Going to Pot
The impacts of marijuana cultivation on northwest California salmon and steelhead streams
by Scott Bauer
— California Department of Fish and Wildlife —

Northwestern California's rugged coastal watersheds are strongholds for Chinook and coho salmon, as well as steelhead and cutthroat trout. The California coho salmon, listed as threatened under both the California and Federal Endangered Species Acts, still returns to coastal streams each winter to spawn despite declines of at least 70% since the 1960s. Coho fry emerge between March and May, and the young salmon must survive the summer drought typical of the local Mediterranean climate before making their way to the ocean the following spring. Many factors have contributed to the historic decline of coho salmon populations, but over the past several years, scientists from the California Department of Fish and Wildlife (CDFW) have documented a new and emerging threat to salmon, trout, and many other sensitive aquatic species in these watersheds.

A majority of marijuana cultivation sites are diverting stream water for their irrigation needs.

Marijuana cultivation in California's "Emerald Triangle" (Humboldt, Trinity, and Mendocino counties) began in the 1960s and 70s during the back-to-the-land movement. However, the scale and prevalence of marijuana cultivation has increased rapidly since the mid-1990s. This rapid increase is often attributed to the passage of California's medical marijuana legislation, in conjunction with marijuana's continued classification as a federally illegal Schedule I drug. In 1996, California voters passed Proposition 215, the Compassionate Use Act. This legislation allowed for cultivation and use of marijuana for medical purposes. In 2003, state legislators passed Senate Bill 420, a piece of legislation which was intended to clarify the scope of Proposition 215 and to authorize California's Attorney General to set possession and cultivation limits. In a 2010 court case, however, the California Supreme Court ruled that setting limits on the amount of marijuana a patient can legally possess or cultivate is unconstitutional.

The complexities of California's marijuana law coupled with the drug's current federal illegality have presented a serious challenge for those

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FROM THE PERCH — EDITOR’S MESSAGE

For Salmon, Every Day is Migration Day

by Jim Yuskavitch

I am writing this column on May 24, the first annual World Fish Migration Day. Conceived, organized and sponsored by a variety of groups involved with fish conservation throughout the world, there will be events over the course of the week celebrating migratory fish, educating people about the challenges to survival they face and helping people to become involved in fish conservation.

As migratory fish go, wild salmon and steelhead occupy the top of the heap, traveling thousands of miles between when they leave their natal streams to when they return again to spawn, and the gauntlet of dangers they face on that migration is truly daunting.

As readers of The Osprey know, the pages of each issue are devoted to making sure that we have the critical mass of wild fish out there in our streams, rivers and oceans to keep those migrations going by getting out the information wild fish advocates need to achieve that end.

In this edition of The Osprey, we explore some old, recurring issues in familiar places, take a look at emerging issue that might spell trouble for wild salmon and steelhead in the future, and visit salmon and steelhead country we have never been to before.

In the first category is the Columbia and Snake rivers Biological Opinion, once again under scrutiny and criticism for not doing enough to save flagging runs on those river systems.

A new and expanding issue is the emerging problem of illegal marijuana farms in northwestern California, where growers divert water out of important salmon and steelhead nursery streams and dump herbicides and other toxins into those waterways.

We’re also off to explore some new country with a primer on the wild steelhead of Alaska’s Tongass National Forest and proposed large-scale mines in the remote and salmon-rich Transboundary region along the Alaska-British Columbia border. Another story fills us in on restoration work on the Sandy River since the Marmot Dam that hampered fish migration was removed. And finally, a critique of the effort to restore Redfish Lake sockeye salmon, another run whose survival is threatened by a compromised migration route.
Puget Sound Hatchery Steelhead Settlement

Washington Dept. of Fish and Wildlife keeps moving needle on hatchery reform

by Will Atlas

Over the last two years, hatchery reform... — Steelhead Committee —

As an organization dedicated to the conservation and recovery of steelhead and salmon, we have spent more than two decades advocating for hatchery reform as a key step forward towards wild salmonid recovery. For more than a century resource managers and fishing groups have tried and failed to make up for habitat loss and overharvest using hatchery propagation. Now two decades of research have unequivocally demonstrated that hatcheries have not only failed to produce recovery in populations of wild salmon, but have contributed to their decline and continue to hinder their recovery. When breeding in the wild, domesticated hatchery fish born in captivity and selected for traits that confer success in the hatchery environment reduce the fitness and productivity of wild salmon populations. Even wild brood stock programs, long heralded by those seeking to protect the status quo as a solution to the problem of hatchery domestication, have been shown to produce rapid declines in the fitness of fish reared in captivity. Hatcheries also take their toll ecologically. While the ecological effects of hatchery fish are less well understood, impacts likely include the transmission of diseases to wild salmon populations, competition with wild stocks for limited resources in the freshwater and marine environments, and elevated predator abundance.

While hatcheries have been an abject failure from a conservation and wild fish recovery perspective, they have failed equally spectacularly at producing harvestable fish in many parts of Washington State. Indeed, the average hatchery raised Chinook harvested in Puget Sound costs Washington taxpayers almost $800, and some Chinook from the interior Columbia and Snake Rivers cost more than twice that amount. Evaluated from a purely economic and policy perspective, these programs fail to pass the sniff test, which likely explains in part why the Washington Department of Fish and Wildlife is increasingly refusing to defend these failing programs and is taking actions to reform hatcheries across our state.

Over the last two years, hatchery reform has gone from an abstract notion to a growing reality in Washington State.

Conservancy, the state has agreed to curtail the releases of hatchery winter run steelhead in all Puget Sound rivers with the exception of the Skykomish, and will place a 12 year moratorium on hatchery programs on the Skagit River system, giving the largest and best population of steelhead in the Puget Sound region the opportunity to recover in the absence of hatchery impacts.

While progress has been a long time coming, it feels like we are finally starting to move the needle. In an environment where many of the populations of steelhead in Washington are listed under the Endangered Species Act, the state is coming to the realization that defending costly, failing hatchery programs is simply not worth doing. Certainly there is still much to be done if we hope to recover productive, abundant and diverse populations of wild salmon and steelhead in Washington, but real substantive hatchery reform is a great start.

Sorry about that

We inadvertently left some donor names off our 2013 Honors List in the last issue of The Osprey. They are:

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We greatly appreciate the support of all our readers whose contributions keep us in print and working for wild steelhead and salmon. Thank you!
Marijuana
Continued from page 1

Trying to regulate marijuana cultivation, especially at the local level. Since marijuana is still illegal at the federal level and in many other states, there is a booming black market economy surrounding the plant. The motivation by many to cash in on this lucrative situation has resulted in what has been termed “the green rush” for its similarities to California’s gold rush era. In some cases it has become nearly impossible, at least on the face of things, to differentiate between people involved in a state-legal activity and those involved in large scale drug trafficking organizations operating under the guise of the state’s medical marijuana laws. Regardless of the legal status of the marijuana plants themselves, it has become clear to resource agencies that many marijuana cultivation sites have the potential to cause serious and cumulatively substantial environmental harm.

This issue has recently garnered national press attention, and headlines have run the gamut from the straightforward (“Marijuana Crops in California Threaten Forests and Wildlife” the New York Times, June 20, 2013), to the somewhat sensational (“The Landscape-Scarring, Energy-Sucking, Wildlife Killing Reality of Pot Farming” Mother Jones, March 2014). Many of these articles have focused, with good reason, on marijuana cultivation on public lands. Sometimes called “trespass” grows, these marijuana cultivation operations are always unquestionably illegal, as they involve trespassing on state, federal, or sometimes private lands to grow marijuana. They are usually characterized by extreme environmental degradation and the indiscriminate use of multiple toxic substances such as fertilizer, pesticides, and anticoagulant rodenticides. Dr. Mouad Gabriel, Executive Director of the Integral Ecology Research Center in Blue Lake, CA, is currently involved in research on toxicants in wildlife related to marijuana cultivation operations on public lands. Gabriel recently published results from his research on the Pacific Fisher. The fisher is a small forest carnivore which is a candidate species for listing under the Federal Endangered Species Act. In his study, the results of which were published in the journal PLOS ONE in 2012, Gabriel found that 79% of the 58 fisher carcasses which he examined tested positive for exposure to anticoagulant rodenticides, and he identified marijuana cultivation on public lands as a potential point source for these toxins. Researchers are now studying possible impacts to the northern spotted owl from these same toxins.

