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Strong Runs

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THE VOICE FOR WILD NATIVE FISH

Conrad Gowell

STRONG RUNS

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Native Fish Society is a tax-exempt, non-profit charitable organization.

It's a never-ending task when people assume the role of Mother Nature.

Dave Streig

(COVER UPPER) juveniles on the move
(COVER LOWER) eggs in redd
Photos: Conrad Gowell

COASTAL CONCERN

WORDS BY MIKE MOODY, EXECUTIVE DIRECTOR

THE OREGON DEPARTMENT OF FISH & WILDLIFE is nearing completion of an ambitious policy overhaul which will control conservation and harvest on nearly 70% of Oregon's coast. The "Coastal Multi-Species Conservation and Management Plan" (Plan) addresses six distinct fish species and includes every stream from Cape Blanco to Seaside.

Its rambling title and the Plan's veracity will be enriched by deleting 'Conservation,' for the emphasis of the Plan is not conservation of wild fish, but rather enhanced angling opportunity. In a document exceeding 200 pages, not once does the word 'conservation' appear in its table of contents.

Oregon's Native Fish Conservation Policy mandates that "…conservation of naturally produced native fish…is ODFW's principal obligation for fish management." Throughout, the Plan fails to adhere to this law and the Native Fish Society has taken initiative to address this.

Partnering with North Umpqua's Steamboaters, we concluded that the most credible approach to addressing the Plan was by creating our own science panel of respected biologists and scientists, including Chris Frissell, Chuck Huntington, Bill Bakke and Steve Cramer.

In fairness, the Plan has some useful information including acknowledging that hatchery programs are a significant risk for wild salmon. However, the most conservation-actions explored by ODFW appear to be whatever might be possible without changing the number of hatcheries or hatchery output.

Opportunities for improved viability of wild stocks are never examined or disclosed. The Plan does not ensure that ODFW shall prevent serious depletion of indigenous species, including Chum, Chinook, and steelhead.

Curiously, the Plan makes speculative and unsubstantiated assumptions about the "independence" and historical significance of early-run Coastal Chinook and without any justification seems off-handedly to dismisses these populations.

Harvest

Without population-specific rationale, the Plan proposes to re-establish a "modest" harvest on eight wild winter steelhead populations. This seems disingenuous when one considers that of the 15 distinct population segments of steelhead on the west coast, 12 are listed as threatened or endangered, and not one has been recovered or de-listed from the Endangered Species Act.

Evidence is lacking to substantiate that these populations are sustainable enough to support wild steelhead retention.

Hatcheries

The Plan does not make explicit the tradeoffs in viability of wild populations known from scientific research to result from hatchery operations and releases. The Plan appears to be founded on a presumption of full use of existing hatchery capacity as a goal equal to the priority of fish conservation. The lack of alignment between hatchery management and habitat conservation makes us question whether the Plan can be effective.

Habitat

Hatchery and harvest management and conservation measures are intrinsically influenced by the capacities of existing habitat. This is fundamental for conservation efficacy and is almost entirely lacking in the Plan.

Curiously, the Plan repeatedly acknowledges that habitat degradation is the most pervasive factor limiting native fish populations, but provides not even a conceptual framework to identify what needs to be fixed or where.

Monitoring

Perhaps the single most important product of any conservation plan is an effective monitoring and evaluation component. It's so vital the Native Fish Conservation Policy requires it. Yet, it is virtually nonexistent in the Plan.

We are confounded that a plan intending to direct harvest and conservation for a decade includes no provisions to monitor results. This is wrong. It's bad policy. It's bad science. Oregonians are entitled to know if their tax dollars are being effectively and efficiently spent.

Much remains to be done to make this a truly effective and groundbreaking plan, and to legitimize 'Conservation' in its title. Upon completion of our science panel's work it will be presented to Fish & Wildlife Commissioners, Oregon legislators, Governor Kitzhaber, the press and others.

Michael Moody

HOLY HYDRO SKYKOMISH SUNSET?

WORDS BY
MARK HOMEYER
SKYKOMISH
RIVER STEWARD

(ABOVE)
Sunset Falls
SF Skykomish River,
A nice place for a dam?
Photo: Thomas O'Keefe

THE SKYKOMISH RIVER IS WELL KNOWN AMONG steelhead fly fishermen. What is not widely known about this tributary of the Snohomish is that it's one of Washington's last remaining undammed and free-flowing rivers. The Sky is widely recognized for its outstanding aesthetic and recreational value. The South Fork has been nominated for protection under the Federal Wild and Scenic Rivers Act. It has also been designated by the Northwest Power and Conservation Council as one of only four Washington State Scenic Rivers. These designations are supposed to provide some protection from hydroelectric development. In this era of dam removal and with these designations you would think the Sky would be protected – and you would be wrong.

Fly fishing on the Sky dates back to the beginning of the 20th century. Two pioneers of modern steelhead fishing Ken and son George McLeod call the Sky homewaters. Through decades of angling experience and work with Scientific Anglers the McLeods are credited with many of the pioneering techniques and fly lines used today in the pursuit of steelhead. Most notably the McLeod's designed several flies which, after many decades, are still considered among the most effective patterns in steelhead fishing.

One of those flies came to be in 1936 as father and son drove along Highway 2 winding their way up along the Skykomish River. The pre-dawn Pacific Northwest morning was grey and gloomy - so common that time of year. As the sun rose behind the Cascades the morning sky ignited in brilliant fire. As they admired the sight, Ken said to his son, "tie me a fly with those colors in it." George later took the red, yellow, and white of that Cascade morning and tied what would be named the Skykomish Sunrise. But the McLeods weren't just pioneering anglers; they were also deeply involved in the protection of their river and its wild fish.

As a founding member of the Steelhead Trout Club of Washington, Ken was an active advocate for river enhancement and steelhead protection. Good thing because over the decades the Sky has suffered through many of the insults of progress and development. Miraculously, several attempts to dam the river have been thwarted by organizations like the Steelhead Trout Club of Washington.

In Washington and the rest of the US damming of rivers has a long and often shameful history. When Europeans first colonized the New World they found forests said to be as thick as the Amazon. Coastal streams and rivers were clogged with vast runs of Atlantic salmon larger than anyone had ever seen. Mill dams were indiscriminately erected to power the rapid expansion of civilization. By the mid 1700s it was clear that salmon populations were in free fall. Over just a few decades that followed most runs of wild Atlantic salmon on the eastern seaboard would become functionally extinct.

