfishing limitations, without more substantive environmental information, combined with other limitations, e.g., the spearing of large specimens like grouper in deeper waters, restriction to "abundant" species (as determined by the appropriate resource agencies and Park staff) instead of overfished species, and the designation and enforcement of minimum size and bag restrictions. Furthermore, size restrictions may need to be increased while per-day bag limits decreased.

No trawl zones:

This alternative proposes a no-trawling zone within the Bay and states that such a zone could be expected to have beneficial direct and indirect effects on targeted finfish by reducing early mortality bycatch, damage to sea grasses, macro algae, and sponges (critical food source removal).[53]

EPA recommends the FEIS clarify the above statement because as written it appears misleading because Chapter 2's description of Alternative 5 does not appear to include a no-trawling area. It only provides for the "consideration of a no trawl zone prohibiting commercial shrimp trawling."[54] Therefore, no beneficial impacts would be expected to result from the consideration of a prohibition.

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[51] P. 57

[52] From a safety perspective, however, there are benefits to eliminating spearfishing since it is a potentially dangerous sport (spear shooting, use conflicts with snorkelers, etc.) and can also be a shark attractant due to blood releases and dispersion in the water column.

[53] P. 58

[54] P. 27

Purpose and Need Analysis

The alternatives presented and evaluated appear to represent an escalation of fishery management measures for commercial and recreational fishery restrictions that primarily target the invertebrates. For example, the DEIS states that most "commercial fishers in the park target invertebrates (spiny lobsters, blue and stone crabs, and shrimp), decreases in the number of commercial fishers would likely have minimal effects on the mean size and abundance of targeted fish species in the park."[55] However alternatives 2, 3, 4, and 5 implement a commercial permit system, the details of which are omitted from the DEIS, leading EPA to assume that the purpose of the commercial permit is to reduce the number of commercial fishers.

Since the preferred alternative implements a commercial permit system containing a non-transferable clause, "which would result in decreases in the number of permitted commercial fishers over time due to the "non-transferable clause," and related decreases in commercial fishing pressure" which would positively effect the abundance and size of targeted fish species.[56] Consequently it is unclear how the finfish species identified as being *overfished* as defined by MSFCMA, approaching an *overfished* status, or qualified to be considered as *overfished* will be addressed to meet the proposed action's purpose and need.

EPA recommends the FEIS clarify how the proposed alternatives will benefit these *overfished*, approaching *overfished* status, or qualified to be considered as *overfished* finfish species. For example, the DEIS is unclear whether the preferred alternative's "non-transferable clause" in its commercial permit system will timely realize protections to these finfish (i.e., groupers and snappers).

Of concern are those finfish where large specimens have been selectively extracted[57] such that mature, large and fecund females are no longer providing their significant contribution to recruitment. According to the DEIS, at least 14 fishery species[58] are being harvested at a size before they average sexual maturity (size of first maturity), so that these species cannot sustain their population. Over the past 25 years, the average size landed was near the minimum size for all harvested species. According to the DEIS, the average black grouper is now 40 percent of its 1940 measurements and its spawning stock appears to be less than 5 percent of its historical maximum. These are clear indicators that current harvesting levels are not sustainable for these species. The DEIS, as written is unclear and lacks environmental information demonstrating whether its preferred alternative will provide for species sustainability.

[55] P. 56
[56] P. 57
[57] P. 30
[58] P. vi.

Other Comments

Environmental Justice

EPA recommends the FEIS should address the societal/economic impacts to commercial fishers, especially if there are any fishers from minority and/or low-income populations since reductions in commercial fishing are expected. The FEIS should include appropriate information regarding the number of minority and low-income fishery dependent populations. The proposed recreational permit fee may detrimentally impact subsistence fishers. Consequently, the FEIS should discuss the demographics of the commercial or subsistence fishers using the Park, their numbers, and what mitigation might be offered or is locally available (e.g., Park employment) to help offset these societal impacts.

Sustainable Use

EPA recommends the FEIS explain how the proposed minimum increases in fishery abundance and size relate to sustainability. Although the proposed percentage increases in the Park's fishery would be helpful to recovery, it is unclear how the proposed minimum 10 percent (Alternative 3) and minimum 20 percent (Alternative 4) increases in fishery abundance and size or the restoration to within 20 percent of the Park's historic, pre-exploited levels (Alternative 5) relate to sustainability. Moreover, it is unclear if overfishing or full exploitation would indeed be resolved by any of these proposed percentage increases.

EPA recommends since the DEIS does not explain what percent increase in fishery abundance and size would constitute an adequate stock for a sustainable level of harvest, the appropriate resource agencies and Park staff determine that a level and designate it as the preferred alternative for the FEIS and implement management actions in an FMP to achieve that level. Alternatively, the Park could set a fishery recovery percentage at a level beyond sustainability to enhance the Park experience.

Commitments and FMP Specifics

EPA recommends the FEIS should fully describe the measures to be implemented and provide more certainty as to what measures will be, or will likely be, implemented. Several potential management measures were provided for Alternatives 2[59], 3[60], 4[61] and 5[62] the Park and FWC would consider. EPA considers such detail essential to the FMP/DEIS. For example in Alternatives 3-5, how would the management options of harvest-size increases, bag-limit decreases, commercial fishermen number decreases, and seasonal or spatial closures,

[59] P. 17
[60] P. 20
[61] P. 24
[62] P. 26

e.g., species-specific spawning closures or marine reserve areas be implemented for each alternative?

The prospective record of decision (ROD) should state this with even more certainty and detail. To the extent feasible, commitments should be made in the ROD (preferably the FEIS) to the effect that these measures will be implemented to reach the recovery goals of each alternative presented (particularly for the preferred alternative). Moreover, the monitoring, performance measures and enforcement of the fishery management measures of the selected FMP should be further discussed in more detail in the FEIS and ROD.

Florida Fish and Wildlife Conservation Commission

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February 3, 2014

Brian Carlstrom, Superintendent
Biscayne National Park
9700 SW 328th Street
Homestead, Florida 33033

RE: Intent to initiate Commission rulemaking following approval of Fishery Management Plan Record of Decision issuance by National Park Service

Dear Superintendent Carlstrom:

At the Florida Fish and Wildlife Conservation Commission's (Commission) recent meeting on November 21 in Weston, the Commission expressed their agreement with the goal of the preferred alternative in Biscayne National Park's (Park) Fishery Management Plan that would increase the abundance and average size of targeted fish and invertebrate species within the park by 20% over current conditions and compared to similar areas outside the Park. The Commission also expressed their intent to initiate public rulemaking following the approval by the National Park Service of the Park's Fishery Management Plan Final Environmental Impact Statement (Plan) and the release of a Record of Decision.

The Memorandum of Understanding (MOU) between the Commission and the Park, which was signed in October 2002 and renewed in September 2007 and again in September 2012, has helped to guide both agencies in the development of the desired future conditions of fisheries in the Park and management strategies to achieve those conditions. I know that Commission staff and BNP staff have worked together as cooperating agencies on the development of this plan for many years. I appreciate the effort of both agencies to involve members of the public in the development of the Fishery Management Plan. I am pleased with the progress that Commission and Park staffs have made to balance National Park Service goals and Commission priorities for the Park and its users.

Based on public comment and discussions between the two agencies, the Commission and the Park have chosen Alternative 4 (Rebuild and Conserve Park Fisheries Resources) as the preferred alternative in the Fishery Management Plan. However, the Commission has expressed concerns about some of the actions that were chosen to achieve the desired future condition in Alternative 4, and looks forward to continuing discussions about the most appropriate way to achieve the desired condition prior to initiating rulemaking. The Commission also has expressed concerns regarding how the Park will measure the effectiveness of any management action taken to achieve the desired future condition described in the preferred alternative

and feels this is an essential precursor to developing further management recommendations. The Commission is prepared to work with the Park to achieve the desired future condition using the least restrictive regulatory actions possible.

The Commission looks forward to working with the Park to identify management actions that will require Commission rulemaking, once the Plan is approved by the National Park Service. In keeping with the Commission's mission of managing fish and wildlife resources for their long-term well being and the benefit of people, I hope that staff from both cooperating agencies can continue working within the guidelines of the MOU and the Commission's rulemaking process to consider management alternatives that will help rebuild and maintain the Park's fisheries resources, while continuing to allow ample public access to those resources.

The Commission stands by the principles of the MOU to work with the Park to promulgate or revise existing State and Federal rules/regulations as may be jointly identified and recommended by the partner agencies. Recognizing that the State of Florida has exclusive rulemaking authority in a portion of the Park and that uniform fishing regulations throughout the Park are in the best interest of the public, I look forward to hearing items that will require Commission rulemaking in the future.

Our staff looks forward to continuing to work with you and your staff on the Fishery Management Plan and General Management Plan for Biscayne National Park.

Sincerely,

Richard A. Corbett
Chairman

rc/mr/jm

cc: Commissioners
Chuck Collins
Jackie Fauls
Jessica McCawley
Eric Sutton
Bud Vielhauer
Nick Wiley

Florida Fish and Wildlife Conservation Commission

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August 17, 2010

Mr. Mark Lewis
Superintendent, Biscayne National Park
9700 SW 328th Street
Homestead, FL 33033

RE: Intent to initiate Commission rulemaking following approval of Fishery Management Plan Final Environmental Impact Statement by National Park Service

Dear Mr. Lewis: Mark

I am writing to inform you of the Florida Fish and Wildlife Conservation Commission's (Commission) intent to initiate public rulemaking following the approval of the National Park Service of Biscayne National Park's (Park) Fishery Management Plan Final Environmental Impact Statement. The Memorandum of Understanding (MOU) between the Commission and the Park, which was signed in October, 2002 and renewed September 14, 2007, has helped to guide both agencies in the development of the desired future conditions of fisheries in the Park and management strategies to achieve those conditions. I know that Commission staff and BNP staff have worked together as cooperating agencies on the development of this plan for many years. I appreciate the effort of both agencies to involve members of the public in the development of the Fishery Management Plan. I am pleased with the progress that Commission and Park staffs have made to balance recreational and commercial fishing and resource protection within the Park.

Based on public comment and discussions between the two agencies, the Commission and the Park have chosen Alternative 4 (Rebuild and Conserve Park Fisheries Resources) as the preferred alternative in the management plan. The Commission feels that the management strategies in this alternative are flexible enough to achieve management goals with the least restrictive regulatory actions.

The MOU reiterates the Commission position on no-take areas as they relate to fisheries, stating:

> "WHEREAS, FWC and the Park agree to seek the least restrictive management actions necessary to fully achieve mutual management goals for the fishery resources of the Park and adjoining areas. Furthermore, both parties recognize the FWC's belief that marine reserves (no-take areas) are overly restrictive and that less-restrictive management measures should be implemented during the duration of this MOU. Consequently, the FWC does not intend to implement a marine reserve (no-take area) in the waters of the Park during the duration of this MOU, unless both parties agree it is absolutely necessary. Furthermore, the FWC and the Park recognize that the Park intends to consider the establishment of one or more marine reserves (no-take areas) under its General Management Planning process for purposes other than sound fisheries management in accordance with Federal authorities, management policies, directives and executive orders."

The Commission looks forward to working with the Park to identify items contained in the Fishery Management Plan that will require Commission rulemaking, once the Plan is approved by the National Park Service. In keeping with the Commission's mission of managing fish and wildlife resources for their long-term well being and the benefit of people, I hope that staff from both cooperating agencies can continue working within the guidelines of the MOU and the Commission's rulemaking process to consider management alternatives that will help restore and maintain the Park's fisheries resources.

The Commission stands by its agreement in the MOU to "work with the Park to promulgate or revise existing State and Federal rules/regulations as may be jointly identified and recommended within the Plan." Recognizing that the State of Florida has exclusive rulemaking authority in a portion of the Park and that uniform fishing regulations throughout the Park are in the best interest of the public, I look forward to hearing items from the Fishery Management Plan that will require Commission rulemaking at a future meeting of our Commission.

Sincerely,

Rodney Barreto
Chairman

rb/jm/mc

cc: Commissioners
Col. Jim Brown
Jackie Fauls
Greg Holder
Mary Ann Poole
Mark Robson
Bud Vielhauer
Nick Wiley

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FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. Mark Lewis
Biscayne National Park
970 SW 328th Street
Homestead, Florida 33033

September 3, 2009

RE: DHR Project File No: 2009-4863 / Received by DHR: August 10, 2009
US Department of the Interior – National Park Service
Fishery Management Plan Draft Environmental Impact Statement (DEIS)
Biscayne National Park
Miami-Dade County

Dear Mr. Lewis:

Our office reviewed the referenced draft environmental impact statement for possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places. The review was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, 36 CFR Part 800: Protection of Historic Properties, and the National Environmental Policy Act of 1969.

We have reviewed the sections of the DEIS that deal with cultural and historical resources, and it is our opinion that such resources have been adequately addressed in this document. We concur with the choice of preferred alternative, and agree that it will have long-term beneficial effects on submerged cultural resources.

If you have any questions, please contact Samantha Earnest, Historic Preservationist, by email *swearnest@dos.state.fl.us*, or by phone at 850-245-6333.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

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PEPC Project ID: 23587, DocumentID: 25004
Correspondence: 278

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Correspondence Information

Status: Reviewed	Park Correspondence Log:
Date Sent: 10/01/2009	Date Received: 10/05/2009
Number of Signatures: 1	Form Letter: No
Contains Request(s): No	Type: Letter
Notes:	

Correspondence Text

The Florida State Clearinghouse has coordinated a review of the Draft Environmental Impact Statement (EIS) under the following authorities: Presidential Executive Order 12372; S 403.061(40), Florida Statutes; the Coastal Zone Management Act, 16 U.S.C. SS 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. SS 4321, 4331-4335, 4341-4347, as amended.

The Florida Department of Environmental Protection's Coral Reef Conservation Program (CRCP) has provided a number of comments on the Draft EIS and is supportive of the Park choosing one of the more conservative alternatives identified. CRCP staff suggests, however, that the preferred management alternative should, ideally, evenly balance restrictions on all fishing sectors (recreational, commercial, and charter) and on all gear types (hook and line, dive, spear, net etc.), unless it can be demonstrated that one sector or gear type is causing more damage/exploitation to resources than others. The CRCP agrees that with ever-increasing human populations and related recreational fishing pressure in the Park, compared to a steady number of commercial users, recreational restrictions may be warranted; however, staff recommends that catch and effort data be assessed for all sectors prior to making that determination. Similarly, if the goal is to allow the largest fish to remain alive, ideally, it should be demonstrated that spearfishers target the largest fish prior to placing restrictions on spearfishing. Alternatively, the Park may want to consider the use of slot limits in lieu of restricting spearfishing. Please refer to the attached CRCP

memorandum and contact Ms. Chantal Collier at (305) 795-1208 or Chantal.Collier@dep.state.fl.us for further information and assistance.

Based on the information contained in the Draft EIS and enclosed state agency comments, the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). The concerns identified by CRCP staff must be addressed, however, prior to project implementations. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting stage.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Mr. Chris Stahl at (850) 245-2169.

Yours sincerely,
Sally B Mann, Director
Office of Intergovernmental Programs.

Agency Comments
Fish and Wildlife Commission- Florida Fish and Wildlife Conservation Commission:
No comment per Mark Robson and Jessica mcCawley on 9/22/09

Environmental Protection- Florida Department of Environmental Protection:
The DEP's Coral Reef Conservation Program (CRCP) has provided a number of comments on the Draft EIS and is supportive of the Park choosing one of the more conservative alternatives identified. CRCP staff suggests, however, that the preferred management alternative should, ideally, evenly balance restrictions on all fishing sectors (recreational, commercial, and charter) and on all gear types (hook and line, dive, spear, net etc.), unless it can be demonstrated that one sector or gear type is causing more damage/exploitation to resources than others. The CRCP agrees that with ever-increasing human populations and related recreational fishing pressure in the Park, compared to a steady number of commercial users, recreational restrictions may be warranted; however, staff recommends that catch and effort data be assessed for all sectors prior to making that determination. Similarly, if the goal is to allow the largest fish to remain alive, ideally, it should be demonstrated that spearfishers target the largest fish prior to placing restrictions on spearfishing. Alternatively, the Park may want to consider the use of slot limits in lieu of restricting spearfishing. Please refer to the attached CRCP memorandum and contact Ms. Chantal Collier at (305) 795-1208 or Chantal.Collier@dep.state.fl.us for further information and assistance.

CRCP Specific Comments
Page ii, beginning of 2nd paragraph: BISC's habitats are a portion of the entire Florida Reef Tract, not just the Florida Keys portion. Perhaps this is written in this manner because the study cited, Ault et al. 2001, only looked at BISC in relation to the Florida Keys, but the larger regional perspective is important to mention.

Page ix, last sentence: Editorial- delete one of the two periods

Page xi, 2nd NEPA goal: In addition to the presence or absence of marine debris, the presence or absence of a healthy, intact ecosystem with a full complement of its inherent benthic and motile taza is a factor which determines aesthetic, cultural, and productivity values.

Page xii, 2nd paragraph: Editorial- ass period to last sentence.

Page xiii, Section 1.1.6: Editorial- too much space between 'Management' and 'Plan'

Page 1, section 1.1.1, 3rd paragraph: BISC's habitats are a portion of the entire Florida Reef Tract, not just the Florida Keys portion. Perhaps this is written in this manner because the study cited, Ault et al. 2001, only looked at BISC in relation to the Florida Keys, but the larger regional perspective is important to mention.

Page 22, Section 2.4.5, 1st bullet: The term 'recreational use' permit implies that all recreational users should pay, including those driving their cars into the park, much like an entrance fee. If the intent of this management tool is to have all boaters or fishers pay an additional fee for their specific use of the resources of the park, we suggest changing the name to target that user group. BISC may want to complete a feasibility study to determine the amount the average user would be willing to pay.

Page 28, Section 2.7.2: In addition to the presence or absence of marine debris, the presence or absence of a healthy, intact ecosystem with a full complement of its inherent benthic and motile taza is a factor which determines aesthetic, cultural, and productivity values.

Page 30, Section 3.2, 3rd bullet: Add scientific name for blue crab.

Page 30, Section 3.2, 4th bullet: Add scientific name for stone crab.

Page 31, 1st paragraph, last sentence: Add ("defined" as number of lobsters).

Page 31, Section 3.4, 1st Sentence: What user groups represent the remaining 70% of BISC visitors, what is their satisfaction level with their use of BISC, and what management actions are being taken to ensure and/or improve their current satisfaction level? In this and other examples in the FMP, we find it difficult to comment on fisheries management actions that have implications for non-fisheries management. Will the FMP be an adaptive document, so that portions can be changed, if necessary, as management of other uses are addressed in the GMP?

Page 32-34, Sections 3.5, 3.6, and 3.7: More recent socioeconomic and use data may make a stronger case for additional protection of BISC resources (e.g., Alternatives 4 or 5).

Page 37-39, Commercial Fishing & Recreational Fishing: Guided fishing in the bay us under commercial fishing, but offshore charter fishing in under recreational fishing. This is inconsistent and can affect data analysis.

Page 40, Last paragraph: States three problems- groundings, anchor damage, and direct damage by divers/snorkelers, but only the latter will be addressed in the GMP. How are the groundings and anchor damage

being addressed in BISC? Are these problems more often associated with fishers or divers/snorkelers? If fishers, than these problems should be addressed by management actions in the FMP under habitat damage, in addition to marine debris. The recently passed Florida Coral Reef Protection Act may have applicability in addressing these problems.

Page 42, 2nd paragraph: Editorial- remove space between "meiobenthic fauna" and comma

Page 61, 2nd paragraph: Figures 5 and 6 indicate in almost all cases overall declining trends in targeted invertebrates; we do not agree that continuing these trends in Alternative 1 would be negligible for invertebrate abundance/density or that it would lead to impairment.

Page 105, Section 4.8.2.5: The description of benthic habitats and communities- bay, Alternative 5 does not include the effects of the potential no trawl zone, which would elevate "minor" to moderate.

Page 131, Section 4.1.2.1: EFH for shrimp within BISC would be enhanced under Alternative 5, which would elevate "negligible" to minor or moderate.

Page 141, Section 4.15.4: Why is the minimization/elimination of spearguns in Alternatives 3-5 not considered enhancing public safety?

Page 190, Appendix 7: Add priority projects that actively enhance/restore fishery habitat rather than only reducing impacts to habitat in the Alternatives.

Page 200, Table legend: Editorial- add period to last sentence.

Page 203, Black Point Marina Reference: Editorial- delete on of the two periods.

Page 217, Table legend: Editorial- add period to last sentence.

General Comments:
Upon review of the BISC FMP DEIS, FDEP-CRCP does not anticipate conflict between proposed management actions stated in this document and its statutory authorities or permit requirements. However, this many not be the case for other divisions/offices within FDEP.

