LETTER A: VENTURA AUDUBON SOCIETY

VENTURA AUDUBON SOCIETY
INCORPORATED
P.O. Box 24198
Ventura, CA 93002

Channel Island
Supt.
Admin.
Cult. RM
Interp.
Maint.
Nat. RM
Protection
Transp.
Marine Sci.
NaS - Terr.
NBS - Mar.

September 5, 2000

Channel Islands National Park
Attn. Superintendent
1901 Spinnaker Dr.
Ventura, CA 93001

Dear Mr. Setnicka:

The Ventura Audubon Society has reviewed the DEIS for the Anacapa Island Restoration Project. We agree with the objective of this program, eradicating rats from Anacapa to help restore seabird populations, but we have some questions, concerns and comments regarding the techniques and rodenticides employed. Our responses are listed categorically here.

Preferred Alternative (#2). Presented as the most effective alternative, it also has the highest potential for negative environmental effects, because of the broadcast method and toxicity of poison. Of most concern is the "heavy impact" to the endemic deer mouse population as described, and unknown impacts to various landbirds and invertebrates, some of which may be considered transitional (to full species status). Further, as islands are very sensitive to population changes, even temporary disruptions could produce long-term effects on other members of limited food chains—and/or make a reduced population even more subject to other changes (disease, climate, etc.). Without much (or any?) research on the effects of brodifacoum on associated endemic and other species, it may not be prudent to experiment to this extent on Anacapa Island.

A1 A2 A3

Toxicity of poisons. While the half-lives of the proposed rodenticides are given in a chart, there is little discussion of "persistence." How long will each poison be toxic? Will the poisons break down to toxic or non-toxic byproducts? Will this occur at a constant rate or differential, when exposed to rain, seawater, or dry conditions? If the pellets fall in places not exposed to rain, how long could they persist? (Our concern, of course, is the continued poisoning of non-target species subsequent to the initial die-off.)

A4

Unknown variables and issues of concern:
-- With invertebrate poison consumption causing transport into narrow food chains, secondary and tertiary poisonings and their persistence may be untraceable and/or unable to be mitigated.
-- Little or no research is given charting effects of poisons on herpetofauna.
-- An assumption presented, that rats would consume most or all of the bait present, out-competing the mice, appears overly optimistic and is not backed by hard data. Especially if brodifacoum is used, rats may ingest very little compared to non-target species.

A5 A6 A7

A1: The impacts to invertebrates has been adequately described (p. 66) for various species. Invertebrates do not have a Vitamin K dependent blood clotting system and therefore are not believed to be negatively impacted by the anticoagulant rodenticides.

Landbirds: The risk analysis for landbirds evaluated the potential for primary and secondary exposure (p. 69). The risk analysis grouped landbirds primarily by foraging strategy which is the primary risk evaluation tool as it determines risk of primary or secondary hazards. Included was a summary of studies completed that documented no landbirds were interested in placebo bait pellets presented. There are no landbirds endemic to Anacapa Island, however, there are endemic subspecies that exist on Anacapa and the other much larger and diverse Park islands (San Miguel, Santa Rosa, and Santa Cruz Islands) and the other Channel Islands (Diamond and Jones 1980, Johnson 1972). Of the eight endemic avifauna found on Anacapa, all are also found on at least one or all of the Channel Islands. Adequate mitigation, such as timing of operation, color of bait pellets, size of bait pellets and formulation of bait pellets will be adopted to minimize risk of rodenticide exposure.

A2: All acute toxicity data is presented in the EIS. No toxicity data exists for many species found on Anacapa Island. For risk evaluation, it is common practice by the US EPA to utilize data from species representative of specific groups eg., Passerines, upland gamebird, and waterfowl. It is impossible to predict the response of any species to a pesticide without data from that species. It is logistically and financially infeasible to collect laboratory toxicology data on every individual species. The data presented allows an evaluation of the relative risks. Wherever possible, we utilized statistical data from the literature that more accurately estimated the acute toxicity of the rodenticides to birds. The data presented then allows for inferences to be drawn about the relative risks and response that could be expected.

A3: The AIRP focuses on restoring seabird nesting habitat. The benefits extend not only to seabirds, but also to landbirds, the Deer Mouse, invertebrates (terrestrial and marine), and plants through relief from predation pressure from rats. Rats on Anacapa Island have altered the ecosystem and are responsible for extirpating seabirds and other species from the island (eg. the 20 year absence of the Deer Mouse from East Anacapa Island). Worldwide, introduced rats appear to be responsible for about 50% of all bird and reptile extinctions. Anacapa Island may be a "sink" to many species because of the presence of rats. Some species are likely kept at a chronically low level, presenting a risk of susceptibility to environmental changes. The removal of rats will greatly benefit these groups of species. There are no endemic species, except for the Deer Mouse, on Anacapa Island that are at risk of rodenticide exposure. All impacted species will likely recover to pre-eradication levels or greater. For those species that are being heavily impacted by rats (seabirds, landbirds, invertebrates), their numbers will increase rapidly post eradication, and likely will exceed the pre-eradication levels. *(continued next page)*

A8 A9 A10 **Aerial broadcast.** This method as described did not address various issues. Will *roosting* pelicans be exposed to the bait or the effects of low-flying helicopters? If most rats live on the cliffs, and bait placement is proposed as "trickling from above and hand-placed from below," then couldn't the baiting be accomplished completely by hand or in bait-stations (so as to further minimize marine and non-target effects)? Are rats living on offshore rocks? (If undetermined, study should substantiate rat presence so as to minimize unnecessary broadcast and resultant disruption to roosting/nesting seabirds and marine ecosystem.)

A11 A12 If brodifacoum is used, Appendix C appears to indicate it has been effectively applied most often with ground applications. Because aerial application has apparently not been tested much (with actual attempts for either method not listed), and Anacapa's ecosystems highly sensitive due to the small size of the island, ground application with bait stations would preserve more non-target species.

A13 **Migrations.** There appears to be no proposal for aggressively controlling possible rat migration from Middle and West Anacapa to East Anacapa, during the year after the initial broadcast/baiting on East Anacapa. Has the placement of traps or bait stations along migration points been considered? (Monitoring alone doesn't seem the best solution if no plan for containment is in place.)

A14 **Emergency Response Plan.** As outlined in various sections and Appendix A, the park's response to new rat introductions should be fully developed and implemented prior to any eradication efforts, including guaranteed funding and personnel to prevent future infestations. Prevention standards and strategies (outlined on pg. 4) are recommended for all islands irregardless of the outcome of this project.

A15 **Conclusion.** A safer alternative than preferred #2 should be strongly considered, utilizing less-toxic poisons and methods of application. Aerial broadcasting of brodifacoum presents the highest risk of widespread and persistent contamination of Anacapa ecosystems, with many effects and variables unknown from the research cited.

A16 Bait stations present the least-risky method even though they require more maintenance and present other possible impacts, including logistical. Whichever methods and baits are chosen, all mitigations proposed in the DEIS, especially those to protect the deer mice, should be enacted prior to application.

Please respond to the above address, and thank-you for considering these comments.

Sincerely,

Neil Ziegler, President
Ventura Audubon Society

A3 continued: The susceptibility to the rodenticide, followed by a recovery to levels higher than measured pre-eradication has been documented in New Zealand and elsewhere after rat eradication. The benefit of the eradication clearly outweighs the risk of rodenticide exposure.

A4: A discussion of persistence requires an analysis of the temporal and spatial availability of the rodenticide. The temporal availability of the rodenticides has been discussed on pages 61 and 64. The spatial availability of the rodenticide is only relevant if it is available to be consumed/absorbed by a biological organism susceptible to the chemical. Any residual bait that is not degraded due to rainfall, or heavy moisture will be susceptible to microbial degradation. There are no toxic metabolites. The rodenticide itself will bind strongly to organic matter in the soil where microbial degradation will expedite the detoxification process reducing the rodenticide to its base components of carbon dioxide and water. The binding to soil will lock the rodenticide, making it biologically unavailable to birds and mice. In the very extreme case of bait entering and residing unconsumed in a dry location on the island, the bait will still be susceptible to microbial degradation. There will not be any bait available in dry locations to be of biological significance to any population. These dry habitats, such as caves, are also good habitat for rat and mouse burrows and any bait found in these areas will likely be the first pellets to be consumed.

A5: The analysis focussed on primary and secondary poisoning. Tertiary poisoning is possible; however, very little study has been reported in the scientific literature. Studies have documented that invertebrates consuming the bait will test positive for the rodenticide so long as the bait is present in the gut of the organism. No rodenticide residue will likely be bound within invertebrates once the bait is excreted, thus, presenting a very low risk of moving the rodenticide into the food chain over the long term. The rodenticides appear to not persist in invertebrate tissue(Pain et al. 2000).

A6: The known ecotoxicology data for herpetofauna was presented in the EIS (pg. 67). There are plans to monitor the herpetofauna population to evaluate the potential toxicological effects. Although there may be some impacts to herpetofauna, there is evidence to suggest that removal of rats will cause increase in the herp population to levels higher than pre-eradication (Merton 1987). Rats are known to prey on the herpetofauna of Anacapa Island and the population may be chronically suppressed because of the rats. In other words, it is expected that the herpetofauna population will rebound and increase to levels higher than currently found on Anacapa Island.

(*Continued next page*)

A7: Rats prey on the Anacapa Deer Mouse and were believed to be responsible for the 20 year extirpation of the Deer Mouse from East Anacapa Island. Rats preyed on and out competed the mice for resources on the island. The bait, formulated for rodents, will be highly palatable to both the rats and mice. Rats will be competitively dominant for the resource. Sowing rates have been optimized such that very little if any bait will be remaining after application and once rats and mice have removed the bait.

A8: Although pelicans may be roosting on the island during the non-breeding season, it is anticipated that the pelicans may temporarily use alternate roost sites on other islands during the period of helicopter activity. There will be no direct effect of the rodenticide bait on the pelicans since they are fish eaters. There is no likelihood that they will ingest any bait directly, or secondarily from contaminated prey. The bait will be in a pellet form and is not expected to adhere to bird feet or feathers, therefore, it is unlikely that pelicans will inadvertently ingest the pellets during preening activities. Pelicans are not scavengers and will not eat dead and poisoned rodents. (It is expected that most (87-100%) of rodents will die underground after consuming the bait.) Pelican prey species are schooling fish such as anchovies and sardines, species which will not come into contact with the bait.

A9: The reasons for the methodology have been outlined in Chapter Two. The reasons for not pursuing placement of bait stations across the whole island are described on page 26.

The hand placement of baits from above and below, alone would not accomplish the purpose and need. Hand distribution of bait would not meet the basic requirement that bait be delivered in every rat's territory. Personnel would be required to stand precipitously close to the edge of the cliff. The cliff edges are extremely unstable and present a significant hazard to personnel. Daily orientation visits for visitors to Anacapa include a discussion of the necessity of avoidance of cliff edges because of the danger. Similarly, all cliff faces are not accessible. The cliffs rise 60 m to almost 300 m on West Island. There is no guarantee that by hand baiting, enough bait could be placed in high enough concentration on the cliff side to meet the purpose and need.

A10: Rats do exist on the offshore rocks (G. Howald, pers. obs.). The offshore rocks are close enough to the Anacapa Islands that rats could easily swim the distance to the island. Thus, if the offshore rocks are not treated, there would be an unacceptably high risk of rats re-invading the island negating the investment in eradicating the rats.

Al1:Aerial application of rodenticides for rodent control to protect endemic and native birds is a tool being pursued in Hawaii. Island rat eradications using the aerial broadcast of rodenticides have been carried out over many islands including in New Zealand and elsewhere in the world. The aerial broadcast of pesticides is common on agricultural lands on the mainland in Southern California. The preferred aerial applicator is an experienced agricultural aerial pesticide applicator, certified by the State of California.

A12: The reason for not pursuing bait stations on Anacapa Island has been outlined on page 26. The relative risk of non-target exposure to the rodenticides would be less with bait stations, however, it is technologically infeasible to place bait stations on the cliffsides. Baiting the cliffsides is necessary to meet the purpose and need of the project.

A13: In May 2000, studies were initiated to evaluate if rats would cross the channel between East and Middle Island. Rats from Middle and East Island were live trapped, fitted with a radio collar, and released in the channel, on the opposite island from which they were captured. After 3 months, no rat has been detected to cross the channel. Nonetheless, we recognize that rats re-invading East Island is a possibility. Re-invasion prevention is outlined in response D3.

A14: The Park fully understands the ecological implications of introductions of non-native plants and animals to Park islands. It is further understood that eradication should not be pursued without a prevention program in place to keep re-introductions from occurring. The Park is committed to fully implementing all aspects of the prevention plan (as described on pages 17) prior to the completion of rat eradication on Anacapa Island. Many aspects of the prevention plan, including public education and rodent proofing the Park's departure points will be implemented prior to Fall, 2001.

A15: The purpose and need require that rats be eradicated from Anacapa Island. The preferred alternative offers the highest probability of successfully meeting the stated objective. The use of a lesser toxic compound would result in a lower probability of achieving eradication. These lesser toxic compounds are valuable for control purposes, where they could be used chronically. However, control would require long term use of the rodenticides, which could result in greater impacts to non-target species than if the preferred action were adopted in the first place. This project is proposing a one time use of the rodenticide, and would not require re-treating. There will be no long term deleterious effects from the use of the rodenticide. Many species impacted by the rodenticide will rebound to pre-eradication levels and in some cases, exceed the levels found before eradication due to release from rat predation.

A16: As written in the FEIS, ensuring the viability of the Anacapa Deer Mouse is a necessary action.

LETTER B: ENDANGERED SPECIES RECOVERY COUNCIL

ENDANGERED SPECIES RECOVERY COUNCIL

RECEIVED
CHANNEL ISLAND NAT'L PK
2000 SEP 08 PM 1:47

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5 September 2000

Mr. Tim Setnicka, Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001

Re: Draft Environmental Impact Statement, Anacapa Island Restoration Project

Dear Mr. Setnicka,

Thank you for the opportunity to comment on this important conservation undertaking. At the outset, I would like to note that our organization, the Endangered Species Recovery Council (ESRC), is 100% in favor of the complete removal of rats from Anacapa Island and the prevention of rat introduction to any other of the CINP islands.

We have long been aware of this plan, and we believe that aerial dispersal of rodenticide is the only practical means to accomplish rat eradication. Indeed, it was the ESRC that initially provided input from New Zealand experts who have successfully removed rats and many other non-native predators at many locations around the world.

Without going into line-by-line commentary on the DEIS, we would like to submit the following summary comments that we believe are most critical to evaluation of the proposed project and its impacts:

B1 1) It is our understanding that the precise rodenticide to be used has yet to be determined - neither the toxicant, the concentration, or the bait matrix. Until these issues have been resolved (and approved by the EPA), we find it impossible to adequately respond to the options as set forth in the DEIS.