Having learned their lessons from the devastation dams caused in Europe and New England, our pioneering forefathers faced west. Provisions were made to protect salmon runs in the Oregon territorial constitution. Later Washington State law required fish passage where dams were constructed. These measures were largely ineffective and all but ignored with the rapid influx of settlers eager to exploit the riches of the west. This disregard reached a pinnacle with the construction of two illegal dams on the Elwha River on Washington's Olympic Peninsula. The dams effectively blocked passage of what was thought one of the largest Chinook salmon known in modern history. But rather than order their immediate removal the state fish commissioner, under the direction of the governor, waived the requirement for fish passage if an adjoining hatchery was constructed. Thus set in motion what today has

evolved into Washington's failed fisheries management plan. In fact, Washington state went on to see the damming of more rivers than any other state in the union -- 1,200 in all.

But Washington is not alone. After a long court battle California's Tuolumne River below Yosemite was dammed destroying John Muir's beloved Hetch Hetchy Valley. Seven dams were constructed along the Coosa River in Alabama - dams the U.S. Fish and Wildlife Service described as "one of the largest extinction events in North America . . ." The Columbia River was dammed in eleven locations and Snake River sixteen. After the completion of the Glen Canyon Dam on the Colorado River in 1963, hydroelectric interests even mounted an effort to construct two more dams in the Grand Canyon - an initiative only narrowly defeated in Congress.

In all there are more than 75,000 dams in the US. These dams are sold as green renewable energy sources by hydroelectric power interests and others. But what is quickly forgotten is that river systems are zones of the highest biodiversity on earth. The price for damming: whole sale loss of aquatic habitat, impacts to the biological and chemical properties of rivers and riparian environments, sedimentation issues including riverbed deepening below dams, the virtual extinction of many bird, plant, and fish species including some of the largest salmon and steelhead runs on earth. And if that weren't enough, studies indicate that some large dams and reservoirs cause greenhouse gas emissions which in total may equal the aviation industry.

So a century after the illegal construction of the Elwha River dams we celebrate their removal. Meanwhile, only a short distance away a utility prepares to dam one of the last free flowing Washington Rivers. The Snohomish Public Utility District (SNOPUD) was awarded a preliminary permit in March of 2012 to study construction of a new run of the river dam that would add to the nearly 1,200 dams already existing in Washington State. The proposed location is just below Sunset Falls on the South Fork. The project would siphon 2,500 (cf/s) out of the river below Eagle Falls, and pipe it around a 1.1 mile section of the now free-flowing South Fork. To produce just 13.7 megawatts of average annual generation; only 1% of the PUD's power needs – ONE PERCENT. The project would greatly reduce flows over two of the state's most scenic waterfalls, Canyon and Sunset Falls, and would reduce spring time flows by nearly 50% and autumn and winter flows by nearly 90%. FERC has received the Notice of Intent and Preliminary Application from the Snohomish PUD to move ahead with the dam.

Those who fail to learn the lessons of history are doomed to repeat them — George Santayana

GRASSROOTS GROWING RIVER STEWARD PROGRAM

WE ARE PLEASED TO INTRODUCE JAKE CRAWFORD as the Southern District Manager for the River Steward Program. Jake joined the NFS staff in October 2013, after first being involved as the River Steward for the Illinois River in Southern Oregon. Jake lives in Ashland, Oregon where he spends his time exploring the beautiful waters wild salmon, steelhead and trout call home.

As the Southern District Manager, Jake works with River Stewards and watersheds from the Umpqua Valley in Southern Oregon to the Russian River in Northern California. He is committed to providing a source of support, knowledge, and coordination to identify threats to, and develop solutions for, wild fish. He welcomes your contact regarding issues on your homewaters in the S. District that affect wild, native fish.

More personally, he is a native of Colorado, and moved to the northwest after completing his M.A. from Colorado State University in Fort Collins where he studied environmental and public policy. He is an active angler, tier, and outdoorsman. Growing up in the Rocky Mountains, whether rafting, canoeing, fishing or skiing, he has always been around water and appreciates all that it contributes to his life.

We all thank you for your continued support of the Native Fish Society and the protection and recovery of our beloved wild fish. If you live and work in S. Oregon and N. Califronia and you're intersted in learning more about becoming a River Steward, contact Jake today!

Jake Crawford, Southern District Manager
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B-RUN STEELHEAD BLUES

BILL BAKKE, SCIENCE & CONSERVATION DIRECTOR

ARE B-RUN STEELHEAD BEING DRIVEN TO EXTINCTION?

This unique population of large steelhead from Idaho's Clearwater and Salmon rivers is slipping away even though it is a protected species and listed as threatened under the Endangered Species Act since 1997.

This year's (2013) large run of fall chinook entered the Columbia River and created a lot of optimism about just how effective the fish management program has become, but the run size for wild B-run steelhead was predicted to be just 7,900 and has since been downgraded to 2,500. The average wild B-run steelhead run size estimate at Bonneville Dam from 1992 to 2012 is 9,702 fish. Not all those fish reach Lower Granite Dam on the Snake River where they are counted again as they pass the dam on their way to their spawning grounds. Under ESA protection 17% of the B-run steelhead can be harvested in tribal and sport fisheries in the Columbia River. According to evaluation by Idaho Fish and Game (IDFG) 55% of the B-run steelhead crossing Bonneville Dam were caught or missing. (Marshall 2004)

Steelhead are managed by a fixed harvest rate under the ESA rather than by a spawner abundance requirement by spawning stream, consequently at low run size there are not enough spawners reaching their spawning grounds.

In the 1980s a 10,000 wild B-run steelhead adult spawner goal was established at Lower Granite Dam. Idaho Fish and Game evaluated the production of steelhead juveniles from spawners in wilderness streams.

"With the current management strategy relying on a minimum adult escapement at Bonneville and Lower Granite dams, it is important to compare the escapement objectives at the dams with redd counts and the resultant parr production in specific drainages."

"There is a large deficit between dam counts and parr production for group-B steelhead, indicating that escapement objectives at Bonneville and Lower Granite dams are set too low to achieve the desired parr production goal which is 70% of capacity."