In addition to the obvious problems associated with trespassing on public lands to grow marijuana, there are many environmental issues associated with marijuana cultivation on private lands, and these issues are often difficult to address due to the remote nature of the land and the legal gray area under which these cultivation sites operate. The “Emerald Triangle” is home to some of California’s most remote rural areas, and it is relatively easy to buy small parcels of forestland for marijuana cultivation in this area. CDFW, along with other state agencies, has become increasingly concerned about the frequency with which these cultivation sites seem to be appearing and expanding on the landscape. The increase in the size and scale of marijuana cultivation was first noticed by CDFW scientists during aerial survey flights in Humboldt and Trinity Counties in 2011. In 2011 and 2012, Google Earth released new imagery of much of southern Humboldt and Mendocino Counties. The clarity and resolution of this imagery was unprecedented, and because the imagery showed the landscape in July and August, during the peak of the marijuana growing season, individual marijuana plants could be seen and counted. CDFW scientists were able to use this imagery to document the spatial arrangement, size, and number of marijuana plants, and to measure greenhouses within marijuana cultivation sites in watersheds of interest. In 2012 and 2013, CDFW scientists mapped four watersheds in Humboldt and Mendocino Counties.

At the same time, CDFW scientists were working on the ground in conjunction with CDFW wildlife officers (game wardens) and local law enforcement to document environmental violations at marijuana cultivation sites on private lands. In many cases, the worst violations were on par with the early days of the timber industry, before regulations were put in place to protect sensitive habitats and to require the implementation of best management practices. The list of observed environmental impacts and violations associated with marijuana cultivation sites on private land includes deforestation and land clearing; grading, damming, and burying of streams; delivery of sediment, fertilizer, pesticides, and petroleum products into streams; and surface water diversions resulting in reduced flows and/or completely dewated streams.

During the summer of 2013, scientist also observed the first fish kills believed to be associated with marijuana cultivation.

Although the cumulative impacts are considerable and pose threats to overall watershed health, the ubiquitous nature of unregulated surface water diversions stands out as an especially important problem to address. In many rural Northern California watersheds, small surface water diversions are the primary source of water for both domestic and agricultural purposes. Legally, these diversions must be registered with the State Water Resources Control Board (SWRCB), but SWRCB records list few registered water diversions within the watersheds in question, and even fewer of those registered diversions are associated with known marijuana cultivation sites. The number of unregistered diversions observed at CDFW site inspections lends credibility to the assumption that the majority of marijuana cultivation sites in the study watersheds are diverting water for their irrigation needs, and that the majority of these diversions are not registered with the SWRCB and therefore are illegal and unregulated. Legal diversions are subject to a number of conditions set by the SWRCB and CDFW to protect fish and wildlife and their habitats, and these conditions typically require the registrant to temporarily stop diverting water when flows drop below certain levels. The proliferation of largely unregulated water diversions to support the growing demands of marijuana cultivators is of increasing concern. It is unclear whether these small watersheds have the capacity to

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meet these demands, but the evidence suggests that they do not. The water diversions are especially troubling considering that many of the watersheds in question support coho salmon, a species which is severely impacted by a lack of water quantity and quality resulting from unregulated water withdrawals. As observed by CDFW scientists, these impacts can be lethal for juvenile coho salmon. In addition to listed salmonid species, these watersheds also support several other sensitive aquatic populations, including two headwaters amphibians listed as State Species of Special Concern — the southern torrent salamander and the coastal tailed frog. These fish and amphibian species, as well as the benthic macroinvertebrates on which they feed, require cold, clean, abundant water throughout the year. CDFW scientists predict that cumulative impacts of many small water withdrawals in these watersheds are causing either direct mortality, or sublethal effects such as reduced growth rates caused by diminished food resources.

Using the data collected from their watershed mapping research, CDFW scientists set out to estimate just how much water these marijuana cultivation sites might be using, and how these demands might impact streamflow and consequently the health and survival of salmon, trout, and other sensitive aquatic organisms (Bauer et al., in prep). Although it is generally agreed that marijuana is a high water use crop-type, there is a dearth of credible published information about marijuana water use requirements. The range of marijuana water use estimates vary, from one gallon per plant per day to 15 gallons per plant per day. For the purposes of this study, CDFW scientists used the estimate put forth in a 2010 document written by the “Humboldt Grower’s Association,” a group of marijuana cultivators who sponsored a draft medical marijuana ordinance for Humboldt County. This draft ordinance contained specific details about typical marijuana cultivation practices, and put forth an average water use estimate of six gallons per plant per day, which falls somewhere in the middle of the wide range of water use estimates cited by law enforcement sources, federal documents, and marijuana growing handbooks.

Using this six gallon per plant per day estimate, CDFW scientists calculated the estimated per day water demand for marijuana agriculture in their four study watersheds by multiplying the total number of marijuana plants by six gallons per day. They then used standard hydrological methods and USGS stream gauge data to estimate streamflow in the study watersheds, and were able to arrive at an estimated percentage of streamflow which may be consumed by marijuana water demands during the summer low flow period. The results varied by watershed, but in the worst case scenario the research indicates that demand for water in three of the four study watersheds would exceed the natural stream flow during the driest period of the summer. News coverage detailing several instances of water theft from local storage tanks in small southern Humboldt towns (including the theft of 20,000 gallons from the Bridgeville Elementary school in July 2013) anecdotally supports the conclusion that demand is outstripping supply in some rural watersheds.

This study is the first attempt to quantify environmental impacts of water diversions for marijuana cultivation, and may help to shed light on ways to minimize impacts to fish and wildlife and their habitats. It is clear that measures must be taken in order to address this emerging threat to sensitive aquatic species, particularly for those species which are already on the brink of extinction, such as coho salmon. There is a lack of oversight of marijuana cultivation operations to ensure that they are in compliance with state and federal environmental regulations, especially in regards to water diversions and other practices which may impact water quality and quantity. The state also lacks the personnel resources to adequately enforce environmental regulations, and violations of those regulations are often difficult to prosecute. Whether or not it is possible to regulate and mitigate the impacts of marijuana cultivation under the current legal framework is unclear, and the potential effects on threatened fish populations are increasingly troubling.
When a Dam Comes Down
A recent history of restoration on Oregon’s Sandy River

By Corinne Handleman
— Sandy River Basin Watershed Council —

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October 19, 2007 marks a pivotal day in the history of the Sandy River. A storm that day cleared away a temporary cofferdam where the Marmot Dam had been removed, restoring the Sandy to free flowing condition for the first time since 1913. Marmot Dam’s removal was the largest, most complex dam removal in the region at that time, and re-set the boundaries for river restoration not just in the Sandy but in the Pacific Northwest.

While 2007’s “free Sandy-versary” was a pivotal moment, it represented only the beginning of basin-wide, collaborative, science and community-based restoration on the Sandy River and its tributaries. Marmot Dam’s removal brought together a broad coalition of partners interested in long-term restoration of the Sandy and the river’s wild salmon and steelhead. While the Sandy’s story is about local successes in restoration, monitoring, and partnerships, the work conducted in restoring the Sandy River also points to new directions for the region and our future livability in the Lower Columbia Basin. Regional fish biologist Todd Alsbury said of the Sandy and its wild salmon populations, “If we’re going to achieve recovery in the Lower Columbia, it has to happen here and it has to happen now.”