FDEP-CRCP is supportive of the Park choosing one of the more conservative alternatives identified. CRCP staff suggests, however, that the preferred management alternative should, ideally, evenly balance restrictions on all fishing sectors (recreational, commercial, and charter) and on all gear types (hook and line, dive, spear, net etc.), unless it can be demonstrated that one sector or gear type is causing more damage/exploitation to resources than others. The CRCP agrees that with ever-increasing human populations and related recreational fishing pressure in the Park, compared to a steady number of commercial users, recreational restrictions may be warranted; however, staff recommends that catch and effort data be assessed for all sectors prior to making that determination. Similarly,

if the goal is to allow the largest fish to remain alive, ideally, it should be demonstrated that spearfishers target the largest fish prior to placing restrictions on spearfishing. Alternatively, the Park may want to consider the use of slot limits in lieu of restricting spearfishing.

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List of Acronyms

BISC: Biscayne National Park

EIS: Environmental Impact Statement

DEIS: Draft Environmental Impact Statement

FEIS: Final Environmental Impact Statement

FKNMS: Florida Keys National Marine Sanctuary Advisory Council

FMP: Fishery Management Plan

FWC: Florida Fish and Wildlife Conservation Commission

FWRI: Florida Fish and Wildlife Research Institute

GMP: General Management Plan

MOU: Memorandum of Understanding

NEPA: National Environmental Policy Act

NOAA: National Oceanographic and Atmospheric Administration

NMFS: National Marine Fisheries Service

NPS: National Park Service

PEPC: Planning, Environment, and Public Comment

RSMAS: Rosenstiel School of Marine and Atmospheric Science

SAC: Florida Keys National Marine Sanctuary Advisory Council

SAFMC: South Atlantic Fishery Management Council

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Appendix 1: Glossary

Benthic: Of, relating to, or occurring on the bottom of a body of water (*e.g.*, bay or ocean).

Bycatch: Non-targeted species caught by fishing gear (ex: juvenile fish caught in a shrimp trawl).

Current levels: levels measured (quantitatively) during 2000-2006 by federal, state, academic and independent researchers.

Derelict: abandoned or lost; potentially damaged as well

Guides: Boat owners who receive monetary compensation for providing fishing trips.

Ecological cascades: Subsequent changes in community structure (*e.g.*, species present, species richness, and intra-species abundance) that result from predatory and competitive interactions altered by an initial change in community structure, such as the removal of organisms by fishing.

Fishery-targeted species: A fish or invertebrate species that is targeted for catch-and-release or harvest by recreational or commercial fishers.

Habitat: the place or environment where a plant or animal naturally or normally lives and grows.

Non-transferable: Not capable of being sold or given from one owner to another. Non-transferable permits expire when they cease to be used by their owners.

Overfished: A species is considered to be overfished if it exhibits a spawning stock potential of less than a pre-determined (by NMFS or a federal Fishery Management Council) percentage of the maximum spawning potential (MSP), or spawning potential of an unfished population. Percentages are typically species-specific.

Overfishing: A species is considered to be subject to overfishing if it is experiencing a fishing mortality rate that, if continued, will result in a spawning stock potential of less than a pre-determined (by NMFS or a federal Fishery Management Council) percentage of the maximum spawning potential (MSP), or spawning potential of an unfished population.

Recreational bycatch: non-target species that are caught and released, or target species that are caught but are but cannot be kept due to fishing regulations (*e.g.*, undersized fish), and thus are released.

Transferable (referring to a commercial permit): Capable of being sold or given from one owner to another.

Appendix 2: Enabling Legislation Documentation

BISC's enabling legislation as it pertains to fishery regulation

On October 18, 1968 the US Congress established Biscayne National Monument under Public Law 90-606. The monument's boundaries were superimposed on an existing NOAA chart and dated May 1966 hence referred to as NM-BIS 7101. A channel easement through Broad Key and seaward is exempt from the federal monument designation. Section 4 of PL 90-606 charged the DOI with the preservation and administration of the monument in accordance with Act of August 25, 1916 (AKA Title 16 US Code). The federal lawmakers deferred to the state in regards to fishing within the monument, but carefully worded the document so as to allow for resource protection:

"The waters within …shall continue to be open to fishing in conformity with the laws of the State of Florida *except* as the Secretary, after consultation with appropriate officials of said State, designates species for which, areas and times within which, and methods by which fishing is prohibited, limited or otherwise regulated in the name of sound conservation or in order to in order to achieve the purposes for which the national monument was established".

On 30 January 1975, a motion to vest the federal government with the 95,064 acres that comprise Biscayne National Monument based on fulfillment of stipulations was filed in US District Court in Miami. Any changes to fishing laws and rights were not addressed. The vesting of land was so ordered on 25, November 1975.

On 26 October 1974, Congress passed Public Law 93-477, Title III, Section 301(1) authorizing an addition of 8,738 acres to the monument. No changes to fishing laws or rights were addressed. The new boundary eliminated the previously mentioned channel easement, and now includes the shoreline. While the subsequent map, 169-90,001 dated October 1979 no longer shows the easement, it does outline a new northern parcel not then addressed in federal legislation.

On 28 June 1980 passed Public Law 96-287 (16 USC 410gg) establishing Biscayne National Park. Section102(a) of said law (16 USC 410gg-1) allows for further acquisition of land within the park's boundaries, however those subsequent acquisitions were still bound by Florida State laws, restrictions and reservations. The same Title 16 citation charging the DOI with monument preservation and administration is again used regarding the park. Under Section 103(a) the federal lawmakers reiterated their deference to the state in regards to fishing within the park, but still held the National Park Service responsible for resource protection. However, a provision was added stipulating that any further land grants by the state or any political subdivision thereof beyond 28 June 1980 *shall be in conformance with state law*. The boundaries are depicted on map 169-90, 003 dated April 1980.

Map 169-90,004 (dated May 1981) depicts the change of land ownership near Homestead Bayfront Park, Black Point Park, and the former Burger King property from federal to

state possession, and the federal assumption of ownership of a small triangle of land adjacent to Card Sound.

On 13 December 1985, The State of Florida Board of Trustees for the Internal Improvement Trust Fund formally dedicated 3 parcels of land, listed as tract 102-01, totaling 72,861 acres that were not originally vested with the monument. The document details the boundaries of the 3 parcels and inserts the following proviso regarding the land dedication and retention of fishing rights:

"All rights to fish on the waters *shall be retained and not transferred* to the United States and fishing on the waters shall be subject to the Laws of the State of Florida."

Appendix 3: Peer Review Summary of Site Characterization (note: references to original figures have not been reproduced for this DEIS)

6/3/02

PEER REVIEW PANEL REPORT

Document Reviewed: *Jerald S. Ault, Steven G. Smith, Geoffrey A. Meester, Jiangang Luo, and James A. Bohnsack, 2001. Site Characterization for Biscayne National Park: Assessment of Fisheries Resources and Habitats*

The review panel met and discussed the report on April 25, 2002, at Biscayne National Park headquarters, Homestead, Florida. The following comments were recorded during this meeting and/or provided in written form by individual panel members:

General Comments:

The report appears to provide a good overview of fish habitats, life history characteristics of the fish in relation to these habitats, and historical information available on the harvest status of a variety of species. The presentation of information regarding fish habitats, life history characteristics, and trends in catch rates and fish sizes appears acceptable and valid. However, the panel felt that the fish-habitat relationships could be strengthened by the authors using a multivariate analytical approach (*e.g.*,a Principal Component Analysis, PCA) to teasing out important habitat parameters for the various species and species-habitat associations. This approach could possibly simplify some of the sampling stratification being used to assess fish population characteristics.

With regards to fishery impacts, the report's basic conclusion is that many of the fish populations appear to be overfished and deserving of more restrictive regulation, particularly within the growing sport fishery. This conclusion is based on an analysis of the average length of fish observed within the populations assessed, which was used as an indicator of population mortality rates based on the known correlation between average fish length and mortality under equilibrium conditions. However, the panel felt that it will be very difficult to adequately defend the conclusion that there is widespread overfishing on the basis of the data and methods presented in the report alone.

The panel felt that the basic findings need to be further substantiated. They felt the data analysis is not complete. Several specific additional data analyses should be conducted to cross-validate the estimates that have been obtained to date. Of particular importance are time-series and multi-species stock assessments. Suggestions for these analyses are provided in the recommendations below. The panel felt that the NPS should not proceed with any major fisheries policy initiatives until such analyses have been completed and reviewed.

Reliance upon estimation of mortality rate from mean length: flawed assumptions and cross-validation options:

The main (and in fact only) stock assessment method actually used in the report is a technique for estimating total mortality rate from length composition data. The authors have developed an "improved" method for doing this estimation, based on discarding information from fish too small or large to be representatively sampled. If taken at face value, this method indicates very high total mortality rates, presumably due to fishing, and very low spawning stocks (SPRs) for some species.

Unfortunately, there are at least three reasons to be deeply suspicious of this method:

Trend data on recreational fishing effort and recreational/commercial catch composition suggest that fishing mortality rates should have at least doubled since the mid-1970s (Figure 23). But no such trend is evident in any of the average size data (Fig. 27-8) despite the sensitivities to fishing rate change predicted by the yield per recruit models (Fig. 30), after correction for effects of changes in size limits. The range of F shown in Fig. 30 is just for the "last decade", when in fact the average size data allows examination of a longer time frame. Something is apparently very wrong here, suggesting either (a) the F's are as high as the behavior of the fish (vulnerability to fishing gear) will permit, *i.e.*, , F is independent of fishing effort and has been so for a long time; or (b) there is something wrong with the estimation method, as indicated in the next two points.

A critical assumption in the mortality equation is that all fish between the assumed minimum and maximum lengths for analysis are exactly equally vulnerable to harvest and/or visual observation. For at least some of the species, this assumption may be very wrong, with vulnerability decreasing considerably with size due to both behavioral and distributional changes. Decreasing vulnerability of larger fish could explain both apparent high total mortality rates, and lack of trend in mean size with trends in fishing effort; in Florida terms, some of the species could be afforded a subtle variation of the obvious decrease in vulnerability with age that helps protect the red drum stock against overfishing.

Agreement between mean sizes in the catch versus visual surveys does argue against this, but that may be simply because the visual surveys are too insensitive, or because both fishing and surveys are missing the older fish. Suggested ways to test this assumption directly are by (a) size-dependent tagging studies, aimed at directly estimating mortality risk of fish of different sizes/ages, and/or (b) direct estimation of fishing rate F as the ratio F=(catch)/(stock size), using some fishery-dependent or fishery-independent estimate of total regional stock size. The panel felt that the survey data and spatial habitat mapping data could be combined for some species to provide at least minimum estimates of total stock size (and hence maximum estimates of F), and catch estimates could be constructed from creel data on c.p.u.e. combined with effort estimates from regional effort surveys.

Another, more worrisome, critical assumption hidden in the derivation of the mortality equation is that recruitment rate is constant (or randomly varying) and independent of stock size. It would seem that if fishing mortality rates are as high as indicated, then recruitment should begin to decline (recruitment overfishing). Variations in recruitment would skew the results because an influx of recruits would lower the average length and subsequently result in estimates of higher mortality rates even though the mortality rates did not change. Conversely, if recruitment were lower, then the average length in the population would be higher and the subsequent estimated mortality would be lower even if actual mortality rates had not changed.

If there has in fact been severe historical recruitment overfishing, so that some populations are now exhibiting recruitment rates proportional to stock size (rather than independent of it), then we in fact expect mean size to be totally independent of fishing mortality rate (this is a very old and very well known result about population age/size composition)! So another way to interpret the lack of historical change in mean size is that in fact there is not only growth overfishing, but also severe recruitment overfishing (*i.e.*, , conditions worse than concluded within the report).

A better understanding of potential past changes in recruitment and/or relationships of recruitment to stock size could possibly be tested for in a limited way by analysis of time trend data (see next section).

The panel also expressed concern about the actual sensitivity of using average length as an indicator of overall mortality rates, particularly when obtained from underwater visual surveys. Figures 26 and 30 can be used to illustrate the concern. A very small change in size is related to very large changes in estimated fishing mortality rates on both of these figures when considering fishing mortality rates of greater than 0.4. Given that small differences in average size can produce large differences in fishing mortality rate, what is the length estimation error by the divers? Can data be provided that assures the reader that length estimation error is not consistently larger or smaller than actual?

Similar to the sensitivity concern is the need to better emphasize or incorporate into the analysis discussion the overall confidence intervals about the mortality estimates that were made from average size data. Data presented in Figure 34 for Black grouper suggests that the confidence intervals about the fishing mortality estimates (actually the F/Fmsy ratios in this case) are all well within the region of overfishing for recent years and thus we can be statistically assured that these stocks are overfished. However, similar such data is not provided for (or discussed) for all of the species presented within Table 14.

Another concern with using average length as an indicator of overall equilibrium mortality for all of the species analyzed is that it appears, for some species, the size of fish may be poorly related to age and the growth curve becomes flat in the older age

categories. In addition, some growth curves with very negative t_o's provide inaccurate estimates to ages of smaller fish. This can be seen in Table 13 where the life history parameters for each of the species that were used in the model are shown. Those species of concern have t_o values of less than –2 years and low *k* values. In addition, it appears that in some cases the largest fish observed exceeded the L infinity parameter that was apparently used. It would be good for the authors to more specifically address the growth/age relationships with regards to these species.

An important discussion point with respect to using average fish length to evaluate population mortality rates centered on the question of how many fish from what areas of occurrence are necessary to estimate a population's average length and thus overall mortality rates? Panel reviewers felt that with several of the fish species analyzed, there may have been insufficient length data to establish average size within the population. It appears that only four of the 17 grouper species and six of the 12 snapper species for which "benchmark" estimates of standard fishery management parameters were presented (Table 14) had more than 10 fish measurements in most years (as per Appendix C). It would be preferable for the authors to only present detailed analysis and stock assessment conclusions on those species for which there is comfortably adequate data. The other species could be mentioned as appearing to follow a similar trend (and perhaps listed elsewhere) but with the acknowledgement that insufficient data exists to conclusively evaluate these species. This may eliminate or at least help reduce much future criticism of this report.

Also applicable to the use of average length is the concern over how you interpret an assessment that covers only part of the stock's range. If all components of the species are moving in and out of the region such that at any time all ages and sizes are represented within the sampled pool, then the assessment should reflect the condition of the stock. However, if all ages and sizes are not represented, results may be biased if used to estimate overall population "mortality" rates. To address this, one would need to compare park average length results against a region-wide assessment to identify how the study area may differ. This appears to be what the authors may have done in Figure 27, but the results are interpreted as "status of stocks within the park compared to elsewhere within the Florida Keys ecosystem" as opposed to possible indicators of movement of certain size classes of fish. Is there strong justification for this interpretation that could be mentioned?

A similar concern may also be expressed in this case for whether the proportional distribution of samples (either from visual observations or creel data) matched the proportional distribution of abundance of the various size classes of the species sampled. It is not clear from the report exactly how the average size of fish within the population was actually calculated other than that analysis was limited to exploited size fish (only the data sources which were used are indicated). Were samples obtained within the bay (where juveniles, smaller adults and presumably larger numbers of individuals occur) somehow weighted proportionately to fish abundance when combined with those

observations made from the reef areas? In short, how was potential bias of sampling location on fish length dealt with in calculating average length within the "population" or what assumptions were made about the distribution of samples with regards to size class geographic distribution & abundance within the population?

Failure to use time series information and modern stock assessment techniques based on such information

Modern fisheries stock assessments generally do not rely upon equilibrium assessment methods when time series data are available. For species like gray snapper, yellowtail, porgy, and white grunt that have shown strong declines in catch per effort, one would ordinarily combine life history information and fishing effort data into dynamic models, and fit these models to the time trend data to provide at least some assessment of the risk of recruitment overfishing. Such methods are particularly helpful when fishery-independent trend indices (*e.g.*,survey data) are available. Basically, what the analyzer looks for are declines in relative abundance too large to explain just by changes in the average size/survival of fish given constant recruitment. Also, such methods give bounds on stock size by examining how large the stock would have to be in order to explain both measured absolute total removals (catches) and measured changes in relative abundance. However, the use of catch per effort data to obtain longer time series for such methods is deeply suspect in recreational fisheries, since (1) effort sorting (poorer fishers tend to give up first during declines) leads to increasing catchability (q) with declining stock size, and (2) catch per effort is often "hyperstable" (q density dependent so anglers keep high cpue even at low stock size) due to nonrandom fishing patterns.

The report has some complicated math (p. 49) appearing to suggest that it is safe to assume constant q (Y=qN on page 49), when in fact this is assumed rather than demonstrated. Proportional cpues (Y=qN) are in fact likely only for "nontarget" fish species that are taken more or less at random by fishing effort targeted on other species.

Where is the multispecies fisheries analysis?

BNP is obviously a multispecies fisheries situation, requiring multispecies policy analysis. The essence of a systems approach to multispecies management problems is not that there are many species with different optimum fishing rates determined by differences in growth and mortality, but rather that the fates of these species are deeply linked through fisheries (and ecological) interactions. In particular, practically any fishery or practice is likely to take a variety of species (with different catchability coefficients and size structure characteristics), implying that optimum harvesting for every species cannot be achieved by varying only total fishing activity or species specific regulations (such regulations create potentially harmful and very difficult to monitor discarding patterns). The report provides no analysis of either the technical (fisheries

catchability, discard pattern) linkages or the ecological ones, that might be used as a basis for future policy design.

Presentation Style:

There is general concern over the presentation style of the report and the panel felt that too much unnecessary jargon and technical rhetoric was used. This should be greatly reduced.

Recommendations for Authors:

Need for x-validation for estimates of F and trends in population size.

Estimates of catch over population size for species and groups.

Extract MRFSS effort data for Miami-Dade and Monroe Counties and examine for trend and precision (or use other possible data to estimate total fishing effort).

Assemble survey data to estimate minimum population estimates (visual & trawl?) by multiplying mean sampled density by habitat area.

Estimate (if possible) expanded catch for recreational and commercial fisheries [rec. CPUE x Effort].

Divide estimated catch by minimum population size to compute minimum fishing mortality rate (exploitation ratio) [this procedure is primarily viewed as a diagnostic crosscheck because of potential problems with expansion factors for effort, etc.].

Time-trend analyses of catch rates for species or if data are too sparse, for species assemblages defined by various criteria.

Fit population data to stock assessment models to evaluate the consistency between trends in observed mean size, estimated F, and observed relative abundance (forward projection models to investigate issues of potential offshore movement or non-representative sampling to bias estimates of Z).

Quantitative analysis of fauna-habitat associations:

Suggest authors use a Principle Component Analysis (PCA) approach to determine statistically valid species associations with specific habitat types or conditions (depth, bottom type, temperature, salinity, season, etc.). Conduct for habitat type and CPUE data

sets (visual, creel, trawl), as appropriate (community associations with cluster analyses – etc.)

Clarification of data collection and analysis:

Need to clarify calculation methods for SPR (*e.g.*, are all mature animals included for animals below legal size?).

In visual surveys, evaluate the proportion of species not sighted through various field-oriented validation methods. (Note: Some of this may already have been done but, if so, should be more strongly reference within the report).

Multispecies Stock Assessments:

Biscayne NP is a classical multi-species fishery and the most successful management decisions may need to be predicated on multi-species stock assessments as opposed to individual species assessments. What has been the overall production of the fishery over time? The authors should try to apply some of the more conventional multi-species stock assessment approaches to determining optimal fishing effort, msy and population trends where possible with the data available.

Research Recommendations – for the NPS

Short-term

Spatially-resolved fishing effort census (possible through aerial surveys) – spatial resolution sufficiently precise to map over habitat types.
Evaluate the design of creel surveys to adequately sample fish removed from the park boundaries – integrate with census of vessels in the park to estimate total removals, species composition, and size/age composition.

Evaluate the potential uses of new technologies (*e.g.*,video monitoring of ramps).

Evaluate the feasibility of tagging studies using dumb and smart tag technologies to evaluate ontogenetic movements of animals among habitat types and across park boundaries, and to estimate exploitation rates directly – acoustic tags should be evaluated.

Long-term

Move to tagging-based and direct assessment methods for population size and harvest rates to understand human impacts on Park resources

Integrate population assessments with region-wide efforts for various resources (especially for effort census, biological sampling for species and size, and stock assessment) – *e.g.*, other NPS units, State of Florida, SAFMC, MRFSS…

Examine methods to identify the sub-population of fishers utilizing the park resources (*e.g.*, individual fishers, guides, charter boats, identification of vessel registrations at ramps and in aerial surveys, specific questions in creel or participation surveys, logbooks, permits…).