"The escapement objective of 13,300 at Bonneville Dam and 10,000 at Lower Granite Dam results in extremely low seeding levels for Idaho's group-B steelhead production streams" (Holubetz 1997).*

After harvest, based on the ESA harvest rate of 17%, about 2000 wild B-run steelhead will pass Lower Granite Dam in 2013. According to IDFG there are 6,400 stream miles available to steelhead production, and at full seeding about 4.5 million steelhead smolts could be produced (IDFG 1991). For B-run steelhead there is an estimated habitat capacity for 33,000 spawners. IDFG says, "Under seeding is principally a function of low wild adult spawning escapement" (IDFG 1991).

Not just in Idaho, but throughout the Northwest, each hatchery has an egg take requirement, but rivers do not have an egg deposition requirement. This suggests that the fish management agencies are more concerned about keeping their hatcheries at full capacity than they are the productivity of wild steelhead in rivers. This indicates a bias toward hatchery production for harvest rather than for wild steelhead conservation, recovery, and fisheries. As one manager told me, spawner escapements are set but they are "aspirational" targets and not a management criterion. This means that wild steelhead spawner abundance is defined by harvest. Spawners are what are left over after harvest.

The 1969 U.S. v Oregon decision, called the Columbia River Fish Management Plan, stated the tribes could harvest 32% of the B-run steelhead run but averaged 34% since 1985. IDFG registered its concern saying that B-run steelhead have declined by 85% since 1985, and averaged only 800 fish escapement.*

(ABOVE) Searching for giants. B-run steelhead homewaters, Idaho.
Photo: Steve Petit

**For those not familiar with biological terminology a "redd" is a nest that eggs are deposited within; "parr" are juvenile fish, and "capacity" is an estimate of the amount of rearing area for juvenile salmonids in a stream.*




In 1998, Will Stelle, Regional Administrator for the National Marine Fisheries Service in Seattle said, "B-run steelhead are not meeting biological objectives and are unlikely to meet minimal threshold escapement levels in the near term even in absence of harvest; given this, conservation should assume top priority" (Fish Letter April 30, 1998).

In 2002, Bob Lohn, Regional Administrator for NOAA Fisheries in Seattle said, "The interim abundance target for B-run steelhead is 29,100 fish set by NOAA Fisheries as guidance for implementing recovery planning in 2002. Since 1985, the interim abundance target at Lower Granite Dam has not been achieved for B-run fish and they have been below the interim goal in all but the last few years since 1985 (NOAA Fisheries 2004). And so it continues.

In 2008 "Abundance – based management" was adopted that allowed more salmon and steelhead to be caught as more of them return to their spawning streams. This includes ESA-listed fish such as the B-run steelhead. The new agreement boosts harvest rates for tribal and sport fisheries when runs increase, called "Sliding Scale" harvest management. But what was left out of the discussion about abundance-based harvest was the impact on ESA-listed B-run steelhead that are mixed in with the fall chinook run. A large fall chinook run would be harvested at a higher rate and the take of wild steelhead would increase.

"In years when higher harvest rates kick in, more steelhead would be caught in tribal fisheries", said Guy Norman, Washington Department of Fish and Wildlife. "However, the draft agreement also calls for more protection of steelhead when runs are low" (NW Fish Letter January 18, 2008).

One could argue that the impact of harvest on wild B-run steelhead has not improved the status of this threatened and federally protected species. There are many factors that limit the survival of B-run steelhead, but those impacts that we have the ability to control are a priority. Most of the spawning streams for B-run steelhead are on federal managed lands and wilderness areas that are considered to be in relatively good condition. It is known that hatchery fish interactions reduce the reproductive success and survival of wild steelhead. It is also known that harvest impacts need to be better regulated to get enough spawners to their spawning streams.

Correcting fishery management impacts on wild steelhead is necessary to support their recovery. As IDFG has pointed out, there are not enough spawners to maintain the wild populations and prevent their extinction. To solve this nagging historic problem the fishery managers will have to adopt a wild spawner abundance requirement for each watershed and manage the fisheries to achieve it. So far, the fishery managers have been unwilling to take this necessary action, preferring to adopt aspirational escapement goals and maximize harvest.

For over one hundred years fishery management has been focused on replacing wild salmonids with technologically produced fish as mitigation for habitat degradation and over-fishing. Hatcheries are the silent partner in the industrial development of watersheds. When wild salmon and steelhead were provided protection under the Endangered Species Act, it threatened to upset this status quo. The most difficult issue now is to change the framework of fisheries management from one based on technological solutions to solve complex ecological problems to one of maintaining the ecological health and productivity of rivers and native wild salmonids. The recovery of wild B-run steelhead is a real test of whether fisheries management can change, moving beyond the status quo and adopting an ecologically based management framework.

**The fishery management term "escapement" refers to those fish that reach their spawning grounds and are not caught in the various fisheries or killed by other impacts.*

(ABOVE) Heads or tails? Many shades of summer steelhead perfection. Photos: Steve Petit

GOING WITH THE LOW FLOW

WORDS BY DOUG DEROY,
GUALALA, GARCIA & NAVARRO
RIVER STEWARD

JUST AS DILIGENT ER DOCTORS MONITOR THE PULSE of their patients, dedicated salmon and steelhead anglers routinely check the flows of their rivers. Checking flows is a ritual that unites nearly all salmon and steelhead anglers, regardless of angling method.

However, for anglers plying the coastal rivers of California from the Oregon border south to the Golden Gate Bridge, meticulously monitoring river flows not only helps one figure out where the best fishing opportunities lie – it is also critical for determining which rivers are legally open to fishing on a given day.

Low-Flow Closures in California

The California Department of Fish & Wildlife (CDFW) sets low-flow closure regulations by selecting an existing river flow gauge and a specific flow, which triggers a closure on its respective river(s).

CDFW put low-flow closure regulations into place on an individual, river-by-river basis in its northernmost region, but for all "central coast" streams – those tributary to the ocean from the Eel River south to the San Francisco Bay – it established a single, region-wide trigger.

CDFW updates a hotline on a weekly basis, which anglers are expected to call to confirm whether the rivers are open or closed to fishing. The weekly low-flow closures are based on Wednesday morning flow data. In other words, central coast streams are closed for a week starting any Thursday when the flows at the designated gauging station fall below the trigger point on the preceding Wednesday morning.

During consistently wet years, low-flow closures may never go into effect. During dry spells, though, these closures protect California salmon and steelhead from excessive fishing pressure. That is, if the trigger chosen is an appropriate and representative indicator.