2) We are gravely concerned that there has not been sufficient public outreach and education on the issue of aerial application of rodenticide. We anticipate, in light of the minimal public awareness of the health "risks" of such operations, that there could well be a backlash that could

B1: Chapter Two (Alternatives Considered in Detail pgs 16) of the EIS describes six alternative that are being considered for implementation. Each alternative describes the toxicant and concentration, including the delivery mechanism. The inerts of the bait will be of a commercially manufactured product, optimized for maximum palatibility and acceptance to rats.

B2: Chapter Five (Public Involvement pgs 84) describes the effort the Park has made to solicit public input on this project. Local newspapers (Ventura Co. Star, LA Times, and Santa Barbara Newspress) have published at least one feature article about the project, some have done two articles. The Park will continue to keep the public informed via press releases, website, and public notices on this project as the compliance process moves forward.

The environmental analysis has discussed the potential human health risk and has determined that exposure of visitors to the rodenticide is extremely low. This fact, along with the island closure and the information dissemination (as described on pg 78) reduces even further the human health risk.

B3: The interaction between Deer Mice and Xantus' Murrelets has been described elsewhere (see Murray et al. 1983, Sydeman et al. 1998). The Xantus' Murrelet has evolved and contended with native predators such as mice on Santa Barbara Island (south of Anacapa Island) for centuries and is the largest breeding colony in the USA. The Deer Mice prey only on eggs, while rats are capable of preying on eggs, chicks and adult murrelets severely impairing reproductive potential in the short term and long term. Anacapa and Santa Barbara Island share similar habitats and the Deer Mice are the only native mammals on the islands. Rats are only found on Anacapa Island, which does not have a significant murrelet breeding colony.

(Continued on next page)

Mr. Tim Setnicka, Page two
5 September 2000

B2 derail this important project and hinder a number of other similar efforts being planned at National Parks and other locations throughout the United States. Much, much more information needs to be proactively disseminated and public fears adequately addressed before the DEIS can be considered complete, and a reasonable assurance of public acceptance attained.

B3 3) It should be noted in the DEIS that native Deer Mice (*Peromyscus sp.*) are also significant predators on the eggs of Xantus' Murrelet, and that removal of rats will not ensure a reduction of losses of murrelets to mice. A "decline" in numbers of murrelets and perhaps even storm-petrels cannot be exclusively attributed to rats. Conversely, a "recovery" could be limited by the presence of native deer mice. Rats could, in fact, also be suppressing deer mouse populations. This dynamic needs to be discussed in detail.

B4 4) We believe that before rat eradication is attempted, that rodent exclusion standards and practices should be fully developed and implemented by the Park. This is not clearly stated in the DEIS.

B5 In summary, we applaud the Park's use of electronic media to distribute the DEIS, but note that both the web site and CD ROM are cumbersome to use. In terms of substance, the document is difficult to read and understand even for professionals who have been engaged in eradication efforts for years. We suspect the public will be highly wary of technical language. Although we understand that such information needs to be included, it should also be stated in terms that a layman can easily understand.

B6 Given the critical weaknesses in crucial elements of this otherwise comprehensive document, we feel that a Revised DEIS should be prepared, and that adequate time be allowed for other regulatory agencies to provide approvals and the public's inevitable concerns to be satisfactorily addressed.

Thank you again for the opportunity to provide comments, and we wish you well in ultimately being successful of ridding Anacapa Island of the rats that have no rightful place in this unique ecosystem.

Sincerely,

William T. Everett
President

Dick Veitch (ge)

Dick Veitch
Senior Restoration Analyst

B3 Continued:

The abundance of available nesting habitat (McChesney et al. 2000), similarity to Santa Barbara Island, and presence of the Xantus' Murrelet attempting to utilize Anacapa Island for nesting, strongly suggests that the Xantus' Murrelet and other small, crevice nesting seabirds will benefit from the removal of rats. The removal of rats from Anacapa Island should aid in the recovery of the Xantus' Murrelet and other crevice nesting species susceptible to rat predation.

B4: See Comment A14.

B5: The Park's intent in distributing the DEIS through its website was to allow for wider distribution to the public. Distribution of the DEIS by CD-ROM is a less expensive way to disseminate the analysis. However, the Park distributed traditional "hard" copies to people who requested them, or to people who did not have computer access. The Final EIS will be distributed in the same manner, however, the Park will review its website dissemination procedure.

The Park attempted to make the document as readable and understandable as possible. Some of the technical language that is in the document is a product of the complex subject manner. Since most of the environmental impacts revolve around rodenticide toxicology, standard methods were used for displaying and discussing this subject. Where possible the analysis attempted to summarize this information.

B6: The environmental analysis that has been prepared for this project meets a very high standard of environmental analysis. Both the legal requirement and the spirit of NEPA have been fulfilled. A supplemental EIS is necessary when substantial new information is discovered or substantial changes with environmental ramifications are made to the proposed action or an alternative to the proposed action. Because substantial changes are not being made, a supplemental EIS is not necessary. The Final EIS adds an option for preparing a supplemental EIS should first year implementation monitoring results indicate that objectives are not being met, or environmental effects are different that what is described in the FEIS (see pg 16 "Effectiveness and Validation Monitoring").

LETTER C: OJAI RAPTOR CENTER

FROM: PETER D. TRIEM
OJAI RAPTOR CENTER
19O GREENVIEW CIRCLE
VENTURA, CALIFORNIA 93003 Tel: 805 642 4210

TO: SUPERINTENDENT
CHANNEL ISLANDS NATIONAL PARK
1901 SPINNAKER DRIVE
VENTURA, CALIFORNIA 93001

DATE: 2 SEP 2000

SUBJ: DEIS FOR ANACAPA RESTORATION PROJECT (AIRP). GOAL OF AIRP: ERADICATION OF NONNATIVE RATS FROM SUBJECT ISLAND.

REF: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR ANACAPA ISLAND RESTORATION PROJECT

1. Thank you for letting me read and comment on this DEIS. Not surprisingly, it is thorough, literate, and accurate, mostly. It has the look and feel of a document prepared by contractors well versed in this art form.

2. My credentials in brief are BA UC Berkeley biological sciences general curriculum; many years of field experience and scientific writing and editing with the US Forest Service as well as 10 years recent experience in providing medical care to wildlife injured, orphaned, or poisoned as their environment has become restricted and degraded.

3. To cut directly to the chase, given your intention to eradicate exotic rodents from Anacapa and inferentially other Channel Islands, I will stipulate to your choice of brodifacoum for initial attack and aerial dispersal in combination with bait stations as the preferred means of poisoning the target species, black rats. But the devil, in this case, is in the unstated premise and assumptions.

C1 4. **Feasibility**. Have you established that it is feasible to eradicate *Rattus* spp. from Anacapa? I see no feasibility studies included or cited nor any statement of the *probability* of success in one year, two years, or n years. The sad history of eradication programs is that they do not achieve their initial objective and become self-perpetuating. Some years back the journal Science published a sidebar titled: Gypsy Moths - 50, USDA - 0 to celebrate 50 years of gypsy moth eradication. You may counter that yours is small island population with less reproductive potential than lepidoptera, and in Appendix C you list some 33 island rat eradication programs - with the *implication* they were all successful. Were they? And what were the cost - benefit and risk - benefit results, the time to completion data, collateral damage, etc? What is the similarity of Anacapa to each of the islands in terms of latitude, climate, size, and relief? Anacapa is larger than all but three of the cases cited, most of which had target species other than *Rattus rattus*. . Given the costs and risks, is it too much to expect you to be explicit about feasibility and compare identical cases or at least present persuasive argument for the similarity of cases? There are many islands with negligible relief that can be made free of rats, but Anacapa is not one of them.

C1: A feasibility study was conducted in 1996 and a report submitted to the Channel Islands National Park (see Tershy et al. 1997). The probability of complete removal, or eradication, of rats from Anacapa Island is high. Eradication of rats from islands has taken place on islands in the sub-Antarctic, to tropical atolls to the temperate Northern Pacific in Canada. The basic underlying principal that resulted in the successful eradication programs has been the delivery of a bait containing a rodenticide into every rat territory on the island. This principal has been applied on all islands in all types of climates and sizes from small offshore rocks to the largest island of over 3000 hectares (7,500 acres). The objective of the AIRP is eradication and not control, therefore, treatment of the entire island is necessary for meeting the purpose and need. The topography of Anacapa was taken into account when developing the alternatives. Aerial broadcast is the only method for ensuring bait is delivered into every territory.

Appendix C is a list of successful eradications.

C2 5. **Assumptions**. **1)** *The rats will take the bait.* Professional pest controllers have learned how difficult it is get all the rats to take the bait. When they have time and funds they typically pre-bait and pre-trap with innocuous baits and unset traps until they hope they have the whole population trained to take the bait. Then they blitz the target population with a combined assault of baits, mechanical traps, and glue traps. If even one pregnant female rat escapes, the area is repopulated at a predictable geometric rate. A recent study revealed part of the problem: young rats tend to eat only what their mothers eat, and given the abundant food along the littoral adjacent to the peak concentrations of Anacapa rats, there is no reason all the target rats will accept poison baits. If you miss a few founder rats, it will be gypsy moths all over again. And as you note, survivor populations tend to select for recalcitrance. **2)** *The breeding season for rats is April to September.* How sure are you of this? Mainland populations of black rats breed all year around, with litter size being a function of food availability and the female's weight and particularly fat:lean ratio. Decrudescence/recrudescence of testes is also a function of optimum weight, not solar azimuth as it is in birds. Skinny and obese male rats tend not to contribute to the gene pool. Your "baddest rats," in terms of risk to birds, population concentrations, and hazards to bait applicators are the ones that have year around access to food near the beach. They are the Willy Suttons of the rat world: they hang out in the rocks because that is where the food and shelter are. What could be better than all the birds, limpets, carrion, and addled eggs you can eat plus a secure retreat lined with bird feathers? **3)** Rats are territorial. In what sense? Adult males with the most testosterone keep lower ranking males away from the females, but is there a well delineated territory? However, territoriality does not seem to be the linchpin of your eradication program. Rats are pioneering animals, and this will have the same effect as territoriality. 4) *Salamanders are dormant during the proposed baiting period from October to January (page 44).* Mainland slender salamanders are active during the rainy season. Are the Island populations different in this respect? **5)** *Alligator and side-blotched lizards would be active during the application period.* This period corresponds to the time of least activity for *Uta* spp. on the mainland; alligator lizards are active year around at lower elevations. Two other assumptions you might revisit, although they have no impact on your DEIS: **6)** *Trapping raptors would result in even more occupying the vacated "territory" - B. Walton.* By your account, there are no raptor nesting territories on Anacapa (there once was an active peregrine falcon nesting site there). Fall and winter raptors do not defend hunting territories, and their occurrence on the Islands is intrusive and random. Unless you have species of special concern such as San Clemente shrikes (probably already doomed) or bald eagles in very small numbers, removal is probably out of the question. Raptors will be fatally poisoned, and this invites the question: If a raptor should fall in the Island scrub and no one sees it, has it really fallen? **7)** Finally, there is the canard *"Golden eagles are non-native species to the Islands . . . .* This is a convenient fiction, justifying the removal of golden eagles to save the Island foxes, a sound if desperate measure. The confabulation contains in its rich warp and woof the notion that golden eagles never flew to the Islands until recently when they espied from a great distance the absence of bald eagles and the opportunity to kill foxes when the "good guys in white hats" were not there to protect the foxes. That is a tale any six-year old could enjoy. Golden eagles are "non-native birds" to Anacapa in the same sense that red tailed hawks are - or any other of the casual avian visitors. Bald eagles with nesting territories will defend a stretch of beach from conspecifics in particular and eagles in general; migrating adults and immatures do not defend territories - they do rob others and intimidate. And don't count on them not killing foxes: these sea eagles kill large birds, seal pups, and sea otter pups. Revegetating the Islands will do more to save the foxes than bald eagles - and in the interim you could create fox shelters out of some of the trash and structures left on the Islands. And vaccinate the foxes for parvo and canine distemper. And worm them. What's so hard about that?

C3 C4 C5 C6 C7

Sincerely,

Peter D. Trim

C2: Rat baits are formulated to be highly palatable to the target species. A battery of tests are required by the EPA to ensure that rats will consume the bait and will have the desired effect on the target population. On Anacapa Island, we are delivering the bait to the rats at a time of year when the population is food stressed and are actively seeking out high quality food resources such as that found in the bait. The bait is formulated to be highly palatable and attractive to the rat population. Island eradications are most likely to be successful if they take place during the annual population cycle when no reproduction is taking place and when rat numbers are declining. This insures that new-born rats will not emerge from their dens after all bait has been consumed, and that most rats will be food stressed and therefore more likely to consume bait.

C3: Work conducted by Erickson (1990) documented the seasonal reproductive condition of rats on Anacapa Island. His work has been cited throughout the EIS.

C4: The basic premise for all successful rat eradications is the delivery of bait into all rat territories. Territory is used synonymously with range.

C5: The application period corresponds to the late dry season on Anacapa Island. Bait will not be applied during the rainy season. During the dry season salamanders would be deep within thick vegetation or deep cracks within the soil to avoid dessication.

C6: Alligator Lizards and Side-blotched Lizards are active year round on Anacapa Island. The herpetofauna will be monitored before, during and after the eradication for measuring impacts from the baiting and the predator release once rats are eradicated. See comments from A6.

C7: Secondary poisoning of birds of prey is of concern. Mortality of individual non-target birds will be mitigated where possible. However, from an ecological perspective such mortality is only significant if it causes a long term population decline. There are no endemic birds of prey on Anacapa Island. The birds of prey on the Channel Islands are habitat limited, i.e., there are more birds than there is available habitat. Data from a raptor control effort around a colony of endangered Least Terns indicates that population effects of such removal are temporary.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001

Dear Superintendent:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the **Anacapa Island Restoration Project**, Ventura County, California (CEQ #000228). Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) and Section 309 of the Clean Air Act (CAA).

The goal of the proposed action is to eradicate the non-native Black Rat from Anacapa Island and to keep Anacapa Island, as well as Santa Barbara Island, Prince Island, and Sutil Island, rat-free. The proposed action involves the aerial application of the rodenticide Brodifacoum into all rat territories on Anacapa Island over a period of two years. The application of rodenticide would occur during the fall of the year to minimize disturbance and exposure to other affected resources on the island. One of the greatest environmental concerns of this project is the exposure of non-target species to the rodenticide. Six alternatives are presented in the DEIS, including a Preferred Alternative and a No Action Alternative.

The six alternatives differ primarily in terms of 1) the type(s) of rodenticide used and 2) the application method(s) employed. There are three types of rodenticide (active ingredients) under consideration: Brodifacoum, Bromadiolone, and Diphacinone, and there are two application methods under consideration: aerial application from a helicopter, or by hand in areas inaccessible by helicopter, and "bait stations." The Preferred Alternative, Alternative 2, employs the aerial application of Brodifacoum over the extent of Anacapa Island. The other four alternatives are designed to reduce the impact of the rodenticide on non-target species. However, these alternatives are less effective in meeting the objective of 100% rat eradication.

EPA applauds the National Park Service's collaborative work with the Island Conservation and Ecology Group and the American Traders Trustee Council, as well as the public outreach that has been incorporated in the development of this document. EPA is also highly supportive of the proposal to split the project into two years to provide the opportunity to monitor, modify and improve operational procedures for the second year and to monitor the impacts of the project on non-target species.