Evaluate potential for various indicator species to evaluate biological integrity and productivity of the park (*e.g.*, long-lived species, productive species, habitat-species associations, piscivores, etc.).

Conclusion that can be drawn from the Report (without additional analysis):

Based on the analysis presented, there are three fundamental hypotheses regarding total mortality rates (Z) of major finfish that can be stated:

Overall mortality rates within many of the populations fished within the park may be high, assuming recruitment to the fishery has been relatively constant and given that the average fish length of individuals observed is lower than expected for a normal population when compared to published growth characteristics for these species. If recruitment has been relatively constant, and fishing mortality is the major component of this high overall mortality, fishing mortality (F) is much greater than the maximum sustainable yield (Fmsy) for most stocks analyzed,

Overall mortality rates within the population may not be as high as the average length analysis suggest. If recruitment to the fishery has been increasing, or there are significant movements of fish out of the park with little compensatory immigration, or the growth characteristic of fish within the park are different (lower) than the published values used in the assessment, then the apparent overall mortality may not be as high as indicated by the report.

Fishing mortality may be higher than the report concludes. Fishing mortality (F) may be underestimated if recruitment has been reduced. Reduced recruitment would give a false apparent increase in mean length within the population and thus actual overall mortality would be higher than that estimated by the length-based method.

For some of the species harvested, current minimum sizes are below the reported size of 50% sexual maturity within the population (we recommend that minimum sizes for all harvested species be set to allow at least one spawning before harvest).

Final Report of Review submitted June 2002

Appendix 4: Memorandum of Understanding (MOU) between NPS BISC and FWC to develop a Fishery Management Plan for BISC (Note: a copy of the signed MOU is available upon request).

Agreement Number: G5250D0089
Signed on October 10, 2002
Renewed in September of 2007 for five years under Agreement Number G5250H0083
Renewed in October of 2012 for two years under Agreement Number G5250O0001

Memorandum of Understanding

between

the State of Florida, Fish and Wildlife Conservation Commission

and

the National Park Service, Biscayne National Park

ARTICLE I – BACKGROUND AND OBJECTIVES

WHEREAS, The purpose of this Memorandum of Agreement (MOU) is to facilitate the management, protection and scientific study of fish and aquatic resources within the National Park Service, Biscayne National Park (hereinafter referred to as the park) by improving communication, cooperation and coordination between the Florida Fish and Wildlife Conservation Commission, (hereinafter referred to as the FWC) and the park; and

WHEREAS, Biscayne National Monument was established by Congress in 1968 "in order to preserve and protect for the education, inspiration, recreation, and enjoyment of present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty" (PL 90-606). The Monument was later expanded in 1974 (PL 93-477), and again in 1980 (PL 96-287), to its current size of 173,000 acres (270 square miles), when it was also redesignated as the park, where excellent opportunities are provided for fishing, snorkeling, scuba diving, boating, canoeing, kayaking, windsurfing and swimming; and

WHEREAS, the State of Florida conveyed sovereign submerged lands to the United States in 1970 to become part of Biscayne National Monument; and

WHEREAS, the park is made up predominantly of submerged lands (95 percent), and may be divided generally into three major environments: coral reef, estuarine and terrestrial. The boundaries of the park begin at the west mangrove shoreline, extend east

to Biscayne Bay (including seagrass communities and shoals), the keys (including hardwood hammocks, mangrove wetlands, sandy beaches and rocky inter-tidal areas), the reef, and continue to their easternmost extent at a contiguous 60-foot depth contour. The northern boundary of the park is near the southern extent of Key Biscayne, while the southern boundary is near the northern extent of Key Largo, adjacent to the Barnes Sound and Card Sound areas; and

WHEREAS, Biscayne Bay has also been designated by the State of Florida as an Aquatic Preserve, Outstanding Florida Water, Outstanding National Resource Water (pending ratification of State water quality standards) and lobster sanctuary under Florida Law, and by Dade County as an aquatic park and conservation area; and

WHEREAS, both FWC and the park have responsibilities under Federal and State laws and regulations that affect fish and other aquatic resources within the park; and

WHEREAS, FWC and the park agree that "when possible and practicable, stocks of fish shall be managed as a biological unit" (Chapter 370.025(d) Florida Statutes). This statement is intended to recognize that measures to end overfishing and rebuild stocks are most effective when implemented over the range of the biological stock; however, it is not intended to preclude implementation of additional or more restrictive management measures within the park than in adjacent State waters as a means of achieving mutual objectives; and

WHEREAS, FWC and the park agree that properly regulated commercial and recreational fishing will be continued within the boundaries of the park. FWC and the park recognize and acknowledge that commercial and recreational fishing constitutes activities of statewide importance that benefit the health and welfare of the people of the State of Florida. The parties also recognize and acknowledge that preserving the nationally significant resources of the park to a high conservation and protection standard to be agreed upon by both parties in the fishery management plan for all citizens to enjoy is of statewide as well as national importance, and as such, will also benefit the health and welfare of the people of the State of Florida; and

WHEREAS, FWC and the park agree to seek the least restrictive management actions necessary to fully achieve mutual management goals for the fishery resources of the park and adjoining areas. Furthermore, both parties recognize the FWC's belief that marine reserves (no-take areas) are overly restrictive and that less-restrictive management measures should be implemented during the duration of this MOU. Consequently, the FWC does not intend to implement a marine reserve (no-take area) in the waters of the park during the duration of this MOU, unless both parties agree it is absolutely necessary. Furthermore, the FWC and the park recognize that the park intends to consider the establishment of one or more marine reserves (no-take areas) under its General Management Planning process for purposes other than sound fisheries management in

accordance with Federal authorities, management policies, directives and executive orders; and

WHEREAS, both parties wish this MOU to reflect their common goals and intended cooperation and coordination to achieve those goals.

ARTICLE II – AUTHORITY

In the Organic Act of 1916, U.S.C. § 1, Congress created the National Park Service (NPS) to promote and regulate the National Park System for "the purpose of conserving the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and by such means as would leave them unimpaired for the enjoyment of future generations." Congress further determined, in 16 U.S.C. § 1a-1, that the authorization of activities within units of the National Park System be construed, and the protection, management and administration of national parks be conducted, in the light of high public value and integrity of the National Park System.

The legislation establishing the park states that the "Secretary shall preserve and administer the park in accordance with the provisions of sections 1 and 2 to 4 of this title, as amended and supplemented. The waters within the park shall continue to be open to fishing in conformity with the laws of the State of Florida except as the Secretary, after consultation with appropriate officials of said State, designates species for which, areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which the park is established: Provided, that with respect to lands donated by the State after the effective date of this Act, fishing shall be in conformance with State law." PL 96-287, § 103(a), codified at 16 U.S.C. § 410gg-2(a).

As a unit of the National Park System, the park is authorized under 16 U.S.C. §§ 1-6 to participate in memoranda of understanding that document mutually agreed upon policies, procedures and relationships that do not involve funding.

The FWC was created by Article IV, § 9 of the Florida Constitution and is vested with the state's executive and regulatory authority with respect to freshwater aquatic life, wild animal life and marine life. This authority, directly derived from the Constitution, provides the FWC with autonomy to regulate and manage wild animal life, freshwater aquatic life and marine life within the State of Florida, which includes the areas encompassed by the park.

The FWC is authorized under Chapter 370.103, Florida Statutes, to enter into cooperative agreements with the Federal Government or agencies thereof for the purpose of preserving saltwater fisheries within and without state waters and for the purpose of protecting against overfishing, waste, depletion, or any abuse whatsoever. Such authority

includes authority to enter into cooperative agreements whereby officers of the FWC are empowered to enforce federal statutes and rules pertaining to fisheries management.

The regulatory responsibility of the State of Florida with respect to fishing on the original Park lands is set forth in section 103(a) of PL 96-287 (see above). The regulatory responsibility of the State of Florida with respect to fishing on additional lands conveyed to the park after the effective date of PL 96-287 is set forth in a Board of Trustees of the Internal Improvement Trust Fund Dedication dated December 13, 1985, which contains the following special reservation: "All rights to fish on the waters shall be retained and not transferred to the United States and fishing on the waters shall be subject to the laws of the State of Florida."

NOW, THEREFORE, both parties agree as follows:

ARTICLE III – STATEMENT OF WORK

A. FWC and the park agree to:

1. Seek concurrence in meeting their management goals and strive to identify means, measures and other interagency actions for the mutual benefit of the aquatic resources within Biscayne Bay and the park.

2. Acknowledge that the FWC will play a crucial role in implementing and promulgating new regulations as may be deemed appropriate, as well as take other management actions to achieve the mutual objectives for the management of fisheries within the boundaries of the park for the term of this MOU. However, the agencies agree to consult with each other on any actions that they may propose to be taken to conserve or protect fish populations and other aquatic resources within Park boundaries or to further regulate the fisheries.

3. Provide for recreational and commercial fishing and opportunities for the angling public and other Park visitors to enjoy the natural aquatic environment.

4. Manage fisheries within the park and Biscayne Bay according to applicable Federal and State laws, and in a manner that promotes healthy, self-sustaining fish populations and recognizes the biological characteristics and reproductive potential of individual species. Desired future conditions for fisheries and visitor experiences within the park will be established cooperatively to further guide fisheries management.

5. Consult with each other and jointly evaluate the commercial and recreational harvest of fishery resources within the park. Such consultation and evaluation, as set forth in the enabling legislation

establishing the park, should include a full review of all commercial and recreational fishery practices, harvest data, permitting requirements, techniques and other pertinent information for the purposes of determining to what extent mutually agreed upon fishery management goals are being met within the park and to determine what additional management actions, if any, are necessary to achieve stated management goals.

6. Collaborate on the review and approval of proposals for fisheries stock assessment, site characterization, maintenance or restoration, including scientifically based harvest management, species reestablishment, stocking, habitat protection, and habitat restoration or rehabilitation.

7. Notify each other, as early as possible, of the release of information pertaining to the development of agency policies, management plans, statutes, rules and regulations that may affect fisheries and aquatic resource management within the park boundary.

8. Share scientific information, field data and observations on Park fishery resources and activities affecting those resources, except in situations where the exchange of such data would violate State or Federal laws or regulations (*e.g.*,law enforcement investigations and confidential landings statistics). The parties will provide each other with copies of reports that include results of work conducted within the park or Biscayne Bay.

9. Jointly consider proposals for the management and control of exotic (non-indigenous) species, if found to occur within the park or in adjacent areas, that may pose a threat to the integrity of Park resources. Exotic species are those that occur in a given place as a result of direct or indirect, deliberate or accidental actions by humans.

10. Review and coordinate, on an annual basis, proposals for fisheries and aquatic resources management, research, inventory and monitoring within the park and Biscayne Bay. Each party will provide prospective researchers with legal notice of agency-specific permitting requirements. Additionally, as a courtesy, and to encourage information sharing, the FWC and the park will provide each other with annual summaries of marine and terrestrial research, inventory and monitoring activities conducted within and in close proximity to the park.

11. Meet at least once annually and otherwise as needed to coordinate management and research activities and exchange information on fish and aquatic resources within the park and Biscayne Bay.

12. Recognize that there may be times when the missions of the FWC and the park may differ, and that while efforts will be made to the maximum extent possible to cooperate fully and jointly manage fishing within the park as intended by Congress when the park was established, there may be occasion when the two agencies choose to disagree. Such occasions will not be construed, as impasses and every attempt will be made to avoid communication barriers and to not jeopardize future working relationships.

13. Develop a comprehensive fisheries management plan (hereinafter referred to as the Plan) for the long-term management of fish and aquatic resources within the park. The Plan will summarize existing information and ongoing activities, clarify agency jurisdiction, roles and responsibilities, identify additional opportunities for cooperative management, list key issues, establish management goals and objectives, describe desired future conditions, indicators, performance measures and management triggers, and develop a list of prioritized project statements. Specifically, with respect to developing the Plan, the two agencies agree as follows:

B. The FWC agrees to:

1. Assist the park, and play a collaborative role in coordinating with the park and its cooperators, in the development and ongoing review of the Plan.

2. Provide representation to a technical committee formed to guide interagency fisheries management within Biscayne Bay, including the park, and participate in monthly teleconference calls and meetings as may be scheduled for purposes of steering fisheries management planning project.

3. Assign staff, including those from the Florida Marine Research Institute, as deemed appropriate to assist the park and its cooperators in developing credible project statements or preliminary research proposals. The emphasis of such proposals will be to design and prioritize projects intended to meet known fisheries data gaps or resource knowledge deficiencies to facilitate scientifically based and informed fisheries management decision- and rule-making.

4. Provide representation to and support for forming the Scientific Advisory Panel for the purposes described in C.4 below.

5. Provide access to and support for requests by the park to existing data and information as may be applicable to Biscayne Bay fisheries and aquatic resources, jurisdictions and other pertinent aspects to developing the Plan.

6. Review and comment upon drafts of the Plan and participate in joint meetings that will be arranged to solicit public opinion and comment concerning proposed fisheries management actions and/or alternatives as may be described within the draft Plan; and to review and comment upon any fisheries and aquatic resources issues and alternatives as may be identified within the park's General Management Plan, also being developed in 2001–2002.

7. Facilitate information exchange and otherwise provide briefings to FWC Commissioners as necessary and deemed appropriate by the FWC.

8. Facilitate information exchange and otherwise provide briefings as may be deemed appropriate to the South Atlantic Fishery Management Council, of which FWC's Director of the Division of Marine Fisheries is a member.

9. Work with the park to promulgate or revise existing State and Federal rules/regulations as may be jointly identified and recommended within the Plan.

10. As may be provided under State law and FWC policies, and upon full review, comment, revision and concurrence by the FWC, co-sign and endorse the Plan.

C. The park agrees to:

Subject to the availability of funds, provide project funding support to cooperators, under contractual requirements separate from this MOU and described within an approved study plan prepared by NPS, to complete the Plan.

Secure contractors and cooperation from other fisheries experts to develop and/or assist the park in developing the Plan. These cooperators may include, but are not limited to, research fishery biologists, aquatic ecologists and fisheries program managers from the FWC, Tennessee Valley Authority, Everglades National Park, National Marine Fisheries Service, Southeast Fisheries Science Center, and the University of Miami--Rosenstiel School of Marine and Atmospheric Science.

Form a technical steering committee comprised of Park personnel as well as those cited in C.2 above, and arrange and coordinate monthly teleconference calls and periodic other meetings of this committee as necessary to develop the Plan.

Arrange and coordinate a Scientific Advisory Panel to review the findings and recommendations contained in the 2001 report entitled "Site Characterization for Biscayne National Park: Assessment of Fisheries Resources and Habitats," prepared under contract for the park by Dr. Jerald S. Ault, et al.

Work with the FWC to promulgate or revise existing State and Federal rules/regulations as may be jointly identified and recommended within the Plan.

Pursuant to the National Environmental Policy Act, arrange and coordinate public meetings, Federal Register Notices, and other requirements associated with preparing an Environmental Impact Statement in conjunction with the Plan.

Under contractual arrangements separate from this MOU, finance, print, and distribute a reasonable and sufficient number of draft and final copies of the Plan to all cooperators and other entities with an expressed or vested interest.

As requested by the FWC, help conduct or simply attend briefings, presentations or other forums concerning fisheries/wildlife management within Biscayne Bay, including the park.

Facilitate and encourage the joint publication of press releases and the interchange between parties of all pertinent agency policies and objectives, statutes, rules and regulations, and other information required for the wise use and perpetuation of the fisheries resources of the park.

Facilitate research permitting to state entities for activities needed to accomplish goals identified in the Plan.

ARTICLE IV – TERMS OF AGREEMENT

This MOU shall become effective upon signature by all parties hereto, and is executed as of the date of the last of those signatures and shall remain in effect for a term of five (5) years unless rescinded as provided in Article IX. It may be reaffirmed and extended for an additional five years.

This MOU in no way restricts the FWC or the park from participating in similar activities with other public or private agencies, organizations, and individuals.

This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the park and the FWC will be handled in accordance with applicable laws, regulations, and procedures. Such endeavors will be set forth in separate written agreements executed by the parties and shall be independently authorized by appropriate statutory authority.

ARTICLE V – KEY OFFICIALS

A. For Biscayne National Park:

Superintendent
Biscayne National Park
9700 SW 328th Street
Homestead, FL 33033

B. For the Florida Fish and Wildlife Conservation Commission:

Executive Director
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600

ARTICLE VI – PRIOR APPROVAL

Not applicable

ARTICLE VII – REPORTS AND/OR OTHER DELIVERABLES

Upon request and to the full extent permitted by applicable law, the parties shall share with each other final reports of actions involving both parties.

ARTICLE VIII – PROPERTY UTILIZATION

Unless otherwise agreed to in writing by the parties, any property furnished by one party to the other shall remain the property of the furnishing party. Any property furnished by the park to the FWC during the performance of this MOU shall be used and disposed of as set forth in Federal property management regulations found at 41 C.F.R. Part 102.

ARTICLE IX – MODIFICATION AND TERMINATION

Either party may terminate this MOU by providing 60 days advance written notice to the other party. However, following such notice and before termination becomes effective, the parties will attempt to address and resolve the issues that led to the issuance of the notice.

Any disputes that may arise as a result of this MOU shall be subject to negotiation upon written request of either party, and each of the parties agrees to negotiate in good

faith. The parties shall use their best efforts to conduct such negotiations at the lowest organizational level before seeking to elevate a dispute. If the parties cannot resolve the dispute through negotiation, they may agree to mediation using a neutral acceptable to both parties. Subject to the availability of funds, each party will pay an equal share of any costs for mediation services as such costs are incurred. If the dispute cannot be resolved through mediation, it will be elevated to a third party acceptable to both the park and FWC for a final decision.

This MOU may be reviewed and/or modified at any time upon written agreement of the FWC and the park.

ARTICLE X – STANDARD CLAUSES

A. Compliance With Laws

This MOU is subject to the laws of the United States and the State of Florida, and all lawful rules and regulations promulgated thereunder, and shall be interpreted accordingly.

B. Civil Rights

During the performance of this MOU, the parties agree to abide by the terms of the U.S. Department of the Interior (hereinafter referred to as the Department) – Civil Rights Assurance Certification, non-discrimination and will not discriminate against any person because of race, color, religion, sex, or national origin. The participants will take affirmative action to ensure that applicants are employed without regard to their race, color, sexual orientation, national origin, disabilities, religion, age or sex.

C. Promotions

The FWC will not publicize or otherwise circulate promotional material (such as advertisements, sales brochures, press releases, speeches, still and motion pictures, articles, manuscripts, or other publications), which states or implies Governmental, Departmental, bureau or Government employee endorsement of a product, service or position, which the Department represents. No release of information relating to this MOU may state or imply that the Government approves of the FWC's work product, or considers the Department's work product to be superior to other products or services.

D. Public Information Release

The FWC will obtain prior approval from the park for any public information releases, which refers, to the Department, any bureau, park unit, or employee (by name or title), or to this MOU. The specific text, layout, photographs, etc. of the proposed release must be submitted with the request for approval.

E. Liability Provision

Each party to this agreement will indemnify, save and hold harmless, and defend each other against all fines, claims, damages, losses, judgments, and expenses arising out of, or from, any omission or activity of such person organization, its representatives, or employees. During the term of the MOU, the park will be liable for property damage, injury or death caused by the wrongful or negligent act or omission of an employee, agent, or assign of the park acting within the scope of his or her employment under circumstances in which the park, if a private person, would be liable to a claimant in accordance with the law of the place where the act or omission occurred, only to the extent allowable under the Federal Tort Claims Act, 28 U.S.C. Sec. 2671 et seq.

ARTICLE XI – SIGNATURES

IN WITNESS HEREOF, the parties hereto have executed this agreement on the dates set forth below.

FOR BISCAYNE NATIONAL PARK:

Signature:_____

Mark Lewis
Superintendent
Biscayne National Park

Date: _ October 5, 2012__

FOR THE FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION:

Signature:_____

Nick Wiley
Executive Director
Florida Fish and Wildlife Conservation Commission

Date: _ September 24, 2012_

Appendix 5: BISC FMP Working Group Recommendations

BISCAYNE NATIONAL PARK FISHERIES MANAGEMENT PLAN WORKING GROUP RECOMMENDATIONS

Introduction

The Biscayne National Park (BISC) Fisheries Management Plan Working Group was formed to make recommendations on goals and actions for BISC's Fishery Management Plan, and to comment and make recommendations on portions of BISC's General Management Plan that are pertinent to fisheries. The Working Group consists of diverse members of the stakeholder community, including commercial and recreational fishers, divers, scientists, and representatives of environmental groups (see Appendix 1 for full member list). The Working Group met six times from January to October 2004, with facilitation provided by Janice Fleischer of the South Florida Regional Planning Council's Institute for Community Collaboration, and planning / oversight by Chairman Jack Curlett and the Working Group Organizational Committee (Appendix 2). For the Fishery Management Plan, the Working Group set forth to develop Desired Future Conditions (DFCs) for fished species and fishery resources in BISC, and Action Steps to achieve the DFCs. The DFCs and Action Steps recommended by the Working Group are presented in the following document, categorized by overarching Issue Groups that the Working Group identified as general areas of concern. These issue groups are (1) populations of fish and invertebrates impacted by fisheries activities, (2) law enforcement, education and coordination, (3) commercial fishing activity, (4) recreational fishing activity, (5) habitat conditions, and (6) recreational fishing experience. In some cases, timeframes are identified in which Action Steps under each Issue Group should be initiated. When no timeframe is identified, the recommendation is that the Action Steps be implemented as soon as possible following finalization of the Fishery Management Plan.