Portland General Electric built Marmot Dam in 1913, producing 22 MW of hydropower through a complex system. This dam routed water from the Sandy River through a tunnel to the Little Sandy River, where another dam sent the combined flow through a wood trestle flume into Rosalyn Lake before dropping into hydropower tur-...
investment to restoration in accessible habitats in the mainstem Sandy and its tributaries. The Water Bureau formulated the HCP to address habitat loss related to drinking water dams, with input from a group of stakeholders that became the Sandy River Basin Partners (Partners, for short), a 15-organization coalition including public agencies at municipal, county state, and federal levels, conservation nonprofits, and angling groups. As preparations for Marmot dam removal were underway, the Partners, led by Freshwater Trust (then Oregon Trout), developed short and long-term restoration strategies and an anchor habitat analysis to guide multi-partner restoration work. By focusing restoration in the most productive river reaches, the anchor habitat approach seeks to maximize restoration benefit to multiple wild fish throughout the basin. The plans establish a blueprint of detailed actions to restore “limiting factors” on salmon productivity, with actions prioritized by sub-basin and divided further by river reach.

**Highlights to Date**

Partners have begun to implement priority restoration projects with measured success. The top priority for native salmon recovery is along the mainstem Sandy River, where all fish use the river at all life stages. On the Delta, the US Army Corps of Engineers, Portland Water Bureau and others removed a small dam in fall 2013, which had blocked the river’s main east channel from the Sandy to the Columbia River since the 1930s. The Delta, about 1,200 acres managed by the US Forest Service, has also seen more than a decade’s worth of invasive species management and re-establishment of native forests, through a diverse organizational partnership and hundreds of volunteers, replacing invasive Himalayan blackberries and other weeds that had covered the area following its return to public ownership in the 1980s. A few miles upstream in the lower Sandy in and around Oxbow Park, Sandy River Basin Watershed Council, Metro and others have begun reconnecting a series of side channels cut off by historic river alterations, where juvenile fish can hide and rest while migrating to the ocean.

Also on the mainstem Sandy, the Sandy Basin Vegetation Restoration Coalition (SBVRC) was founded to focus on coordinating invasive species treatments and replanting efforts to restore and protect riparian forest habitat. Through these efforts, The Nature Conservancy led SBVRC has largely eliminated invasive knotweed infestations in priority habitat areas basin-wide, while replacing other invasive plants with native trees and shrubs.

Priority tributaries have undergone a coordinated series of floodplain and side channel reconnections to increase spawning and rearing habitat in historically productive reaches. Multiple partners have led such projects, including the Freshwater Trust, US Forest Service, BLM, and SRBWC. Projects have installed large logs to mimic naturally occurring formations, dividing river flow into channels cut off by historic river channelization following record floods in 1964, and expanding living space for fish. The Salmon River and Still Creek, the Sandy’s other top-three priorities, have been the focus of these coordinated efforts. This work has been paired with replacement of undersized culverts to reduce impeded fish passage, led by the US Forest Service in the upper basin. Salmon spawning surveys and restoration monitoring has shown measurable, immediate increases in spawning and juvenile rearing that these actions have spurred. Along one Salmon River side channel, a dozen homeowners joined the Freshwater Trust, US Forest Service, and SRBWC to replace two undersized culverts. The winter after each replacement, neighbors found spawning wild coho in their stream not seen for decades. The Oregon State Land Board recently recognized efforts in the basin, as the

**Partners actions led by the Freshwater Trust received a 2013 award for their large-scale multi-year collaborative approach to restoring habitat for endangered wild salmon.**

The US Forest Service, the majority landowner in the upper watershed, has implemented extensive road-decommissioning efforts to reduce road-related erosion and improve water quality. Having prioritized roads for decommissioning or removal, the Mt. Hood National Forest gained competitive federal funding to reduce the road networks in some areas by more than 50%. Partners and volunteers assisted in plantings to reduce invasive species and establish native vegetation on the former roadbeds.

Beyond the top three priority basins, Sandy Partners have restored habitats in other sub-basins such as Beaver Creek, the lowest tributary to the mainstem Sandy, where surveys have identified small but meaningful populations of native salmon despite concentrations of agriculture and urbanization. The Partners’ strategy emphasizes actions within priority
basins, but envisions approximately 20% of funding and efforts for other projects to boost habitat recovery, public participation and water quality within the entire basin. The Beaver Creek conservation partnership focuses on similar goals as the entire Sandy Basin: vegetation and fish passage enhancement, science-based monitoring, and creating in-stream spawning habitat.

**IMPACTS ON WILD FISH POPULATIONS**

Sandy River restoration efforts have benefitted from extensive and collaborative monitoring by Oregon Department of Fish and Wildlife, USFS, Portland Water Bureau, BLM and others. Agency staff, in some cases assisted by community volunteers, conduct annual carcass and redd surveys to document and study salmon spawning trends. USFS and Portland Water Bureau staff biologists implement seasonal smolt trapping to sample and estimate outgoing juveniles downstream from key spawning reaches. Studies by the Bureau of Land Management have analyzed initial data from restoration actions in the lower Salmon River. Findings indicate that restoration actions are significantly associated with expanded native fish presence. While results have been promising in their indication of positive spawning relationships to restoration action, monitoring also identified an unintended consequence of dam removal: high proportions of hatchery Chinook strays among spawning adults.

**HATCHERY STRAY ISSUES**

Complications in hatchery-wild fish interactions from removing the Marmot Dam were anticipated, but the level of hatchery strays grew beyond predictions. While diverting water to the Little Sandy for hydropower generation, Marmot Dam acted as a sorting site for returning adult spawners heading upstream, effectively maintaining the upper Sandy and tributaries as a wild fish sanctuary. Since upstream fish passage was entirely impeded, biologists trapped and moved wild salmon above the dam to prime spawning habitat. Fin-clipped hatchery fish were removed or returned to the lower river for another pass by anglers. Research indicates that hatchery-wild spawning reduces the productivity of offspring, potentially affecting wild fish recovery. Without sorting at Marmot, hatchery and wild salmon populations, particularly spring Chinook that proved likely to bypass the Sandy hatchery, could intermingle throughout the basin.

Sandy Hatchery strays in the years immediately after dam removal far exceeded the allowable rate of 10% set out in management plans for the hatchery. Spring Chinook strays exceeded 80 percent of spawning fish in some reaches, averaging over 50 percent of all spawners in the first three years. Oregon Department of Fish and Wildlife set out temporary weirs to trap and remove hatchery fish, and have acclimated juveniles in the Bull Run before release to discourage returning hatchery fish from straying up the Sandy. But timing and operational difficulties initially limited the weirs' effectiveness. Weir counts in 2013 stray rates reached the 10% allowable rate.

The extreme high hatchery stray rates drew a challenge to hatchery operations in a lawsuit against ODFW and the National Marine Fisheries Service. The Native Fish Society and McKenzie Fly Fishers contended that hatchery stray impacts illegally risked the recovery of threatened steelhead and salmon. The initial ruling by Judge Ancer Haggerty in January 2014 concluded that the hatchery plan for the Sandy violated the Endangered Species and National Environmental Policy Acts. The Judge ordered hatchery managers to reduce hatchery releases for 2014 to 200,000 coho salmon, about 100,000 less than planned. The Sandy Hatchery plan updated in November 2013 states that spring Chinook will still be released at rates up to 300,000 salmon annually, as long as stray rates remain below 10%. Sport fishing and fishing industry groups, who opposed the suit, worry about reduced fishing opportunities related to smaller total hatchery releases. Before the ruling, ODFW had significantly reduced hatchery fish compared to pre-dam production.

**HOPE FOR THE FUTURE**

Through prioritized habitat restoration actions, multi-agency partnerships, and continued monitoring, the Sandy River has set the stage for basin-wide recovery for native salmonids. Efforts since the river’s undamming have built on science, broad public-private collaboration, and community involvement, delivering future dividends on targeted investments that appear to be paying off. Coordinated restoration activities at basin- and reach scale are underway from the Sandy’s headwaters in the Mount Hood Wilderness to the confluence with the Columbia River, and bringing hope with each year’s returning salmon that the Sandy can anchor the race toward wild fish recovery in the region.

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Steelhead of the Tongass National Forest
Habitat, life histories and management

By Mark Hieronymous
— Trout Unlimited —

Author Mark Hieronymous is Trout Unlimited's Southeast Alaska Project Director. For additional information on the Tongass National Forest and its wild fish visit www.americansalmonforest.org.

