Editor’s Note. This is the second in a series of articles by members of the FFF Conservation Committee exploring the need for native fish refuges as tools for conserving and protecting declining native fish populations and their habitat. The first article examined the need for refuges for Pacific salmon and steelhead populations. Rick Williams, conservation vice president for the Western Rocky Mountain Council, and Bob Tabbert, national director for the Southern Council, describe in this article the opportunities for refuge systems for native inland trout in Western and Eastern North America. Although the article focuses on the plight of our declining native trout populations, the situations described and some of the solutions proposed also apply to other coldwater and warmwater species in North America.

By Dr. Richard N. Williams and Robert Tabbert

Biodiversity and Fish Refuges

Biological diversity has long intrigued biologists even when they’ve failed to recognize it or understand its implications. Darwin commented on the obvious but remarkable diversity among beetle species, but he failed at the time of his travels on the HMS Beagle to appreciate the diversity he observed among small ground finches from the Galapagos Islands. Only back in England, after painstakingly working backward through his journals and field notes, did he realize that different islands in the Galapagos were home to various and different species of finches, some island specific, yet all derived from a common ancestor. The finches and their evolutionary story became a central argument in his book Origin of Species.

What does this have to do with fish and refuges? Quite a lot, actually. Like the Galapagos finches, salmon and trout are remarkably diverse with respect to behavior, ecological adaptability and life history types. Even within the salmonids, cutthroat trout, the rainbow/redband and southern rainbow trout complex, and the arctic char complex that circles the subpolar Northern hemisphere are standouts with respect to behavioral and phenotypic diversity. However, recognition of the diversity found within rainbow and cutthroat trout occurred only recently with conservation steps to protect and preserve it following that recognition.

Throughout most of the 20th century, cutthroat trout were thought to be a single species with a distribution running from southern Alaska to California and inland to Montana and Colorado. Pioneering work by Bob Behnke (FFF
The Plight of Native Fish in North America

The distribution, abundance and diversity of nearly all trout species in the Western and Eastern United States declined within their native ranges during the growth of the Euro-American population and the settlement and development of lands throughout North America. Some trout species, like the Apache and Gila trout from the desert Southwest or the Lahontan cutthroat trout from the Great Basin, have declined dramatically enough to warrant protection under the Endangered Species Act (ESA). Others, like Yellowstone cutthroat, westslope cutthroat and redband trout, have undergone widespread declines across historically large distributions, but enough viable populations and genetic diversity still exist so that recent petitions for ESA protection have been denied by the U.S. Fish and Wildlife Service. Nevertheless, future listing attempts are sure to continue for these and other trout taxa.

Trout populations throughout North America have declined for largely the same reasons – the suite of human-caused impacts to the populations themselves and the habitats they depend upon. Impacts include overt ones, such as overharvest, construction of dams, deforestation and water diversions, but they also include less visible impacts to water quality from agricultural practices (sedimentation, temperature, pH, etc.) and the introduction of non-native competitors. Non-native species compete directly with native species as brook trout do in the Western United States with cutthroat and redband trout, and as introduced rainbow trout do with brook trout in Appalachian streams. They can also negatively impact native fish populations through hybridization as occurs between native bull trout and introduced brook trout in the western Rocky Mountains or between introduced rainbow trout and native cutthroat trout subspecies, Gila trout and Apache trout.

2004 Leopold Conservation Award Recipient) in the 1960s led to the recognition of 14 subspecies of cutthroat trout¹ and, later, to descriptions of the substantial geographic and life history diversity found among the various rainbow and redband trout forms that occur from central Alaska to Mexico. Recognizing and understanding the diversity of native cutthroat and rainbow trout dramatically altered the management of Western trout species in the late 20th century and shifted program emphasis toward protection and restoration of native trout species in most Western states.

Many fisheries programs responded to this information on diversity by curtailing or altering long-standing rainbow trout stocking programs in areas where introduced fish interacted competitively or genetically with remaining native fish populations. In 1996 for example, a 60-year-old program of stocking catchable rainbow trout in Oregon’s Metolius River was eliminated. A strong native redband component remained in the river at that time, and wild trout spawning redd numbers have since increased from 158 redds in 1996 to 825 redds in 2001². The Metolius River is now managed with catch-and-release regulations and functions as a refuge for native redband trout and one of the West’s most robust populations of bull trout.