The Working Group will reconvene to review the BNP Fishery Management Plan (and potentially the General Management Plan) as it continues to be developed, and to generate additional comments and recommendations at those times.

ISSUE GROUP 1 – POPULATIONS OF FISH & INVERTEBRATES IMPACTED BY FISHERIES ACTIVITIES

DESIRED FUTURE CONDITION

1.1 - Abundance and size of key / indicator species are increased over a five-year period.

The following Action Steps should be undertaken to accomplish DFC 1.1:

Determine and examine the previous record for key indicator species (specified as bonefish, permit, tarpon, shark, snapper, grouper, snook, lobster, shrimp, crabs (blue & stone), mullet (finger), bait species, seatrout, redfish) by utilizing scientific biological sampling, dockside surveys, and species specific harvest data. Where possible for each species, review historical data and establish baselines. Summarize the status of each species annually, prepare an analysis of species standing after five years, and prepare an assessment for each species after 10 years.

Implement restrictions by species. Establish local/stakeholder advisory panels (not standing committees) to develop and review management regulations (existing and proposed) for specific species. Consider species-specific spawning season closures.

Implement additional restrictions in adjacent State & Federal waters via the FWC and federal rulemaking public processes.

Distribute an end-of-season sampling card to license holders to monitor populations.

ISSUE GROUP 2: LAW ENFORCEMENT, EDUCATION AND COORDINATION
DESIRED FUTURE CONDITIONS
2.1 - Park rules and regulations are enforced effectively and uniformly.
2.2 - Increased funding for and number of law enforcement officers over current levels.
2.3 - Education and outreach efforts have fostered voluntary protection of Park resources by building support for rules and regulations and responsible behavior on the water.

Note: Education and enforcement are key components to making the entire plan work. To accomplish this, we need to establish a funding structure.

The following Action Steps should be undertaken to accomplish DFCs 2.1, 2.2 and 2.3:

Establish a permit system for fishing and other water-based activities within BISC. Under the permit system:

- $25.00 annual permit (by calendar year) for usage of Park per boat. The permit would be required for all vessels involved in recreational activities (*e.g.*, fishing, diving, swimming, birding, etc.) or not underway (with exceptions for boat trouble). The permit would not be required for boaters navigating through, but not utilizing for recreation, the park. Cost of the permit would be pro-rated depending on date of purchase.
- Can obtain more than one sticker per permit if can document owning multiple boats.
- Permit would also be required for land-based fishing.
- Differentiate between residents and visitors.
- Coordinate efforts with Everglades National Park and Florida Keys National Marine Sanctuary.
- Funding generated by permit should be earmarked solely for enforcement and education.
- Funds should support additional NPS or Florida Fish and Wildlife Conservation Commission (FWC) law enforcement officers to increase enforcement of regulations pertaining to fish and other resources.
- BISC should seek funding to develop an educational video on rules and regulations pertaining to fishing, boating and habitat within Park. Once developed, the video should be required viewing for first-time purchasers of the permit; viewing should occur within 12 months of purchase of permit, else permit will be revoked.

The Working Group also recommends that the FWC create a $2 stamp to be purchased with a state fishing license that would enable the license holder to fish in BISC.

Education [concerning both (1) rules and regulations and (2) the importance of being an ecologically responsible park user]

- Place signage and materials in English/Spanish/Creole at all public access ramps and fuel docks leading to BISC explaining all fishing and general regulations pertaining to vessels using Park waters.

- Coordinate with appropriate media outlets to disseminate rules and regulations.
- Provide education to schools, clubs, vendors, etc.
- Earmark 10% of permit-generated funds to community outreach programs to reach youth.

Enforcement of Rules and Regulations
FWCC officers should continue to be cross-deputized to enforce federal and state regulations in BISC.
Establish and enforce strict penalties for all violations, particularly for repeat offenders.
Devise and utilize creative law enforcement approaches.

ISSUE GROUP 3 – COMMERCIAL FISHING ACTIVITY
SUB CATEGORY 3.1 Commercial fishers within the park

DESIRED FUTURE CONDITION
3.1.1: Reduce adverse impacts of commercial fishing.

The following Action Steps should be undertaken to accomplish DFC 3.1.1:

- Establish a limited, qualified, non-transferable commercial permitting system for the next 5 years in BISC. To be eligible for the permit, commercial fisher must have reported landings within the last 3 years prior to the year of permit establishment in zones 744.4, 744.5 or 744.8 (or, for years prior to the establishment of 744.4, 744.5 or 744.8, zone 744.0).
- Permits are only issued in Year 1 of the initial 5-year period.
- Permits and permit renewals are $100.
- Permits may not be transferred within the first five years of the program.
- Permits are lost if not used (no reported catch) or renewed annually.
- After 5 years, put a transferable permit system in place that includes fishermen with qualified landings in BISC in zones 744.4/744.5/744.8.
- As above, permits are lost if not used (no reported catch) or renewed annually.
- If future research indicates that the number of permits needs to be reduced above and beyond any reductions due to non-use or non-renewal, create a fair and equitable buyout program to reimburse permit-holders unable to transfer their licenses.

NPS / BISC should work with commercial shrimp trawlers to identify areas being trawled to help later identify management actions and identify areas of user conflicts.

Restrict traps from hard bottom habitat (limit to sand and grass bottom) via establishment of an FWC or NPS / BISC rule.

Consider banning wing nets targeting food shrimp via establishment of an FWC or NPS / BISC rule.

Consider establishing fishery-specific boat standards (see Action Steps for DFC 3.2.1) via establishment of an FWC or NPS / BISC rule, or through cooperation with the US Coast Guard, which is responsible for current inspections.

SUB CATEGORY 3.2 Bycatch amount and bycatch-related mortality associated with commercial fishing gear
DESIRED FUTURE CONDITION
3.2.1 - Minimize adverse effects of bycatch mortality.

The following Action Steps should be undertaken to accomplish DFC 3.2.1:

For shrimp trawlers, establish an inspection program to check for proper equipment/gear use. Have frequent (at least semi-annual) visual inspection of roller-frame trawls by FWC or NPS. Issue certificates or decals indicating inspections have been passed.

Researchers should work with shrimp trawlers to investigate new technologies that can reduce bycatch.

NPS should consider stricter gear standards on trawl equipment. Consult with trawlers/shrimp fishermen to identify gear that is damaging, place restrictions as appropriate. Put in place when FMP is implemented. Determine recommended restrictions during scoping/drafting period (see Action Step 5 under DFC 5.2.1 for further detail).

Perform more public outreach/education to ensure commercial fishermen are aware of regulations and adverse effects (in English & Spanish). For example, mail summary information to commercial permit holders annually. Implement this process as soon as commercial permit system is established (see 3.1.1).

ISSUE GROUP 4– RECREATIONAL FISHING ACTIVITY
Note: Additional recommendations affecting recreational fishing activity (specifically, recommendations to implement additional regulatory restrictions by species) are included under Issue Group 1.

SUB CATEGORY 4.1 Recreational fishers within the park
DESIRED FUTURE CONDITION #4.1.1: Minimize the adverse impacts of recreational fishing to habitat and fish populations including bycatch mortality.

The following Action Steps should be undertaken to accomplish DFC 4.1.1:

Initiate the permit system described under Action Step 1 for DFCs 2.1 – 2.3. Include a $2 state fishing stamp for BISC.

Distribute educational materials at time of sticker (permit) issuance. Ensure recreational fishers know what “bycatch” is and how to handle bycatch.

Educate the public about park regulations. Add “Special Regulations Apply” to park signage.

Eliminate lobster sport season (“mini-season”) by FWC or BISC regulation (also recommended under DFC 5.2.1).

Continue monitoring of recreational catch and effort via creel surveys of recreational anglers.

SUB CATEGORY 4.2 Spearfishing impacts (Previously under HABITAT category)
DESIRED FUTURE CONDITION
4.2.1 - Minimize the adverse impacts of spearfishing to habitat and fish populations.

The following Action Steps should be undertaken to accomplish DFC 4.2.1:

Eliminate use of any gear with a trigger mechanism via FWC or BISC regulation. Improve enforcement.

Eliminate air equipment for all spear fishing (prohibit the use of scuba gear by spearfishers) via FWC or BISC regulation.

ISSUE GROUP 5: HABITAT CONDITIONS
Sub Category 5.1: Marine Debris
DESIRED FUTURE CONDITION
5.1.1 - Minimize adverse impacts to habitat from monofilament, stainless hooks, sinkers, traps, nets, trash, ropes, anchors and lines.

The following Action Steps should be undertaken to accomplish DFC 5.1.1:

Partner with programs like Clean Marina program.

Establish a required education program before Park use.
Video (see Action Step #1f for DFCs 2.1 – 2.3)
In-school programs
Sticker to indicate completion or signed "contract" (like Three Sisters for manatees)

Disseminate information re: debris via radio, television and distribution to hotels (including closed circuit hotel television).
Work w/NGOs, local groups, networks, DJs, etc.
Hotels run on their in-house channel.
Establish a monitoring program.
Partner with organizations that already have programs.
Work with Park users.
Encourage use of biodegradable fishing materials via educational efforts.
Create signage that educates re: marine debris.
School projects
Park "make a sign" contest.
Work w/NGOs to sponsor signs.
Apply for grants.
Marine debris clean-ups (derelict trap clean-ups)
Work with students, groups, etc.
Park organized activity.
"Treasure hunt" for key debris
Place discard receptacles (monofilament, etc.) in the park.
Partner with existing programs.

Create own receptacles.
"Design a can".

The group also discussed and generally recommended implementing incentives (*e.g.*, reduced fees) for "good behavior" on the water, but did not clarify the specifics of how this approach would work. The group also discussed in general terms implementing or increasing penalties for violations.

Sub Category #5.2: Direct Fishing Impacts
DESIRED FUTURE CONDITION
5.2.1 - Minimize adverse impacts to habitat from: lobster divers, roller trawlers, prop damage, anchor damage, groundings, spearing and traps

Note: Portions of this DFC (specifically, damage from propellers, anchors and groundings) may be more pertinent to the Biscayne National Park General Management Plan, and should be considered in the development of that plan. The Working Group considered, but opted not to recommend, a Research Natural Area as an Action Step under DFC 5.2.1.

The following Action Steps should be undertaken to accomplish DFC 5.2.1:

Research Park topography for fragile (define) areas (*e.g.*, reefs, grass, sand-grass interface) and map within three months of FMP implementation
Aerial survey
Underwater survey
Use existing habitat maps and ground truth to update.

Conduct study to gain knowledge on habitat impacts within three months of FMP implementation.
Review areas of current use (fisherman reports and other user reports).
Underwater survey
Commission marine bio team

Mark fragile habitat areas with signs/lights or computer within six months of accomplishing Action Steps 1 and 2.
Buoys
Beacons
Lights

Eliminate lobster sport season ("mini-season") by FWC or BISC regulation (also recommended under DFC 4.1.1).

Establish gear standards for roller trawls and inspections so gear rolls not drags. Establish workable standards and inspection process for all gear used (also recommended under DFC 3.2.1):
Length
Width
Height
Roller diameter
Finger bar spacing

Establish the permit system described under Issue Group 2. Make permits available by mail, internet and at physical locations.

Any state regulations on commercial lobster apply to BISC; where different, BISC should adopt FWC regulations.

BISC sets fine $ if NPS catches State regulation violators (incentives for enforcement); community service in the park as a consequence of violating any of the new rules (established by BISC regulation).

ISSUE GROUP 6: RECREATIONAL FISHING EXPERIENCE

The Working Group recommends that the park collect baseline data on (1) what is required for a "quality" experience and (2) what proportion of fishers are having a quality experience. The Working Group also recommends that the park provide a feedback critique system for BISC anglers and spearfishers. The information collected should be used to guide management to optimize recreational fishing experience to the extent practicable. The working group recognized that these recommendations might be more applicable to the Biscayne National Park General Management Plan (GMP). Thus, these recommendations should also be considered for the GMP.

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Appendix 6: Law Enforcement and Concurrent Jurisdiction

LAW ENFORCEMENT AND CONCURRENT JURISDICTION

According to Title 16 US Code, Chapter 1, subchapter 1, section 1a- 6, federal investigative jurisdiction and state civil or criminal jurisdiction are not preempted within National Parks. In essence, the federal government IS NOT restricted in its investigative jurisdiction within park boundaries. However, Biscayne National Park Law Enforcement Officer's jurisdiction IS restricted to the park boundaries unless in pursuit of individuals whose criminal activities originated within the park. Law enforcement officers commissioned by the state or any political subdivision thereof are not restricted in their exercise of civil and criminal jurisdiction within and without the park. In the event of resource protection scenarios not covered by Title 16 US Code, BISC LE Officers may defer to and enforce Florida Statutes, Chapter 370.

Whereas the National Park Service jurisdiction is restricted to park boundaries, FWC authority extends 3 miles beyond the ocean side of any particular key, and 9 miles into Florida Bay and the Gulf of Mexico. In regards to saltwater fisheries, the Florida Fish and Wildlife Conservation Commission (FWCC) derive their enforcement authority from Florida Statutes, Chapter 370. Section 103 of the same chapter and statute addresses a cooperative agreement between federal and state law enforcement officers whereby commissioning state officers to enforce federal law. FWCC officers are "cross- deputized" as federal law enforcement agents and are commissioned to enforce federal laws pertaining to the National Marine Fisheries and the US Department Fish & Wildlife seaward to the 200 mile Exclusionary Economic Zone as outlined in Title 50 of the Code of Federal Regulations.

Miami-Dade County Sheriffs are sanctioned to "execute all process of the Supreme Court, circuit courts, county courts, and boards of county commissioners of this state, to be executed in their counties". Their authority stems from Florida Statutes, Title V, Chapter 30, Section 15a. While the Miami-Dade County Sheriff's Marine Patrol is legally enabled to enforce federal fisheries law, their charter is primarily peace keeping and public safety. Occasionally, Miami-Dade Marine Patrol Sheriffs are cross-deputized as federal agents and are commissioned to enforce federal customs and immigration laws in support of "Operation Blue Lightning".

Appendix 7*:* Priority Research and Monitoring Projects

Project 1: Cross-validation and follow-up analyses of analyses described in the Biscayne National Park Site Characterization Report (Ault et al. 2001), as recommended by the Site Characterization Report Peer Review Panel.

Project justification and need:
This project is necessary to validate several of the analytical methods and conclusions of the Site Characterization. Once validated or improved in precision, results can serve as baselines against which to compare characteristics of fished populations in subsequent years, to determine if management actions are effective in accomplishing fishery management goals.

Project priority:
High

Project tasks:
Need for cross-validation for estimates of F and trends in population size:

Estimates of catch over population size for species and groups

Extract MRFSS effort data for Miami-Dade and Monroe Counties and examine for trend and precision (or use other possible data to estimate total fishing effort)

Assemble survey data to estimate minimum population estimates (visual & trawl?) by multiplying mean sampled density by habitat area

Estimate (if possible) expanded catch for recreational and commercial fisheries [rec. CPUE x Effort]

Divide estimated catch by minimum population size to compute minimum fishing mortality rate (exploitation ratio) [this procedure is primarily viewed as a diagnostic crosscheck because of potential problems with expansion factors for effort, etc.]

Time-trend analyses of catch rates for species or if data are too sparse, for species assemblages defined by various criteria.

Fit population data to stock assessment models to evaluate the consistency between trends in observed mean size, estimated F, and observed relative abundance (forward projection models to investigate issues of potential offshore movement or non-representative sampling to bias estimates of Z).

Quantitative analysis of fauna-habitat associations:
Use a Principle Component Analysis (PCA) approach to determine statistically valid species associations with specific habitat types or conditions (depth, bottom type, temperature, salinity, season, etc.). Conduct for habitat type and CPUE data sets (visual, creel, trawl), as appropriate (community associations with cluster analyses – etc.)

Clarification of data collection and analysis:
Clarify calculation methods for SPR (*e.g.*, are all mature animals included for animals below legal size?)

In visual surveys, evaluate the proportion of species not sighted through various field-oriented validation methods. (Note: Some of this may already have been done but, if so, should be more strongly reference within the report)

Multispecies Stock Assessments:
Biscayne NP is a classical multi-species fishery and the most successful management decisions may need to be predicated on multi-species stock assessments as opposed to individual species assessments. What has been the overall production of the fishery over time? Apply some of the more conventional multi-species stock assessment approaches to determining optimal fishing effort, MSY, and population trends (where possible) with the data available.

Projects 2-4: Assess (1) ontogenetic habitat linkages, (2) range of movements, and (3) fishery exploitation rates for key fishery-targeted fish species

Project justification and need:
(1) Ontogenetic habitat linkages – Managers need to better understand the habitat-specific contribution that juvenile habitats (*e.g.*, seagrass, mangrove, patch reef) make to the adult populations, which will facilitate prediction of trends in abundance of targeted fishery species.

(2) Range of movements – Managers need to better understand the range over which individuals of fishery-targeted species move during the period after they become susceptible to the fishery, as well as migratory behaviors of those individuals. Such knowledge will help determine (1) the spatial scale at which management measures will be effective, and (2) whether apparent "loss" of adults from an area is actually due to movement from the area.

(3) Fishery exploitation rates – Managers desperately need to obtain better estimates of fishing mortality to enable more accurate population assessments for fishery-targeted species, and to make inferences about appropriate management measures.

Project priority:
High

Project tasks:
Use tagging studies to accomplish all three projects. These studies should include combinations of natural tags (*e.g.*, otoliths microchemistry and stable isotope), traditional tags (*e.g.*, floy tags), coded wire tags, passive inducer transponder (PIT) tags, acoustic tags, and satellite pop-up tags. Multi-year studies, including modeling components, will be necessary.

Project 5: Establish long-term larval, juvenile and adult fish surveys

Project justification and need:
Scant information exists regarding larval supply, juvenile abundance and habitat use, and adult abundance. Increasing knowledge about relationships between these three life stages would enable managers to better predict trends in abundance of both fishery-targeted and non-fishery-targeted species, and determine when management actions were necessary.

Project priority:
High

Project tasks:
Significantly expand current larval and juvenile monitoring programs, which are extremely limited in temporal and spatial replication due to funding limitations. Implement a fishery-independent adult sampling program.

Project 6: Determination of the importance and role of bay-to-ocean channels as fish habitat and movement corridors

Project justification and need:
Scant information exists regarding the utilization of channels by fish and invertebrates in tropical and subtropical systems. In BISC, no information on channel habitat utilization exists, with the exception of recent (Dec. 2004) reconnaissance surveys performed by BISC and NOAA NOS divers. Preliminary information suggests that channels may serve as (1) critical settlement and long-term habitat for ecologically and economically important fish and invertebrates in BISC, as well as (2) corridors from bayside nursery habitats to oceanside adult habitats. Determining the role channels play in providing critical habitats and as corridors will be necessary to optimize fishery and ecosystem management in BISC.

The project will result in a solid description of (1) channel habitat consistency (*i.e.,* what substrates and benthic communities occur in channels, and to what extent), (2) fish and invertebrate utilization of channel habitats, and (3) the role of channels as corridors from bay nursery habitats to oceanside adult habitats. The output of this project will be an improved understanding of ecosystem processes and function in BISC, optimizing BISC's ability to effectively manage its fishery and ecosystem resources.

Project priority:
High

Project tasks:
Creel and hook-and-line sampling, length measurement and otolith removal from targeted fish.

Project 7: Evaluate the design of creel surveys to adequately sample fish removed from the park boundaries – integrate with census of vessels in the park to estimate total removals, species composition, and size/age composition.

Project justification and need:
Managers in BISC have no methods by which to estimate the number and biomass of fish removed from the park per unit time. Only by assessing the type, size and number of fish missed in creel surveys per unit time, and by linking this and creel data with estimates of fishing effort in the park, can managers accurately estimate fish removals from BISC waters, and thus fishing mortality for targeted species or species groups. Accurate estimates of fishing mortality will be critical to future population assessments, and thus to assessing whether fishery goals are being met.