In general, in our review of the DEIS, we have not identified any environmental impacts requiring substantive changes to the proposal. In addition, we believe the analysis provided adequately sets forth the environmental impacts of the Preferred Alternative and the other alternatives considered. We have rated this document LO-1, *Lack of Objections-Adequate Information*.

Our rating of LO-1 reflects our overall view of the adequacy of the document. However, we recommend the inclusion of clarifying language and a commitment to both monitor the impacts of the project to non-target species and to implement mitigation measures laid out in Chapters 2 and 4. Specifically, EPA requests that the Record of Decision (ROD) outline NPS's commitment to project monitoring and mitigation. EPA also requests that the Final EIS include a discussion of the emergency response plan for accidental spill of rodenticide during bait application. Please see the attache Detailed Comments for further discussion of these issues.

We appreciate the opportunity to review this DEIS. When the Final EIS is completed, please send two copies to me at the address above. If you have any questions or comments, please feel free to contact me or Nova Blazej, the primary staff person working on this project. Nova Blazej can be reached at 415-744-2089 or *blazej.nova@epa.gov*.

Sincerely,

David J. Farrel, Chief
Federal Activities Office

Attachments: Summary of EPA Rating Definitions
Detailed Comments

U.S. EPA DETAILED COMMENTS
DRAFT EIS: ANACAPA ISLAND RESTORATION PROJECT

PROJECT MONITORING & MITIGATION MEASURES
The DEIS states that the project will be split into two years to 1) allow for monitoring of efficacy of the project and 2) to allow the Park to monitor impacts to non-target species and to identify further necessary mitigation measures (p.13). The DEIS also includes descriptions of specific mitigation measures designed to protect non-target species, particularly deer mice and landbirds, from non-target poisoning (pp. 13, 63). The island populations of both deer mice and landbirds are expected to decline during the project period.

D1 *Recommendation:* We strongly recommend that the National Park Service 1) commit to monitor, modify and improve operational procedures for year 2, as necessary, and 2) to commit to specific mitigation measures to protect and restore the populations of deer mice and landbirds on Anacapa Island. Include this commitment in the Final EIS and in the Record of Decision (ROD).

EMERGENCY RESPONSE PLAN
The DEIS states that application of the rodenticide would be carried out by or under the supervision of licensed applicators. The document does not, however, state whether an emergency response plan is in place in the case of an accidental spill of rodenticide during the project application.

D2 *Recommendation:* In the EIS include a discussion of the emergency response plan that will be implemented in the case of accidental spill of rodenticide during the project application.

TEXT CLARIFICATIONS
Timing
Chapter Two of the DEIS includes a discussion of the "timing" of bait application and states that application would be restricted to September through December of each year to minimize disturbance and ecotoxicological impacts to non-target species. For clarity, it would be helpful to reiterate this restricted period of application in the discussion of each alternative. In addition, the discussion of the Preferred Alternative states that the 20 ha Middle Islet may be treated periodically to prevent re-invasion of East Islet (p.14). Clarify whether or not repeated treatment of Middle Islet would occur only during the restricted months of September through December or during other periods of the year when impacts to non-target species would be more significant.

D3

U.S. EPA Comments on DEIS: Anacapa Island Restoration Project *August, 2000*
1 of 2

D1: The Final EIS adds a monitoring element to all action alternatives. In summary, should first year implementation monitoring results indicate that objectives are not being met, or environmental effects are different from that what is described in the FEIS (see pg 16 "Effectiveness and Validation Monitoring") then a supplemental EIS would be prepared. The supplemental EIS would address potential modification of the project and their environmental effects.

D2: A Bait Spill Contingency Plan will be developed in case of an accidental release of bait into both the terrestrial or marine environment. The handling and storage of the bait, as well as the dispensing of bait (aerial or hand placement) will follow California Code of Regulations (Title 3. Food and Agriculture) Division 6. Pesticides and Pest Control Operations managed by the California Environmental Protection Agency, Department of Pesticide Regulation. These regulations outline the requirements of applicators and pesticide handling procedures. All of these regulations will be complied with to ensure that there is a low risk of bait spill into sensitive environments. In addition, consultation with the US Coast Guard and NPS IPM staff will take place to develop a plan to respond to any bait spills. Included will be an outline of procedures for clean up, monitoring, and reporting of any bait spill incidents. All staff will be trained to standards and thoroughly understand their responsibilities in an emergency.

D3: The re-treatment of the 20 ha headland on Middle Island may become necessary for protection of East Island from re-invasion of rats. The intention of treating the 20 ha headland is to open up territory for rats moving East on Middle Island, thus, as they move out of rat occupied territory into unoccupied territory, they would utilize open territory on Middle Island. The size of the headland is equivalent to about 20-40 average sized adult rat territories. Thus, the highest probability of re-invading East Island would be late in the rat breeding season as juveniles are dispersing and are seeking their own ranges to occupy. Thus, the re-treatment period would only be necessary if rats are utilizing the headland extensively. Monitoring for rat presence/absence will take place on the headland near the accessible points along the shoreline. The results of the monitoring will evaluate location of detection, number of detections and rate of re-occupancy of the headland to evaluate risk of re-invading East Island. If the risk of re-invasion is deemed high, the 20 ha headland on Middle Island will be re-treated. Similarly, monitoring stations will be placed on the East Island near the accessible shoreline to evaluate presence/absence of rats suggestive of re-invasion from Middle Island. Monitoring stations near the accessible shoreline may include the use of non-toxic indicator blocks and the use of bait containing the rodenticide brodifacoum. Thus, rats will likely have consumed a lethal dose after they have been detected, presenting a lower risk of re-invasion. However, bait stations alone would not adequately defend against re-invasion of East Island because, the cliffs are extremely steep and unstable and bait stations could not be placed on them. (*Continued on next page)*

D4 Island Rat Eradication Success Rate
Appendix C presents a table on "Island Rat Eradications Worldwide" to give an overview of the active bait ingredient(s) used in various rat eradication efforts on islands worldwide (p.104). This table would benefit greatly from the inclusion of statistics on the success rate of each of the rat eradication efforts. Information on the success rate of previous efforts would give the public and decision makers a clearer idea of the success rate they can expect for the proposed project.

D5 Likelihood of Rat Re-colonization
The DEIS includes some information on the behavior patterns of black rats on Anacapa Island (pp. 4, 5, 53). A more thorough discussion of the island rat population and individual behavior patterns, such as individual territory and foraging range, would be helpful. This information would help establish a better understanding of the potential for re-colonization of areas previously treated for rats and the overall probability of success of the project.

D3 Thus, only a few bait stations could be placed along the accessible areas along the shoreline, thus, leaving the potential for rats not encountering the stations before they cross the channel.

If the risk of re-invasion is deemed high, then the headland on Middle Island would be re-treated outside of the September-December window. However, the impacts to non-target species would not be significant because treatment would be on a limited section of the island (20 ha), the sowing rate would likely be lower because of fewer rats, reducing the relative risks further, and Brown Pelicans do not nest on Middle Island. Although there would likely be non-target mortality from re-treating the 20 ha headland of Middle Island, the impacts would not be significant.

D3 *Response Continued*

D4: Appendix C is a list of successful island rat eradications. Once the time and resources have been invested into an island eradication, it becomes necessary to sustain those resources until the eradication is complete. The economic resources have been devoted to this project and Anacapa Island falls within the size class of all successful island eradications. The project also has a 2-3 year follow up monitoring plan for detecting the presence/absence of rats on the island post eradication. If rats are detected after eradication, the detection response plan would be implemented as outlined in Appendix A.

D5: The rats on Anacapa Island have been a focus of a few studies (ICEG 2000, Howald 1997, Erickson 1990 and Collins 1979). The rats are distributed unevenly across the island. The highest density of rats can be found along the shoreline, where the intertidal zone is likely and important foraging area especially during the lean dry season, and the cliffsides provide good burrowing habitat. Rats utilize the rocky crevices of Anacapa Island and are found to overlap quite extensively with the high quality murrelet nesting habitat (McChesney et al. 2000). Erickson (1990) documented important rat habitats as those that provide adequate cover, either from dense brush or rock crevices. Dense brush on the islands include coreopsis, sagebrush, and wild cucumber. The wooded canyons also provide excellent rat habitat. Grassland habitats found on Middle and East Island do not provide good habitat for rats and thus, rats are found in low density. The presence of rocky crevices providing protection appears to be the most important feature for the distribution of rats on Anacapa Island (Erickson 1990). Rats can be found utilizing gullies and drainages on the islands as travel corridors, allowing freedom of movement between feeding and burrowing areas. Radio-telemetry studies conducted in 2000 and 1996 confirmed that movement of rats on Anacapa is primarily limited to drainages and gullies, and areas of dense shrubbery , very little movement of rats has been found on the grassland. In May 2000, studies were initiated to evaluate if rats would cross the channel between East and Middle Island. Rats from Middle and East Island were live trapped, fitted with a radio collar, and released in the channel, on the opposite island from which they were captured. After 3 months, no rat has been detected to cross the channel. Re-invasion prevention is outlined in response **D3**.

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
VENTURA FIELD OFFICE
2151 ALESSANDRO DRIVE, SUITE 255
VENTURA, CALIFORNIA 93001

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REPLY TO
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August 7, 2000

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Office of the Chief
Regulatory Branch

National Park Service,Channel Islands National Park
Attention: Tim Setnicka
Channel Islands National Park
1901 Spinnaker Dr.
Ventura, California 93001-4354

Dear Mr. Setnicka:

We received the DEIS for the Anacapa Island Restoration Project (AIRP), dated June 2,000. The stated purpose of the AIRP is to eradicate non-native rats from Anacapa Island and keep other islands rat-free. It appears the proposed project would not result in any Corps-regulated activities. Consequently, we will not be providing comments on the DEIS.

Please be advised a Corps of Engineers permit is required for:

a) structures or work in or affecting "navigable waters of the United States" pursuant to Section 10 of the Rivers and Harbors Act of 1899. Examples include, but are not limited to,

1. constructing a pier, revetment, bulkhead, jetty, aid to navigation, artificial reef or island, and any structures to be placed under or over a navigable water;

2. dredging, dredge disposal, filling and excavation;

b) the discharge of dredged or fill material into, including any redeposit of dredged material within, "waters of the United States" and adjacent wetlands pursuant to Section 404 of the Clean Water Act of 1972. Examples include, but are not limited to,

1. creating fills for residential or commercial development, placing bank protection, temporary or permanent stockpiling of excavated material, building road crossings, backfilling for utility line crossings and constructing outfall structures, dams, levees, groins, weirs, or other structures;

2. mechanized landclearing, grading which involves filling low areas or land leveling, ditching, channelizing and other excavation activities that would have the effect of destroying or degrading waters of the United States;

3. allowing runoff or overflow from a contained land or water disposal area to re-enter a water of the United States;

4. placing pilings when such placement has or would have the effect of a discharge of fill material;

c) any combination of the above.

If you believe your project includes any of the above activities which require Corps authorization, or if you have any questions, please contact me at (805) 641-3753. Please refer to this letter and 200001629-LM in your reply.

Sincerely,

Lisa Mangione

Lisa Mangione
Project Manager

LETTER F: CALIFORNIA COASTAL COMMISSION.

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
GRAY DAVIS, Governor
CALIFORNIA COASTAL COMMISSION
45 FREMONT STREET, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

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August 3, 2000

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cc
cc Herald

Tim J. Setnicka
Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001

Re: Draft Environmental Impact Statement for Anacapa Island Restoration Project

Dear Mr. Setnicka:

Thank you for the opportunity to comment on the above-referenced draft environmental impact statement. The proposed project includes the use of poison to eradicate black rats on Anacapa Island. The purpose of this letter is to inform the National Park Service that the proposed project is an activity that affects resources of the coastal zone and requires a consistency determination pursuant to the requirements of the federal Coastal Zone Management Act (CZMA).[1] Specifically, the National Park Service proposes to use aerial application of the rodenticide brodifacoum into all rat territories on Anacapa Island. The Commission staff agrees that these non-native rats degrade nesting habitat for shore and sea birds, compete with other native species, and the eradication of this animal would benefit the habitat values of the Island. However, the use of rodenticide could adversely affect water quality and habitat resources of the coastal zone. The rodenticides could degrade marine water quality through accidental discharges into the ocean or through storm runoff contaminated with the rodenticides draining into the ocean. Additionally, the rodenticide may also adversely affect non-target species either through the direct consumption of the poison or by consumption of animals killed by the poison. Therefore, the Commission staff believes that the proposed project triggers a requirement for a consistency determination pursuant to the CZMA[2] and its implementing regulations.[3]

A consistency determination is an evaluation of the proposed activity's effects on coastal resources or uses and its consistency with the mandatory enforceable policies of the California Coastal Management Program and includes the necessary information to support the federal agency's conclusion.[4] A consistency determination must be submitted to the Commission 90 days prior to final federal approval of the

[1] 16 USC § 1450 *et seq.*
[2] 16 USC § 1456(c)(1).
[3] 15 CFR § 930.34(a).
[4] See 15 CFR § 930.39 for a full listing of the information required for a complete consistency determination.

F1 activity, unless the state and the federal agencies agree to an alternate schedule.[5] If the federal agency determines that this activity does not affect coastal uses or resources, it must submit a negative determination 90 days before final federal approval of the activity.[6]

If you have any questions or need assistance preparing a consistency determination, please contact me at (415) 904-5292. Thank you for your cooperation in this matter.

Sincerely,

James R. Raives
Federal Consistency Coordinator

cc: South Central District

F1: On September 7, the Park sent a "Negative Determination" to the California Coastal Commission. In the letter the Park provided documentation as to why a "Negative Determination" was appropriate for this project.

[5] 16 USC § 1456(c)(1) and 15 CFR §930.41(c).
[6] 15 CFR § 930.35(d).

LETTER G: U.S. FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

RECEIVED 00 SEP -8 PM 1:15

September 6, 2000

Memorandum

To: Superintendent, Channel Islands National Park, National Park Service, Ventura, California

From: Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California

Subject: Draft Environmental Impact Statement for the Anacapa Island Restoration Project, Ventura County, California (A1415-CHIS)

We have reviewed your letter, dated July 11, 2000 and received in our office on July 13, 2000, requesting our comments on the draft environmental impact statement (EIS) for the subject project. The National Park Service (NPS) proposes to eradicate non-native black rats (*Rattus rattus*) from Anacapa Island and keep other islands rat-free. NPS presented six alternatives to accomplish this goal.