At nearly 17 million acres, the Tongass National Forest in Southeast Alaska is the country's largest national forest. This complex landscape of western hemlock, Sitka spruce, western red cedar and yellow cedar is part of the world's largest remaining intact temperate rainforest. The Tongass comprises thousands of mist-covered islands, deep fjords, tidewater glaciers and soggy muskegs that host some of the rarest ecosystems on the planet. It is ideal habitat for a wide array of plant and animal species, including all five species of North American Pacific salmon, resident trout and char, brown and black bear, Sitka black-tailed deer, bald eagles, and wolves, among many others. The Tongass includes more than 15,700 miles of clean, undammed streams and 4,100 lakes and ponds that provide optimal spawning and rearing conditions for the region's abundant wild steelhead and salmon.

Each year as hundreds of millions of wild salmon return to Tongass streams to spawn and die, they bring nutrients from the North Pacific Ocean to the forest. Enriched by this annual salmon return, the Tongass literally is a "salmon forest" with unique ecosystems found nowhere else on Earth. Among the beneficiaries of the salmon-based marine derived nutrient cycle is the steelhead (O. mykiss), an oceangoing phase of the rainbow trout. Steelhead are "officially" found in over 300 Tongass streams, according to the Alaska Department of Fish and Game (ADF&G) Anadromous Waters Catalog (AWC), a database of the extant institutional observations concerning anadromous fish populations in Alaska. Although the AWC is considered the last word on anadromous populations, it is by no means a complete survey, and should be thought of as a work in progress in terms of steelhead stream identification. Anecdotal data and empirical observations seem to suggest that steelhead occur in many more streams than indicated by the AWC; there are some that believe steelhead are present in 450 or more of the close to 5,000 streams in the Tongass.

Steelhead may be present in 450 of the 5,000 streams in the Tongass National Forest.

The average Pacific Northwest steelhead river can be generally described as a large, long, and meandering flow. The flow of this river is in thousands of cfs, its fishable habitat numbering in the tens to hundreds of miles, and it is most likely classified as low-gradient. This river has tributary rivers, and many feeder streams of these tributaries. By way of comparison, most of the steelhead streams in the Tongass are fairly short affairs, averaging about 3-5 miles in total length of spawning and rearing habitat, and their tributaries, although of critical importance in terms of their contributions to the riparian ecosystem, are often too high gradient to be of value as spawning or rearing habitat. There are only a handful of steelhead streams over 15 miles in length and these are predominantly located on the eastern mainland section of the Tongass. Another shared attribute of many Tongass steelhead streams is their small size. While there are a relative handful of larger rivers, most of the steelhead flows in the Tongass are less than 750 cubic feet per second (cfs) in size, and it is not unusual to find fish in a stream of less than 100 cfs. Taken as a whole, the island and coastal mountain drainages of the Tongass could be described as a set of tributaries to the Inside Passage waterways, which in turn flow into the Pacific Ocean.

The combination of short, small rivers and limited spawning and rearing habitat within them has the effect of limiting steelhead run sizes in the Tongass. There are rivers that have seen recent single-year counts of over 15,000 steelhead, and a relative handful of other streams in the Tongass that may have escapements numbering over a thousand fish — however, the majority of the streams in the Tongass host fewer than 200 spawning adults.

There are 3 distinct run components in the steelhead streams of the Tongass — the spring, summer, and fall runs. The largest component in terms of population is the spring run with the bulk of the fish entering freshwater in April and May, but starting as early as March in some watersheds. Spring run fish account for approximately 80% of the steelhead in the Tongass, and enter the river as sexually mature fish, ready to spawn. Fall run steelhead make up between 15 and 20% of the steelhead population of the Tongass, and are most often found in streams with anadromous-accessible lakes. These fish enter the river in a sexually immature state and mature as they overwinter. The fall run starts in September and continues through November, and with a few exceptions occurs mainly south of the 57° N latitude. Summer-run steelhead are rare.

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but not unheard of in the Tongass, and they enter freshwater in July and early August and mature as they overwinter. Regardless of when the steelhead of the Tongass enter fresh water, they all spawn in the spring, with an occasional flurry of activity as early as April but the bulk of the spawn occurring in the second week of May. As a result, some fall fish may spend up to eight months in freshwater before spawning, whereas late spring fish may have a residence time of as little as 48 hours.

The steelhead of the Tongass exhibit a high rate of return spawning when compared to steelhead from other geographical areas; estimates vary from system to system, but it has been suggested that 20-25% of all spawners are repeats, and in some cases may make up close to 50% of the spawning population. The repeat spawners are typically female and most often spawning for the second time, although 4- and even 5-time spawners have been documented.

Tongass steelhead also display a wide range of both freshwater and marine residence times in their complex life history. The results of a 1994 weir study on a high-production Tongass steelhead stream showed that in one year, 22 distinct age classes and 6 separate brood years were present. The most common freshwater residence time is three years, followed closely by four and two years. Five and six year freshwater residence fish are uncommon but present in small number in several systems in the Tongass. Similarly, the residence time of steelhead in saltwater is most commonly two or three years, however, the observed range is anywhere from one to five years.

The bulk of the steelhead populations in the Tongass are composed of wild fish, but there have been historic efforts at enhancing run sizes. In the 1970s, the ADF&G initiated a study series on multiple steelhead streams with the ultimate goal of enhancing runs to provide more angler opportunity. Similarly, there have been cases of “mitigation enhancement” of runs that have displayed anthropogenic-based habitat degradation or population depression. Steelhead stocking efforts have largely been curtailed in the Tongass due to a number of factors, including less-than-satisfactory run performance, concerns of competition potential between wild and hatchery stocks, high costs, and poor return on investment. One Tongass steelhead stocking program was discontinued in 1994, in part due to the average cost of $572 per harvested fish. The ADF&G Genetic Policy, adopted in 1985, places stringent controls on hatchery activities and emphasizes the protection of wild populations. Currently, there are no hatchery steelhead propagated for directed enhancement of Tongass populations.

The steelhead populations on the Tongass have fluctuated from an historic perspective, both when taken as a whole and on a stream-by-stream basis. Population counts and estimates are a relatively new trend in Tongass steelhead management. Prior to the 1960s, there was very limited data on steelhead, usually found in the form of anecdotal observation. Biologists and sport fishers alike began taking an interest in steelhead in the mid-1970s in part due to lower harvests despite increasing angler effort. Daily bag limits were reduced from three fish to two in 1975 in an effort to conserve a limited resource, and several population surveys were undertaken to better understand the scope of the issue. Steelhead populations in some Tongass streams increased after 1977, in part because of the reduced harvest limits but quite possibly the increases were more attributable to the loss of interception in foreign fisheries after the enactment of the Magnusson act in 1976.

In the late 80s and early 90s, steelhead populations across the Tongass took a sharp turn downward. In response to this, fisheries managers implemented a series of emergency orders prohibiting steelhead harvest and banning bait on select rivers in the Tongass. In 1994, ADF&G adopted sweeping regulation changes for the steelhead fisheries in hopes of halting and eventually reversing the population decline, while still providing for recreational opportunity and limited harvest. The new regulations prohibited harvest of steelhead smaller than 36”, a measure that protects close to 95% of all Tongass steelhead and is designed to exclude first-time spawn- ers from harvest. In addition, bag limits were sharply curtailed from the previous two fish a day to one fish a day with a two-fish annual limit, to be noted on a new harvest record portion of the Alaska state fishing license. The

While Alaska's Tongass National Forest is known as America's Salmon Forest, it also provides habitat for healthy runs of steelhead. Photo by Mark Hieronymous

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use of bait was also banned on select rivers of the Tongass.

In the 2000s, close management of Tongass steelhead stocks continued, with more watersheds added to the bait ban and several high-use areas closed to the retention of steelhead. Many fall steelhead streams in the southern portion of the Tongass that had seasonal bait restrictions were closed to the use of bait year-round to more adequately protect stocks. In 2009, the watersheds crossed by the road system of Juneau (Alaska’s capital city and third most populous borough) were closed to the retention of steelhead.