Project priority:
High

Project tasks:
Use on-the-water surveys, creel surveys at marinas outside park boundaries, and mail surveys to assess the numbers of fishers that fish in the park and use non-park associated marinas, and the type and amounts of fish they harvest. Develop models to predict seasonal harvest missed by current creel surveys. Utilize knowledge of the relationship between trailers at marinas and boats on the water in BISC to estimate fishing effort in BISC over time. Evaluate the potential uses of novel methods (*e.g.*,video monitoring of ramps) to obtain detailed trailer counts.

Project 8: Determine current size-at-age relationships for key fishery-targeted species (*e.g.*, grouper, snapper, hogfish) for which historical size-at-age data are available.

Project justification and need:
Because fishing tends to selectively remove the largest and fastest-growing individuals from the population, heavily fished populations tend to exhibit smaller size-at-age relationships over time due to the loss of "faster-growing" genes from the population. Determining whether such impacts have occurred in Biscayne will help managers assess whether fishery populations are impaired, and whether more restrictive management methods such as marine reserves are necessary to restore an unimpaired fishery resource.

Project priority:
High

Project tasks:
Creel and hook-and-line sampling, length measurement and otolith removal from targeted fish.

Appendix 8*:* Responses to Comments

During a 60-day public comment period spanning August 5, 2009 through October 6, 2009, the National Park Service (NPS) and the Florida Fish and Wildlife Conservation Commission (FWC), hereon collectively referred to as "*the cooperating agencies*", received 337 individual pieces of correspondence, which contained a total of 746 separate comments, with 'comment' defined as a statement pertaining to a unique topic or theme. The number of comments pertaining to each major theme and sample quotes (in italic font) which represent the sentiment of that topic are provided below, immediately followed by the response of the cooperating agencies. Acronyms appearing throughout this document are as follows:

NPS- National Park Service
BISC- Biscayne National Park
FWC- Florida Fish and Wildlife Conservation Commission
DEIS- Draft Environmental Impact Statement
FEIS- Final Environmental Impact Statement
FMP- Fisheries Management Plan
DFCs- Desired Future Conditions
MOU- Memorandum of Understanding (agreement between the two cooperating agencies)

Topic 1: General pro-conservation sentiment. (46 comments)
Representative quote:
"Thank you for recognizing the plight of Biscayne Bay fish stocks and taking a bold step to restore balanced management to this national public and marine wonderland. Restoring balance to an exploited ecosystem may take decades. But, by then all Floridians and Americans may once again experience a healthy and balanced ecosystem in America's only marine ecosystem national park. Visitors can relish the opportunity to recreate with their families in a national park where corals, sponges and crabs, are recovered and they too are recognized for economic value. We commend your venture and look forward to the day diversity and natural balance have been restored."
Response: The cooperating agencies appreciate that many park users are in support of proposed management activities that will promote conservation and sustainable use of resources for this and future generations. BISC's FMP will attempt to balance fishing activities and resource conservation. The park was established "to preserve and protect for the education, inspiration, recreation and enjoyment of present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty" (16 USC Sect. 410gg). Congress recognized "the unique and special values" of the resources within BISC, as well as the "vulnerability of these resources to destruction or damage due to easy human access by water" (PL 96-287). Congress therefore directed the NPS to "manage this area in a positive and scientific way in order to protect the area's natural resource integrity". The FWC's mission is managing fish and wildlife resources for their long-term well-being and the benefit of people.

Topic 2: Quality of science used to develop the FMP DEIS (55 comments)
Representative quotes:
"The management alternatives proposed in 'Fishery management plan. Draft environmental impact statement, November 2008' are based on the 'Overview of need for action'. The studies cited and subsequent rationale for undertaking the proposed management actions are woefully out of date. In

summary the management proposals cannot be justified by the outdated and inadequate information provide as rationale for the proposals."
and
"But the science is pretty clear that fish populations within the park are heavily depleted, they're not like they were."
Response: Although some of the studies cited in the DEIS and FEIS are ~10 years old, the cooperating agencies, when making decisions, have also continued to consider findings of newer high-quality research completed by scientists affiliated with a myriad of local universities and government agencies. These newer studies corroborate the earlier studies; recent data show that the condition of resources in the park have continued to decline, and the park knows of no information suggesting that resources have improved since the 2001 study used as the basis of the "Overview of Need for Action". The fisheries resources of South Florida, including those of BISC, are extensively studied and the cooperating agencies consider the data available to be adequate for management decisions.

Topic 3: Level of detail regarding the specific management activities proposed in each alternative (78 comments)
Representative quotes:
"Alternatives 3, 4, and 5 each include marine reserves as a possible management action, yet no information is given as to how it will be determined if marine reserves are necessary, where they would be placed, how long they would be implemented, or what level of monitoring and enforcement would be placed on the reserves."
and
"What is more? Closure for the entire year? Increasing minimum size limits. To limits? Now, snapper, yellowtail, are 12 inches. What are you gonna make them? 18 inches? Then you can't catch any because obviously there are no yellowtail that big in the park- they're in deeper water."
Response: The alternatives in the FMP focus on DFCs of the park's fisheries resources and *not* on the exact management activities to be implemented. The FMP provides examples of possible management activities to give the reader a way to compare among alternatives and understand how management actions could potentially change from the current state. The intention of the FMP is to determine the DFCs; the cooperating agencies will then work to develop the specific regulatory changes necessary to achieve the DFCs. As part of the FWC's rule-making process, proposed regulatory changes would include public hearings at Commission meetings during which the public can provide input.

Topic 4: Suggestions for new alternatives or new elements within proposed alternatives (60 comments)
Representative quotes:
"I somewhat agree that Alternate 4 provides the necessary actions to ensure long-term protection of BISC's natural resources. Yet it leaves much to be desired; mainly, the elimination of fishing, spear fishing, and lobstering inside the proposed Coral Reef Protection Areas (CRPA's)."
and
"Size limits on hog snappers should be 15 inches and no more than 4 should be allowed per boat. Groupers size should be increased to 24 in. and no more than 3 per boat. Yellowtail should be increased to 14 in. with a limit of 10. Grunts should be limited to 20 per boat. Mutton snapper should be increased to 20 in. and 4 per boat."
Response: As previously stated, the alternatives in the FMP focus on DFCs of the park's fisheries resources and *not* on the exact management activities to be implemented. Regardless, the cooperating agencies appreciate the insights and suggestions of park visitors. Specific

suggestions are evaluated on a case-by-case basis and any regulatory changes will be implemented by the State of Florida's FWC, which will involve further opportunity for public involvement via public hearings at Commission meetings as part of the FWC rule-making process.

Topic 5: Incorporation of the recommendations of the FMP Working Group into the FMP (42 comments)
Representative quotes:
"I'd like to ask the superintendent what happened to the plan? I saw one mention in this presentation of a plan that we worked on for 6 months. 23 people worked on this plan and it was barely a footnote in this plan."
and
"I was part of a fishery working group I was part of the group back in 2004… We came up with a lot of recommendations, I was glad to see. And as a shrimper, I was glad to see that some of the regulations, the inspections, that was part of our plan for the gear. I was glad to see that you guys included in part of it. There was a group of fishermen, biologists, lawyers, environmentalists, aquaculture, I mean it was a really good group. There was 21 people on the board. We met for 6 months, these weren't 1 hour meetings, these were 9 in the morning until 5 at night, carried on to the summer into the fall before we finally came up with the ideas, and I'm glad to see that some of them are on there, but also wasn't real happy to see that some of them were discarded either."
Response: The efforts of the FMP working group remain an invaluable tool in the development of the alternatives in the DEIS and the FEIS. The cooperating agencies have fulfilled the intent of the working group by directly incorporating the suggestions of the FMP Working Group throughout all alternatives in the FMP. The working group recommended Alternative 3 as the preferred alternative. However, updated data obtained after the working group met indicated that Alternative 3 would be unsuccessful at protecting the park's fisheries resources so that fishing could continue sustainably and resources could be enjoyed by current as well as future generations.

Topic 6: Banning commercial fishing in some or all of the park (51 comments in support of a ban, 3 comments against a ban)
Representative quotes:
"It is my opinion that the greatest good would be served for the maximum number of individuals (not just 'stakeholders') if parts of S Biscayne Bay were declared off-limits to commercial shrimpers, as well as crabbers."
and
"I have no problem with fishermen commercial or otherwise. I think that both commercial and recreational fishing are part of the fabric of the community in and around BISC."
Response: In accordance with US Code Title 16, Congress directed that "…the waters within the park shall continue to be open to fishing in conformity with the laws of the State of Florida" (16 USC Sect. 410gg-2). As such, fishery regulations in BISC waters are regulated by the State of Florida and recreational and commercial fisheries have occurred in BISC waters since its founding. It is not the intent of the cooperating agencies to ban commercial fishing in the park, but rather to gradually phase out commercial fishing activity over the long term through the proposed non-transferable commercial permit system.

Topic 7: Non-transferable commercial permits (4 comments in support of, 5 comments against)
Representative quotes:

"I strongly support the Park Service's recommended approach to reduce commercial fishing in the Park as well as require a recreational boaters permit for fishing in the park. Over the years we have repeatedly seen many commercial traps throughout the park that have decimated the stocks of crabs and lobsters. Fishing has steadily declined due to the vacuuming of species from the reefs both by commercial and recreational fishermen. While dolphin are mostly outside of the park, we have seen so many instances where fishermen simply haul out as much as they can take, with no regard to size or quantity. Rather than take what they need for their families, these fishermen simply grab everything and then just have to throw it out when they cannot eat it."
and
"I have two boats and I'm a wholesaler and I sell quite a bit of product every year. And to make these licenses non-transferable, whether it's for five years or forever, you're taking basically all of the fishermen who have a business built up with some equity in it, and you're taking their retirement. When they retire they could sell the business to someone else that wants to keep going, but with no way to have a license to keep going. It's like taking someone who's a fireman or anyone else that's been working his whole life and then telling him we're not going to give you any retirement at the end. You have your time worked in, that's it. I'm not against limited entry permits but they need to be transferable, and there needs to be some work done on that."
Response: The cooperating agencies have proposed a non-transferable commercial permit to reduce commercial fishing effort in the park. It is expected that this permit would result in a gradual phasing out of commercial fishing activity over the long term. The non-transferable clause would mean that commercial fishers who retire or choose to fish elsewhere would not be able to sell or transfer their permits to other fishers who could initiate commercial fishing in BISC. The cooperating agencies recognize that commercial fishers will still be able to operate in areas outside of BISC boundaries.

Topic 8: No-trawl zone in the Bay (18 comments in support of, 0 comments against)
Representative quote:
"The Bay's sport fishery, particularly for bonefish and permit, will dramatically improve if you elect to eliminate shrimp trawling and traps from Biscayne Bay."
Response: The cooperating agencies recognize that trawling can have detrimental impacts to benthic communities, particularly if trawl gear is not properly maintained. In the DEIS, a no-trawl zone was described as considered only under Alternative 5. Based on public feedback, the cooperating agencies have edited the FEIS text to propose (rather than consider, as originally stated in the DEIS) a no-trawl zone. Additionally, given that a no-trawl zone was well-favored by the public, the cooperating agencies have modified the FEIS to also propose in Alternative 4 that the FWC consider a no-trawl zone. The cooperating agencies will work with commercial trawlers and scientists to determine details about the size and location of this zone. As part of the FWC's rule-making process, the proposed no-trawl zone would include public hearings at Commission meetings during which the public can provide input.

Topic 9: Permit required of guide fishermen (for-hire or charter commercial business) (2 comments in support of permit requirement, 1 comment against permit requirement)
Representative quotes:
"The idea of a guide permit is a good idea, most of the full-time guides I know would be more than happy to do that."
and
"I do not agree with having more permits imposed upon myself to fish inshore waters and flats where I do not harvest any fish."

Response: Establishment of a permit system for fishing guides provides the park with opportunities to ensure minimum levels of service to the public, help ensure safety, and fulfill the NPS requirement to manage commercial business operations within the park.

Topic 10: Educating park visitors about fishing regulations (17 comments)
Representative quote:
"Education will be of huge benefit to you if we can get people to realize that with a well stocked park the interest will be far greater than it is now and enterprises that presently make revenues from the park will have to adjust and accept there will be quite a few lean years before it increases beyond anything they could ever dream about after year ten"
Response: BISC currently offers a free monthly Fisheries Awareness Course which educates park users on fishing regulations, the rationale behind different types of regulations, fish identification, and ethical fishing practices. Details are available at http://www.nps.gov/bisc/planyourvisit/fisheries-awareness-class.htm. Additionally, BISC managers continue to submit proposals to funding agencies for projects which will allow for increased on-the-water outreach and education opportunities. The FWC also offers statewide fishing clinics and other educational programs.

Topic 11: Educating park visitors about boating (13 comments)
Representative quote:
"Boater education is the key to sustained use without abuse! If boaters where licensed/educated there would be much less problems as in running aground and anchoring in the wrong locations. It seems all boaters are being restricted in the bay for the actions of a few uneducated boaters/abusers."
Response: The cooperating agencies agree that boat-related habitat damage can negatively affect fisheries resources and that education can decrease undesirable boater impacts. The purpose of this plan is to develop the desired future conditions of BISC's fisheries resources. Education is a component of several activities proposed in this plan. BISC is currently also developing its General Management Plan and a Mooring Buoy and Marker Plan, which also address boater education and outreach issues. Additionally, the FWC recently updated their boating safety education requirements such that anyone born on or after January 1, 1988 who operates a vessel powered by 10 horsepower or more must pass an approved boater safety course.

Topic 12: Impacts of plan on socioeconomics (13 comments)
Representative quotes:
"The dollar value of the fishery to the region and state are staggeringly in favor of a improving the Bay as a sport fishery. Commercial enterprises will only diminish the Bay's value, reduce the regions and state's income, and eventually sink the natural environment of the Bay."
and
"Finally, we feel compelled to mention that if the removal of the "small guy" was to happen in the ways mentioned, the diving and boating industry would sustain extremely high losses. Since much of the business in this industry is done in the three weeks prior to Lobster Mini-Season, a good analogy would be to remove the Christmas holiday from the retail clothing industry. The diving and boating industry has been an extremely important entity for South Florida to protect in the past, and it should only seem this important to do so in the future."
Response: Socioeconomic impacts of the FMP implementation were carefully considered and assessed. If fishing effort continues at or increases above the current rates, fisheries resources could decline to the extent that: i) commercial fishing, particularly for finfish, could become unprofitable and ii) recreational fishing could become cost-prohibitive because the expenses

would far outweigh the gains. The FMP is designed to manage recreational fishing sustainably and gradually phase out commercial fishing in order to achieve the DFCs. Management actions will be determined by the cooperating agencies and will be implemented following approval by the FWC. These actions are expected to have long-term economic and ecological benefits. The cooperating agencies do not intend to ban fishing altogether, and while some particular activities (*e.g.* lobster mini-season) may be modified or prohibited, fishing opportunities will still be available and will continue to support local merchants and the regional economy.

Topic 13: Law enforcement (138 comments)
Representative quote:
"Ultimately, regulations are only as successful as the level of enforcement they are under. The biggest problem facing resources in BNP is lack of enforcement of current regulations. Without first addressing this problem, additional regulations will only further restrict law-abiding citizens from enjoying the park while doing nothing to those that break the rules."
Response: The cooperating agencies recognize that increasing law enforcement staffing would always be beneficial, however financial constraints limit the cooperating agencies' abilities to create more law enforcement positions. Currently, the cooperating agencies' law enforcement officers at BISC have made a concerted effort to address the ongoing problem of fishing regulation violations. For example, in the three-year period spanning 2009 through 2011, BISC law enforcement rangers have issued 1,195 fishing-related citations and warnings (*e.g.*, harvesting an undersized fish or fishing without a license). These fishing-related cases represent 35% of all tickets and warnings issued during that time period. Due to financial constraints, staff size, and the complexity of law enforcement issues in the park, the capability to significantly improve fisheries resources through law enforcement efforts alone is limited. However, BISC is actively seeking additional funding to support additional staff to enforce new fishing regulations that would be implemented under the FMP.

Topic 14: Banning recreational fishing (9 comments in support of a ban, 13 comments against a ban)
Representative quotes:
"Limiting fishing, both commercial and recreational is the only way to protect what is left. There should be NO fishing allowed by anyone and no taking of any species by anyone."
and
"I hope that you will continue to allow recreational fishing in the park."
Response: The cooperating agencies recognize that BISC's enabling legislation allows for fishing to occur in the park. Banning recreational fishing is not proposed in any alternative of the FMP.

Topic 15: Implementation of more restrictive regulations (*e.g.*, size limits, bag limits, slot limits, catch and release) (25 comments in support of more restrictive regulations, 29 comments against more restrictive regulations)
Representative quotes:
"I know I speak for many fellow flyfishers that we would STRONGLY welcome very restrictive limits on all types of fishing, especially commercial, spearfishing, shrimp trawling, bottomfishing, etc. The fish stocks are indeed extremely overfished and need significant restrictions"
and
"I oppose special fishing restrictions in all national parks"

Response: The cooperating agencies acknowledged that there was considerable support for using stricter regulations as management tools to help manage its fisheries in a more sustainable manner. Upon implementation of the FMP, the cooperating agencies will together determine regulation changes needed to meet the goals of the selected alternative. The cooperating agencies will consider all available tools, including stricter size and bag limits, establishing slot limits for some species, making some species catch and release only, and seasonal closures. Marine reserves will be considered only if both of the cooperating agencies agree that they are absolutely necessary, since the FWC believes, as stated in the MOU, that 'marine reserves (no-take areas) are overly restrictive and that less-restrictive management measures should be implemented during the duration of this MOU'. All regulatory changes will be implemented through the FWC's rule-making process and each proposed rule will have opportunities for public involvement and comment.

Topic 16: Eliminating Lobster Mini-Season (8 comments in support of elimination, 14 comments against elimination)
Representative quotes:
"The annual mass killing of lobsters at the start of the lobster season is a senseless exhibition of gluttony and waste that should be eliminated immediately."
and
"I am in support of the lobster mini season as it gives the regular guy a clear advantage to commercial trappers and divers."
Response: The cooperating agencies propose to eliminate lobster mini-season within BISC in order to promote increased public safety and to decrease resource damage, such as seagrass and reef groundings, which have traditionally resulted from the increasingly high numbers of vessels in the park during the mini-season. The regular lobster season is proposed to remain open in the park, allowing licensed fishers to engage in lobster harvesting activities during this time; the cooperating agencies hope to disperse lobstering effort over the regular season rather than having the resources intensively harvested over a concentrated mini-season. It is believed that dispersed use and reduced crowding will better protect the seagrass and reef habitats that are vital to many of the park's fisheries resources.

Topic 17: Implementation of increased restrictions on or prohibition of spearfishing (12 comments in support of increased restrictions and/or prohibition, 49 comments against increased restrictions and/or prohibition)
Representative quotes:
"Should there be more control over scuba spearfishing? Without a doubt! Scuba divers who spearfish can spend more time submerged than those who freedive. The scuba diver has better odds on finding more fish than a freediver. Put more control on scuba divers who spearfish"
and
"Please don't discriminate based on the method in which the fish are taken or the equipment that is used to take fish."
Response: The spearfishing restrictions proposed in the FMP were recommended by the FMP Working Group, which included a spearfishing representative. Analysis of the park's creel database indicate that, when compared to their hook and line counterparts, spearfishers in the park are more than twice as likely to take at least one undersized fish per trip, likely due to failure to correct for underwater magnification. The cooperating agencies believe that the resources in a National Park should be as good as or better than those in surrounding areas, and the cooperating agencies will continue to explore all management tools to allow it to achieve this

goal. The proposed spearfishing restrictions are intended to reduce the illegal harvest of undersized fish, help replenish fisheries resources in the park, and make spearfishing regulations within BISC more comparable to those of surrounding areas.

Topic 18: Recreational boating permit (19 comments in support of permit, 123 comments against permit)
Representative quotes:
"A permit system is ok but should be affordable so everybody can enjoy and should be based on the size of the boat and propulsion type since large powerboats pollute more and disturb the environment more."
and
"I am opposed to any requirement for needing an access permit to use the park!"
Response: For a variety of reasons, the recreational use boat permit system proposed for Alternatives 3, 4 and 5 in the Draft Environmental Impact Statement was not considered in the Final Environmental Impact Statement. First, the cooperating agencies received strong public sentiments against a recreational boater permit. Second, the cooperating agencies recognize that besides being unpopular with the public, implementation of this system would also impose a large administrative burden on park staff and would be difficult to enforce. Lastly, restrictions on how the park could utilize any revenue generated from the permit system would limit the the park's abilities to achieve the enforcement and outreach goals for which the system was proposed.