The Issue

Currently, the low-flow closure for central coast streams is triggered when the Russian River gauge near Guerneville falls below 500cfs. The issue, aside from the disproportionate size of the watershed, is that the Russian's flow is artificially regulated by dam releases from Lake Mendocino and Lake Sonoma. This problem became glaringly clear (no pun intended) earlier this year when we had more than a month long drought in the middle of winter steelhead season. The coastal streams dropped down to mere trickles, yet remained open to fishing because dam releases kept the Russian above the 500cfs trigger point the entire season. ESA-listed fish, congregating into a handful of shrinking holes below restricted passage areas, were then subject to increased angling pressure for weeks on end.

Basing the central coast low-flow closure trigger on the Russian River does not make much sense, particularly when there are reliable gauges on more representative central coast streams that lack dams or diversions. Furthermore, the fact that these low-flow closures are based off of gauge readings taken only once a week each Wednesday underscores the need for a more accurate indicator. The graph on the following page illustrates the problem.

Taking Action

The problem was so clear, and the solution so simple, it was impossible to ignore. Shortly after drafting a one-pager of the issue and proposed solution, a couple of motivated fishing buddies and I began building a coalition of stakeholders to urge the California Fish & Game Commission (the Commission) to enact an emergency regulation change to the central coast low-flow closure trigger.

We started by talking to the locals

Quickly we began to see that the issue created a rare opportunity to bring an uncommon group of interests together in support for a proposed solution. We turned the one-pager into a PowerPoint

(ABOVE) Gualala River in low light, Photo: Jeff Bright

armed with photos and video and began presenting at local watershed council meetings. It was encouraging to see local bait, gear, and fly fishermen, as well as a tackle shop, logging company, river groups, and regional nonprofits come together in support for a change. Our proposal is not about finger pointing, and the idea of shared sacrifice of fishing days for the good of the fish seemed to lay everyone's hackles down.

Calling the authorities

With a respectable array of interests on board, I called the Commission's office and asked to speak to the Deputy Director. To my surprise he took the call. Before I could get past "Hi," he asked what agency or group I was with, but after hearing that I was just a concerned citizen (I wasn't a river steward at the time) he let his guard down. Within minutes he engaged with the issue, advised on next steps, and put me in touch with the head of the fisheries branch of CDFW as well as the relevant regional managers.

Joining forces

Shortly after my conversations with the Commission, National Marine Fisheries Services (NMFS) biologist, Josh Fuller, contacted me regarding a similar proposed regulation change he was working on, but had not gotten the agency traction that we had. We joined forces and began scheduling meetings with CDFW.

Testifying at the Commission meeting

As we solicited meetings with CDFW, I testified during the public comment portion of the CA Fish & Game Commission Meeting in Sacramento. It was nice to see the Commissioners' reactions to our proposed change in person (none were negative). More importantly, it set the regulatory process in motion by compelling CDFW into action.

Engaging the Department of Fish & Wildlife

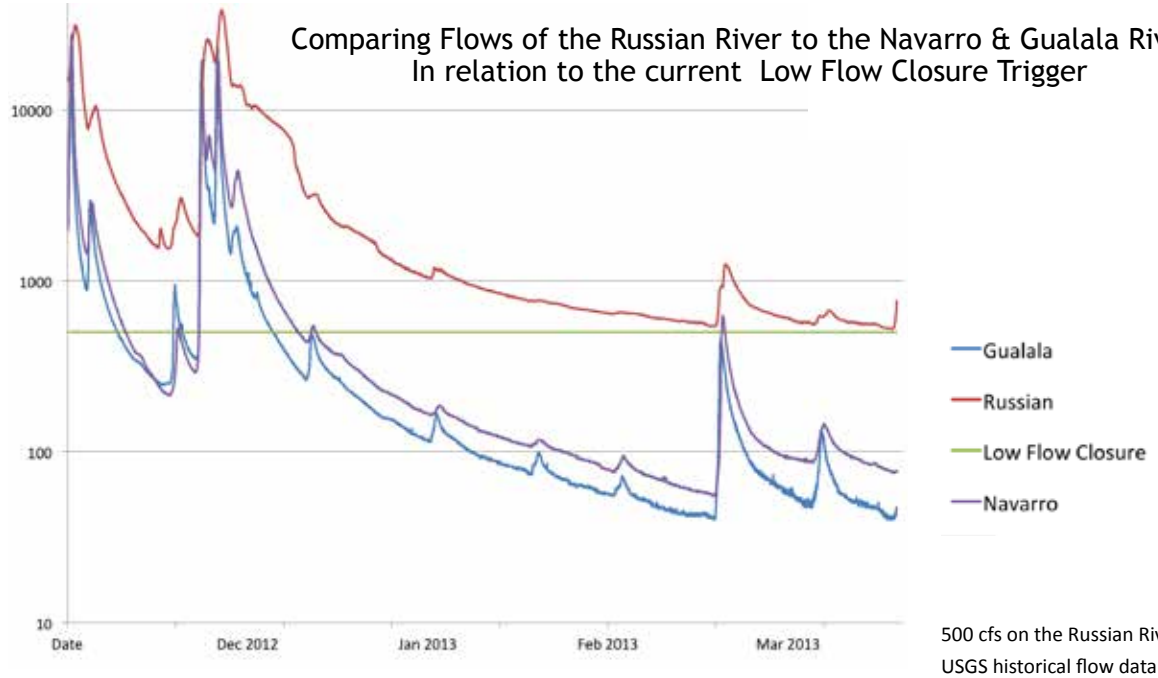
With CDFW then fully engaged, we had a series of meetings between the NMFS biologist, CDFW regional managers, and local stakeholders. We agreed that it would be best to propose separate low-flow triggers for each of the two CDFW Regions that lie within the "central coast."

The CDFW Fishery Management Committee (FMC) declined to grant the emergency status that would fast track this proposed regulation change because it could not prove imminent risk of species extinction. In order to achieve "emergency" status it is necessary to meet the extreme burden of proof that the last returning individual fish of a given species would be taken if the regulations were not changed as soon as possible. Thus, this proposal will proceed per the standard fishing regulation change process.

The proposed regulation change is now an official CDFW action. The CDFW regional managers have taken the lead and will host a town hall meeting in each of their two respective regions to publicly vet the proposal before presenting it to the Commission. Presenting the proposed regulation change to the Commission this spring will set the official Commission cycle into motion in time to put the changes into effect in 2015.