Based on the limited stock status information available, steelhead abundance in the Tongass was relatively stable and slightly above average between 2003 and 2007 but has trended downward in recent years, closer to the 15-year average. Overall adult steelhead returns are below those experienced in the late 1980s, and there are still systems in the Tongass that have not rebounded from the depressed levels observed in the late 1980s and early 1990s. Current regulations, which restrict the harvest and incidental mortality of wild steelhead, should remain in place to conserve and rebuild the naturally producing stock. Given the small populations that occur in the bulk of the Tongass steelhead streams, there is very little wiggle-room when it comes to impingement on these stocks, either in the form of harvest or habitat degradation.

To address many of the habitat issues faced by Tongass steelhead (and other salmonids), Trout Unlimited, Alaska Program has advanced a proposal called the “Tongass 77”. While most steelhead and salmon populations in the Tongass are recovering or healthy and abundant, their future is uncertain. Industrial-scale logging and road building, new mining developments, dozens of hydroelectric dam projects, and various proposals to privatize large swaths of the most productive and valuable portions of the Tongass threaten permanent damage to the region’s most valuable resource. While 35% of Tongass steelhead and salmon habitat is currently conserved at the watershed scale, many of the most important spawning and rearing streams remain vulnerable to industrial development that has the potential to negatively impact fish habitat.

The downward trend of salmonid populations in the Pacific Northwest and California, where the volume of wild steelhead and salmon once rivaled that of the Tongass, foreshadows what could occur in Southeast Alaska unless law- makers and government agencies and the public act to make habitat conservation and restoration top priorities. In the Tongass, there is the opportunity to ensure steelhead and salmon enjoy a healthier and more stable future.

Researchers from the Alaska offices of the Audubon Society, The Nature Conservancy and Trout Unlimited used state-of-the-art GIS and conservation planning software to identify the “best of the best” from the thousands of steelhead and salmon watersheds on the Tongass that currently lack watershed-scale conservation measures. After consulting with federal and state biologists and various community and business stakeholder groups, the list was narrowed down to 77 high-value watersheds comprising 1.9 million acres that form the backbone of salmonid production in the Tongass. Of these 77 watersheds, 61 of them have populations of steelhead ranging from a few hundred to the tens of thousands. Based on the outstanding fish habitat in these watersheds and their contributions to local communities and economies, the highest and best use of the “Tongass 77” is for salmon and trout production. Federal legislation to permanently conserve the watersheds of the “Tongass 77” is necessary to ensure the long-term productivity of these important watersheds. Maintaining natural steelhead and salmon production and the health and function of fish and wildlife habitat should be the top management priorities. Additionally, by prohibiting commercial logging, new road building and new mining developments within the “Tongass 77”, it is possible to ensure Southeast Alaska’s wild steelhead and salmon return for generations to come and continue to fuel the region’s communities and economy.

As previously mentioned, about 35% of the steelhead and salmon spawning and rearing habitat in the Tongass is currently conserved at the watershed scale. The footprint of these watersheds represents roughly 40% of the land base of the Tongass National Forest. The “Tongass 77” would conserve an additional 23% of the steelhead and salmon spawning and rearing habitat available in the Tongass on about 12% more of the total Tongass land base — focused, fish-first conservation measures for the continued health of Southeast Alaska steelhead and salmon populations and the millions of dollars they generate in the local, Alaskan, and greater Pacific Northwest economies. For more information about the “Tongass 77”, please visit www.americansalmonforest.org.

To support watershed-scale conservation measures for high-quality salmon and trout spawning and rearing habitat in the Tongass National Forest: www.americansalmonforest.org/sign-on/ and join the growing number of folks who are making their voices heard.

An angler shows off a wild steelhead caught in a Tongass National Forest stream. Photo by Mark Hieronymous
Mining Development Threatens Transboundary Region’s Wild Salmon

By Chris Zimmer
— Rivers without Borders —

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If you follow Alaska fish issues you undoubtedly know about the proposed Pebble Mine and the threats it poses to one of the world’s premier salmon and trout fisheries. But you may not know that in Southeast Alaska, far from Bristol Bay, but a region no less dependent on healthy salmon runs, we face the prospect of several Pebble-type mines, massive open pits with huge tailings dumps, and other industrial development in the headwaters of major transboundary rivers including the Taku, Stikine and Unuk. And since these headwaters with much of the salmon spawning habitat and mines are in British Columbia (BC), we have fewer mechanisms to address threats than are available to those fighting Pebble. BC’s existing and proposed development also poses serious risks to the non-transboundary Bell Irving, Nass and Skeena Rivers...all world class steelhead rivers.

THE RIVERS AND THE FISH

At 7,250 square miles, the Taku River watershed is more than twice as large as Yellowstone National Park. The Taku is usually Southeast Alaska’s largest overall salmon producer, with Southeast’s largest run of coho and Chinook salmon. The Taku produces up to 100,000 Chinook, 300,000 coho, 400,000 sockeye, 50,000 chum and 1,000,000 pink salmon, as well as significant populations of steelhead, cutthroat, Dolly Varden and eulachon (smelt).¹ Taku salmon support a $2 million sport fishery and a commercial fishery worth over $5 million annually to the Juneau area.²

The Stikine River, ‘The Great River’ in the Tlingit language, is one of North America’s largest and most intact wild salmon systems. At about 20,000 square miles, the watershed is larger than Switzerland and has been called “the Serengeti of the north.” Like the Taku, it supports substantial sport, commercial and subsistence fisheries.

The Unuk River is relatively small, at 80 miles long and draining some 1,500 square miles, but it has the fourth largest runs of Chinook salmon in Southeast Alaska, along with significant runs of pink, chum, sockeye and coho salmon and eulachon.³

Certainly the Skeena, and probably also the Nass, third largest salmon producer in BC, and its tributary the Bell Irving, need little introduction to those familiar with northwest steelhead rivers. The Bell-Irving River and its tributaries Treaty and Teigen Creeks, produce 8% of Nass River Chinook, 17% of the coho, and 25% of the steelhead. Nass commercial salmon fisheries are worth over $10 million annually.⁴

THE TRIPLE WHAMMY

Much of the habitat in these rivers remains intact and productive. The Unuk is remote and the US portion flows through the Misty Fiords National Monument. The lower Stikine is protected by US wilderness designation. The Taku and upper Stikine and Unuk in BC have remained largely undeveloped due to lack of access and electrical power. But all this is about to change.

These rivers face what I call “the triple whammy.”

● The Northwest Transmission Line, expected to be completed later this year, will facilitate major mining projects in northwest BC. At least half a dozen are in advanced development with many more proposed.⁵

● In recent years both BC and the Canadian federal government have significantly weakened permitting processes and environmental regulations.

● Neither the State of Alaska nor the US federal government has analyzed the cumulative and long-term effects on salmon across the transboundary region from BC’s development or engaged with Canada to obtain guarantees that Canada’s upstream development will not harm downstream water quality and salmon.

THE MINING THREATS

The following projects currently present the greatest potential for damage to water quality and fisheries in the northwest BC/Southeast Alaska region: The proposed Kerr-Sulphurets-Mitchell (KSM) mine located in the headwaters of the Unuk River calls for three large open pits, an underground mine, and enormous tailings and waste rock dumps for billions of tons of acid-generating rock. The mine and waste rock dumps drain into the Unuk, while the tailings dumps drain into the Bell-

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Irving and Nass.

The Tulsequah Chief mine, located on the Tulsequah River upstream of its confluence with the Taku River, is proposed for re-opening and has been polluting the Tulsequah River with acid mine drainage since it was abandoned in 1957. The proposed mine access road would open the watershed to additional industrial development.

The proposed Galore Creek mine is on Galore Creek, which flows to the Stikine River. Tailings would be submerged in Round Lake, which drains into the Stikine’s major tributary, the Iskut River.

The proposed Schacht Creek project is located between Schaft Creek and Mess Creek, a tributary of the Stikine River. Mining would generate 100 million tons of waste rock.