Topic 19: Marine reserves (26 comments in support of a reserve, 82 comments against a reserve)
Representative quotes:
"Protected areas offer a wealth of comparative research opportunities as well as an aesthetic and educational opportunity for many to catch a glimpse of what original Florida and a dynamic but intact and functioning subtropical marine ecosystem may once have looked like."
and
"I am writing to strongly request that the National Park Service avoid closing any portion of the park to fishing or boating under the new Fisheries Management Plan (FMP)"
Response: Marine reserves are one of many tools that can be used to manage fisheries resources. The BISC FMP represents a partnership between the NPS and the State of Florida's FWC, and all fishery-related regulatory changes would be executed through the FWC. As noted in the FMP DEIS and FEIS, the FWC has openly stated the belief that "marine reserves (no-take areas) are overly restrictive and that less-restrictive management measures should be implemented". It has also been stated that "…the FWC does not intend to implement a marine reserve (no-take area) in the waters of the park during the duration of this MOU, unless both parties agree it is absolutely necessary." Therefore, while it is unlikely that a marine reserve would be implemented under the FMP, the cooperating agencies wish to maintain this as a management option, should it become necessary. Park users should note that BISC has proposed a marine reserve zone under its GMP; this zone would provide park visitors with the opportunity to experience unfished marine habitats that contain diverse and abundant marine life of a variety of life history stages.

Topic 20: Opening the Goliath Grouper (jewfish) fishery (5 comments in support of opening, 1 comment against opening)
Representative quotes:
"The agencies governing this activity seem to be reactive rather than proactive. While diving for lobster in the keys we are seeing large numbers of jewfish but there is no harvest allowed. Some of the ledges I've

looked under have had five to six three- to four-foot jewfish under them. There aren't many grouper in these areas. When I e-mailed the FWC with these observations I was told that they would reconsider opening the season in 2013!"
and
"In the case of the scattered remaining Goliath grouper, protected since 1990 but still considered overfished as of 2004, the fishers now want to spear and harvest them once more. As Goliath grouper begin ever so slowly after 19 years to approach some semblance of what may have been even remotely close to historic population levels, their numbers now seem to those lacking institutional memory as "unnatural" alongside other associated target species that have been fished out. They are even deemed a "nuisance" whose population must be knocked back down in the eyes of some anglers and spear fishermen who consider themselves conservationists."
Response: Since the NPS does not have any authority to open up the goliath grouper fishery, the cooperating agencies do not intend to pursue this under any alternative of the FMP FEIS. Changes to goliath grouper regulations would be enacted through the FWC in state waters and the South Atlantic Fishery Management Council (SAFMC) in federal waters. As part of the FWC's rule-making process, proposed regulatory changes would include public hearings at Commission meetings during which the public can provide input. Any changes to this closure would have to be implemented by one or both of these agencies. The alternatives in the FMP focus on DFCs of the park's fisheries resources and *not* on the exact management activities to be implemented. The FMP provides examples of possible management activities to give the reader a way to compare among alternatives and understand how management actions could potentially change from the current state. The intention of the FMP is to determine the DFCs; the cooperating agencies will then work to develop the specific regulatory changes necessary to achieve the DFCs.

Topic 21: Impacts of freshwater flow and water quality on fisheries and habitats (27 comments)
Representative quote:
"Silt is smothering the bottoms, massive freshwater dumpings from the canals is upsetting the salinty balance destroying a vital nursery habitat and killing sealife as freshwater is dumped to mantain a desired level inland."
Response: The cooperating agencies fully acknowledge that freshwater quality, quantity, and timing of release are issues that affect critical fish habitat and fisheries resources. Represenatives from the cooperating agencies continue to stay engaged in the Comprehensive Everglades Restoration Plan and in the efforts of the Army Corps of Engineers and South Florida Water Management District. The cooperating agencies encourage concerned park users to voice their concerns to the Corps and the District as well.

Topic 22: Alternative 1 (15 comments in support of Alternative 1; 2 comments against Alternative 1)
Representative quotes:
"I am for maintaining the status quo and not adding further restrictions to the park"
and
"We hope and expect that this recognition [of severely depressed fishery species populations] makes it impossible for the NPS to pursue Alternative 1 – the status quo – or Alternative 2- maintenance of fisheries resources at current levels."
Response: Given the latest scientific information regarding the compromised condition of the park's fishery resources, the cooperating agencies believe that implementing Alternative 1 would result in failure to "manage this area in a positive and scientific way in order to protect the area's natural resource integrity", as directed by Congress. Furthermore, the cooperating agencies do

not believe that maintaining the status quo will be in compliance with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity. Under Alternative 1, the condition of the park's fisheries resources would be expected to continue to decline. Overall effects of actions in Alternative 1 on targeted (fished) fish species would likely lead to a continued decrease in mean density and/or length of targeted fish populations, which would occur for the foreseeable future.

Topic 23: Alternative 2 (8 comments in support of Alternative 2; 4 comments against Alternative 2)
Representative quotes:
"After reviewing all of the Fishery Management Draft plan options, I believe, the Alternative #2 plan is the best all around option for public/recreational parties"
and
"We hope and expect that this recognition [of severely depressed fishery species populations] makes it impossible for the NPS to pursue Alternative 1 – the status quo – or Alternative 2- maintenance of fisheries resources at current levels."
Response: Overall effects of actions in Alternative 2 on targeted (fished) fish species would likely lead to minimal change in mean density or length of targeted fish populations. Due to effects of current and future anthropogenic impacts, including fishing pressure, this alternative would result in the maintenance for the foreseeable future of the heavily impacted fisheries resources and altered (relative to unfished) conditions that exist at present. Because the park's fisheries resources have already been identified as in decline, the cooperating agencies do not believe that maintaining targeted species at current levels will be in compliance with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity, particularly in light of increasing population and improving fishing technology. Furthermore, as with Alternative 1, the cooperating agencies believe that, given the latest scientific information regarding the condition of the park's fishery resources, implementing Alternative 2 would result in failure to "manage this area in a positive and scientific way in order to protect the area's natural resource integrity", as directed by Congress.

Topic 24: Alternative 3 (9 comments in support of Alternative 3; 6 comments against Alternative 3)
Representative quotes:
"I think that the third option might be the best and be less severe."
and
"I am not in favor of # 3,4 or 5."
Response: The cooperating agencies do not believe that implementing Alternative 3 would do enough to restore the park's fisheries resources to levels that can be enjoyed by current and future generations. Although Alternative 3 would seek to achieve a 10% increase in the size and abundance of targeted species, the cooperating agencies do not believe that this 10% improvement would be enough for compliance with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity.

Topic 25: Alternative 4 (35 comments in support of Alternative 4; 9 comments against Alternative 4)
Representative quotes:
"I support your decision for the preferred alternative being # 4."
and

"In addition, it is of significant concern to me that option 4 is the park's preferred alternative since it includes many draconian options. While BNP officials state that closures to fishing will be a last resort, the options do not include guidelines to determine when it is time to limit recreational use of the park. Therefore, the public will be left in the dark as to what criteria will be used to determine whether closures are 'necessary.'"

Response: The cooperating agencies believe that Alternative 4 results in the best and most equitable balance between conservation, enjoyment and extractive uses of BISC's fishery resources. Under Alternative 4, fishing regulations would be modified such that resources can improve and future generations would be able to experience and enjoy the park's wildlife and habitats. Overall effects of actions in Alternative 4 on targeted (fished) fish species would likely lead to an appreciable increase (~ 20%) in mean density or length of some targeted fish populations for the foreseeable future. By improving the condition of fisheries resources, actions undertaken for this alternative would comply with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity.

Topic 26: Alternative 5 (27 comments in support of Alternative 5; 9 comments against Alternative 5)

Representative quote:

"I believe that we need to go to the "restore" plan that would put Biscayne Bay nearly back to its historic population and variation of marine species. We have lost so much already and returning this section of our waters to its pre-devastation state will have effects on surrounding waters that will be beneficial, also"

and

"I vehemently disagree with all aspects of plan 5 and most of plan 4"

Response: Overall effects of actions in Alternative 5 on targeted (fished) fish species would likely lead to an appreciable improvement (to within 20% of historic, unexploited levels) in mean density or length of some harvested fish populations for the foreseeable future. While Alternative 5 would best protect the fisheries resources within BISC and has been identified as the Environmentally Preferred Alternative, the cooperating agencies realize that the management actions required to achieve the stated goals would severely limit visitor use and enjoyment of the park's resources. Actions undertaken for this alternative would comply with Executive Order 12962's mandate to manage recreational fishing in national parks as a sustainable activity.

Errata

The following is a list of corrections to errors found in the Draft EIS. These edits were made by the NPS and its cooperating agency, The State of Florida Fish and Wildlife Conservation Commission (FWC), to improve the accuracy of the document. These corrections and revisions have been incorporated into the Final EIS, although none of these corrections or revisions affects the outcome of the environmental analyses provided in the FEIS nor changes the preferred alternative. These items are listed in order of their appearance in the DEIS.

1. The commercial ballyhoo fishery was incorrectly identified (on pages 20, 47, and 194 of the DEIS) as using purse seines when the actual method used is the lampara net.

2. Page 27 of the DEIS stated that under Alternative 5, a no-trawl zone in the bay would be considered. The FEIS has been amended to state that the no-trawl zone will be *proposed* rather than considered, since such actions would require additional consultation and planning with the State of Florida. The cooperating agencies will work with commercial trawlers and scientists to determine details about the size and location of this zone. As part of the FWC's rule-making process, the proposed no-trawl zone would include public hearings at Commission meetings during which the public can provide input.

4. Least tern *Sterna antillarum* was incorrectly listed on page 43 of the DEIS to be included among the threatened or endangered bird species occurring in the park yet dismissed from further consideration. However, this species is not federally listed in the part of its range that includes BISC, and so this species was removed from the listing in the FEIS.

5. The DEIS incorrectly stated on page 44 that the southeastern U.S. nesting aggregation is the largest nesting aggregation for loggerhead sea turtles *Caretta caretta*. The most recent recovery plan for this species (see NMFS and USFWS 2008), however, states that the loggerhead nesting aggregations in both Oman and the U.S. account for the majority of nesting worldwide. The text in the FEIS has been updated for accuracy.

6.On page 82 of the DEIS, Alternative 3 was incorrectly identified as the Preferred Alternative, when it is actually Alternative 4 that is identified as the Preferred Alternative.

7. The DEIS incorrectly identified the Endangered Species Act Section 7 Effect Determination for Smalltooth Sawfish *Prictis pectinata* as 'No effect' under Alternatives 1 and 2 on page 117 and corresponding Table 9 (page 212). These have been corrected to 'May affect, not likely to adversely affect' in the FEIS, with the updated recovery plan cited in the FEIS Literature Cited.

8. Appendix 4 (page 179) of the DEIS stated that the MOU between BISC and FWC was renewed on October 26, 2007 with the final document signed on December 7, 2007. The correct date of renewal and signing was September 14, 2007.

NMFS Biological Opinion

The National Marine Fisheries Service's (NMFS) issued a Biological Opinion based on the review of impacts associated with the Biscayne National Park General Management Plan (GMP) and associated plans, including the Fishery Management Plan, which tier under the GMP. This Biological Opinion can be obtained in its entirety by:

1) Downloading the report from the National Park Service's Planning, Environment, and Public Comment (PEPC) website at http://parkplanning.nps.gov/bisc

2) Visiting Biscayne National Park at 9700 SW 328th St, Homestead, FL 33033 to request a copy

3) Calling Biscayne National Park at 305-230-1144 to request a copy

Table 1: Recreational and commercial fishing gears, with associated target species, used in Biscayne National Park waters.

Gear	**Target Species**
Recreational	
Hook and line	Reef, bay and pelagic (water-column) species
Spearfishing	Reef species
SCUBA, hookah, and snorkel	Spiny lobster
Commercial	
Roller-frame trawls	Penaeid shrimp spp.
Hook and line	Snapper/grouper complex (predominantly yellowtail snapper)
Lampara net	Baitfish
Lobster and crab traps	Spiny lobster, blue crabs, stone crabs
SCUBA	Spiny lobster

Table 2: Data collection programs that provide fisheries monitoring data for BISC.

Program	Sponsor	Data Collected	Years in Service
Creel survey	NPS/BISC[1]	Number, size and taxa of species landed; spatially-explicit fishing effort and catch-per-unit-effort	1976-present
Reef fish visual census	NPS/BISC[1]/NOAA[2]/UM-RSMAS[3]	Species composition, abundance, frequency of occurrence, and individual size composition	1983-1992; 1995-present
Roller-frame trawl survey	UM-RSMAS[3]	Species composition, abundance, frequency of occurrence, and individual size composition	8/1993 – 9/1994
Commercial landings data collection programs	NOAA[2] and FWC[4]	Species-specific landings (lbs.) and dockside value (US $) (note: not Park-specific)	1950-present
Marine Recreational Fisheries Statistics Survey (MRFSS)	NOAA[2]	Number, size and species landed; estimated angler effort (note: not Park-specific)	1981-present

[1]National Park Service/Biscayne National Park; [2] National Oceanic and Atmospheric Administration; [3] University of Miami-Rosentiel School of Marine and Atmospheric Sciences; [4] Florida Fish and Wildlife Conservation Commission

Table 3: Major goals established or actions undertaken under each of the five "Fishery Components" for each alternative. Goals or actions may be repeated under separate Fishery Components under the same alternative if the goal or action applies to more than one Fishery Component.

Alternative	Fishery Component	Action
1 (Maintain Status Quo)		N / A (Status quo alternative)
2 (Maintain At or Above Current Levels)	Populations of fishery-targeted fish and invertebrates	Fishery-targeted fish and invertebrate populations would be maintained at current levels. Park fish stocks would not likely differ in abundance or average size from those stocks outside the Park unless populations decline in areas adjacent to the Park. Park-specific management actions would be enacted only if populations or mean sizes in the Park declined below current levels.
	Recreational fishing activity	Satisfaction of fishers would be maintained at or above 90%. If the level of satisfaction decreased below 90%, BISC would make further efforts to identify characteristics of a fishing outing most important to providing a satisfying experience (i.e., through interviews and surveys), and make subsequent efforts to provide those characteristics (staff and funding dependent).
	Commercial fishing activity	New fisheries would not be allowed to develop within the Park. The Park would continue to allow commercial fishing within its borders, provided that the fisheries were established and occurring when the Park was expanded and established as a national park in 1980.
		Future growth in the number of commercial fishermen would be prevented. All commercial fishers would be required to obtain a limited-entry permit from the Park Superintendent. The permit would be issued to the individual owner and would name the individuals authorized to engage in commercial fishing activity from the owner's vessel(s). The permit would be transferable and would require annual renewal for each year in which landings are reported.
		Shrimp trawlers would be subject to inspection by park staff to ensure that trawl gear is in compliance with FWC regulations. Up to two failed inspections would result in warnings to the permit-holder; a third failed inspection would result in termination of the commercial permit-holder's permit (see above).
		BISC would seek to establish an annual permit system for commercial guides operating in the park
	Habitat	Management actions to reduce the level and impact of debris associated with recreational and

Alternative	Fishery Component	Action
	conditions	commercial fisheries would be considered if an increase above current levels is observed. Such actions could include increased removal efforts by Park staff and partner groups, increased education efforts, or spatial closures. Additionally, BISC would explore the feasibility and effectiveness of establishing a regulation to restrict traps from hardbottom habitat (staff and funding dependent)
	Law enforcement, education and coordination	BISC would investigate the feasibility of establishment of a stamp associated with the FWC recreational fishing license that would enable the license holder to fish in BISC, and that would fund additional enforcement efforts by the FWC in BISC.
3 (Improve Over Current Levels)		**Unless differentiated below, this alternative would result in the same actions described in Alternative 2, as well as the actions below.**
	Populations of fishery-targeted fish and invertebrates	Management actions would be enacted (in conjunction with the FWC) to increase the abundance and average size of fishery-targeted fish within the Park by at least 10% over current conditions and over conditions in similar habitats (with similar regulations) outside the park. Initially, these efforts would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit.
		Fishery-targeted invertebrate populations would be maintained within historical levels; such that management actions would be taken if fishery-dependent and fishery-independent data indicated that invertebrate stocks were subjected to overfishing or became overfished.
	Recreational fishing activity	Spearfishing would be limited to gear lacking a trigger mechanism (e.g., the Hawaiian sling model). The use of air-providing equipment (e.g., scuba and hooka) while spearfishing would be prohibited.
		The two-day recreational lobster sport season would be eliminated.
	Commercial fishing	Commercial fishers would be required to obtain a limited-entry permit from the Park Superintendent. The permit in this alternative differs from that described in Alternative 2 in that the permit would be non-transferable for the first five years. Permits would require annual renewal, and would be "use or lose", such that a permit could not be renewed if (1) it was not renewed the previous year, or (2) no catch was reported in the previous year.
		BISC would work to establish a trap-free zone north and east of park headquarters at Convoy Point in which deployment of commercial or recreational crab traps would not occur. Beginning at park headquarters, the zone would range north to the mouth of Mowry Canal (C-103), east to the spoil

Alternative	Fishery Component	Action
		islands located near the mouth of Mowry Canal, southeast to the mouth of the marked channel leading to Homestead Bayfront marina, and west along the marked channel back to park headquarters. BISC and the FWC would work with industry to seek voluntary compliance with the trap-free zone; if unsuccessful, BISC and the FWC would explore the possibility of establishing an official closure.
	Habitat conditions	The two-day recreational lobster sport season would be eliminated to protect coral reef habitat from diver-related damage.
		Coral reef protection areas (CRPAs) would be established to delineate coral reef habitat on which lobster and crab traps could not be deployed. Traps within the CRPAs could be moved outside CRPA boundaries by authorized FWC or Park staff, or other authorized personnel.
4 (Preferred Alternative - Rebuild and Conserve Park Fisheries Resources)		**Unless differentiated below, this alternative would result in the same actions described in Alternative 3, as well as the actions below.**
	Populations of fishery-targeted fish and invertebrates	Management actions would be enacted (in conjunction with the FWC) to increase the abundance and average size of targeted fish species within the Park by at least 20% over current conditions and over conditions in similar habitats (with similar regulations) outside the park. As in Alternative 3, these efforts initially would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit.
	Commercial fishing activity	As in Alternative 3, all commercial fishers would be required to obtain a limited-entry permit from the Park Superintendent. The permit in this alternative differs from that described in Alternative 3 in that it would be permanently non-transferable. Permits would require annual renewal, and would be “use or lose”, such that a permit could not be renewed if (1) it was not renewed the previous year, or (2) no catch was reported in the previous year. BISC would establish a no-trawl zone within the Bay, in which commercial shrimp trawling would be prohibited. This zone would serve to protect juvenile fish and invertebrates commonly caught as bycatch in trawls, as well as to protect of essential fish habitat
	Habitat conditions	As in Alternative 3, coral reef protection areas (CRPAs) would be established to delineate coral reef habitat on which lobster and crab traps could not be deployed. Traps within the CRPAs could be moved outside CRPA boundaries by authorized FWC or Park staff, or other authorized personnel.

Alternative	Fishery Component	Action
		Unlike Alternative 3, under Alternative 4 the trap number from traps observed within CRPAs would be recorded; traps having a trap number with three or more recorded violations could be confiscated from Park waters.
5 (Restore Park Fisheries Resources)		**Unless differentiated below, this alternative would result in the same actions described in Alternative 4, as well as the actions below.**
	Populations of fishery-targeted fish and invertebrates	Management actions would be enacted (in conjunction with the FWC) to increase the abundance and average size of *harvested* fish species within the Park to values within 20% of their historic, unexploited values (based on fisheries models estimates) of fishery-harvested species occurring within the Park and similar habitat outside the Park. As in Alternatives 3 and 4, these efforts initially would be focused on frequently harvested species such as grouper, snapper, hogfish, and spiny lobster, which studies have indicated have already been negatively affected by fishing impacts. Future efforts, as deemed appropriate given the best available data, could include less-impacted species such as grunts and barracuda, and catch-and release species such as bonefish and permit.
	Recreational fishing activity	Spearfishing would be prohibited within Park boundaries.

Table 4: Comparison of proposed management actions needed to address fishery component goals among the Alternatives.