Poaching: the Elephant in the Room

It is worth mentioning that alongside our low-flow meetings, other meetings were being held amongst high-ranking officials regarding poaching in the Garcia River, as publicized in numerous Press Democrat articles. The same low-flow conditions that raise ethical issues amongst honest anglers also make for prime poaching conditions. Poachers on the central coast thrive under the current, flawed low-flow trigger. With rivers open to fishing under low-flow conditions, some poachers are able to pose as honest anglers and the understaffed enforcement task is make even more difficult. When a river is closed due to low-flow, it is a lot harder for poachers to operate because it is illegal to be out on the water with fishing gear in the first place. However, in the interest of keeping our proposal clear and simple, we decided to leave the poaching issue as a related but entirely separate one.



GRAPH: 2013 Flow Data 2, 3 – Winter Season

500 cfs on the Russian River @Guerneville
USGS historical flow data
Graph: Spencer Miles

METOLIUS DISEASE & HATCHERY TROUT

WORDS BY HAMISH RICKETT, M.D.
PATHOLOGY RIVER STEWARD

HAVING GROWN UP IN OREGON, I was naturally drawn to articles featuring the fish and the areas with which I grew up. More than thirty years ago, I discovered what many people in the Northwest and beyond already know and that is the stunning beauty of the Metolius River and its inhabitants.

As a teenager I was always happy to catch fish of any kind but was struck by the difference between the easy to catch, snub-nosed hatchery rainbows and the much harder to catch but far prettier native rainbow and bull trout. Of course at that point in my life I didn't grasp the complicated politics and stocking history of this river. I was all too happy to traipse up and down the riverbanks, fishing but not worrying much about the provenance of the fish I caught. How brook trout, brown trout, rainbow trout, bull trout (we called them dollies) and Kokanee all wound up in the same river was a wonder but not one to cause me more than fleeting curiosity. How it was that the fish uniquely adapted to this river had to compete with these other species as well as genetically mingle with the stocked rainbows was lost on me.

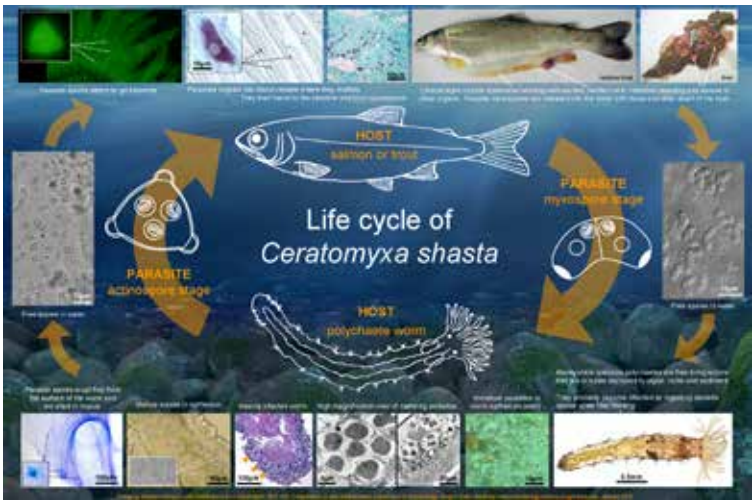
Thirty years later, however, I was struck by a study by Currens et al. that looked at the genetics of the rainbow trout of the Metolius River and their resistance to a specific parasitic infection and how 70 years of stocking non-native rainbow trout have affected their survival fitness. Now they stopped stocking the Metolius in 1995 but with two dams downstream (Round Butte Dam and Pelton Dam) isolating the rainbow trout population from the non-stocked Deschutes River this afforded an opportunity to look at the genetic difference as well as the resistance to the parasite *Ceratomyxa shasta*. They found evidence of genetic introgression (hatchery fish genes were being incorporated into the genes of native fish), less resistance to a naturally occurring parasite and the native fish were beginning to look more like the hatchery fish (scale numbers were between the native and hatchery trout).

This paper highlights the subtle but potentially devastating effects that stocking may have on a native population of fish that is uniquely adapted to its environment.

There are four lines of evidence that the hatchery fish stocked in the Metolius River were having a significant and permanent effect on the native rainbow trout.

1. Genetic introgression (hatchery fish genes were being incorporated into the genes of native Metolius River fish)
2. Increasing susceptibility to infection (*C. shasta*)
3. Morphologic evidence (native trout were beginning to look more like hatchery trout (number of lateral series scales were intermediate between hatchery and native trout)
4. Mitochondrial DNA also showed evidence of interbreeding between hatchery and native rainbow trout (Williams et al 1997)

The genetic introgression was demonstrated by isolating and testing specific enzymes from rainbow trout collected in the Metolius River (native, non-fin clipped), the Deschutes River and from typical stocking source trout. The Metolius River is in the Deschutes Basin and so the Metolius River rainbow trout should have the same genetic make-up as the lower Deschutes rainbow trout as these populations were able to freely inter-mingle before the construction of the Round Butte and Pelton dam that now creates Lake Billy Chinook and separates these two trout populations. The tests showed, however, that the genetic makeup of the native Metolius River trout was now intermediate between the Deschutes River trout and the hatchery source trout. Clearly, the 70 years of stocking non-native hatchery trout had allowed many generations of hybridization (at least 20 generations since the dams were built in the 1960's).



While this hybridization was apparent in the genes of the native fish, people had debated the significance of this. Yes, there were small differences in the amino acid sequences of some proteins but, so what? As in the case of human genetics, small changes in the genetic makeup can have profound changes on the fitness and survival of a species or an individual. One of the differences that was apparent in this study was susceptibility and resistance to disease.

The parasite *Ceratomyxa shasta* infects salmonid fish in the Pacific Northwest (California, Oregon, Idaho, Washington, British Columbia and Alaska). In addition to infecting fish, its life cycle includes a stage infecting a freshwater polychaete worm. Fish can only be infected by the spores released from the infected worms, they cannot be infected from other fish or transmit the infection to their progeny. Infection occurs more frequently at higher water temperatures (infections generally don't occur below 50 degrees Fahrenheit), low water flows, below bodies of still water and in high densities of spores. The infection is generally fatal and there is no known treatment though cold temperatures slow the progression. The infection affects the entire digestive tract as well as other organs. The fish loses body weight, the skin darkens, the eyes bulge and the fish becomes lethargic before dying.