We applaud NPS's proactive efforts to restore the Channel Islands to a more natural state. We strongly support Alternative Two, the preferred alternative for the project. In this alternative, the rodenticide brodifacoum would be aerially broadcasted over the islands in November and December of 2000 and 2001. We believe that this alternative will best meet the purpose of the project by quickly and effectively eradicating black rats. We offer the following recommendations prepared in accordance with the Endangered Species Act of 1973, as amended, the Migratory Bird Treaty Act of 1918 (MBTA), and other authorities mandating Department of the Interior concern for environmental values:

1. G1 The project has the potential to affect birds protected by the MBTA. This risk is highest for granivorous landbirds that could ingest poisoned bait and predators such as western gulls (*Larus occidentalis*) and barn owls (*Tyto alba*) that could scavenge poisoned rat carcasses. The MBTA prohibits the take of any migratory bird, or part, nest, or egg of any such bird (16 U.S.C. 703). A list of species that are protected by the MBTA can be found at 50 Code of Federal Regulations 10.13. We recommend that you take all reasonable steps to prevent impacts to birds that are protected by the MBTA.

G1: The NPS is aware of the MBTA and is mitigating to minimize any potential impact to non-target birds that would fall under the MBTA. This project is a significant conservation action to benefit many bird species in the long term. Upon the successful removal of rats from the island, there will be a rebound of seabirds and landbirds that are currently impacted by rats. In the long term, the restoration of bird habitat on Anacapa Island will enhance the local bird population protected under the MBTA.

Superintendent, Channel Islands National Park 2

2. **G2** To minimize the occurrence of secondary poisoning to non-target species, we recommend that rat carcasses (and other carcasses encountered that may contain rodenticide) be retrieved until no carcasses are found for five days.

3. **G3** To avoid effects to the federally endangered island malacothrix (*Malacothrix squalida*), we recommend that project personnel working on the island be briefed on the appearance and occurrence of island malacothrix habitat. Although individual plants will not be present during the time of year when project activities are occurring, symbolic fencing (i.e., flagging) around the perimeter of known locations could help alert project personnel to the presence of this sensitive habitat.

G4 In addition, we believe that the beneficial effects of rat eradication on sensitive seabird species, especially Xantus' murrelets (*Synthliboramphus hypoleucus*) and ashy storm-petrels (*Oceanodroma homochroa*), will be maximized by simultaneously addressing other threats to these species. As you are well aware, we are concerned that the squid fishery around Anacapa Island has been increasing predation of these species by barn owls and western gulls due to its creation of an unnaturally light environment. Once rats are removed, Xantus' murrelets and ashy storm-petrels may be attracted to areas that may increase their susceptibility to predation, thereby creating a "sink" situation. We recommend that NPS continue its cooperative efforts with the Service and the Channel Islands National Marine Sanctuary to encourage the fishery and its regulating entity, the California Department of Fish and Game, to take action in reducing this form of mortality.

We look forward to reviewing the final EIS when it becomes available. Should you have any questions regarding these comments, please contact Bridget Fahey of my staff at (805) 644-1766.

G2: The risk of secondary poisoning of scavengers is already partially mitigated by the fact that most rats and mice (87-100%) will die below ground after exposure to the rodenticide. However, NPS will further mitigate against secondary poisoning through removal of any carcasses found above ground. Regularly scheduled "sweeps" of the island will be conducted by personnel seeking and retrieving any carcass found after rodenticide application. Sweeps will be conducted until no carcasses are found for 5 days.

G3: The endangered Island Malacothrix (*Malacothrix squalida*) is found on Middle Anacapa Island. To mitigate against any damage to this species, the NPS botanists will identify and mark known locations of this endangered plant. Personnel working on Middle Anacapa Island will be advised of the presence of the plant and will be briefed thoroughly on techniques to minimize disturbance/trampling of the area surrounding malacothrix locations.

G4: The Park has been concerned about the squid fishery around Park islands. We have submitted suggestions to the California Department of Fish & Game for measures that would mitigate impacts to seabirds.

LETTER H: PACIFIC SEABIRD GROUP

Pacific Seabird Group

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DEDICATED TO THE STUDY AND CONSERVATION OF PACIFIC SEABIRDS AND THEIR ENVIRONMENT

Julia K. Parrish
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Craig S. Harrison
Vice Chair for Conservation
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Arlington, VA 22203
(202) 778-2240

William Sydeman
Chair-Elect
Point Reyes Bird Observatory
4990 Shoreline Highway
Stinson Beach, CA 94970
(415) 868-1221

To: Mr. Tim Setnicka, Superintendent
Channel Island National Park
1901 Spinnaker Dr.
Ventura, CA 93001

From: Pacific Seabird Group (PSG)
Re: **Draft Environmental Impact Statement for the Anacapa Island Restoration Project (AIRP)**
Date: 11 September 2000

Thank-you for the opportunity to comment on the AIRP. As you know, the Pacific Seabird Group (PSG) is an international organization of professionals engaged in research on, education about, and conservation of seabirds. With over 500 members, PSG is the largest group of seabird experts in the United States. PSG regularly comments on proposed projects concerning seabird conservation and restoration, and has recently authored a volume on seabird restoration[i].

PSG applauds and supports agencies and organizations which attempt to remove introduced species from islands, particularly in cases where the introduced predator has been shown to have deleterious effects on seabird populations. Such is the case with many rat introductions. PSG supports the proposal for 100% removal of introduced black rats, *Rattus rattus*, from Anacapa Island, and the Emergency Response Plan (ERP) to keep the island rat-free. However, we do take issue with or have concerns about several aspects of the rat eradication plan, as written. In general, the message pervading the DEIS is that seabirds are more important to preserve and conserve than other species, including endemic species. PSG does not support this view. We have listed and elaborated on each point below.

Timing

Although PSG is listed in the DEIS as an organization receiving the document, in fact, the DEIS did not reach us until the week prior to the end of the comment period. Given the Labor Day holiday, this left precious few working days for our members to comment. In future, and specifically with the FEIS, PSG would appreciate more time to read and review documents. Because the timeline imposed by this late receipt of the DEIS made your deadline unreasonable, Dr. Julia K. Parrish, Chair of PSG spoke with Steve Ortega on 1 November 2000, and obtained an extension of several days from him.

Use of PSG Opinion

We note that Chapter 3 pg 32 states:

> "The population decline of the Xantus' Murrelet in conjunction with the threats that face this species, has led the Pacific Seabird Group (PSG) to formulate a petition to list the species for protection under the Endangered Species Act. The PSG is a group dedicated to the study and conservation of Pacific seabirds and their environment. Rationale for the group to petition for listing the Xantus' is based on the following (PSG Annual Meeting: Summary Notes 2000):
> Low Population size
> Expansion of commercial squid fishery
> Potential oil spill impacts
> Introduced predators (Rats)"

The Executive Council - the elected representatives of PSG - were not aware that we had done this at this past, or any other, annual meeting. No request for information on PSG's opinion on the merits of listing the Xantus' Murrelet was sent to either the Chair of PSG or the Vice-Chair for Conservation, Craig Harrison.

The Executive Council has shifted control of Xantus' Murrelet issues to the Xantus' Murrelet Committee, chaired by Bill Everett and Ken Briggs. As such, Bill and Ken are responsible for directing committee actions, including any actions by the committee members to draft potential listing petitions. At the present time, the Xantus' Murrelet Committee is in the process of editing a draft petition to list the Mantu's Murrelet as endangered under the Endangered Species Act, to be submitted to the Executive Council in future. At that time, the Executive Council will read and review the draft, and decide whether to submit the document as a listing petition, to amend the draft and submit it as a listing petition, or to drop the issue. Before this formal process in completed, PSG has no opinion about the merits of petitioning to list the Xantus' Murrelet, and we certainly would not issue any statement listing specific reasons for such a listing.

2

H1 **PSG insists that the language in the FEIS be changed to reflect the fact that PSG has not yet rendered an opinion on the merits of or reasons for listing Xantus' Murrelets.**

Documentation of Harm

Actual documentation of the harm rats have delivered to seabirds, specifically Xantus' Murrelets and Ashy Storm-petrels, is seriously lacking in the DEIS. As far as we can determine, either Gerry McChesney or Harry Carter (the document gives both credit in different sections for the same data) did a habitat survey and determined that Xantus' Murrelets only use 2 sites out of the available habitat (listed as 1,510 sites). This figure, by the way, is mis-quoted as 0.4%, but is actually 0.1% (0.4% would be six nests). There is no mention of how this habitat survey was conducted, the objective criteria used in the survey, or the specific results of the survey. There are no habitat-specific data presented.

In Chapter 3, page 33, the DEIS goes on to say that "both eggs showed evidence of mammalian predation and were in areas where rats appeared to be common." However, only a few sentences later, the document states :Murrelets on Anacapa Island are mostly limited to nesting in areas inaccessible to rats or where rats occur infrequently." Thus, it is confusing to us, without seeing any of the actual data, what the situation really is. Are rats coincident with Murrelet nests or not? Are rats responsible for the egg predation (as is insinuated) or is it possible that the endemic deer mouse is the culprit? As you are probably aware, mice have been documented as predators on small seabird eggs[ii].

H2

Because the rationale for rat eradication appears to be the low numbers of Xantus' Murrelets and the potential for nesting of Ashy Storm-petrels, **PSG would like to see a much more detailed presentation of the science linking rats to seabird decline on Anacapa Island**. Specifically, PSG recommends:

H3 (1) Inclusion of any historical data pointing to larger than present breeding populations of Xantus' Murrelets or Ashy Storm-petrels, or even greater use of island habitat than present.

H4 (2) Inclusion of the habitat types sampled, the sampling methods used, and the specific numeric outcomes, including any statistics.

H5 (3) Inclusion of any evidence of rat predation.

Endemic Deer Mice

Although PSG strongly supports the eradication of introduced predators, including rats, on islands housing seabirds, we do lend our support at any cost. With specific reference to the AIRP, PSG is concerned about the lack of documentation of the specific mitigation efforts which will be undertaken to insure the continued health - at present levels of genetic diversity - of the endemic

3

H1: Chapter 3 page 40 will be changed to read as follows:

> "The executive committee of the Pacific Seabird Group has authorized a committee to draft a petition to list the Xantus Murrelet for protection under the Endangered Species Act." The Pacific Seabird Group, however, has yet to render an opinion on the merits or reasons for listing Xantus' Murrelet."

H2: The most current information of seabird predation, including Xantus' Murrelet predation, by rats is from surveys conducted in 1997 (summarized in McChesney et. al. 2000) , 2000 (H.Carter unpublished data), and 2000 (P. Martin pers. comm).

Since publishing of the DEIS, the cited "H.Carter Unpublished Data pg 33 DEIS" is now a published report (see citation McChesney et al. 2000). Results of the survey show that they found evidence of nesting murrelets at only two sites in areas that were fully accessible to rats, or 0.4% of 505 potential sites investigated on ground surveys. Both eggshells showed evidence of rodent predation and were in areas where rats appeared to be common. In contrast, at Santa Barbara Island (where rats do not occur), similar surveys in 1991 found murrelet eggshell fragments in 29.4% of potential sites, including 27.9% of crevice and 39.6% of shrub sites.

H.Carter (unpublished data), researchers collecting baseline Xantus' Murrelet population data noted the following during sea cave nest surveys: Eleven nests were found in sea caves with known nesting in the past at Anacapa Island. Some caves with previous nesting were empty. No murrelets were handled and none were flushed from nests during surveys. About 4-5 eggs appeared to have been depredated by rats.

P.Martin (Unpublished data), monitoring gull productivity grids in June 2000 found evidence of rat chewed carcasses on 10 gull chicks. Evidence strongly suggests rat predation because of the condition of the carcass (brain cavity opened and eaten), and location of where the carcasses were found (thick brush with numerous rat burrows). It is not known if the gulls were previously dead, or if rats preyed upon the chicks.

Evidence of rat impacts to the Xantus' Murrelet including: low nesting numbers in suitable habitat as compared to Santa Barbara Island; low population numbers in comparison to Santa Barbara Island; evidence of rat predation on murrelet eggs; and extremely low nesting success in areas known to be accessible to rats when considered together suggests that rats are suppressing Xantus' Murrelet population numbers on Anacapa Island, an area that has similar nesting habitat availability as rat free Santa Barbara Island.

Anacapa Island deer mouse, *Peromyscus maniculatus anacapae*. The proposed rodenticide in the preferred alternative (brodifacoum) is quite powerful - single ingestion leads to death. Although the language is delicate, it is clear that many mice will be killed and there is the distinct possibility that the entire population will be wiped out. The stated mitigation for this is to sequentially treat the island (apparently the island is actually divided into several land masses, although this is never spelled out very clearly) with aerial application of rodenticide: one year one side, the next year the other side. Chapter 2, page 13 states:

H6

> "The sequential treatment of the islets will ensure that there is always a viable population of deer mice on one of the three Anacapa islets."

It is unclear why this should be the case.

In Chapter 4, page 63, the argument is made that because rats are competitively dominant to mice, rats will consume all or the majority of the bait before the mice can get to it. The supposition is that enough of a remnant population of mice will be left alive that this population can rebuild, apparently unharmed. However, in Chapter 1, page 2, the document states that the rat population fluctuates between 750 and 2000 annually. Thus, it would seem extremely difficult to estimate an application amount of brodifacoum which would selectively target rats, leaving none for the mice.

H7

Chapter 2, page 13 goes on to state: "The following management actions may be implemented: Captive breeding population on island or on the mainland." Given the difficulty of correctly measuring rodenticide application to target only rats, PSG assumes that this step must be implemented. **PSG recommend's that the FEIS include a detailed section on exactly how the endemic deer mouse population will be maintained**, including:

H8 (1) How the population be sampled a priori to determine the number of mice needed in such a program, and from which locations throughout the three islets, to ensure the viability and genetic health of the population.

H9 (2) The specific capture, handling, and captive breeding methods.

H10 (3) Release sites and dates, relative to the rat eradication schedule, and post-release monitoring methods.

Human Visitation

According to the DEIS, Anacapa Island is visited annually by 16,000 visitors. This figure includes individual campers, and counts of people brought to the island by park concessionaires (the bulk of the total). Although these people are confined to one part of the island (East Anacapa), one wonders what effect they have on the lack of nesting by seabirds. More importantly, this level of visitation is a potential vehicle for rat re-introduction, a subject mentioned in general (although this particular route of re-introduction is not explicitly discussed). The mitigation for re-introduction is an Emergency Response Plan which includes the provision (Chapter 1, page 4):

H3: No pre-rat historical breeding population data is known to exist for the Xantus' Murrelet or other seabirds for Anacapa Island. Because no pre-rat population data is available the Park has to rely on: 1) population data comparisons between Anacapa and Santa Barbara Island; 2) known rat impacts to seabird colonies on other islands; and 3) direct evidence of rat predation on Anacapa Island seabirds to make an assessment on the impact rats are having on Anacapa Island seabird colonies. The Park's assessment is that rat impacts are suppressing the crevice nesting seabird population on Anacapa Island. This assessment is consistent with the suggestions given by species experts that eradicating rats to protect crevice-nesting seabirds is a necessary conservation project.

H4: The most complete assessment of potential nesting habitat for crevice-nesting seabirds on Anacapa Island was done by McChesney et. al (2000). The executive summary of this report can be found in Appendix D.

H5: See H2.

H6: The treatment of the islets would be carried out over a two year period. East Island would be treated in Year 1. In Year 2, Middle and West Island would be treated. In between treatment of East and Middle/West Islands, mice could be moved from Middle and West Island to rat-free East Island. The mouse population would be allowed to grow, and individuals would be transported over to Middle and West Island post eradication thereby ensuring the viability and genetic diversity of the mouse population. This mitigation measure may be implemented independently or in conjunction with other mitigation measures outlined in Chapter 2.