Component	**Alternative**				
	1 **Maintain Status Quo**	**2** **(Maintain At or Above Current Levels)**	**3** **(Improve Over Current Levels)**	**4** **(Preferred Alternative - Rebuild and Conserve Park Fisheries Resources)**	**5** **Restore Park Fisheries Resources**
Recreational Fish harvest regulation changes	No change	Actions could include: • Moderate increases in minimum size limits • Moderate decreases in bag limits • Seasonal or spatial closures		Actions could include: • Considerable increases in minimum size limits • Slot limits • Substantial decreases in bag limits • Seasonal or spatial closures	Actions could include: • Substantial increases in minimum harvest sizes • Slot limits • Substantial decreases in bag limits • Seasonal or spatial closures • Prohibition of extractive fishing (i.e. only allow catch-and-release fishing) • Temporary moratorium on all fishing activity within the park

Component	Alternative				
	1 **Maintain Status Quo**	**2** **(Maintain At or Above Current Levels)**	**3** **(Improve Over Current Levels)**	**4** **(Preferred Alternative - Rebuild and Conserve Park Fisheries Resources)**	**5** **Restore Park Fisheries Resources**
Lobster Sport Season	No change		Lobster sport-season eliminated in the Park		
Spearfishing	No change		Spearfishing limited to gear lacking a trigger mechanism; the use of air-providing equipment while spearfishing is prohibited		All spearfishing prohibited in the park
Commercial fishing harvest permits	No change	• Limited-entry • Transferable • Renewable for each year in which landings are reported	• Limited-entry • Non-transferable for the first five years • Requires annual renewal • 'Use or lose'	• Limited-entry • Forever non-transferable • Requires annual renewal • 'Use or lose'	
Commercial fishing guide permits	No change	BISC would seek to establish an annual permit system for commercial guides operating in the park			
Commercial Shrimp Trawling	No change	Trawl gear inspected by park staff to insure that it is in compliance with FWC regulations. A warning is issued after 2 failed inspections; permit terminated after		Trawl gear inspected as described for Alternatives 2-3; in addition, a no-trawl zone in the Bay will be established	

Component	Alternative				
	1 Maintain Status Quo	**2 (Maintain At or Above Current Levels)**	**3 (Improve Over Current Levels)**	**4 (Preferred Alternative - Rebuild and Conserve Park Fisheries Resources)**	**5 Restore Park Fisheries Resources**
		3 failed inspections			
Crab and lobster traps	No change	Park staff explore feasibility of establishing regulations to restrict traps from hardbottom habitats	• Trap-free zone with voluntary compliance established • Coral Reef Protection Areas (CRPA's) no-trap areas established • Traps found within CRPA's can be moved by FWC or Park staff	• Trap-free zone with voluntary compliance established • Coral Reef Protection Areas (CRPA's) no-trap areas established • Traps found within CRPA's can be moved by FWC or Park staff • Traps violating no-trap CPRA's three or more times are confiscated	

Table 5: Annual boat launch estimates from major boat ramps around Biscayne National Park.

Marina	Estimated Usage	Reference
Crandon Park Marina, Key Biscayne	12,000	J. Travieso, pers. comm.
Matheson Hammock Marina, South Miami	12,000	J. West, pers. comm.
Black Point Marina, Cutler Ridge	24,000	K. Hayes, pers. comm.
Homestead Bayfront Park, adjacent to BISC Visitor Center	14,000	D. Winston, pers. comm.

Table 6. Criteria for Describing the Effects of Actions in the Alternatives on Components of the Affected Environment. All descriptions of Type of Effect refer to within the boundaries of BISC. Adverse = effect negative; Negligible = no effect; Beneficial; = effect positive.

	Type of Effect		
Component of Affected Environment	**Adverse**	**Negligible**	**Beneficial**
Targeted (fished) fish species	Decrease in mean density (# per unit area) or length	Minimal change (within the range of natural variation) in mean density (# per unit area) or length	Increase in mean density (# per unit area) or length
Targeted (fished) invertebrate species	Decrease in mean density (# per unit area) or size	Minimal change (within the range of natural variation) in mean density (# per unit area) or size	Increase in mean density (# per unit area) or size
Non-targeted (non-fished) fish and invertebrates	Decreases in mean density (# per unit area) of non-targeted organisms due to bycatch, or changes in community composition due to ecological cascades caused by the removal by fishing of organisms from the community	Minimal potential for changes in mean density (# per unit area) of non-targeted organisms, or in community composition due to ecological cascades caused by the removal by fishing of organisms from the community	Return to a more natural community composition, less affected or unaffected by (1) trophic cascades caused by the removal by fishing of organisms from the community, or (2) habitat alteration caused by fishing gear or vessels
Recreational Fishing Experience	Reduces quality of recreational fishing experience.	Minimal change in recreational fishing experience.	Improves quality of recreational fishing experience.
Visitor Use and Experience	Reduces visitor use and the quality of visitor experience, in the form of snorkeler and scuba diver experience	Minimal change in visitor use and experience, in the form of snorkeler and scuba diver experience	Improves visitor use and experience, in the form of snorkeler and scuba diver experience
Commercial Use	Decrease in commercial use of the park	Minimal change in commercial use of the park	Increase in commercial use of the park
Socioeconomics	Negative socioeconomic effect on users of the park	Minimal socioeconomic effect on users of the park	Positive socioeconomic effect on users of the park
Benthic Habitats and	Increase in impacts to benthic	Minimal potential for change in	Decrease in impacts to benthic

	Type of Effect		
Component of Affected Environment	**Adverse**	**Negligible**	**Beneficial**
Communities	communities from fishing gear or vessels, or through trophic cascades due to the removal of organisms from the community	impacts to benthic communities from fishing gear or vessels, or through trophic cascades due to the removal of organisms from the community	communities from fishing gear or vessels, or through trophic cascades due to the removal of organisms from the community
Marine Wildlife	Increase in human activities likely to alter behaviors affecting individual or population health	Minimal change in human activities likely to alter behaviors affecting individual or population health	Decrease in human activities likely to alter behaviors affecting individual or population health
Avifauna	Decrease in species-specific mean density and health, or increase in human activities likely to alter behaviors affecting individual or population health	Minimal change in species-specific mean density and health, or in human activities likely to alter behaviors affecting individual or population health	Increase in species-specific mean density and health, or decrease in human activities likely to alter behaviors affecting individual or population health
Ecologically Critical Areas	Decrease quality and function of habitats that serve as Essential Fish Habitat (EFH) or as Habitat Areas of Particular Concern (HAPCs)	Minimal change in quality and function of habitats that serve as Essential Fish Habitat (EFH) or as Habitat Areas of Particular Concern (HAPCs)	Increase quality and function of habitats that serve as Essential Fish Habitat (EFH) or as Habitat Areas of Particular Concern (HAPCs)
Cultural Resources	Decreases protection and conservation of cultural resources in the park	Minimal change in protection and conservation of cultural resources in the park	Improves protection and conservation of cultural resources in the park
Aesthetic Resources	Decreases quality of aesthetic resources	Minimal change in quality of aesthetic resources	Improves quality of aesthetic resources

Table 6a. Criteria for Describing the Effects of Actions in the Alternatives on Threatened and Endangered Species. All descriptions of Type of Effect refer to within the boundaries of BISC.

	Type of Effect		
Component of Affected Environment	**No Effect (NE)**	**May Affect, Not Likely to Adversely Affect (NLAA)**	**May Affect, Likely to Adversely Affect (LAA)**
Threatened and Endangered Species	The proposed action will not affect a listed species or designated habitat, either because the species is not present, or no project elements have the potential to affect the species. A finding of NE does *not* qualify for instances of insignificant or discountable effects	All effects of the proposed action are beneficial, discountable, or insignificant. Take would not occur. A NLAA determination requires written concurrence from USFWS or NMFS.	The proposed action may directly or indirectly result in a detectable adverse effect, whether minor or major to listed species. The overall effect may be positive or neutral, but some adverse effects may be unavoidable. A determination of LAA requires formal consultation with USFWS or NMFS.

Table 7: Criteria for evaluating negative impacts.

Resource Category	Degree of Negative Impact	Criteria
Natural resources: - Targeted and non-targeted fish and invertebrate species. - Benthic habitats and communities. - Threatened and endangered species. - Marine wildlife and avifauna. - Ecologically critical areas.	Minor	Detectable, but not expected to have an overall effect on species and community dynamics, or on community structure, processes, or function
	Moderate	Clearly detectable; likely to have an appreciable effect on individual species dynamics, or on community structure, processes, or function
	Major	Easily detectable; likely to have a substantial effect on individual species dynamics, or on community structure, processes, or function
Recreational fishing experience; Visitor use and experience; Aesthetic resources	Minor	Detectable, but not expected to have an overall effect on visitor experience or aesthetic resources
	Moderate	Clearly detectable; likely to have an appreciable effect on visitor experience or aesthetic resources
	Major	Easily detectable; likely to have a substantial effect on visitor experience or aesthetic resources
Socioeconomic resources	Minor	Detectable, but not expected to have a considerable effect on socioeconomic resources
	Moderate	Clearly detectable; likely to have an appreciable effect on socioeconomic resources
	Major	Easily detectable; likely to have a substantial effect on socioeconomic resources

Resource Category	Degree of Negative Impact	Criteria
Cultural resources	Minor	Detectable; not expected to have a considerable effect on the appearance or structural integrity of cultural resources
	Moderate	Clearly detectable; likely to have an appreciable effect on the appearance or structural integrity of cultural resources
	Major	Easily detectable; likely to have a substantial effect on the appearance or structural integrity of cultural resources

Table 8: Effects of each alternative on components of the Affected Environment.

Component (and subcomponent) of Affected Environment	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4 (Preferred Alternative)**	**Alternative 5 (Environmentally Preferred Alternative)**
Targeted fish species	Adverse; Moderate; Long-term	Adverse; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Moderate; Long-term	Beneficial; Major; Long-term
Targeted invertebrate species	Adverse; Negligible to Minor; Long-term	Negligible	Negligible	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term
Non-targeted fish and invertebrates	Adverse; Moderate; Long-term	Adverse; Minor; Long-term	Negligible	Negligible	Negligible
Recreational Fishing Experience	Adverse; Moderate; Short-term Adverse; Moderate; Long-term	Adverse; Minor; Short-term, Adverse; Minor; Long-term	Adverse; Minor; Short-term, Beneficial; Minor; Long-term	Adverse; Minor; Short-term, Beneficial; Moderate; Long-term	Adverse; Minor; Short-term, Beneficial; Major; Long-term
Visitor Use and Experience	Adverse; Moderate; Long-term	Negligible	Beneficial; Minor; Long-term	Beneficial; Moderate; Long-term	Beneficial; Moderate; Long-term
Commercial Use	Adverse; Moderate; Long-term	Negligible	Beneficial; Minor; Long-term	Beneficial; Moderate; Long-term	Beneficial; Moderate; Long-term
Socioeconomics	Negligible	Negligible	Adverse; Minor; Long-term	Adverse; Minor; Long-term	Adverse; Minor; Long-term
Benthic Habitats and Communities: Coral Reefs	Adverse; Moderate; Long-term	Negligible	Beneficial; Minor; Long-term	Beneficial; Moderate; Long-term	Beneficial; Moderate; Long-term

Component (and subcomponent) of Affected Environment	Alternative 1	Alternative 2	Alternative 3	Alternative 4 (Preferred Alternative)	Alternative 5 (Environmentally Preferred Alternative)
Benthic Habitats and Communities: Bay	Adverse; Minor; Long-term	Negligible	Negligible	Beneficial; Moderate; Long-term	Beneficial; Moderate; Long-term
Benthic Habitats and Communities: Mangrove	Negligible	Negligible	Negligible	Negligible	Negligible
Threatened and Endangered Species: manatee	Adverse; Minor; Long-term	Adverse; Minor; Long-term	Negligible	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term
Threatened and Endangered Species: sea turtles	Adverse; Minor; Long-term	Negligible	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term
Threatened and Endangered Species: American crocodile	Adverse; Minor; Long-term	May Affect; Likely to Adversely Affect	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term
Threatened and Endangered Species: American alligator	Negligible	Negligible	Negligible	Negligible	Negligible
Threatened and Endangered Species: smalltooth sawfish	Negligible	Negligible	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term
Threatened and Endangered Species: Acroporid corals	Adverse; Minor; Long-term	Negligible	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term

Component (and subcomponent) of Affected Environment	Alternative 1	Alternative 2	Alternative 3	Alternative 4 (Preferred Alternative)	Alternative 5 (Environmentally Preferred Alternative)
and other proposed stony coral species					
Marine Wildlife	Adverse; Minor; Long-term	Adverse; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Moderate; Long-term
Avifauna	Adverse; Minor; Long-term	Adverse; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term	Beneficial; Minor; Long-term
Ecologically Critical Areas	Negligible	Negligible	Negligible	Beneficial; Minor: Long-term	Beneficial; Minor: Long-term
Cultural Resources	Adverse; Minor; Long-term	Adverse; Minor; Short-term, Beneficial; Minor; Short-term	Adverse; Negligible; Long-term, Beneficial; Minor; Long-term	Adverse; Minor; Long-term, Beneficial; Minor; Long-term	Adverse; Minor; Short-term, Beneficial; Minor; Long-term, Adverse; Minor; Long-term
Aesthetic Resources	Adverse; Minor; Long-term	Negligible	Beneficial; Minor; Long-term	Beneficial; Moderate; Long-term	Beneficial; Moderate; Long-term

Table 9: Endangered Species Act Section 7 determination of effects of each alternative on threatened and endangered species and areas of critical habitat. "LAA" indicates 'likely to adversely affect' and "NLAA" indicates 'not likely to adversely affect'.

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4 (Preferred Alternative)**	**Alternative 5 (Environmentally Preferred Alternative)**
Manatee	May Affect; LAA	May Affect; LAA	May Affect; NLAA	May Affect; NLAA	May Affect; NLAA
Loggerhead, Hawksbill, and Green sea turtles	May Affect; LAA	May Affect; LAA	May Affect; LAA	May Affect; LAA	May Affect; LAA
Leatherback and Kemps Ridley sea turtles	May Affect; NLAA	May Affect; NLAA	May Affect; NLAA	May Affect; NLAA	May Affect; NLAA
American crocodile	May Affect; LAA	May Affect; LAA	May Affect; NLAA	May Affect; NLAA	May Affect; NLAA
American alligator	No Effect	No Effect	No Effect	No Effect	No Effect
Smalltooth sawfish	May Affect; LAA	May Affect; LAA	May Affect; LAA	May Affect; LAA	May Affect; LAA
Acroporid corals and other proposed stony coral species (and related Critical Habitat)	May Affect; LAA	May Affect; LAA	May Affect; LAA	May Affect; LAA	May Affect; LAA
Ecologically Critical Areas	No Effect	No Effect	No Effect	No Effect	No Effect

Figure 1: Map of Biscayne National Park and surrounding areas.

Figure 2: Population of Miami-Dade County over time.

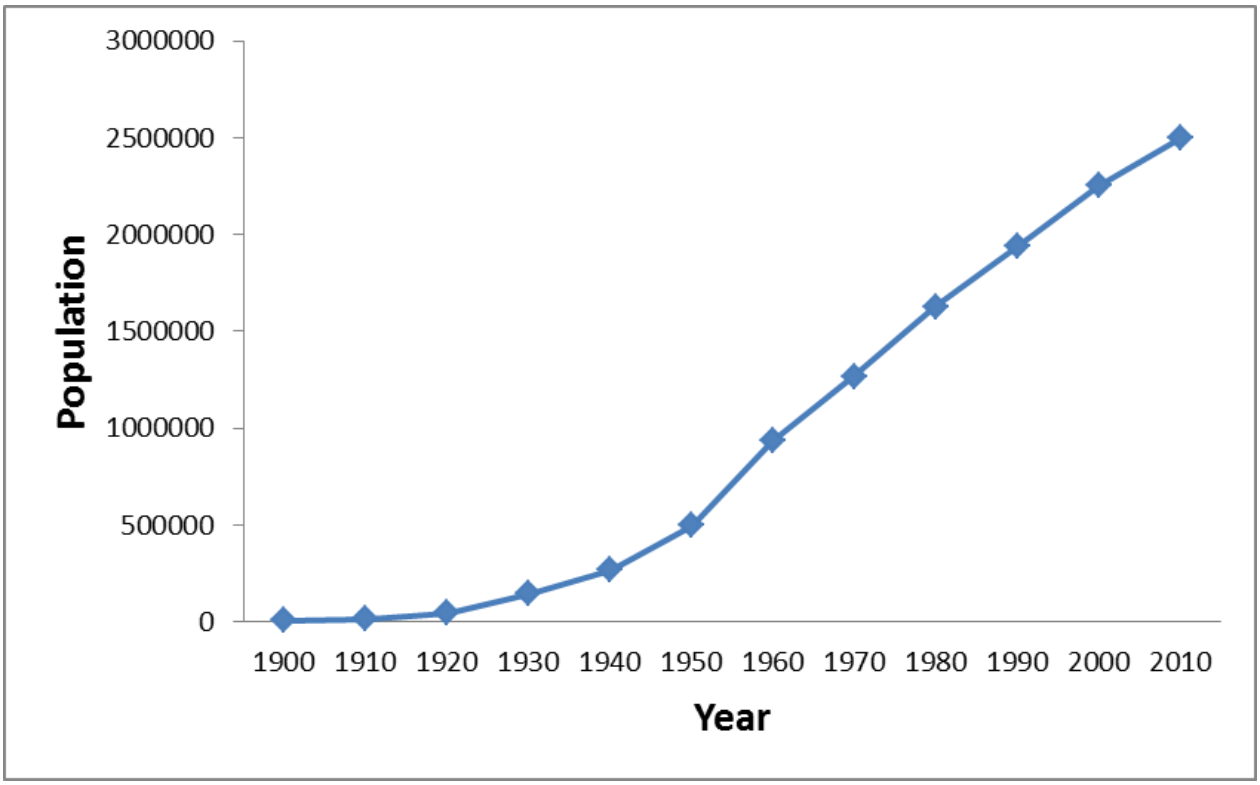
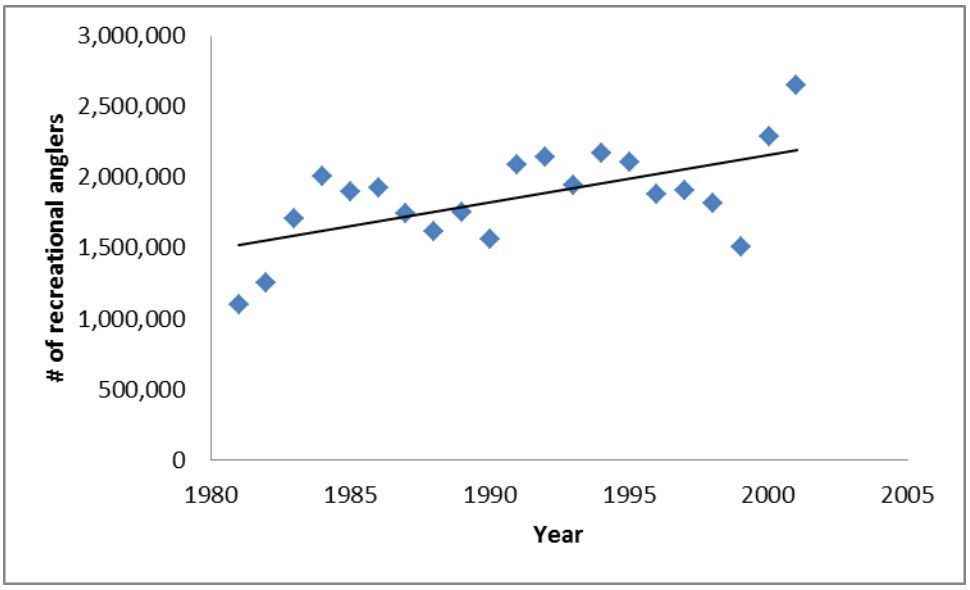


Figure 3: Estimated number of (A) recreational anglers and (B) angler trips (1 angler fishing for 1 day = 1 angler trip) for the years 1981-2001. Both trendlines represent a statistically significant positive relationship ($P < 0.05$).

A.



B.