C. shasta naturally occurs in the Deschutes basin and the native rainbow trout are resistant to its infection. The Metolius River was stocked with hatchery rainbow trout for roughly 70 years before this practice was halted in 1995. The hatchery trout were derived from a coastal strain of rainbow trout that were not resistant to the infection with the parasite *C. shasta*. In 1989 and 1990, the team that wrote this paper (researchers from Oregon State University, Oregon Department of Fish and Wildlife and the US Geological Survey) studied the native rainbow trout in the Metolius River and compared their resistance to infection with *C. shasta* to native rainbow trout from the lower Deschutes River (non-stocked, from several sources) and to non-native hatchery trout (Cape Cod and Oak Springs—not of Deschutes origin).

(OPPOSITE) Metolius River, Photo: Brian O'Keefe
(ABOVE) Life cycle of C. Shasta, OSU Microbiology Department

(BELOW) The incredible markings of a wild Metolius River redband trout
Photo: Brian O'Keefe

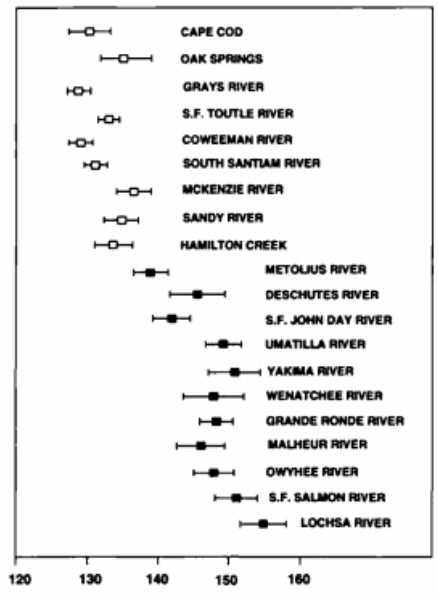


FIGURE 5.—Means and 95% confidence intervals for number of scales in the lateral series for rainbow trout in the Columbia River drainage. Open boxes are populations of coastal origin. Closed boxes are inland rainbow trout populations (S.F. denotes South Fork).

So the next time you're out on the banks of a river, lake or stream, look around you and ask, is this just another cookie cutter place? Are these fish, plants and animals all alike? Are they all interchangeable widgets?

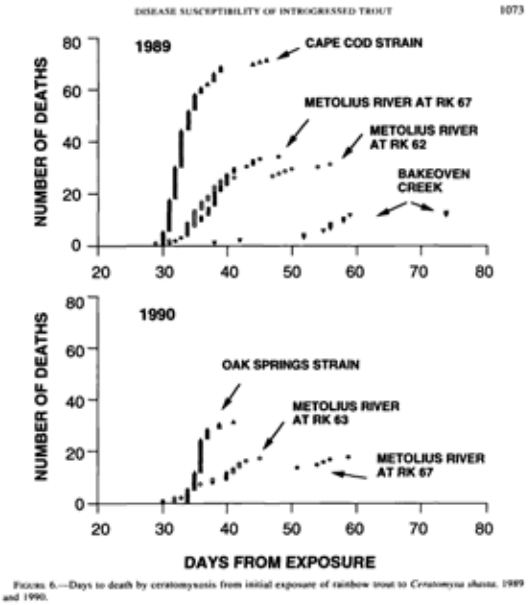


FIGURE 6.—Days to death by ceratomyxosis from initial exposure of rainbow trout to *Ceratomyxa shasta*, 1989 and 1990.

As with the genetic studies, the Metolius River native trout were intermediate in their resistance to infection from *C. shasta*. (see figure) In both years, all the hatchery fish became infected and died after a month from exposure. Only 16-25% of the Deschutes River trout became infected. 67-94% of the Metolius River trout became infected. See figures 5,6

In one year, there were some differences between the rate of infection of Metolius River trout above and below the confluence of Lake Creek that drains Suttle Lake. Lake Creek is often warmer than the Metolius River and has been recognized as a source of the *C. shasta* parasite. The combination of warmer water and higher density of spores means that fish below the creek likely have been exposed to the infection more often and perhaps has selected for a more resistant population. This difference was not apparent both years. The Metolius River has a mosaic of temperatures due to the large number of cold water springs entering the river and unlike most rivers, the average temperature of the water drops as one goes further downstream. The springs that feed the Metolius River keep the average temperature quite cold (mean temperatures year round are generally less than 50F or 10C). Colder than is ideal for the native redband rainbow trout. Indeed, the lower Deschutes and Crooked River generally have higher densities of native rainbow trout. The cold temperature in the Metolius River has allowed the hatchery fish to survive because the parasite *C. shasta* is much less likely to infect fish below 50F.

This study also looked at the morphology of the rainbow trout and again, the Metolius River trout were inbetween the characteristics of their native ancestors from the Deschutes River and the hatchery fish. The number of lateral series scales from the Metolius River fish were 139 but all the inland rainbow trout populations had greater than 140 scales (142-155) and the coastal hatchery origin trout were less than 140 (130-138). See figure 6.

I believe this article is particularly important because it highlights the important changes that occur when non-native hatchery stock are allowed to spawn with the native fish that are uniquely suited to their environment. While we may not notice these changes on a macro level, they are occurring at the nuts and bolts level that determines their fitness, survival and ability to reproduce. When we see studies illustrating the reduced reproductive efficiency of steelhead after a single generation of hybridization between native and hatchery steelhead we should not be wondering if this is true but instead see it as another manifestation of this same paradigm: native fish are uniquely adapted to their specific environment and haphazardly allowing non-native fish to hybridize with them (through hatchery stocking or straying) impairs their ability to thrive in that specific environment. Just because we have not elucidated the exact mechanism by which this happens, does not make it any less true. For the Metolius River trout, resistance to infection from *C. shasta* is but one way that researchers have discovered how native trout are more ideally suited to survive in the river than the stocked rainbows but I believe that every river, lake and stream will have similar but unique adaptations in their genetic makeup that we have yet to discover that makes them more suited for survival in their specific environment. As more research is done, we will see this through many different paths: genetics, physiology, behavior, timing, life histories, morphology, male/female ratios and in more ways than we can imagine.

I'm beginning to sound like a zealot. And I suppose that is what years of traipsing about river banks can do to a person. So the next time you're out on the banks of a river, lake or stream, look around you and ask, is this just another cookie cutter place? Are these fish, plants and animals all alike? Are they all interchangeable widgets? After all, that is what the hatchery system is based upon: a fish is a fish. I may have believed that once, but not now.

