



Exotic Fish Management

Introduction

Of the exotic fish species present within park waters, brown and rainbow trout are the most widely distributed, have the greatest potential to invade and colonize traditional, native brook trout waters and have the potential to negatively impact native fish populations including brook trout. The history of hatchery propagated exotic trout releases into streams on private lands adjacent to stream sections that originate within and flow from park lands extends back to 1943 for rainbow trout and 1963 for brown trout. Rainbow trout are native to Pacific slope streams from Alaska to Mexico and brown trout are native to portions of Europe, Asia and Africa. Neither species is native to Virginia. Due to the popularity of the two species from an angler's viewpoint combined with their attributes of hardiness and adaptability, these trout have been introduced into suitable habitat, worldwide.

During the 1970s, these exotic trout species were implicated for having major impacts on populations of native eastern brook trout within Great Smoky Mountains National Park. A similar study within Shenandoah during the early 1980's documented four park streams (North Fork Moorman's, North Fork Thornton, Hughes and Rose Rivers) with coexisting populations of brook and brown trout, a fifth stream (Conway River) containing the same but sharing a common boundary with the Rapidan Wildlife Management Area and an additional park stream (Pass Run) containing coexistent brook and rainbow trout. In addition to encroachment from stocking efforts downstream, the exotic trout had naturalized to self sustaining, breeding populations within these six streams.

Management Needs

The extent of impacts of exotic trout populations, particularly brown trout, on native fish populations including brook trout within park streams is only partially understood. The principal concerns include the potential displacement of the native brook trout population by brown trout over time and ultimately, the extent of park stream reaches that brown trout populations may eventually occupy. Direct predation (brown upon brook) has been detected in the past within park streams in addition to the more apparent competition for limited habitat within the reaches where the two species coexist. Complete displacement by brown trout has been documented within sections of the Rose and Hughes Rivers, particularly following good recruitment years and in the absence of removal efforts. The principal management issues are and will continue to be containing the occupancy by brown trout populations to lower (and therefore accessible) stream reaches and controlling their population sizes within those reaches. Eradication may not be possible since a component of the brown trout populations occur down stream of the park on private lands. An achievable management goal should be the containment of brown trout populations to 5% or less (see attached chart) of the total trout population in each stream which may serve to limit reproduction and prevent displacement.

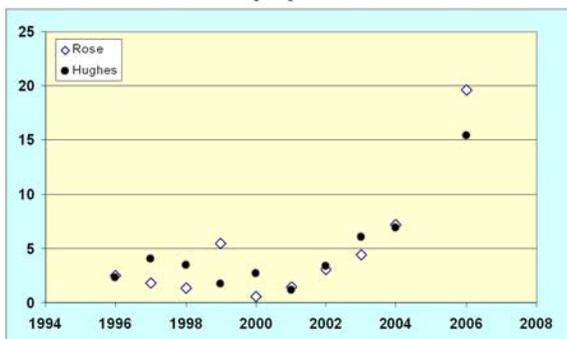
Rainbow trout have the potential to displace native brook trout populations in the lowermost reaches of park streams where the two species currently coexist. Predation is a non issue since rainbow trout principally feed upon aquatic insects. Competition for available habitat and food resources are the primary issues associated with coexistent rainbow trout populations.

Current Procedures

Protection of park aquatic resources can be achieved by physically removing the exotic fish. Exotic trout removals are most efficient and effective during periods of low stream flow in the late summer (August and September). It is possible that exotic trout populations down stream, move up into park reaches during late summer seeking cooler water sources therefore exposing higher numbers to removal efforts.

Removals are accomplished by systematically electrofishing each occupied stream reach, starting at or near the park boundary and progressing upstream. Due to the size of affected stream reaches, a minimum of two backpack units are required along with support staff to net and bucket fish.

Brown trout as a percentage of the total trout population



Brown trout as a fraction of total trout populations. Note that by 2006 brown trout comprised about 20% of the trout population in the Rose River and 15% in the Hughes River.



Exotic Fish Management (continued...)

During ideal, low flow conditions, an experienced crew can cover approximately 1000 meters per day. Ideally, each day should conclude at a well defined habitat break to minimize the likelihood of reoccupancy overnight or over a weekend.

Removals are coordinated with the Virginia Department of Game and Inland Fisheries (VDGIF) and with local Trout Unlimited (TU) chapters for the relocation of live brown or rainbow trout to streams where exotic trout are acceptable. In the event that this assistance is unavailable, all captured exotic trout are discarded well away from the stream, any roads or trails, and preferably concealed to the extent possible behind logs or rocks.



The tiger trout is a sterile hybrid cross between a female brown trout and a male brook trout.

Accomplishments

Since 1993, approximately 2,500 brown trout and 500 rainbow trout have been removed from park streams. Removal efforts have been intermittent due to a combination of late season field staff shortages, years without seasonal staff and/or unfavorable water flow conditions. The latter condition is strongly influenced by tropical weather systems that typically affect the park during late summer.

During sequential years when field staff were available and stream flows were sufficiently low, exotic trout populations have proven to be containable at or below 5% of total trout encountered within an affected stream reach. Following an extended period (1999 - 2005) of non removal years in combination with robust exotic trout recruitment, brown trout populations surged to 18 - 24% of total trout captured within the Rose and Hughes Rivers and a new population had established itself in Brokenback Run.

New fishing regulations have been enacted on the Rose and Hughes Rivers requiring fishermen to euthanize brown trout when caught. Brown trout over seven inches may be creel, and all brown trout under seven inches must be euthanized and disposed of away from the stream and park roads and trails.

A graph of removals by year for Rose, Hughes, North Fork Moormans, and North Fork Thornton Rivers as well as Pass and Brokenback Run's from 1985 to 2010 follows. Brown trout are considered extirpated from North Fork Moormans, and North Fork Thornton Rivers. There is a short section at the lower end of Brokenback Run that contains brown trout but none have been found above that point since the initial effort in 2006.

References

- Atkinson, J. B. 2005. Shenandoah National Park Fisheries Monitoring Program Annual Report for 2004. Natural Resources Branch; Division of Natural and Cultural Resources; Shenandoah National Park, Luray, VA. 46 pp.
- Josephson, Dan. 1982. An Evaluation of Sympatric Populations of Brown and Brook Trout in Four Virginia Streams. Dingell- Johnson Project F- 39- p- 4. M.S. Thesis VPI& SU. SHEN- N- 057.
- Moore, Stephen, et al. 1981. Changes in Standing Crop of Brook Trout Concurrent with Removal of Exotic Trout Species. Great Smokey Mountains National Park. Uplands Field Res. Lab. Research/Resource Management Report No. 37.