H7: Both mice and rats are rodents, and the bait will be attractive to both species. It is a logistical challenge to eradicate rats without having a significant impact on the local Deer Mouse population. The NPS recognizes the need for the conservation of the Anacapa Deer Mouse and is a priority of the AIRP. The NPS will ensure the genetic diversity and viability of the Deer Mouse population is protected (See H8 –H10).

H8: The conservation and management of Anacapa Island deer mice is a high priority for the AIRP. The genetic and morphological status of the Anacapa Deer Mouse has been investigated using genetics, morphometrics and computer modeling (mitochondrial DNA (mtDNA) analysis, morphometric discriminant function analysis and population viability analysis (see Pergams et al. 2000)). The morphological and genetic analysis confirms that the Anacapa Deer Mouse is a distinct subspecies when compared to other populations from the mainland and other islands. The mice on each islet are not genetically distinct from the other islets indicating that the population could be managed as one unit. In other words, the mice across all three islets are genetically indistinct. The results of the computer modeling have indicated that 1000 mice collected across all three islets would be adequate to ensure a viable and genetically diverse population.

"3) Control rodents at all departure points, including planes, boats, and helicopters that transport people and materials to the Islands."

Unfortunately, the document does not explain how this will happen. Because tourists are such a large presence on the island, and they are brought to the island by concessionaires, **the DEIS should contain specific implementation plans to make sure tourists and concessionaires as potential rat vectors are controlled**. PSG would like to see this added to the FEIS. H11

Effects on Raptors

The DEIS admits that secondary effects are likely for raptors which prey on rodents, as many striken mice and rats will die outside of their burrows: Chapter 4, page 63 states:

"There would be extensive secondary poisoning of the birds of prey with the use of brodifacoum or bromadiolone."

Potential mitigation includes a supplemental feeding program started before the rodenticide application and continuing through until after the baiting period, and/or a program to find and collect all (most?) of the carcasses before the raptors can get to them. However, the document makes extensive mention of the fact that large portions of the island are not accessible by humans, hence the need for aerial application of rodenticide. Thus it would seem that the stated raptor mitigation strategy is suspect. **PSG would like to see a discussion of the numbers and species of raptors likely to be affected, as well as a detailed and logistically manageable implementation plan for mitigating the effects of rodenticide application**. H12

Conclusion

The use of aerial broadcast of toxicants is controversial due to the appearance of an indiscriminant application of powerful poisons. This public perception is compounded by secondary poisonings of non-target species and can only be dispelled though extensive public education. PSG recommends extreme caution in the design and implementation of the Anacapa Island rat eradication project because this first use of a critically important tool to seabirds – aerial application of powerful rodenticides - must not fail on any level. In short, this inaugural eradication must be flawless in order to not engender a public backlash. From what we know and have read of the public perceptions regarding the Anacapa eradication as well as the level of documentation in the DEIS, we feel the public still has significant doubts about the process, the justification for use, and the guaranteed outcome. If proper documentation and adequate public outreach and education efforts means delaying the project one or two years until: (1) the FEIS can be rewritten as outlined above, (2) the bait formulation is granted by the EPA, (3) the public is informed and generally supportive, (4) a colony of endemic deer mice is established off-island, and (5) PSG decides whether to petition for endangered species status for Xantus' Murrelets, then a successful eradication can be virtually guaranteed and we will wholeheartedly endorse this project.

5

H9/H10: *Peromyscus* spp. are one of the most ubiquitous small mammals in North America. These populations are highly tolerant to disturbance and habitat alteration and populations are very resilient. They readily breed and do well in captivity. Populations of *Peromyscus* are managed in laboratories such as at the Brookfield Zoo in Brookfield, Illinois, or the Peromyscus Genetic Stock Center at the University of South Carolina. The capture, handling and breeding methodology has been well documented in the scientific literature. Consultation with *Peromyscus* and genetic experts from the Brookfield Zoo and University of Illinois is underway to develop a protection plan that will incorporate handling/breeding methodology to ensure genetic diversity and a viable population. The plan will include a re-release schedule including monitoring ensuring that the population will remain viable post eradication. The Effectiveness and Validation Monitoring program will aid in the development of an effective management program for the Anacapa Deer Mouse by identifying problem areas that would allow changes to the protection plan prior to completion of the baiting.

Changes to the Deer Mouse protection plan have been incorporated into Chapter II, page 17.

H11: The Non-Native Rodent Introduction Prevention Plan has been adequately outlined on page 14. The basic premise is that through active rodent control around all departure points, as well as a strong educational component, there would be a low probability of re-introducing rats on to the island.

H12: The numbers and species of raptors likely affected by the program have been discussed in Chapter IV, page 73. Secondary poisoning of birds of prey is of concern to the AIRP. Mortality of individual non-target birds will be mitigated where possible. However, from an ecological perspective such mortality is only significant if it causes a long term population decline. There are no endemic birds of prey on Anacapa Island. The birds of prey on the Channel Islands are habitat limited, i.e., there are more birds than there is available habitat. Most of the birds of prey, as well as ravens, are killed in the vicinity of Least Tern breeding colonies in an ongoing effort to protect this endangered species from predation. The ongoing nature of predatory bird control around Least Tern colonies suggests that any decrease in predatory birds due to the rat removal on Anacapa will be temporary.

Consultation with the Predatory Bird Research Group (PBRG), University of California, Santa Cruz, is underway to develop mitigation plans for birds of prey. The Effectiveness and Validation Monitoring program will aid in the development of an effective raptor mitigation program which may include any or all aspects of the mitigation as outlined on page 73.

[i] Warheit, K. I., Harrison, C. S., & Divoky. G. J. 1997. *Exxon Valdez* Oil Spill Seabird Restoration Project Final Report. Pacific Seabird Group Technical Publ. 1.

[ii] Burger, J. & Gochfeld, M. 1994. Predation and effects of humans on island-nesting seabirds. In: Seabirds on Island: Threats, Case Studies and Action Plans. D. N. Nettleship, J. Burger, & M. Gochfeld, eds. BirdLife International, Cambridge. pp: 39-67.

ANACAPA ISLAND RESTORATION PROJECT

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Index

air quality, 36
American Trader, 86, 84, 87
Anacapa, iv, 3, 4, 5, 6, 7, 13, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 65, 67, 68, 69, 70, 72, 73, 74, 75, 76, 77, 78, 81, 82, 83, 85, 86, 87, 84, 85, 88, 108, 109, 113, 114, 116, 117
anticoagulant, 21, 22, 23, 24, 27, 48, 49, 52, 59, 63, 65, 66, 68, 70, 81, 85, 112, 113, 115
Ashy Storm Petrel, 16, 39

bait, 5, 6, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 81, 83, 84, 85, 117
bait shyness, 5, 27, 52
biological control, 29
black abalone, 45
Black rat, 4
Black Rat, 15, 18, 19
brodifacoum, 21, 22, 24, 25, 27, 48, 49, 50, 51, 53, 62, 63, 64, 65, 66, 68, 70, 74, 76, 77, 79, 81, 84, 111, 113, 116, 117
bromethalin, 27
Brown Pelican, 9, 14, 40, 41

California Sea Lion, 9, 31, 42, 43
cliffsides, 5, 20, 21, 22, 23, 24, 25, 26, 29, 51, 54, 66, 67, 83
Climate, 9, 31, 35
Council on Environmental Quality, 15
cumulative impacts, 48, 78

deer mouse, 6, 15, 17, 42, 53, 56, 58, 77, 78
diphacinone, 24, 25, 27, 48, 49, 50, 63, 64, 66, 74, 75, 76, 81
Double-crested Cormorant, 39
Drought, 36

East Island, 21, 15, 18, 19, 20, 22, 23, 25, 26, 27, 51, 56, 76, 83, 84
ecosystem, 5, 18, 11, 20, 22, 25, 29, 48, 53, 59, 60, 61, 68, 69, 77, 86, 87, 117
Endangered Species Act, 15, 26, 40, 54
endemic, 6, 17, 18, 15, 17, 37, 38, 41, 54, 78, 117
Environmental Consequences, 5, 88
EPA, 21, 18, 27, 62, 68, 74, 77, 111

Frenchy's Cove, 15, 46, 83

Geology, 9, 31, 33, 34, 113
granivores, 41

Harbor seals, 13, 44
Herpetofauna, 8, 9, 11, 10, 14, 31, 37, 55, 57, 70

invertebrates, 18, 19, 13, 14, 37, 41, 45, 53, 54, 61, 62, 64, 68, 72, 75, 78, 86, 87
Invertebrates, 8, 9, 10, 13, 31, 36, 37, 45, 47, 55, 57, 68
Island Conservation and Ecology Group, 4, 11, 84, 86, 113, 114, 117, 118

landbird, 6, 38, 73, 74, 75

marine mammal, 6, 108, 109
Middle Islet, 19, 22, 25, 34
Miocene, 33, 34
Mitigation, 6, 76, 78, 84, 86

NEPA, 4, 11, 19, 84
Non-Target Impacts, 5, 10, 12, 53
Non-target species, 4, 53, 59

Pacific Seabird Group, 87, 115
Pacific Slender Salamander, 37
Peromyscus maniculatus anacapae, 15, 41. *See* Anacapa Deer Mouse
pinnipeds, 17, 43, 44, 66, 67, 108
primary exposure, 6, 13, 15, 20, 23, 51, 53, 59, 60, 61, 62, 66, 67, 68, 69, 70, 71, 72, 74, 76, 83
Prince, 4, 18
proposed action, 4, 5, 11, 12, 13, 14, 15, 32, 59, 82, 85, 88
public meetings, 4

Rat Detection Response Plan, 18, 20, 21, 23, 24, 26
Rattus rattus, 15, 19, 40, 49, 50, 111, 113, 117, 118. *See* Black rat
Resources Management Plan, 16
RMP, 16
rodenticide, 5, 6, 11, 12, 13, 14, 15, 19, 21, 24, 27, 29, 48, 49, 50, 51, 52, 53, 54, 58, 59, 60, 61, 62, 63, 65, 66, 68, 69, 70, 71, 72, 74, 75, 77, 78, 81, 82, 83, 85, 86
Rodenticide, 6, 10, 13, 14, 48, 53, 67, 110, 111, 116

San Clemente, 43

San Miguel, 15, 22
San Miguel Island, 22, 43
San Nicolas, 43, 109
Santa Barbara, 4, 12, 18, 32, 33, 36, 37, 40, 41, 42, 43, 53, 82, 85, 86, 87, 108, 109, 110, 112, 113, 115, 117
scoping, *84*
seabird, 6, 39, 65, 72, 81, 82, 86, 84, 109, 113
secondary exposure, 6, 13, 14, 24, 59, 60, 61, 62, 63, 64, 65, 66, 72, 74, 75, 76, 77, 78
Side-blotched Lizard, 37
Soils, 9, 31, 34
Southern Alligator Lizard, 37
Sutil, 4, 18

Target species, 4
the American Traders Trustee Council, 84
The National Historic Preservation Act;, 15

U.S. Fish and Wildlife Service, 39, 40, 86, 118

vertebrate, 4, 16, 41, 60, 79, 81, 85
visitation, 4, 6, 10, 15, 18, 31, 43
Visitation, 4, 6, 8, 11, 10, 12, 15, 18, 82, 85
Vitamin K1, 27, 84

Warfarin, 5, 19, 27, 52, 84

Xantus' Murrelet, 16, 19, 39, 41, 110, 115, 117

zinc phosphide, 27

Appendix A

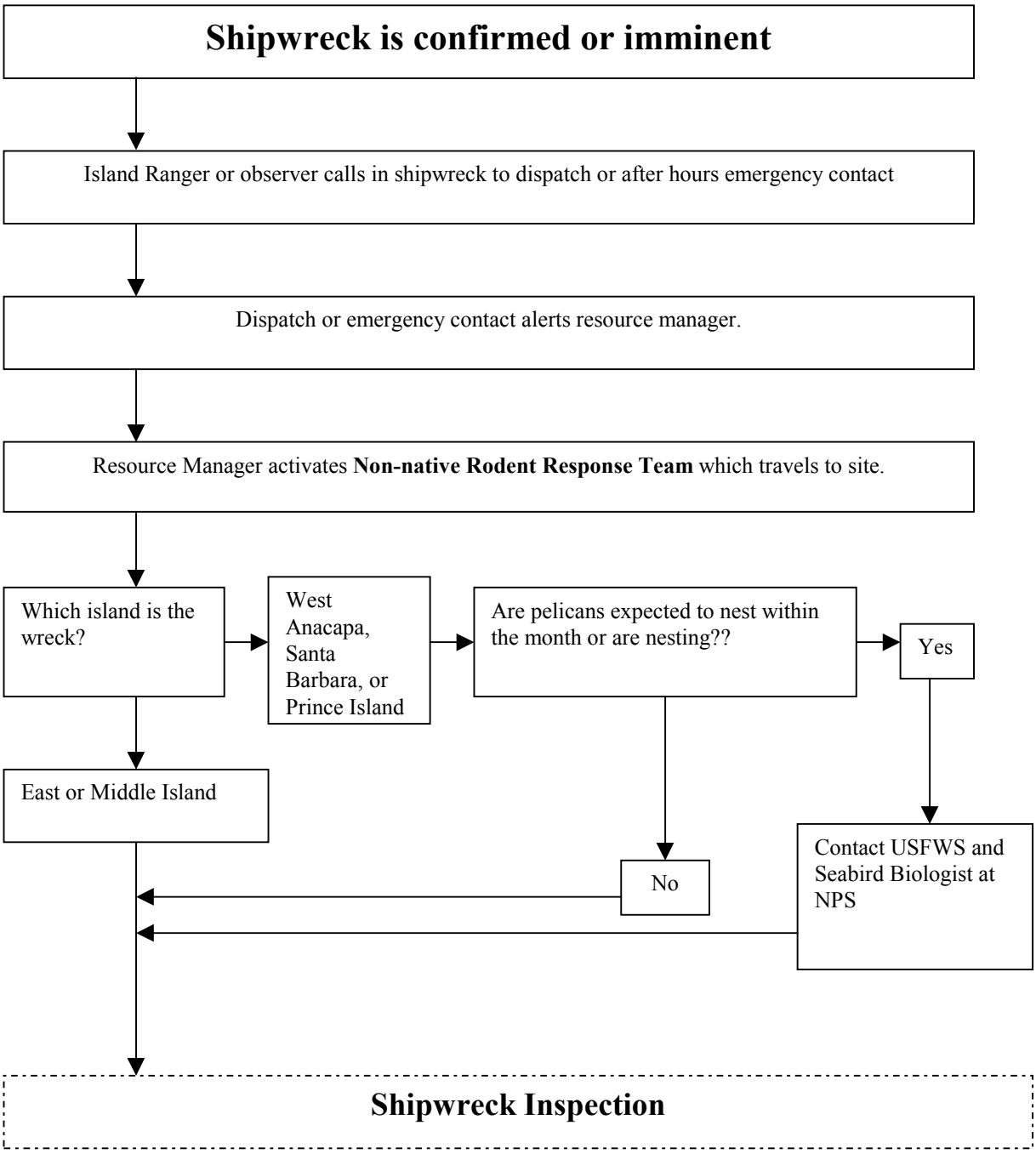
This appendix is divided into two sections: the Shipwreck Response Plan and the Rat Detection Response Plan. Each of the response plans are in flowchart form, designed for ease of reading and required steps to implement an eradication. The objective of this document is to provide a pathway for managers and personnel to successfully implement the eradication of introduced rodents. This flow chart is designed to serve as a guide for immediate action. However, the recommended actions should be followed up as soon as possible by a meeting of the AIRP working group to examine the available information and design the best possible plan. The Shipwreck Response Plan is designed to direct actions of managers and personnel toward implementing the Rat Detection Response Plan. Once rats are confirmed on the islands, the Rat Detection Response Plan directs personnel and managers toward a resolution, i.e., eradication of the introduced rodent. If rats would be introduced via transport of equipment or goods, the Rat Detection Response Plan would be implemented, bypassing the Shipwreck Response Plan.