¹. Behnke’s (2002) Trout and Salmon of North America describes this wonderful collage of diversity and its origins and is accompanied by the familiar and beautiful illustrations of Joe Tomelleri.
Why Refuges for Native Fish?

One of the major principles in conservation biology is succinctly captured in the trite-sounding aphorism, “protect the best; restore the rest.” However clichéd it may sound, the phrase accurately describes the core of many of our best ecologically based management recovery programs. In particular, it is relevant for our declining coldwater trout populations throughout North America. Mounting evidence from recent large-scale surveys of native resident salmonids in the Western United States and New England show that species abundances and distributions are shrinking, except for populations in specific locations that are functioning as refuges. Water quality and habitat attributes required by salmonids remain intact in these locations, human disturbance elements are limited, and some locations have management regulations that limit or eliminate harvest. Most of these locations and populations in the Western United States occur within a network of federally protected and managed lands, such as national forests, wilderness areas, wild and scenic rivers (westslope cutthroat in Idaho’s Selway and Middle Fork Salmon rivers), and national parks (westslope cutthroat in Glacier National Park, Yellowstone cutthroat in Yellowstone National Park and greenback cutthroat in Rocky Mountain National Park). Remaining native brook trout populations in New England are found primarily in the Green Mountain and White Mountain National Forest lands and in the large, privately owned northern forest tracts.

The first step in the “protecting the best” strategy requires us to identify where the best remaining wild trout populations are located and to describe their population status. Fortunately, much of this work has been compiled in the last decade or so by federal, state and tribal fisheries managers throughout the country, sometimes in collaboration with private organizations (see Footnotes 3 and 4). Where resident salmonids existed historically, most fisheries resource management agencies have now established programs that focus on identifying, protecting and restoring remaining native salmonid populations. While part of this response represents a laudable, conservation-minded reaction to the general declining abundance of native fish populations, the response is also partly an administrative reaction to the plethora of ESA listing petitions that occurred in the early 1990s.

Trout Species, Conservation Efforts and Potential Refuges

BROOK TROUT

Brook trout are native to much of northeastern North America, particularly Eastern Canada. They occur in northern Minnesota and Wisconsin and in all Atlantic coastal drainages south into Virginia and in higher-elevation streams in the southern Appalachian Mountains. Brook trout exhibit several noteworthy life history types, beyond the typical stream resident life history exhibited by most trout populations. Along the Atlantic coast from Cape Cod north through Hudson Bay, some brook trout move into saltwater bays and estuaries to feed before returning to freshwater systems for spawning. These fish are locally called “salters” or “sea trout,” and few such populations remain. One “salter” population occurs in Red Brook stream in southern Massachusetts near Cape Cod. A permanent reserve was established in 2001 that protects the spawning area for the Red Brook “salter” population.

Lake Superior is home to another unique brook trout life history, where trout from some populations migrate into the lake, feed along the lakeshore, and return to rivers or streams.
to spawn. These brook trout, called “coasters,” were historically noted for their large size; however, overharvesting, habitat destruction and non-native species introductions have reduced “coaster” populations. Efforts are under way using strains of brook trout from Isle Royale in Lake Superior to reintroduce “coaster” populations back into the Lake Superior basin.

Unique strains of brook trout are also found in headwater springs of many northern Michigan, Wisconsin and Minnesota drainages. The brook trout and water bodies – kettle lakes and spring ponds – are relicts of the region’s recent glacial history. Many of these remote spring ponds are found in federal or state forests and likely contain relict pure native brook trout populations that warrant description and protection.

**CUTTHROAT TROUT**

Nowhere in the salmonid world is the diversity and adaptability of trout more evident than in cutthroat trout. While the amazing diversity found in cutthroat trout is recognized today – and celebrated in FFF’s Cuttcatch Program – cutthroat trout were thought to be a single species prior to Behnke’s important work in the 1960s. Behnke’s contribution led to the recognition of 14 subspecies of cutthroat trout, which in turn led to increased protection and restoration efforts for native trout species in most Western states.