STUDENTS OF STEWARDSHIP

it takes a community to raise the next generation of river stewards

WORDS & PHOTOS BY KEN JOHNSON, SKAGIT RIVER STEWARD

SOMETIMES OPPORTUNITIES AND EVENTS STEER US in directions we might not anticipate. A few years back, I attended a workshop co-sponsored by Puget Sound Energy and ReSources, a local Bellingham environmental non-profit. The workshop was designed to educate teachers about climate change and to also help us plan ways to educate our students about our changing climate. It's easy, when addressing climate change, to start with the doom and gloom angle, which can end up as more sermon than lesson. Kids have an innate talent at tuning out these types of sermons. The challenge then becomes how do you get the message across more subtly and help the students learn about science and the scientific method in the process?

As a result of the workshop, I was fortunate to gain the mentorship of David Tucker, a renowned retired high school physics teacher, who helped me obtain water quality testing equipment from PASCO Scientific. With David's help and advice, we began a program at Blaine Middle School, where our sixth graders test various local locations for water temperature, pH, dissolved oxygen, salinity, and turbidity. The idea was for the students to be able to not only observe seasonal changes in the water and connect that to their studies of Earth, Moon, and Sun relationships, but to also analyze the data over time, to see if there are any long-term trends on local salt water conditions.

The Blaine School district is ideally located for marine science. But, due to state budget cuts and changes in grant regulations, our district had no money for field trips to do the water testing. Many of our students live within walking or biking distance of Drayton Harbor and Birch Bay, so the solution was to take the field trip to them. Three times during the school year, the kids ride their bikes, walk or get rides and meet me at the various testing locations after school.

A few years ago, one of my students came to school one Monday morning, excited to show me the picture of a fish she had caught. The picture was of a wild Coho, which she had proudly speared from the creek behind her house. It was tempting to start in on a lecture about spawning fish, closed water, legal fishing techniques, etc. Remember the part about kids tuning out sermons?

(Below) Digging deep; tree planting for riparian shade.

Instead, I took this as a cue to improve sixth grade environmental science. The idea was to foster a bond between the kids and their local environment, including the salmon. Why not expand our focus to the streams that flow into Birch Bay and Drayton Harbor? With the guidance of the Nooksack Salmon Enhancement Association, our students and their families are helping restore salmon runs by planting native trees and shrubs at nearby Terrell Creek.

Last fall, Annitra Ferderer and Maggie Long of NSEA helped us start a middle school learning project designed around Terrell Creek. NSEA provided money for transportation as well as knowledgeable instructors and interns. In November, colleague Sarah Fisher and I took our classes to the outlet of Lake Terrell where they viewed the site of a recently removed small dam and a stream bed restoration project. NSEA provided excellent streamside lessons and activities, but the main attraction for the kids and their science teacher was the sight of several pairs of Coho salmon, preparing to spawn. In the spring, we returned to Terrell Creek and the army of muddy twelve-year-olds helped to plant and place protective barriers around many native trees and shrubs.

This fall, we received exciting news from Ted Morris that Birch Bay State Park will begin construction of an educational center. This will be a great base for our students to explore and investigate the near shore of Birch Bay as well as the Terrell Creek estuary. Currently, I am taking the Citizen Action Training School course from the Puget Sound Partnership. I'm optimistic the course will help me to strengthen and expand our student service project. New environmental education programs are not easy to get going, but we have been quite fortunate to have the strong support of our school administrators, Darren Benson and Molly Mitchell-Mumma.

(UPPER) Terrell Cr. home for wild coho salmon (LOWER) Water quality testing

Where does Native Fish Society fit in with Blaine Middle School? Eight years ago I moved to Bellingham from Hailey, Idaho, and was happy to discover that there is a large, environmentally active, fly fishing population. At an informal gathering of local anglers, frustrated with the decline of the Nooksack River fishery, I met local fly fisherman, Chris Johnson. Chris told us about an organization called the Native Fish Society. Many of us strongly agreed with NFS's mission and signed up for membership. Chris soon volunteered to become the Native Fish Society Nooksack River Steward.

One of the most active (perhaps hyperactive) of our local anglers is Ed Megill. Ed and his wife Audrey own and operate Cascades Fly Fishing Expeditions and also now partner with Scott Willison in the Confluence Fly Shop. Ed's enthusiasm is contagious. He talked me into joining him as an NFS River Steward on the Skagit River. Four years ago, Ed helped us start an after-school fly fishing class. With the help of Klaus Lohse and Bill Hall of the 4th Corner Flyfishers, we have taught over one hundred kids the art of fly fishing and help instill a conservation ethic with our students.

Through our River Steward experience, Ed, Chris and I have been fortunate to work with Mark Sherwood. Last fall, Mark visited our sixth grade classes at Blaine and helped students understand that these beautiful salmon we see don't need to be raised in hatcheries, but are indeed quite capable of reproducing naturally. Mark helped the kids understand the value of healthy, wild fish. One result of Mark's visit is that we now have many river stewards of Terrell Creek, Dakota Cree, and California Creek. We are into our fifth year of water testing, and the NFS has generously offered to help update our well-used testing equipment. I truly appreciate the support of the Native Fish Society in our science education endeavors at Blaine Middle School as well as their efforts to bring back wild, healthy fish populations to our part of the Salish Sea ecosystem.

PRESERVING WILD FISH & YOUR RETIREMENT

REDUCE TAXES AND SUPPORT WILD, NATIVE FISH

By designating the Native Fish Society as a beneficiary of your estate you join a growing number of like-minded visionaries creating a visible legacy that confirms your enduring commitment to restoring wild salmon and steelhead.

Small or large estate, philanthropic minded people can reduce taxes and leave more for both family members and their favorite charitable organizations.

The easiest way to donate retirement assets is to designate Native Fish Society as a beneficiary in your will or living trust. You can specify either a defined percentage or a specific dollar amount.

For those in a position to make gifts currently, it's possible to realize significant income tax savings. Strategic gifting of appreciated, and therefore highly taxed, retirement assests may reduce, even eliminate taxes.

For more information, please contact Mike Moody at 503.496.0807 or mike@nativefishsociety.org

11 BEST RESTORED WILD FISH RIVERS 2013

The Northwest is seeing dramatic improvements in the health of many of its rivers and wild fish populations. The Native Fish Society wants you to know about it, so we have created our inaugural list of the **11 Best Restored Wild Fish Rivers in the Pacific Northwest**. We wish to celebrate those rivers enjoying a healthy resurgence. This list will annually acknowledge the good work being done by countless organizations and individuals, many of whom are volunteers. This list will shine a light on their successes for wild, native fish.

Not surprisingly, NFS River Stewards actively work on seven of this year's 11 best rivers.