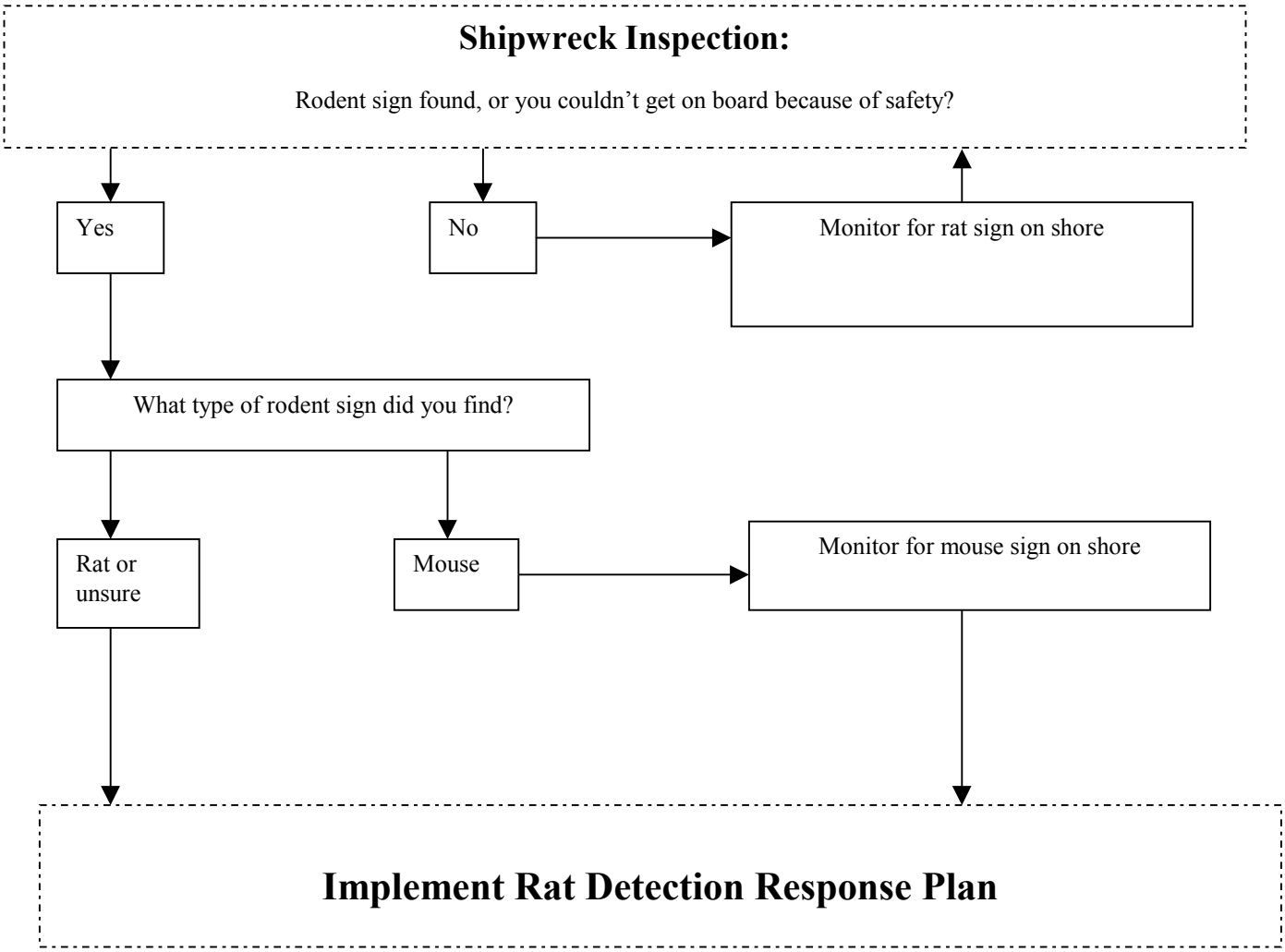
The plans follow on the next pages.

AIRP: Shipwreck Response Plan

Objective: The objective of this plan is to provide a pathway for managers and personnel to respond to shipwrecks that potentially could introduce non-native rodents to Anacapa Island.

Instructions: Follow the flowchart to implement an appropriate action. A description for each box is attached. Be clear about each step before moving on.

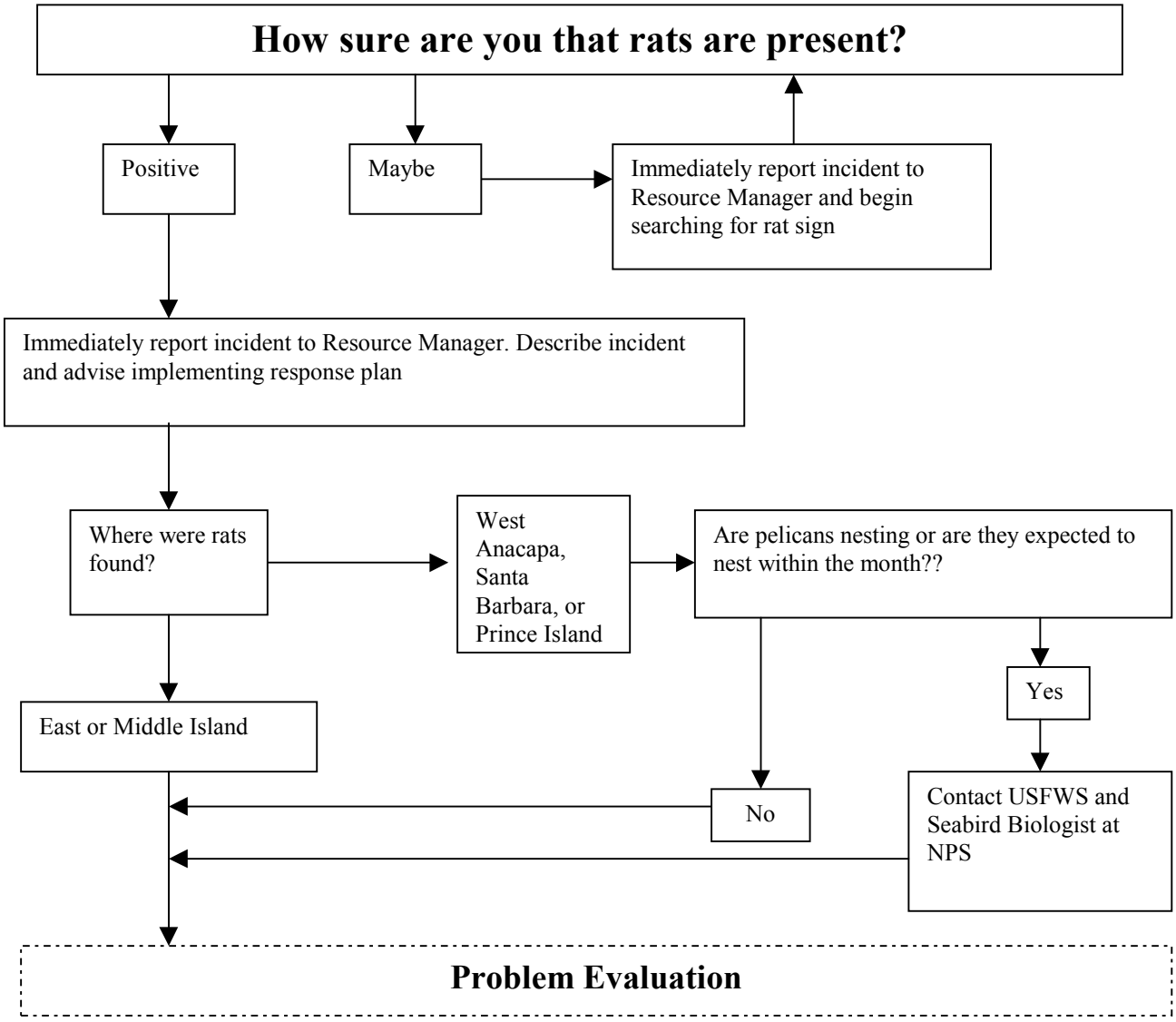


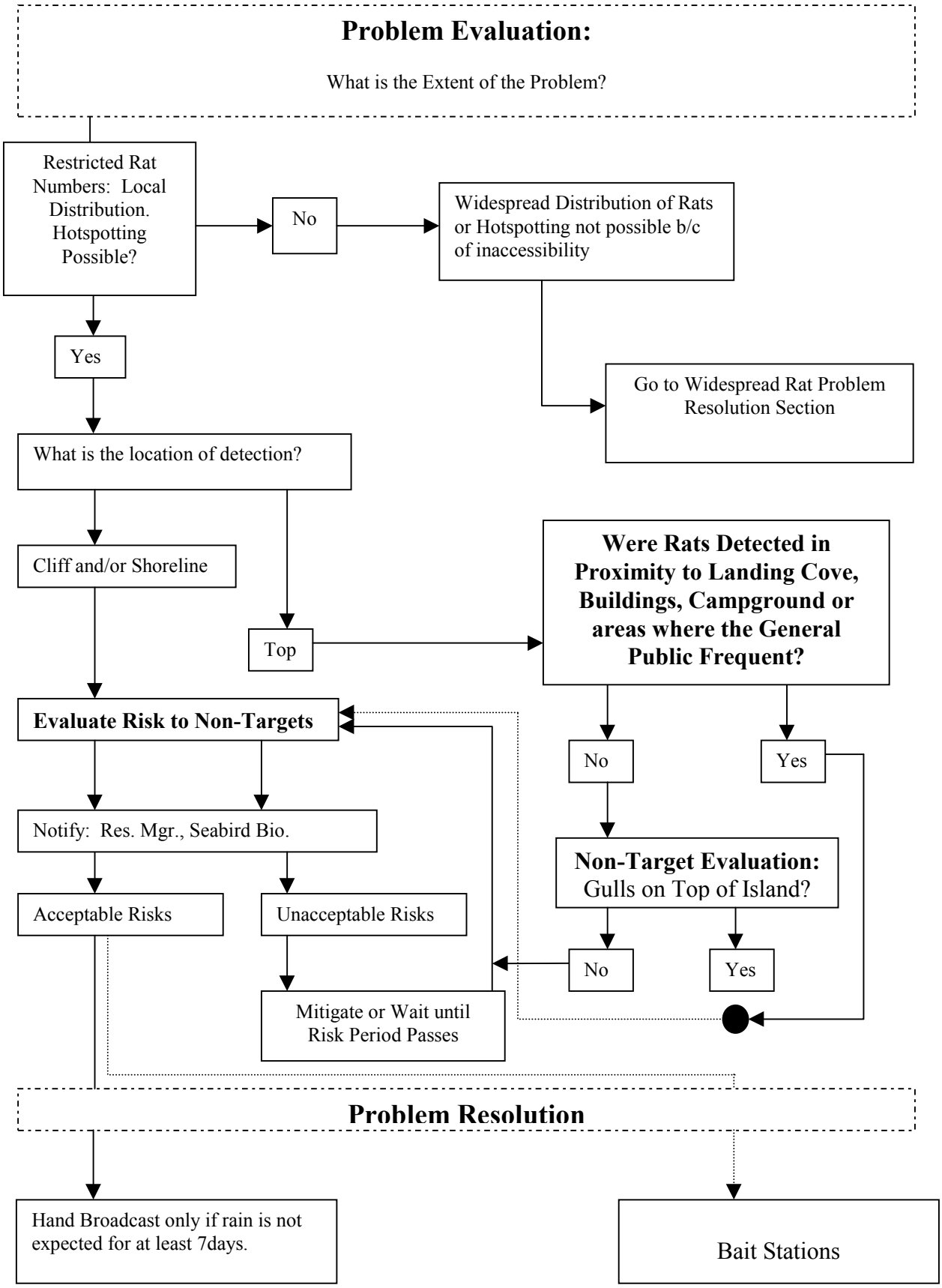

Shipwreck Inspection:
Rodent sign found, or you couldn't get on board because of safety?
Yes
No
Monitor for rat sign on shore
What type of rodent sign did you find?
Rat or unsure
Mouse
Monitor for mouse sign on shore
Implement Rat Detection Response Plan

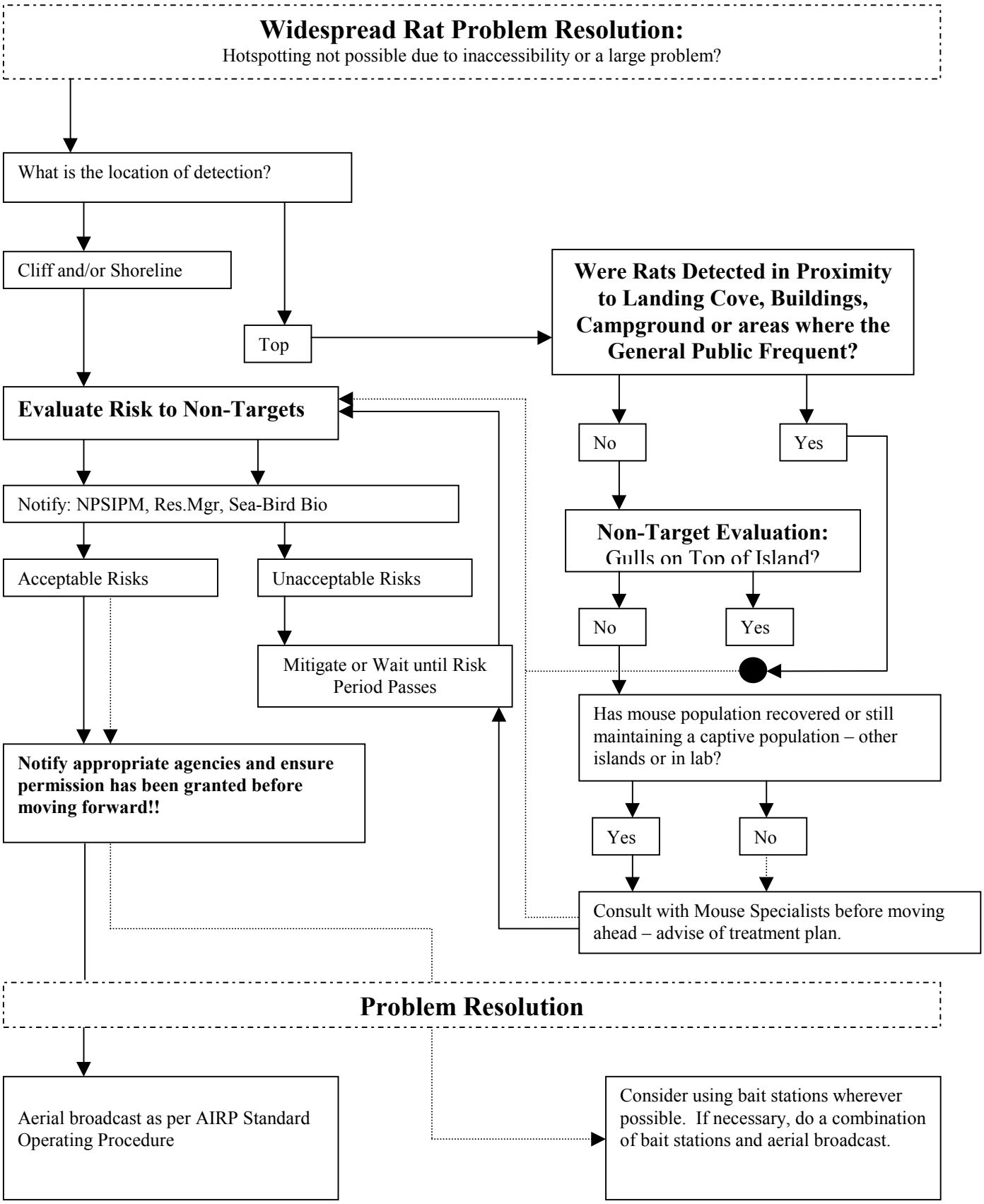
AIRP: Response Plan for Positive Detection of Rats Post Eradication

Potential Situation: Rats have been detected due to incidental introduction or shipwreck. Tools and budgets necessary are available.