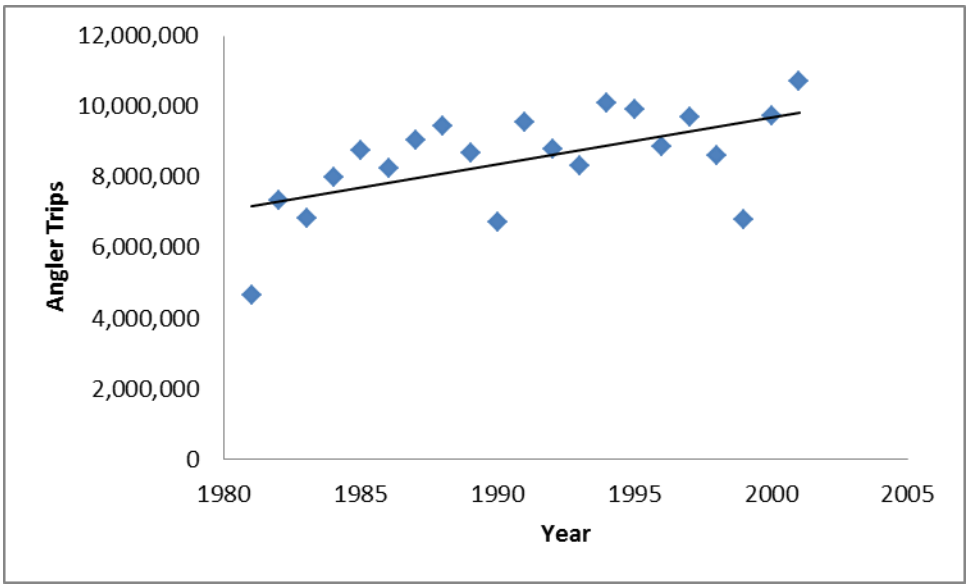


Figure 4 (from Ault et al. 2001):

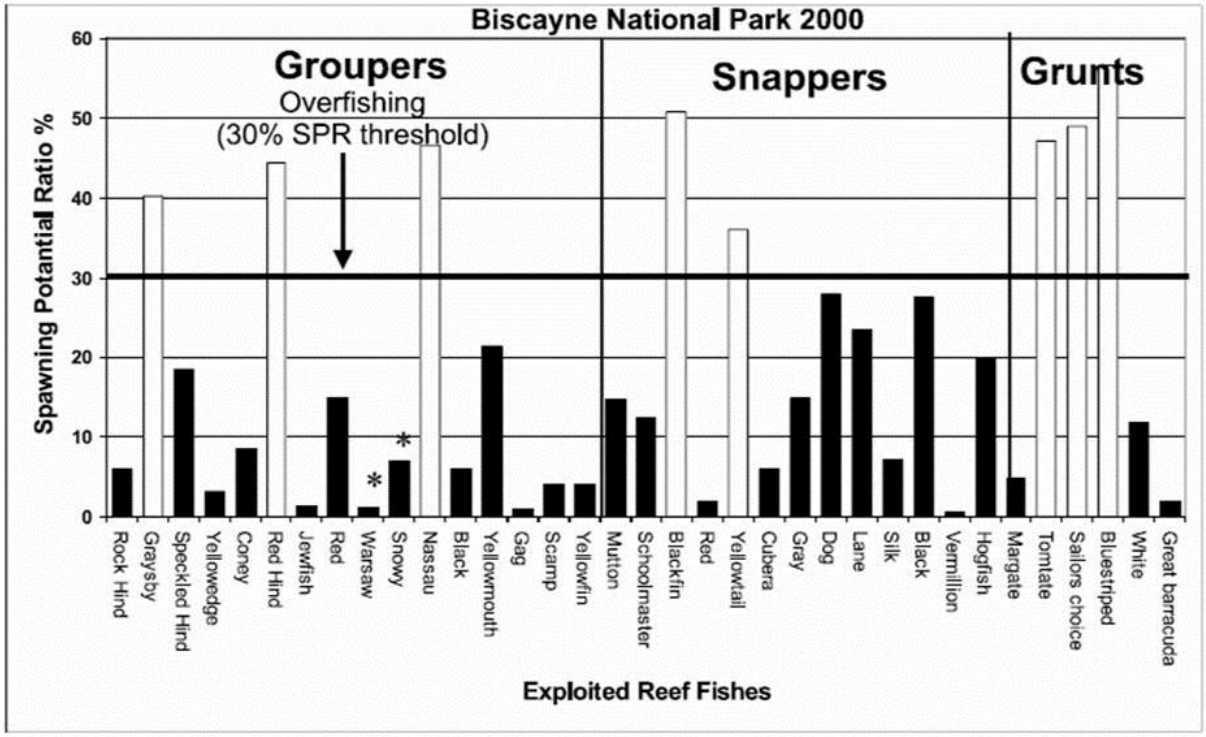
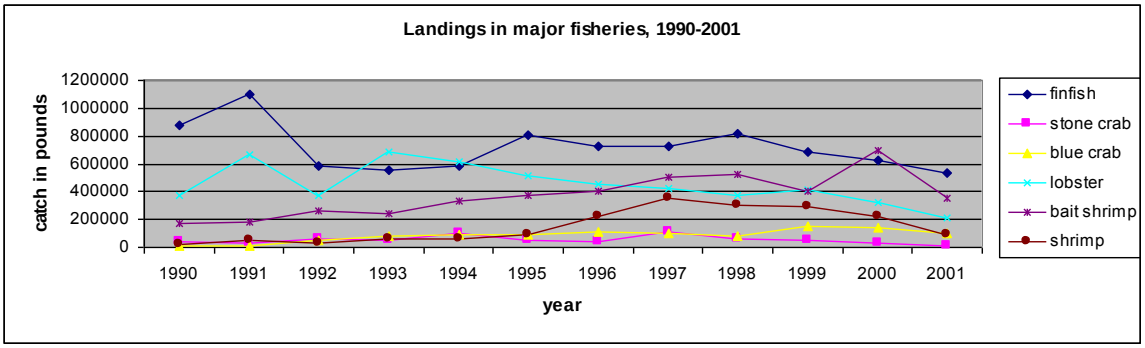


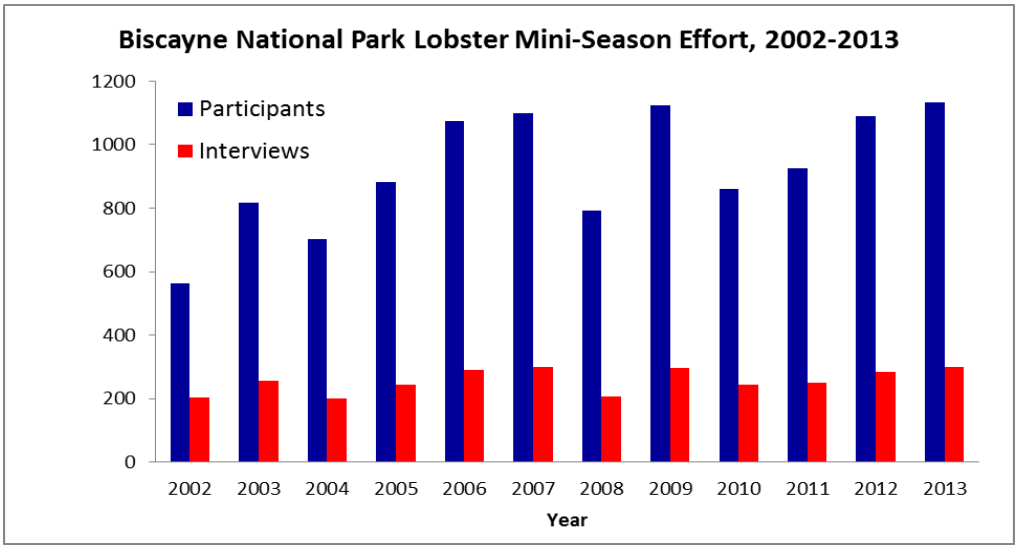
Figure 33.- Fishery management benchmark spawning potential ratio SPR annalyses for 35 exploited species of BNP-Florida Keys reef fish comprising groupers, snappers and hogfish, grunts and great barracuda. Darkened bars indicate stock "overfishing" and open bars indicate the stock is above the 30% SPR U.S. Federal Standard. Asterisk indicates estimate from headboat data outside BNP. The high SPR estimate for Nassau grouper is dubious.

Figure 5: Trends in fishery landings in effort for Miami-Dade County for the period 1990 – 2001 (A) and Biscayne National Park Lobster Mini-Season for the period 1996-2007 (B and C).

A



B



C

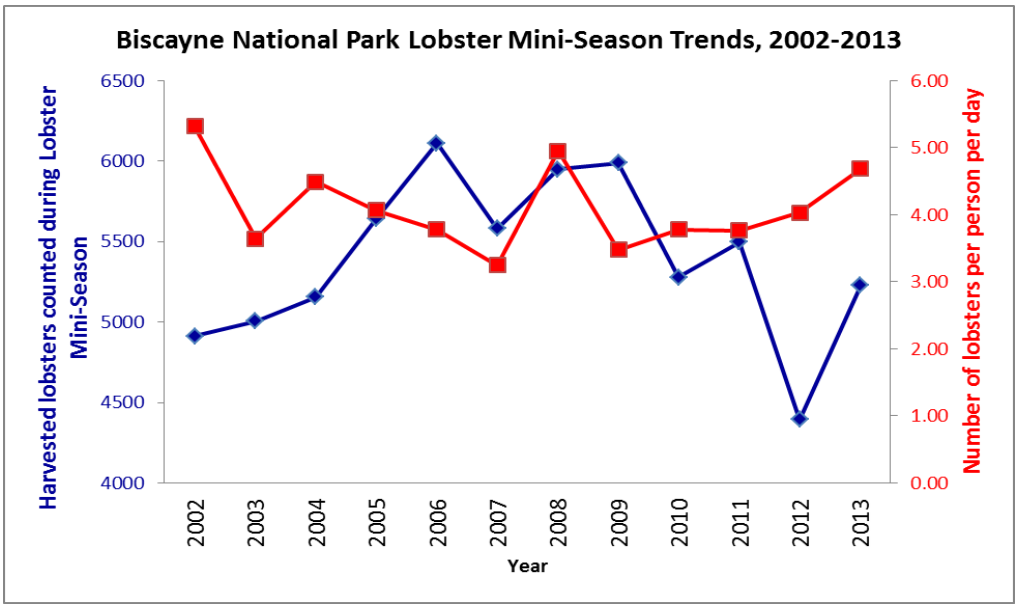
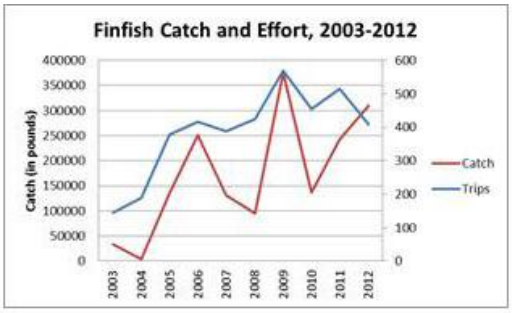
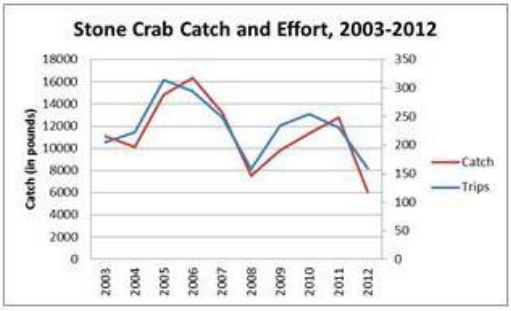


Figure 6: Commercial fishing landings and effort for 2003 through 20012 as reported to the FWC Trip Ticket program for BISC zones, for (A) finfish, (B) stone crab, (C) blue crab, (D) spiny lobster, and (E) bait shrimp.

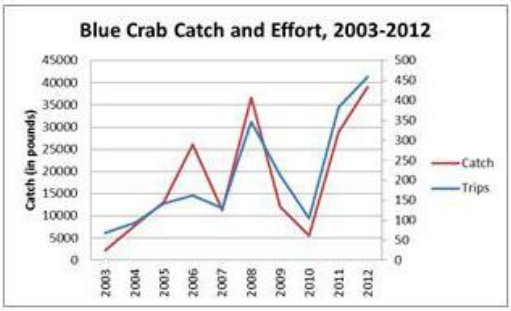
A



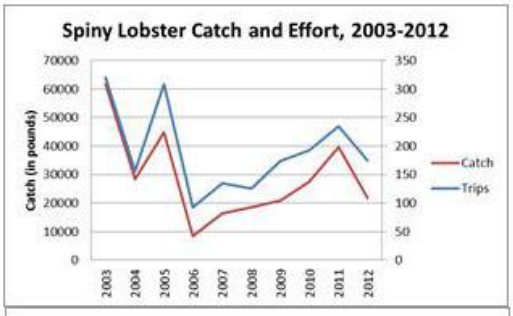
B



C



D



E

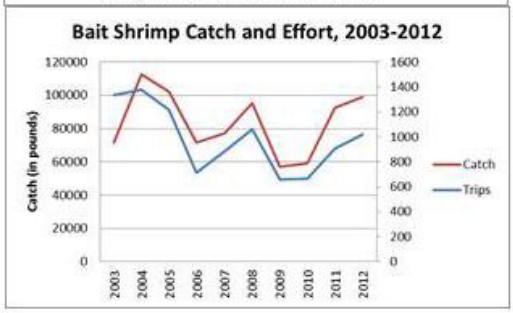


Figure 7: Seagrass bed in BISC with propeller scars and “blow-outs” caused by motor vessel attempting to power off after grounding on seagrass bed.

Figure 8: Sea turtle mortality resulting from (A) being struck by a boat, (B) entanglement in marine debris, and (C) entanglement in a commercial lobster trap.

(A)

(B)

(C)

Figure 9: Spear lodged through wood in a marine archeological site.

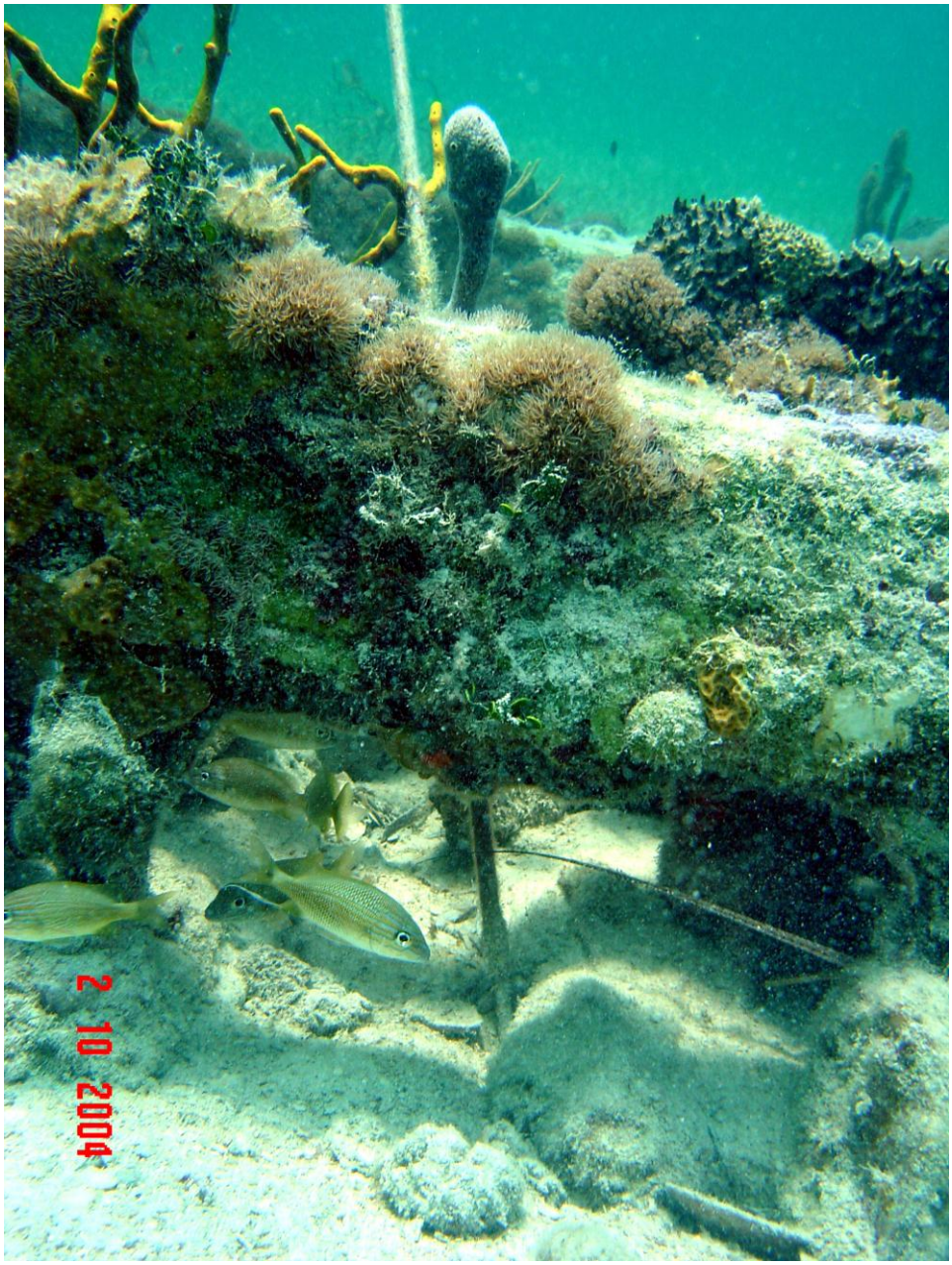
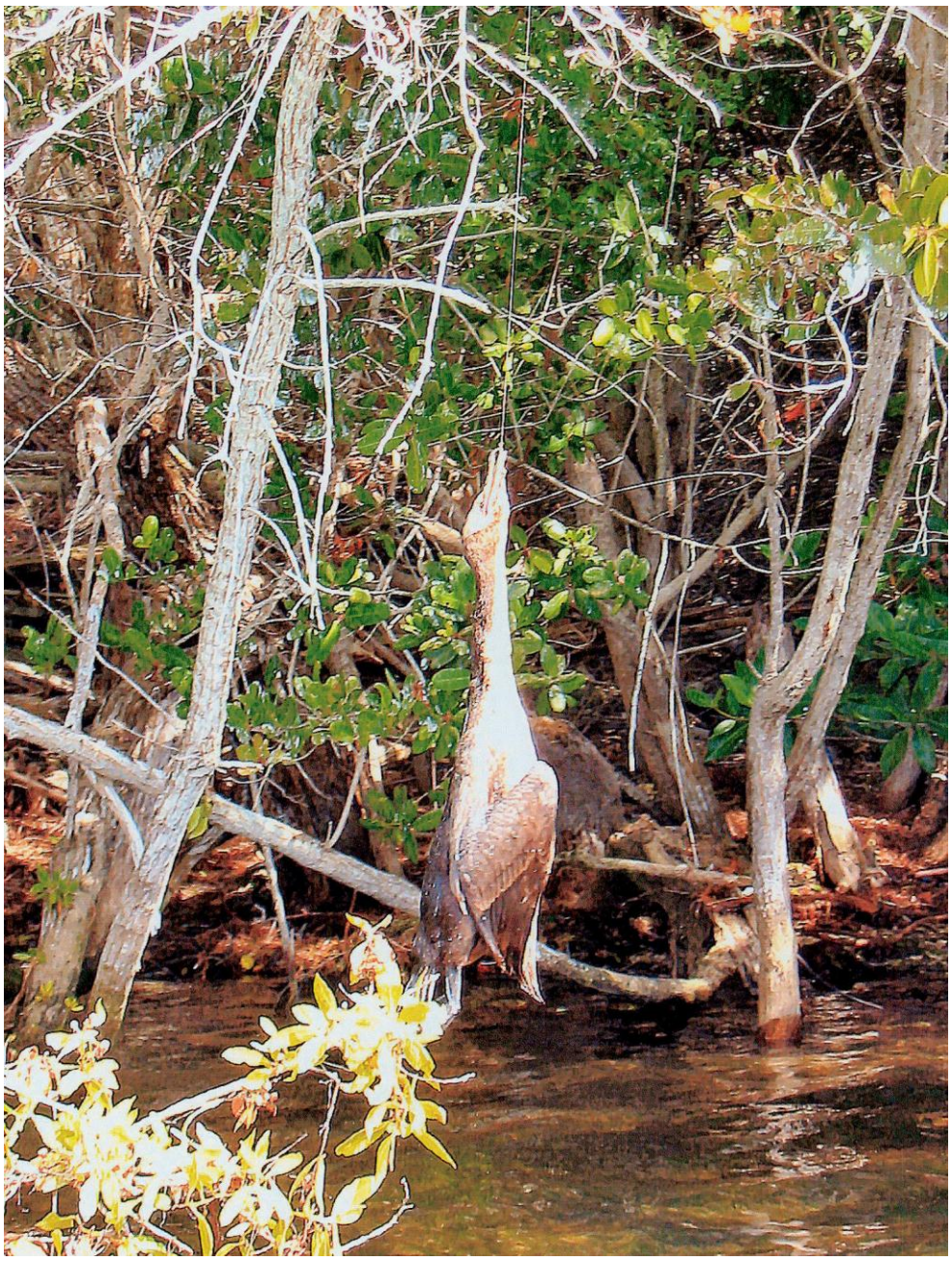



Figure 10: Deceased cormorant (*Phalacrocorax auritus*) fouled on hook and line.