The Red Chris mine is located near the headwater lakes of the Iskut River. Several hundred million tons of tailings and waste rock would be submerged in Black Lake.

Canadian and U.S. scientists are acutely aware of the potential negative impacts of large-scale industrial development in northwest B.C. In November 2011, 36 US and Canadian scientists wrote to B.C. Premier Christy Clark, “Cumulative impacts likely will cascade throughout the watersheds in the form of altered flow and temperature patterns, disturbance to wildlife interacting with roads, and reduced water quality associated with sedimentation and acid mine drainage...British Columbia must initiate a comprehensive assessment of potential cumulative impacts.”

LONG-TERM RISKS

Mining operations involve a host of toxic chemicals and a high potential for water pollution and habitat degradation. Massive amounts of water need to be captured, treated and discharged during mine operation and after closure. Seabridge Gold, owner of KSM, proposes a system involving seven of the largest water treatment plants ever proposed. The system will treat up to 118,000 gallons of contaminated water a minute. The discharge into the Unuk River will not meet BC water quality standards so KSM will need a mixing zone. Seabridge proposes a “dilution is the solution” system to address selenium pollution. There is no assessment of selenium impacts on the Bell-Irving, Nass or estuary, despite the fact that selenium has been shown to bioaccumulate and contaminate estuaries when released upstream.6

Salmon and trout exposed to the metal contaminants Seabridge Gold proposes to release into the Unuk from KSM have shown habitat avoidance, impaired olfaction, migratory disruption, impaired anti-predator response, reduced growth and swim speed, increased stress, impaired reproduction, and death.7 Tulsequah Chief has been polluting the Tulsequah and Taku rivers with these same heavy metals for decades.

These mines also pose the threat of long-term acid mine drainage and heavy metals pollution. KSM and Galore Creek require huge tailings dams that will have to be maintained for at least hundreds of years, and more likely in perpetuity. KSM’s dams will be wider and higher than the Hoover Dam. Seabridge Gold plans water treatment at KSM for 200 years after mine closure. Does this mean that the toxins are somehow rendered benign after 200 years? No, but Seabridge’s models break down after 200 years, so they really can’t say what will happen. It is likely water treatment will be needed far longer.

The mine proposals do not include mechanisms to assure adequate funding for long-term water treatment. The proposed bond for KSM is about $400 million and is supposed to cover costs for 200 years after mine closure. But since the water treatment plants cost over $25 million per year to run, the real costs for water treatment alone are over $5 billion.8 Without a bond for the entire amount, British Columbians and Alaskans could be on the hook for cleanup costs and damages.

The transboundary region has very high precipitation levels and is seismically active. Rain, wind, earthquakes and time will erode tailings dams and other facilities. These tailings dumps will be long-term environmental time bombs situated right upstream of the transboundary region’s major salmon rivers. This is a problem that can’t be solved now and will be passed on to future generations, without funding or a clear plan for preventing damage to salmon.

The mostly undeveloped Taku River basin provides a significant amount of critical side channel habitat for salmon. Photo by Chris Miller, csmpotos.com

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WHAT IS ACID MINE DRAINAGE?

Acid mine drainage occurs when sulphur-bearing ore is exposed to air and water. The resulting acidic water then leaches toxic heavy metals from the ore. If not captured and treated, such discharges are extremely toxic to fish and other aquatic life. The bulk of the ore at these mines is acid-generating. Tailings dams will have to contain billions of tons of acid-generating rock and highly toxic sludge from the water treatment plants essentially forever.

As expected, the mining companies predict no water quality problems. However, a 2006 study by Kuipers and Maest showed that 91% of mines that predicted no water quality guidelines exceedances impacted surface waters. Of the mines that predicted exceedances and imposed mitigation, 73% still impacted surface waters.\(^9\)

CAN’T TRUST GOVERNMENT TO PROTECT TRANSBOUNDARY REGION

Canadian Prime Minister Stephen Harper is an aggressive supporter of major oil, gas, pipeline and mining development and has overseen efforts to weaken environmental regulations and permitting processes. BC Premier Christy Clark calls for eight new mines in the next several years and has revised permitting regulations “to get to yes faster.”

The Canadian Environmental Assessment Act (CEAA) is Canada's version of NEPA. In 2012, the Canadian parliament passed bills C-38 and C-45, which weakened several major environmental laws including the CEAA, Navigable Waters Protection Act, and Fisheries Act. Fewer projects will undergo a federal EA process, public participation opportunities are curtailed, and short timeframes limit the ability of agencies to understand the full potential impacts of a project. Canada is also decreasing its oversight by giving the provinces more responsibilities for permitting and enforcing environmental laws.

Prior to C-38, the Fisheries Act prohibited the harmful alteration, disruption or destruction of both fish and fish habitat without permission. Now, legal protections for fish habitat have been replaced with weaker rules that prohibit only “serious harm to fish,” defined as “permanent” alteration to, or destruction of, fish habitat. This could be very difficult to prove, and temporal harm to fish habitat could have significant impacts given the life cycles of salmon.

All but five of BC’s fisheries field offices will be cut as part of a $79 million budget cut to Department of Fisheries and Oceans, and the department in BC will have half the habitat staff it had a decade ago.

In March 2012, 625 scientists wrote to Prime Minister Harper that industrial activities pose significant risks to fish habitat and many aquatic species, and the government should “therefore be strengthening, not weakening the habitat protection provisions of the Fisheries Act.”

The current BC Environmental Assessment Act was significantly amended in 2002. These amendments reduced its scope and application, and eliminate provisions allowing for the involvement of First Nations, local governments and community stakeholders. The goal of these amendments was to expedite the provincial EA process and apply it to fewer projects. BC environmental reviews largely focus on each project in isolation. There has been no comprehensive analysis of the overall and cumulative social, ecological and economic effects of multiple projects on downstream Alaska interests or on the transboundary region as a whole.

In July 2011, the B.C. Auditor General found that the B.C. Environmental Assessment Office “cannot assure British Columbians that mitigation efforts are having the intended effects because adequate monitoring is not occurring and follow-up evaluations are not being conducted.” This failure is significant as the proposed mining projects rely on extensive monitoring and mitigation.

SO, WHAT CAN BE DONE?

Here in Juneau I often hear that the mines are in Canada and we can’t do anything. This is simply not true. A precedent was set in Montana’s Flathead River and British Columbia’s Elk River regions that is directly applicable. In the 1980s the State of Montana, its congressional delegation and the US federal government joined together out of concern that proposed coal mine development upstream in BC would damage water quality and fisheries in the Flathead River region. The Boundary Waters Treaty was invoked and an International Joint Commission (IJC) was established between the US and Canada. In 1988 the IJC concluded that the coal mine should not proceed due to the likely impacts on the Flathead River.\(^10\) Since then Montana and the US federal government have continued to object to selenium pollution from existing mines and the potential impacts from proposed mine expansion. Processes have been established to help address those concerns.

In March 2014, 40 commercial and sport fishing groups, local governments, Alaska Native Tribes, tourism businesses and environmental groups signed a letter to the Alaska congressional delegation asking it “to identify

Proposed mining projects threaten the upper Stikine, along with other river systems in the Transboundary Region between Alaska and Canada. Photo courtesy Rivers without Borders
and utilize mechanisms to ensure that downstream Alaska water quality and fisheries will not be adversely affected by industrial development in B.C." \( ^{11} \)

In April the three members of the delegation wrote to Secretary of State John Kerry out of concern that “hardrock mines in British Columbia has raised serious concerns regarding water quality” and urged him to “raise this issue in appropriate bilateral meetings with your Canadian counterparts.”

Stakeholders from the March group letter have also engaged with the Alaska Department of Fish and Game (ADFG) and Department of Natural Resources (DNR). Unfortunately the response has been disappointing so far. Despite the fact DNR staff told the Taku River Task Force, established by the Juneau legislative delegation, on January 5, 2012, that DNR “does not have dedicated funding for Canadian mine project coordination” both DNR and ADFG staff have expressed confidence in the rigorouess of the BC permitting process and seem to think this process is sufficient to protect fish in general and Alaska’s interests specifically. Although Canada establishes joint working groups with Alaskan and U.S. agencies to review mine proposals, there are no specific requirements to address U.S. or Alaska’s concerns.