Instructions: Follow the flowchart to implement an appropriate action. Be clear about each step before moving on.




Problem Evaluation:
What is the Extent of the Problem?
Restricted Rat Numbers: Local Distribution. Hotspotting Possible?
No
Widespread Distribution of Rats or Hotspotting not possible b/c of inaccessibility
Go to Widespread Rat Problem Resolution Section
Yes
What is the location of detection?
Cliff and/or Shoreline
Top
Were Rats Detected in Proximity to Landing Cove, Buildings, Campground or areas where the General Public Frequent?
Evaluate Risk to Non-Targets
No
Yes
Notify: Res. Mgr., Seabird Bio.
Non-Target Evaluation: Gulls on Top of Island?
Acceptable Risks
Unacceptable Risks
No
Yes
Mitigate or Wait until Risk Period Passes
Problem Resolution
Hand Broadcast only if rain is not expected for at least 7days.
Bait Stations


Widespread Rat Problem Resolution:
Hotspotting not possible due to inaccessibility or a large problem?
What is the location of detection?
Cliff and/or Shoreline
Top
Were Rats Detected in Proximity to Landing Cove, Buildings, Campground or areas where the General Public Frequent?
Evaluate Risk to Non-Targets
No
Yes
Notify: NPSIPM, Res.Mgr, Sea-Bird Bio
Non-Target Evaluation:
Gulls on Top of Island?
Acceptable Risks
Unacceptable Risks
No
Yes
Mitigate or Wait until Risk Period Passes
Has mouse population recovered or still maintaining a captive population – other islands or in lab?
Notify appropriate agencies and ensure permission has been granted before moving forward!!
Yes
No
Consult with Mouse Specialists before moving ahead – advise of treatment plan.
Problem Resolution
Aerial broadcast as per AIRP Standard Operating Procedure
Consider using bait stations wherever possible. If necessary, do a combination of bait stations and aerial broadcast.

Appendix B

The Birds of Channel Islands National Park

(adapted from: Jones et al. 1985)

Symbols:

Abundance: a – abundant; c – common; u – uncommon; o – occasional; r – rare; x – accidental

Seasonal Occurrence: FR – former resident; FT – fall transient; FV – former visitor; IR – introduced resident; R – resident; SR – summer resident; ST – spring transient; SV – summer visitor; V – visitor; WV – winter visitor

- - breeds on islands noted.

	San Miguel Island	Santa Rosa Island	Santa Cruz Island	Anacapa Island	Santa Barbara Island
LOONS					
Red – throated Loon	oWV	uWV	uWV	oWV	oWV
Pacific Loon	cWV oSV	aWV oSV	cWV	uWV	cWV
Common Loon	cWV oSV	cWV	uWV	oWV	oWV
GREBES					
Horned Grebe	uWV	cWV	uWV		
Eared Grebe	aWV oSV	aWV oSV	aWV	aWV	aWV
Western Grebe	uWV	cWV	cWV	oWV	oWV
ALBATROSSES					
Black – footed Albatross	rV		rV		
SHEARWATERS					
Northern Fulmar	oWV	uWV	uWV	oWV	oWV
Pink – footed Shearwater	oSV	oSV	oSV	oSV	oSV
Sooty Shearwater	uSV	uSV	uSV	uSV	uSV
Black-vented Shearwater	rWV		rFT		rFT
STORM-PETRELS					
Leach's Storm-Petrel*	uSR				
Ashy Storm-Petrel*	cSR		uSR		cSR
Black Storm-Petrel*					cSR

TROPICBIRDS					
Red-billed Tropicbird	rSV		xFT	xST	xFT
PELICANS					
Brown Pelican	aV	aV	rR*	aR*	aR*
CORMORANTS					
Double – crested Cormorant	Cormorant cR*	cV	cR*	cR*	cR*
Brandt's Cormorant*	aR	aR	aR	aR	aR
Pelagic Cormorant*	cR	cR	cR	cR	uR
FRIGATEBIRDS					
Magnificent Frigatedbird	xST			rSV	xSV
HERONS, EGRETS, BITTERNS					
Great Blue Heron	oV	uV	uV	oV	oV
Cattle Egret	xWV	oWV	oWV	oWV	rWV
Green-backed Heron			oST oFT	xFT	
Black-crowned Night-Heron		xWV	rST		xST
GEESE, DUCKS					
Greater White-fronted Goose		oFT		FV	
Snow Goose	xWV	oWV	oWV	xFT	
Brant	rWV	oWV	oWV	xST	oST
Canada Goose	xWV	oWV	oWV		rWV
Wood Duck			rFT		
Green-winged Teal		cWV	oWV	xWV	
Mallard		oWV xSV	oWV		
Northern Pintail	xSV rFT	cWV	oWV		xFT
Blue-winged Teal		oFt oST	oFT oST		
Cinnamon Teal	xFT	uWV	uWV	xFT	
American Wigeon		cWV	xFT		
Surf Scoter	aWV oSV	aWV oSV	aWV oSV	aWV	cWV
White-winged Scoter	cWV	cWV oSV	cWV	oWV	rST
Red-breasted Merganser	uWV	uWV	uWV	oWV	xST
Ruddy Duck	rFT	oWV	xSV		
OSPREY, HAWKS, EAGLES					
Osprey	rFT		oFT xST	rFT rST	rFT
Bald Eagle	FR	FR oWV	FR	FR	FR xV
Northern Harrier	oWV xSV	oWV xSV	oWV	oWV	oWV

Sharp-shinned Hawk	oFT	oWV	uWV		
Cooper's Hawk	oFT oST	oWV	uWV		rFT
Red-tailed Hawk	uR*	uR*	uR*	uR*	xSV uWV
Golden Eagle	xV	rV	oWV		
FALCONS					
American Kestrel*	uR	cR	cR	uR	uR
Merlin	rFT rST	oWV	oWV		xST
Peregrine Falcon	FR uIR*	FR oV	FR oV	FR oWV	FR oWV
PHEASANTS, TURKEYS, QUAIL					
Chukar*		uIR			
Common Peafowl*			uIR		
Wild Turkey*			uIR		
California Quail*		cIR	cIR		
RAILS, COOTS					
Virgina Rail			rWV		xFT
Sora		xFT	oST	xST	xSV
American Coot		xWV	uWV xSV+	uWV	rFT
PLOVERS					
Black-bellied Plover	aWV uSV	aWV uSV	cWV uSV	rWV	uWV
Lesser Golden-Plover	oV	xFT	xWV		xST
Snowy Plover	cR*	cR*	cR*		xST
Semipalmated Plover	oWV	oFT oST	oFT oST		xFT
Killdeer	oFT rST	cR*	cR*	oFT	rST
Mountian Plover	FV	oWV			
OYSTERCATCHERS					
American Oystercatcher			rR*	xR+	xSV
Black Oystercatcher*	cR	cR	cR	cR	cR
SANDPIPERS, PHALAROPES					
Greater Yellowlegs	oFT oST	oFT oST	oFT oST	xFT	
Solitary Sandpiper	xFT	xFT	oFT	xFT	
Willet	cWV uSV	aWV uSV	cWV uSV	uWV	uWV oSV
Wandering Tattler	cWV uSV	cWV oSV	cWV oSV	cWV uSV	cWV uSV
Spotted Sandpiper	oWV	oWV	uWV	uWV	oST oFT
Whimbrel	cWV uSV	cWV uSV	cWV uSV	oWV	cWV uSV

Long-billed Curlew	oV	uWV	oFT oST		uSV
Marbled Godwit	uWV oSV	cWV uSV	uWV oSV		rST
Ruddy Turnstone	cWV	cWV oSV	uWV oSV	oST	oFT oST
Black Turnstone	aWV uSV	aWV oSV	cWV uSV	cWV	uWV oSV
Surfbird	rST	oFT	xST	rFT rST	xST
Sanderling	cWV	aWV oSV	aWV oSV	xFT	rFT
Western Sandpiper	oFT oST	uWV	oFT oST	oFT	xST
Least Sandpiper	uWV	cWV	oWV	xFT	rFT rST
Baird's Sandpiper		rFT	xFT		
Pectoral Sandpiper	rFT	oFT	xFT		xFT
Dunlin	oFT	uWV	oWV	xST	
Short-billed Dowitcher	rFT rST	xSV	xFT	xFT	xST
Long-billed Dowitcher	xFT	oWV		xFT	
Common Snipe		rFT rST	uWV	xFT	rFT
Red-necked Phalarope		oST oFT	oST	oST oFT	
Red Phalarope		oST oFT	oST	oSt oFT	
JAEGERS, GULLS, TERNS					
Parasitic Jaeger		xWV	oV	oV	
Franklin's Gull	xST			rFT rST	xST
Bonaparte's Gull	oWV	uWV	uWV	oWV	oWV
Heermann's Gull	cWV oSV	aWV oSV	aWV oSV	cWV oSV	uWV oSV
Mew Gull	uWV	uWV	cWV	uWV	
California Gull	cWV	cWV	cWV	uWV	uWV
Herring Gull	uWV	uWV	uWV	xST	oWV
Western Gull*	aR	aR	aR	aR	aR
Glaucous-winged Gull	cWV	oWV	oWV	oWV	oWV
Black-legged Kittiwake	uWV	uWV	uWV	uWV	uWV
Royal Tern	cWV	cWV	cWV	oWV	oWV
Forster's Tern	xFT	oFT		xST	
AUKS, MURRES, PUFFINS					
Common Murre	oWV FR	uWV	uWV	uWV	xST
Pigeon Guillemot*	cSR	cSR	cSR	uSR	cSR
Xantus' Murrelet*	uSR		uSR	uSR	aSR

Cassin's Auklet	aR*	oV	uR*	oV	uR*
Rhinoceros Auklet	oWV	oWV	oWV	oWV	oWV
Tufted Puffin	FR	rV	FR	FR	FR
	xSV				
PIGEONS, DOVES					
Rock Dove	oV	oV	oV	oV	oV
Band-tailed Pigeon	oST	oST	uWV		oSV
	xSV				
White-winged Dove	xFT	rFT		rFT	rFT
		xWV			rST
Mourning Dove	cSV	cR*	cR*	cSV	cSV+
				rWV	rWV
BARN-OWLS					
Common Barn-Owl*	uR	uR	uR	uR	uR
TYPICAL OWLS					
Burrowing Owl	uWV	uWV	uWV	uWV	uR*
Long-eared Owl	oWV	xST			oV
Short-eared Owl	rWV	uWV			uR*
Northern Saw-whet Owl			uR*		
GOATSUCKERS					
Lesser Nighthawk			rSt	oFT	uST
					rFT
Common Poorwill			uWV	rST	xFT
SWIFTS					
Chimney Swift					rST
Vaux's Swift	xST	oFT	uFT	uFT	oFT
		oST	oST	oST	oST
White-throated Swift	rST	uR*	cR*	uSR*	oSV
HUMMINGBIRDS					
Anna's Hummingbird	cSR*	oST	uR*	rST	oST
		xFT		oFT	oFT
Costa's Hummingbird	rST		oST	rST	oST
	rSV		rFT	rSV	rFT
Rufous Hummingbird	xST	xFT	xWV		uST
		xST	xST		xFT
Allen's Hummungbid	cR*	cR*	cR*	cR*	oFT
					oST
KINGFISHERS					
Belted Kingfisher	oWV	oV	uWV	uWV	uWV
					xSV
WOODPECKERS					
Lewis' Woodpecker		rWV	uWV	xFT	xFT
Acorn Woodpecker	xST	rWV	cR*	rWV	xFT
Yellow-bellied Sapsucker			oWV		
Red-breasted Sapsucker	rWV	uWV	uWV	xFT	
Northern Flicker	uWV	uWV	cR*	uWV	uWV

					xSV
TYRANT FLYCATCHERS					
Olive-sided Flycatcher	oST		oFT	xST	uST
			oST		oFT
Western Wood-Pewee	uST	uST	cST	uST	cST
		uFT	cFT	uFT	uFT
Willow Flycatcher			oFT	oST	uST
				oFT	uFT
Hammond's Flycatcher	rST	xST		rST	oST
Dusky Flycatcher					oST
Gray Flycatcher				rST	oST
Western Flycatcher	cST	cSR*	uSR*	rSR*	cST
	cFT				cFT
Black Phoebe	uR+	cR*	uSR*	uWV	uWV
Say's Phoebe	cWV	vWV	cWV	cWV	cWV
	xSV				
Ash-throated Flycatcher	oST		uSR*	uST	cST
	oFT			cFT	cFT
Cassin's Kingbird	xST	rV	xFT	oFT	rST
					oFT
Western Kingbird	oST	oST	uST	oST	uST
		xFT	uFT	oFT	uFT
Scissor-tailed Flycatcher	xST			rST	xST
LARKS					
Horned Lark	aR*	aR*	aR*	oWV	aR*
				FR	
SWALLOWS					
Purple Martin			xFT		rST
Tree Swallow	xST	oST		xFT	oST
	xFT				
Violet-green Swallow	xSV	xFT	xST	xST	oST
		xSV	xSV	xFT	
Northern Rough-winged Swallow		xST	xST		oST
	xFT	oFT			
Cliff Swallow	xST	xST	oST	oST	oSV
	xFT	xFT	rFT	oFT	
Barn Swallow*	cSR	cSR	cSR	cSR	uSR
JAYS, CROWS					
Scrub Jay*			cR		
Clark's Nutcracker			rWV		
Common Raven	FR	aR*	aR*	uR	FR
	oV				xST
BUSHTITS					
Bushtit			cR*	xSV	
NUTHATCHES					
Red-breasted Nuthatch	uWV	uWV	uR*	xFT	oST
					oFT
White-breasted Nuthatch			rWV		