11 BEST RESTORED WILD FISH RIVERS

1. Lower Deschutes River, Oregon
species: Resident Redband Trout & Fall Chinook

2. North Umpqua River, Oregon
species: Winter Steelhead

3. Eel River, California
species: Fall Chinook & Winter Steelhead

4. Chewaucan River, Oregon
species: Redband Trout

5. John Day River, Oregon
species: Summer Steelhead & Spring Chinook

6. Sandy River, Oregon
species: Fall Chinook

7. Joseph Creek, Oregon
species: Resident Rainbow & Summer Steelhead

8. Sol Duc River, Washington
species: Winter Steelhead

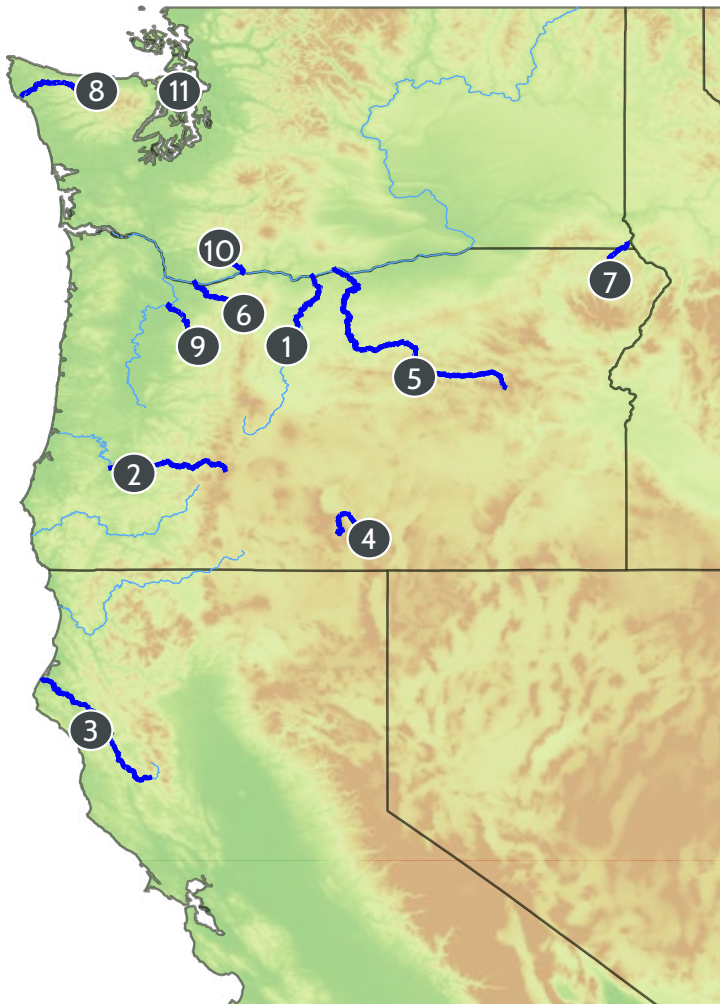
9. Molalla River, Oregon
species: Winter Steelhead

10. Wind River, Washington
species: Summer Steelhead

11. Puget Sound, Washington
species: Coastal Cutthroat

The selection criteria used by NFS requires that the designated populations in each river must:

(a) Have no direct hatchery influence on the species designated
(b) Have no-kill or restricted-kill protections
(c) Achieved or close-to achieving self-sustaining population of the species designated



(LEFT) Fall on the Clackamas (ABOVE) Deschutes River, OR Photo: Darcy Bacha

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(BELOW) It's all about homewaters! Photo: Conrad Gowell

SAVE THE DATE

NATIVE FISH SOCIETY BENEFIT BANQUET + AUCTION

FRIDAY, APRIL 11 2014 ~ MONTGOMERY PARK PORTLAND, OR

NATIVE FISH SOCIETY RIVER STEWARDS

Christie Adelsberger, Lost & Sprague
John Appleton, Grand Ronde
Will Atlas, N. Puget Sound
Bill Bakke, Columbia
Scott Baumer, Hood, 15 Mile
Duncan Berry, Salmon
Rob Bowler, N. Umpqua
John Bracke, Nestucca
Dick Bushnell, Salmon
Wes Campbell, Siletz
Chris Daughters, McKenzie
Tom Davis, Upper Deschutes
Doug DeRoy, Garcia, Navarro, & Gualala
Tom Derry, Molalla
Peter Donahower, Mid Columbia Regional Coordinator
Pat Dunham, John Day
Paul Engelmeyer, Mid Oregon Coast Regional Coordinator
Scotty Evans, Salmon
Ian Fergusson, Salmonberry
Sean Flaherty, Gig Harbor
David Gee, Hood
Charles Gehr, Rogue
Conrad Gowell, N. Oregon Coast Regional Coordinator
Ryan Haseman, S. Puget Sound
Jeff Hickman, Clackamas
Mark Homeyer, Skykomish
Chris Johnson, Nooksack
Ken Johnson, Skagit
Jonathan Knapp, Stillaguamish
Dave Lacey, Hunter Creek
Jena Lemke, Salmonberry
Steve Lent, Washougal
Alan L'Hommedieu, Sandy
Steve Light, Lower Deschutes
Matt Lund, Siletz
Michael Mathis, Snake River Lower Hell's Canyon
John McConnaughey, Washougal
Matt McQueen, Klickitat
Ed Megill, Skagit
Spencer Miles, Nestucca, Tillamook Bay Rivers
Bart Mills, Johnson Creek
Ed Miranda Jr., Wood, Williamson & 7 Mile Creek
David Moryc, Sandy
Jim Myron, Crooked
Scott Nelson, Calapooia
Chip O'Brien, Pudding
Stan Petrowski, S. Umpqua
Hamish Rickett, Pathogens
Jake Robinson, Coos Bay
Brent Ross, McKenzie
Mark Schmidt, Molalla
Marty Sheppard, Sandy
Mia Sheppard, John Day
Joyce Sherman, Salmonberry
Eric Shoemaker, Necanicum
Jason Small, S. Puget Sound
Kyle Smith, Calapooia
Rick Snyder, Grande Ronde
Keith Stonebraker, Clearwater
James Thurber, S. Oregon Coast, Lower Umpqua
Peter Tronquet, Rogue, Umpqua & Illinois
Walt Weber, Lower Columbia Tributaries
Cullen Whisenhunt, N. Santiam
Scott Willison, Stillaguamish