**How You Can Help**

We are at a major crossroads in the transboundary. Is the path piecemeal development without regard to cumulative effects and downstream impacts, or will the US and Canada work together to ensure mining is done in a way that ensures the continued productivity of major transboundary rivers?

What gives me hope is the fact that nearly every constituency here in the region is part of the growing effort to fight the threats posed by BC’s mines...every commercial gear group, sport fishing groups, tourism businesses, local governments and other elected officials, and conservation groups. It is very rare all of these groups join together, and it is becoming very powerful.

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**The Osprey on the Web**

http://www.ospreysteelhead.org
Groundhog Day for Columbia River Salmon

New Columbia/Snake River BiOp same as the old one

By Steve Mashuda

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e last updated readers of The Osprey in 2009 with a summary of the problems with the National Marine Fisheries Service’s 2008 Biological Opinion (BiOp) for the operation of the federal dams on the Snake and Columbia Rivers. After five years and a court ruling in favor of salmon and steelhead advocates, however, the federal government continues to trudge stubbornly down the same failed path. In January 2014, the Fishries Service issued another in a long series of inadequate biological opinions. Though this “2014 Supplemental BiOp” nominally responds to a 2011 federal court ruling invalidating the 2008 BiOp, and a 2010 Supplemental BiOp, it was appropriately greeted with references to Groundhog Day, the 1993 movie where Bill Murray’s character is forced to relive the same day again and again. In many ways, however, the 2014 Supplemental BiOp goes beyond simply repeating the mistakes of the past; it actually rolls back court-ordered spill and other actions that have helped boost fish survival in recent years and fails to tackle new or increasing threats to their survival.

Before getting to the details of this latest chapter in the long-running battle to protect salmon and steelhead, it is useful to review how we got to this point. The decline of Columbia and Snake River salmon and steelhead can be blamed on many factors, but none so much as the construction and operation of the massive federal dams that have turned these once-free-flowing rivers into a series of slack-water lakes. Since the late 1990s, the fight to ensure that these fish survive and recover has focused on the need to partially remove the four dams on the Lower Snake River – a measure supported by a broad and deep consensus among fisheries biologists as the single most effective way to restore healthy Snake River salmon and steelhead.

The four dams on the lower Snake River create a deadly bottleneck for migrating salmon as they try to swim to the Pacific Ocean from the Basin’s rivers and streams. Despite this deadly migration corridor, Snake River salmon and steelhead are blessed with access to the largest area of unspoiled, cool, high-elevation wilderness spawning habitat of any Columbia Basin salmon. This wild salmon refuge will become even more critical as the effects of global warming increase. Because of these dams, however, wild Snake River coho salmon swam quietly into extinction in the 1980s and today every remaining population of Snake River salmon and steelhead is listed for protection under the Endangered Species Act. Nine other runs in the Columbia River basin also have been listed, largely because of the harmful effects of federal hydropower dams. In one form or another, litigation over the impacts of these dams has been ongoing since the first runs were listed in the early 1990s.

The current iteration of litigation in the federal courts under the ESA began in early 2001 when a coalition of fishing and conservation groups filed a case challenging the federal government’s 2000 BiOp. The 2000 BiOp ignored the consensus among fisheries biologists and rejected Snake River dam removal in favor of an uncertain and unsupported belief that actions like habitat restoration, hatchery and harvest reforms, and minor adjustments in dam operations would ensure the survival and recovery of the fish. While significant mitigation measures are necessary for salmon recovery, without dam removal, these other measures are insufficient to secure a future in which these fish return to the interior Northwest.

In 2003, the U.S. District Court for the District of Oregon rejected the 2000 BiOp and sent it back to the National Marine Fisheries Service for an overhaul. And overhaul the plan is what NMFS did, though in the wrong direction. In contrast to every previous biological opinion, NMFS in 2004 declared that the dams did not jeopardize the continued existence of salmon and steelhead because the dams were considered an immutable part of the environment. The same coalition of plaintiffs, joined by the State of Oregon and several Columbia River Treaty Tribes, quickly challenged the 2004 plan in federal court. Both the District Court and the Ninth U.S. Circuit Court of Appeals rejected this plan in strongly-worded opinions. The Ninth Circuit called the agency’s approach a “sleight of hand” that “manipulated the variables to achieve a no jeopardy finding.”

After the courts sent the plan back to the federal agencies for another do-

Despite the Court’s ruling and direction to reconsider, the 2014 BiOp carries forward or amplifies each of the problems with its predecessor.

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over, they granted the coalition's request for injunctive relief to protect salmon by requiring the agencies to spill water over the dams to help juvenile fish migrate to the sea. Many scientists outside the government — including those at the independent Fish Passage Center — credit the increased spills (along with adequate river flows and good ocean conditions) with the abundant sockeye and fall Chinook runs on the Columbia River in recent years.

After almost three years, the government released its new biological opinion in May of 2008. In that 2008 BiOp, NMFS again concluded that removal of the four lower Snake River dams is unnecessary by once again modifying the legal standards and analysis applied, tweaking dam operations, and relying on a plan similar to that included in the 2000 BiOp to restore habitat and reform hatchery operations. A coalition of conservation and fishing groups, joined by the State of Oregon and the Nez Perce Tribe, once again challenged the new plan soon afterward.

In 2009, the newly-arrived Obama administration announced that it would conduct a 60-day review of the 2008 BiOp. To aid in that review, the Court sent a letter to the parties explaining its preliminary conclusion that the 2008 BiOp was illegal. The Court urged the federal government to consider all of the options — including lower Snake River dam removal — to restore these fish as it performed its review. But rather than fundamentally rethink any of these issues, the administration issued a band-aid in the form of an "Adaptive Management Implementation Plan" that ignored the core problems with the BiOp and adopted a series of ineffectual and risky "triggers" that might cause the agencies to take additional actions sometime in the future if fish populations crash to the levels seen in the early 1990s.

In an August 2011 ruling, the Court rejected the 2008 BiOp and the Obama administration's tweaks added in 2010. The Court found the BiOp arbitrary and capricious for the entire ten-year term because NMFS relied on unidentified and unproven future actions in tributary and estuary habitats to mitigate for the harm caused by the dams. Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 839 F. Supp. 2d 1117, 1128 (D. Or. 2011). The Court's decision highlighted both the lack of specificity for the actions and the troubling lack of scientific support for NMFS's conclusions that any such actions would result in the precise numerical survival increases that NMFS found necessary to avoid jeopardy. The Court rejected the BiOp on this basis alone and reserved judgement on the remaining issues raised by the plaintiffs. Once again, the Court remanded the BiOp back to NMFS and gave the federal agencies more than two years to (1) "reevaluate the efficacy of the RFAs in avoiding jeopardy," (2) "identify reasonably specific mitigation plans for the life of the biological opinion, and" (3) "consider whether more aggressive action, such as dam removal and/or additional flow augmentation and reservoir modifications are necessary to avoid jeopardy." The Court also granted the injunction requested by plaintiffs and others and ordered continuation of previous levels of court-ordered spill to alleviate some of the short-term irreparable harm to ESA-listed salmon and steelhead stocks.

During the course of the two-and-a-half-year remand, a number of organizations, businesses, and decision-makers urged the federal government to seize the opportunity to end the cycle of poor decision-making and litigation and convene stakeholders at an "everything's on the table" negotiation to recover salmon and steelhead, boost clean energy sources, and provide more reliable transportation of goods and commodities. During this same period, the multi-year Comparative Survival Study by state, tribal, and federal scientists demonstrated that increasing the amount of water released through the dams' spillways could significantly boost salmon and steelhead returns — possibly even to recovery levels for some stocks. Both of these developments presented the administration with a unique chance to ensure fish protection in the short term and to focus on measures to end two decades of litigation.