CREEPERS					
Brown Creeper		rWV	oWV		
WRENS					
Rock Wren*	cR	cR	uR	uR	uR
Canyon Wren			rR		
Hermit Warbler	oST	oST	oST	cST	cST
	xFT	uFT	uFT	oFT	oFT
				xWV	
Palm Warbler	rFT	xFT	oFT		xST
	xST				oFT
Blackpoll Warbler		xST	oFT	xFT	rST
		rFT			oFT
Black-and-white Warbler	xFT	xST	xST		oST
			xWV		rFT
American Redstart	xST	oFT	oFT	xST	rST
	xFT			oFT	oFT
Ovenbird					oST
					oFT
Northern Waterthrush		xFT	rFT	xST	rST
MacGillivray's Warbler	xFT	oFT	oST	oST	uST
			oFT	oFT	uFT
Common Yellowthroat	uWV	oFT	uWV	oFT	oST
		xWV	xSV	xST	xSV
					oFT
Wilson's Warbler	uST	uST	uST	uST	uST
	uFT	uFT	uFT	cFT	cFT
			xWV		
Yellow-breasted Chat	xST	xFT	xFT	xST	oST
				xFT	xFT
TANGERS					
Summer Tanger			xSV		rST
Western Tanger	oST	oST	oST	uST	uST
	oFT	uFT	uFT	uFT	cFT
GROSBEAKS, BUNTINGS, SPARROWS					
Rose-breasted Grosbeak	xFT		rST		uST
					oFT
Black-headed Grosbeak	uST	oST	cSR*	uST	cST
	oFT	oFT	xWV	uFT	uFT
Blue Grosbeak	xST	oFT	rST		oST
			rFT		rFT
Lazuli Bunting	oST	oST	uST	cST	cST
		oFT	uFT	uFT	uFT
Indigo Bunting	xST			rST	uST
					oFT
Green-tailed Towhee	xST		oFT	oFT	oST
	xFT		xWV		oFT

Rufous-sided Towhee	oFT	cR*	cR*	oWV	uFT
	xST				rWV
Rufous-crowned Sparrow*			cR	uR	
Chipping Sparrow	uST	cSR*	cSR*	cSR*	uST
	uFT		xWV		cFT
Clay-colored Sparrow			xFT	xFT	oFT
					xST
Brewer's Sparrow				xST	xST
				rFT	rFT
Vesper Sparrow		oFT	oFT	oFT	oST
					uFT
					oWV
Lark Sparrow		uFT	xST	oST	oST
		oWV	cWV	xSV	oFT
				uFT	
Black-throated Sparrow			xFT	xST	oST
				oFT	rFT
Lark Bunting					rFT
Savannah Sparrow	cWV	cWV	cWV	uST	cWV
				cFT	
Grasshopper Sparrow			uSR*	xST	rST
Fox Sparrow	oWV	oWV	cWV	oST	oWV
				oFT	
Song Sparrow	aR*	aR*	uR*	xFT	FR
Lincoln's Sparrow	oST	oFT	uWV	oWV	oWV
	oFT	xWV			
Golden-crowned Sparrow	uWV	cWV	aWV	cWV	cWV
White-crowned Sparrow	cWV	aWV	aWV	aWV	aWV
Dark-eyed Junco	oST	cWV	cWV	oST	uST
				cFT	cFT
Chestnucollared Longspur					rFT
ORIOLES, BLACKBIRDS					
Bobolink	xST	xFT		oFT	oST
	rFT				oFT
Red-winged Blackbird		oST	uR*	oFT	oST
		oFT			oFT
Tricolored Blackbird		xFT	oST		rST
Western Meadowlark*	cR	aR	cR	cR	cR
Yellow-headed Blackbird	rFT	oST	oST	oST	oST
		oFT	oFT	oFT	oFT
Brewer's Blackbird	oST	oST	oST	oST	oST
	oFT			oFT	oFT
Brown-headed Cowbird	oFT	uWV	uWV	oST	uST
	xST			uFT	uFT
Hooded Oriole	xST	xFT		oFT	oST
					oFT

Northern Oriole	oST	xST	oST	oST	uST
		oFT	oFT	uFT	uFT
FINCHES					
Purple Finch	xST	oWV	uWV		oST
House Finch	aR*	aR*	cR*	cR*	FR
					oV
Red Crossbill			oV		
Pine Siskin		xST	uWV	oST	rWV
				oFT	
Lesser Goldfinch	uSR*	cR*	cR*	xST	oST
				uFT	uFT
Lawrence's Goldfinch	xST	oST	oST	oST	oST
		oFT	oFT	oFT	oFT
			xWV		
American Goldfinch	xWV	oWV	oWV		rST
	xSV				
OLD WORLD SPARROWS					
House Sparrow	xST	xST	xST		oST
		FR			xFT

ACCIDENTAL SPECIES

Pied-billed Grebe (SMI, SRI)
Least Storm-Petrel (SMI)
Brown Booby (SMI)
American White Pelican (AI)
Great Egret (SRI)
Snowy Egret (SRI, SCI, SBI)
Northern Shoveler (SRI, SCI)
Lesser Scaup (SRI, AI)
Harlequin Duck (SMI)
Black Scoter (SMI, SRI, SCI)
Common Golden Eye (SRI, SCI)
Black-shouldered Kite (all islands)
Swainson's Hawk (SCI)
Rough-legged Hawk (SCI, SBI)
Prairie Falcon (SRI, SCI, SBI)
Black-necked Stilt (SCI)
American Avocet (SCI)

Least Flycatcher (SRI)
Eastern Flycatcher (SMI, SRI, SBI)
Bank Swallow (SMI, SBI)
American Crow (SRI, AI)
American Dipper (SCI)
Gray Catbird (SCI)
Bendire's Thrasher (AI, SBI)
Red-throated Pipit (SMI, SCI)
Gray Vireo (SBI)
Philadelphia Vireo (AI, SBI)
Red-eyed Vireo (SBI)
Lucy's Warbler (SCI)
Northern Parula (SMI, SBI)
Cape May Warbler (SRI, SBI)
Black-throated Blue Warbler (SMI, SRI)
Black-throated Green Warbler
(SMI, SCI, SBI)

Lesser Yellowlegs (SCI)
Upland Sandpiper (SBI)
Red Knot (SMI, SRI)
Wilson's Phalarope (SBI)
Pomarine Jaeger (SRI, SCI, AI, SBI)
Ring-billed Gull (SMI, SCI, SBI)
Thayer's Gull (SMI, SCI, AI)
Glaucous Gull (SMI)
Caspian Tern (SRI)
Artic Tern (SRI, SCI)
Craveri's Murrlett (SBI)
Horned Pufin (SMI, AI)
Spotted Dove (SBI)
Ringed Turtle-Dove (SBI)
Flammulated Owl (SBI)
Great Horned Owl (SBI)
Black Swift (SCI, AI)
Calliope Hummingbird (SBI)
Nuttall's Woodpecker (SMI, SRI, SCI)
Northern (Yellow-shafted) Flicker (AI, ABI)
Blackburnian Warbler (SCI, SBI)
Graces's Warbler (SCI)
Bay-breasted Warbler (SRI, SBI)
Kentucky Warbler (SBI)
Canada Warbler (SRI)
Painted Redstart (SCI)
Dickcissel (SBI)
Anerican Tree Sparrow (SCI)
Black-chinned Sparrow (SCI, SBI, AI)
Sage Sparrow (SCI, SBI)
Swamp Sparrow (SCI)
White-throated Sparrow (SCI, AI, SBI)
Harris' Sparrow (SBI)
McCown's Longspur (SBI)
Lapland Longspur (SRI, SBI)
Rusty Blackbird (SRI, SCI)
Scott's Oriole (SCI, AI)

ANACAPA ISLAND- AI
SAN MIGUEL ISLAND- SMI
SANTA CRUZ ISLAND- SCI
SANTA BARBARA ISLAND-SBI
SANTA ROSA ISLAND- SRI

Appendix C
Island Rat Eradications Worldwide

Species	Island	SIZE (HA)	Technique	Reference
R. norvegicus	Cox, Canada	10	Brodifacoum	Kaiser et al. 1997
R. norvegicus	Otata, NZ	15	Brodifacoum & 1080	Veitch & Bell 1990
R. exulans	Korapuki, NZ	17	Brodifacoum	Veitch & Bell 1990
R. rattus	Great Bird, Antigua	20	Brodifacoum	K. Lindsay pers. comm.
R. rattus	Tawhitinui, NZ	21	Brodifacoum	Taylor 1993
Rattus rattus	Ille Aux Aigrettes, Mauritius	25	Brodifacoum	B. Simmons, pers. comm.
R. rattus	Somes, NZ	32	Brodifacoum	Veitch & Bell 1990
R. norvegicus	Titi, NZ	32	Brodifacoum	Veitch & Bell 1990
R. exulans	Double, NZ	32	Brodifacoum	Veitch & Bell 1990
R. norvegicus	Lucy, Canada	40	Brodifacoum	Buck 1995
Rattus exulans *Rattus rattus*	12 Islets in the New Caledonia Group	48.5	Brodifacoum	B. Simmons, pers. comm.
R. norvegicus	Rasa, Mexico	60	Brodifacoum	J. Ramirez pers. comm.
R. norvegicus	Ailsa Craig, UK	>60	Warfarin	B. Zonfrillo, pers. comm
Rattus exulans	Onoeo, Pitcairn Group, Pacific	62	Brodifacoum	B. Simmons, pers. comm.
Rattus rattus *Mus musculus*	Flat Island, Mauritius	67	Brodifacoum	B. Simmons, pers. comm.
R. rattus	San Roque, Mexico	70	Brodifacoum & Bromethalin	Tershy & Croll 1996
Rattus exulans	Ducie, Pitcairn Group, Pacific	74	Brodifacoum	B. Simmons, pers. comm.
Rattus exulans	Raratoka (Centre Island), NZ	86	Brodifacoum	B. Simmons, pers. comm.
R. norvegicus	Stanley, NZ	100	Brodifacoum aerial spread	Buckle & Fenn 1992
Rattus rattus	Bird Island, Seychelles	101	Brodifacoum	B. Simmons, pers. comm.
R. norvegicus	Mokoia, NZ	133	Brodifacoum	Veitch & Bell 1990
Rattus exulans	Long Island, NZ	142	Brodifacoum	B. Simmons, pers. comm.
Rattus exulans	Putauhini, NZ	144	Brodifacoum	B. Simmons, pers. comm.
R. norvegicus	Breaksea, NZ	170	Brodifacoum	Veitch & Bell 1990
R. norvegicus	Whale, NZ	173	Brodifacoum	Veitch & Bell 1990
Rattus exulans	Inner Chetwode, NZ	195	Brodifacoum	B. Simmons, pers. comm.
R. norvegicus	Brown, NZ	200	Bromadiolone	D. Veitch pers. comm.
Rattus exulans *Rattus norvegicus*	Whakaterepapanui, Puangiangi and Tinui, NZ	220	Brodiafacoum	B. Simmons, pers. comm.

R. norvegicus	Ulva, NZ	259	Brodifacoum	Taylor 1993
R. rattus	St. Paul, Indian Ocean	800	Brodifacoum aerial spread	T. Micol pers. comm.
R. norvegicus	Kapiti, NZ	2000	Brodifacoum aerial spread	D. Veitch pers. comm.
R. norvegicus	Langara, Canada	3000	Brodifacoum	Kaiser et al. 1997

Appendix D (McChesney et al. 2000)

EXECUTIVE SUMMARY

The Department of Fish and Game (Habitat Conservation Planning Branch) sponsored the Humboldt State University and U.S. Geological Survey to conduct an assessment of potential nesting habitat for Xantus' Murrelets (*Synthliboramphus hypoleucus*) and other small, crevice-nesting seabirds at Anacapa Island, California, in 1997. Both ground and boat techniques were used to search for nests and estimate the number of potential nest sites. We focused on the upper portions of West Anacapa since this islet appeared to possess a considerable amount of accessible, potential habitat. A total of 1,510 (range = 848-1,303) potential nest sites for Xantus' Murrelets and other similiar-sized crevice-nesting seabirds (e.g., Cassin's Auklet *Ptychoramphus aleuticus*) were estimated (not including potential sites in sea caves). The majority of sites were on West Anacapa Island (53.8%), followed by East Anacapa (27.5%) and Middle Anacapa (18.6%) islands. Of these potential sites, 91% were in rock crevices and 9% were in shrubs (mostly Island Buckwheat *Eriogonum grande*). A large proportion of potential nesting habitat occurred in the steep, largely inaccessible slopes and cliffs of the island, particularly on the north side. Sixty-two percent of sites were estimated from either ground or boat surveys, and 38% of sites were counted directly from ground surveys. About 100 additional potential nest sites may occur in sea caves at Anacapa Island, but these were not fully assessed. The remains of 23 eggs at 20 nest sites was the only evidence obtained of murrelet nesting in 1997. Eighteen nests were in sea caves on the West and Middle islands, and two nests were in rock crevices among the cliffs of the West and East islands. Of the 23 eggshells found, 9% were determined to have hatched, 56% had been rodent-depredated, and 35% had unknown fates.

The remains of a rodent-depredated Cassin's Auklet eggshell found in Pinnacle Cave (West Anacapa) represented the first documented nesting record for this species on Anacapa Island. No evidence of nesting by storm-petrels (*Oceanodroma* spp.) was obtained. A large but unmeasured proportion of potential rock crevice sites showed evidence of use by introduced Black Rats (*Rattus rattus*). Rat predation probably has been the main cause for long-term decline in the breeding population of Xantus' Murrelet and possibly other seabird species on Anacapa Island. Other factors that may have contributed to decline have been predation by feral cats (*Felis catus*, now extirpated) and mortality from oil pollution. We estimated only 50-200 breeding pairs of Xantus' Murrelets on Anacapa Island in 1997. These numbers appear low relative to the amount of potential habitat and to numbers that likely bred in the past. In the absence of rats, we consider that several hundred to low thousands of breeding pairs of murrelets could breed at Anacapa Island, based on potential habitat available. Thus, Anacapa Island could be a major colony if restored. Further studies using a variety of techniques are needed to more fully assess population sizes of Xantus' Murrelets and other seabirds, and to assess impacts of small mammals and other threats to seabirds at Anacapa Island. Conservation measures, especially the eradication of rats, likely would enhance murrelet and other seabird populations on Anacapa Island.