Many cutthroat trout subspecies, as described above, occur in locations where existing federal and state land designations and management regulations provide significant levels of protection – similar to those we envision for refuges in some cases. This is particularly true for many of the westslope and Yellowstone cutthroat trout populations that occur in Glacier and Yellowstone National Parks and in Idaho and Montana wilderness areas. Some cutthroat subspecies, such as Lahontan and coastal cutthroat, have relatively large distributions but have few large populations. Other cutthroat trout subspecies, like the Paiute, Willow/Whitehorse and Snake River Finespot, have small natural distributions and presently occur in only a few locations, often with limited population size. Identifying and establishing wild fish refuges for these subspecies would be a boon to their continued persistence.

**REDBAND TROUT**

The term “redband” trout has several meanings. Here, we use it to refer to all native rainbow trout east of the Cascade Mountains in the Columbia, Klamath and Sacramento drainages, as well as the rainbow trout native to six closed internal basins in the Northern Great Basin. Describing the diversity of rainbow and redband trout has been difficult compared to cutthroat trout, where different subspecies were geographically separated by distinct basins or watersheds. The difficulty of accurately describing patterns of diversity within redband trout has also delayed conservation programs from focusing on redband trout until recently. It has been difficult to know what to protect and where to do so.

With that said, it seems ironic that the first formally established trout refuge in the Western United States was created in 2001 in Oregon to preserve redband trout. No such formal refuges exist for cutthroat trout, or even for bull trout,

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6. Two of these subspecies are presently extinct. The yellowfin trout from Twin Lakes, Colorado was extinct shortly after 1900, while the Alvord cutthroat of the northern Great Basin, which survived only in a form hybridized with rainbow trout through the last several decades of the 20th century, now appears extinct.
which are listed as ESA threatened species. The Redband Trout Refuge on the Donner und Blitzen River in southeastern Oregon protects an area surrounding 16 miles of the river where all management decisions are reviewed with respect to their effect on redband trout. Catch-and-release fishing is allowed on the refuge. The refuge was also designated as cattle free, the first time this has ever occurred for a section of wilderness.

Although several rivers in the intermountain West, like the Deschutes, Yakima and McCloud, contain large robust populations of redband trout that are managed with sustainable fishing regulations, most redband trout populations are smaller and occur in smaller watersheds where they are vulnerable to habitat and fishing impacts. Surveying these populations would be a fruitful exercise for the identification of potential wild fish refuges.

**Incentives for Fish Refuges**

We believe that establishment of a nationwide system of wild fish refuges would complement the existing system of national wildlife refuges that has worked so effectively to preserve and enhance previously declining waterfowl populations. A series of native fish refuges would serve to recognize and protect the diversity and legacy of our native fish fauna and provide a secure biological source for restoring many populations throughout their historic ranges.

But how realistic is it to think that a system of fish refuges could actually be created across the country? Many people tend to view conservation-oriented actions like the establishment of reserves or refuges as taking something away from them, rather than as positive actions that provide and assure personal and societal benefits. We further propose that beyond the ethical stewardship responsibility we have to our native fish species (recognized in the FFF founding principles and our FFF Native Fish Policy), there are strong economic and societal benefits to establishing a national system of wild fish refuges. These should act as incentives for investing in a national fish refuge system.

The refuge system we envision would not lock up watersheds and fish populations. Rather, refuges would protect the habitat and water quality needed by fish populations while allowing public access to the watershed for catch-and-release fishing, hiking, boating and other recreational activities that are compatible with sustainable management of the refuge’s fish populations. Additionally, and most powerfully, a nationwide system of wild fish refuges that protects a significant number of fish (and aquatic) species would likely provide significant immunity against frivolous ESA listing petitions – providing in effect, a form of insurance for state and federal fisheries management agencies against unwarranted petitions. Hopefully, incentives like this could help transform the dynamics of native trout management in the interior United States from a reactive to a proactive model, supporting the dual goals of conservation and broad public interest as its core principles.

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