Unfortunately, the federal government squandered this opportunity and on January 17, 2014, NMFS issued its 2014 BiOp. Despite the Court's ruling and direction to reconsider, the 2014 BiOp carries forward and/or amplifies each of the problems with its predecessor. On the legal side, NMFS continues to base its yardstick for "success" on a standard that absolves the dams of any responsibility for harm so long as a salmon population is on a "trend toward recovery," which they define as any detectable population growth rate, no matter how small and regardless of whether dam operations will allow that population to actually reach a recovered level in 100, 500, or 1,000 years. At the same time, NMFS continues its reliance on yet another suite of unspecified and unproven mitigation measures to compensate for the harm caused by the dams.

The scientific flaws in the opinion are too numerous to list, but include NMFS's dismissal of evidence showing that long-term productivity of wild salmon and steelhead continues to decline or remains unchanged, its failure to wrestle with the additional challenges posed by climate change, the additional population declines caused by increased bird predation in the Columbia River estuary, its reliance on implausible numerical survival improvements from habitat actions in the tributaries and the estuary, and its decision to cut back on even past improvements to dam operations by curtailing spring spill and terminating summer spill early.

In 1994, Judge Malcolm Marsh rejected a BiOp much like the 2014 BiOp as "significantly flawed because it is too heavily geared towards a status quo that has allowed all forms of river activity to proceed in a deficit situation . . . when the situation literally cries out for a major overhaul." Twenty years later, the federal government has yet to deliver that overhaul. The coalition of conservation and fishing groups, including the International Federation of Fly Fishers, has given notice to the federal agencies of their intent to take the federal government back to court over their 2014 BiOp. Stay tuned.
Idaho’s Redfish Lake Sockeye Hatchery Can’t Recover Salmon

By Greg Stahl
— Idaho Rivers United—

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It’s been 22 years since a very determined sockeye salmon entered the Columbia River bound for Idaho’s Redfish Lake. Driven by powerful genetic impulses, he swam 900 miles up the Columbia, Snake and Salmon rivers. He scaled eight dams, drove upstream through frothy rapids and climbed 6,547 feet. He refused to eat, dodged predators and passed by anglers’ bait. His purpose was singular: to spawn and perpetuate his kind.

But Lonesome Larry returned alone on Aug. 4, 1992, the first year after his species was listed as endangered under the Endangered Species Act. “This is one of the epic nature stories of our time,” said Idaho Rivers United Executive Director Bill Sedivy. “This lone fish, a remnant of his species’ former magnificence, traveled the gauntlet of dams from Idaho to the Pacific, swam the lonely ocean for two or three years, and then fought to return—alone. Only he survived. The tragedy can’t be overstated.”

Though tragic, Larry’s epic journey was not in vain. This famous fish became part of the Idaho Department of Fish and Game’s captive breeding program to save the Northwest’s most endangered salmon from extinction. His milt was cryogenically preserved and used to fertilize eggs from returning females in 1996 and 1997. His genes are now scattered throughout a percentage of every new generation of sockeye, including the 1,000 or so fish that are likely to return in 2014.

“Now, while sockeye numbers have improved some, 22 years after Lonesome Larry’s return we’re still not a lot closer to actual recovery of salmon than we were then,” said Tom Stuart, a central Idaho fisherman and advocate for wild salmon recovery in the Columbia and Snake rivers. “This is a good time to pause and reflect on the tragedy of this decline, the limited progress made for salmon since 1992, and on the opportunities we still have to recover this iconic species.”

Aided by court-ordered spill to assist downstream migration of baby salmon, plentiful snowpack, friendly ocean conditions and dramatically pumped-up hatchery releases, sockeye returns have experienced modest if tenuous improvements. In 2010, 1,535 sockeye returned to central Idaho, but in 2012 only 242 completed the journey. Last year, in 2013, only 270 made it back. Meanwhile, aided by money from the Bonneville Power Administration, fisheries managers are aiming to significantly boost hatchery production. In September 2013, the Idaho Department of Fish and Game opened the doors of a new $13.5 million sockeye salmon hatchery in Springfield, Idaho.

“The next five to 10 years will tell us a lot as we ramp up the smolt release program at Springfield,” said Dan Baker, who has managed the sockeye captive broodstock program at Fish and Game’s Eagle Hatchery for the past 12 years. “It will take three years to get Springfield up to full production. It’ll be a few years before we start to see the result of that smolt release.” Baker said the Springfield hatchery produced 350,000 sockeye smolts this year, a number that should increase to 500,000 in 2015 and 1 million in 2016. Although Idaho Fish and Game deserves ample credit for preventing the extinction of sockeye salmon, Stuart remains unimpressed with the reliance on hatcheries to ultimately recover the species.

“Fish and Game scientists deserve an enormous amount of credit for rescuing sockeye from the brink of extinction over the past 20 years, but this new facility won’t recover sockeye,” Stuart said. “Recovery will only occur when sockeye start surviving at much higher rates after they leave Idaho en route to the Pacific. This new hatchery may be necessary now, but it won’t restore our sockeye by itself.”

Stuart pointed out that the Endangered Species Act requires a salmon management program that restores wild, natural-origin fish. “Natural-origin fish in places like Redfish Lake in central Idaho are what matter most—not hatchery fish,” Stuart said. “Our focus really needs to be on improving salmon survival downriver where most of Idaho’s salmon die at dams and reservoirs on the lower Snake and Columbia rivers.”

Long-term, sockeye salmon can only be restored and sustained in the wild by protecting Idaho’s abundant habitat and restoring the damaged migration corridor downstream, said retired Idaho Fish and Game fisheries biologist Bert Bowler. Hatcheries simply can’t do that.

“The bottleneck in salmon survival is created by too many dams on the Columbia and Snake,” Bowler said. “No matter how many baby salmon hatch in Redfish Lake, or how many more hatchery fish are released, too many still die because of the effects of downriver dams and reservoirs. We want to see real improvements in downriver survival. That’s the surest way to save both sockeye salmon and ratepayer money.”

In the short term, with all existing dams remaining in place, increased spill during the migration of baby salmon to the ocean appears to be the best way to improve salmon survival. “In the long term, removing four dams—four dams we can easily live without—is the best and least expensive answer, and the best path for Idaho’s sockeye salmon,” Bowler said. Bowler said the modest improvements in runs of sockeye salmon to Central Idaho are overshadowed by the fact that the species is still far from safe. Recent returns represent only a small

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fraction of the potential and only a fraction of what's needed for recovery. Scientists say that 2,000 natural-origin sockeye must return for eight consecutive years before the species can even be considered for removal from the Endangered Species list.

From 2008 to 2013, between 53 and 180 natural-origin sockeye returned. These are fish hatched and grown in conditions as nature intended—and recovery is about natural returns. These natural sockeye returns represent a small return on a very large hatchery investment.

In 2007, benefitting from court-ordered spill, an estimated 143,547 sockeye smolts left the upper Salmon River system en route to the Pacific. When 833 sockeye returned to the Sawtooth Valley in the summer of 2009, that constituted an approximate 0.06 percent return of outgoing fish, far below the minimum return rate of two percent scientists say is required to sustain natural populations.

"We're grateful that sockeye haven't gone extinct and that Fish and Game's captive broodstock program has prevented extinction as it was supposed to do. But this isn't actual recovery, in legal or biological terms," Bowler said. "There's a direct correlation between the number of hatchery fish pumped into the river and the number of fish returning. The return rate is still dismal—probably only 10 percent of what it needs to be. As happy as I am to see hatchery fish returning to Redfish Lake, recovery is about wild fish, and wild fish surviving at higher rates. Hatchery programs and the current spill program won't be enough to recover this species."

Historically, Lonesome Larry's ancestors spawned in September and October along the shores and tributaries of Idaho's glacial lakes: Alturas, Pettit, Yellowbelly, Redfish, Stanley and Payette lakes. Once numbering close to a hundred thousand, the runs dropped to dozens by the late 1970s, and to single digits in the 80s and 90s, by then returning only to Redfish Lake in 1984, 1988 and 1989. None returned in 1990. In 1991, four fish returned, only one a female. Dubbed Eve, she became another genetic key-

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