Salmon River Restoration Council

Fall 2016

The Bigfoot Trail Alliance joined forces with the Salmon River Restoration Council to hike up the South Russian Creek Trail into Russian Lake in the Russian Wilderness. At the trail's high point, we put in a photo monitoring plot as part of the Bigfoot Trail's citizen monitoring program. This was one of SRRC's periodic community education events, which get us all out to learn about and enjoy our beautiful watershed.

Salmon River Restoration Council

www.srrc.org

P.O. Box 1089 Sawyers Bar, CA 96027
530-462-4665 info@srrc.org

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Above and cover photos by Karuna Greenberg

With the arrival of fall, a shift occurs in our work here at the SRRC. Summer is always a hectic blur, with noxious weed crews busily transitioning from spurge to mustard to knapweed; fisheries crews surveying for juveniles and working hard to keep creek mouths open so that fish can access cold water in the heat; monitoring crews checking creek flows and water temperatures. But with the first rains of fall, noxious weeds are done flowering for the season, the water cools, the creeks come up, hobo temps get pulled, and the fish start spawning. Suddenly it is the time for carcass surveys, watershed ed., prescribed fire and fuels reduction. The last big push before the short, cold days of winter slow things down and give everyone time to prepare for another season.

This past couple of years we've experienced a lot of change and growth in our programs. Since 2015 all of our programs have gotten new coordinators. While introducing new people always involves a steep learning curve, it also provides an opportunity for our work to evolve in good ways. We are incredibly happy with our current team. We've also introduced a whole new program to the mix. While we've dabbled in larger scale habitat restoration projects in the past, hiring a coordinator for the Habitat Restoration Program has led to an exciting array of new projects (see pages 6+7).

Another big change has been the addition of prescribed fire to our Fire, Fuels & Forestry Program. Although we've participated in fire planning activities for years, 2014 marked the first time we were actually able to implement prescribed fire on private lands. This occurred through the Klamath River Prescribed Fire Training Exchange (TREX), which has been a great opportunity for our staff to gain practical experience in conducting prescribed burns. We hope to do more of this work in the future (see pages 16-18).

In our ongoing efforts to collaborate more with the Klamath National Forest, a couple of new opportunities arose. For the past two summers, SRRC has hired trail crew members to join the Salmon/Scott Ranger District trail crew on maintaining trails throughout the watershed. This has been a chance for us to have more input into working on trails that are used by the community, and provides an opportunity for local folks to do trail work if they are interested. We also had a staff member conduct monitoring of several grazing allotments in the Marble Mountains this summer under contract with the USFS (see page 15).

Getting back to our roots a bit, we've been trying to put on more fun, educational community events. From mushroom forays, to wildflower walks and fruit tree pruning workshops, this has been a great way to get community members together, get outside and learn new things. Stay tuned for upcoming events by checking the calendar on our website.

We hope you enjoy hearing about the work we do to protect this place we love. We're looking forward to another year! - Lyra Cressey, Associate Director

While SRRC and the Salmon River community have been monitoring our runs of Chinook, coho and steelhead for many years, another anadromous fish has been lurking in the waters of the Salmon River almost completely unseen and unstudied. This year, SRRC and the Klamath National Forest's Salmon-Scott Ranger District set out to learn more about these mysterious inhabitants of our river.

Lessons on Lamprey

They're not pretty creatures, but how good would you look after 400 million years?

Lamprey are an ancient group of animals similar to fish, but they are not actually a "true fish" because they lack characteristics such as paired fins and jaws. Lamprey are highly specialized and possess many primitive characteristics with evolutionary lines going back over 400 million or more years. Adult lamprey are readily recognizable with an eel-like body, a sucking disc on the mouth covered with sharp teeth, gill slits along each side of the head, and large eyes. A juvenile lamprey, known as an ammocoete (ammo-seet), is more inconspicuous than the larger predatory adults. Ammocoetes are filter feeders and inhabit the softer substrates on river bottoms such as sand and silt for 3-5 years. They rarely reach a size of 100mm during this phase before developing the eyes or mouth parts necessary for predation. Once mature, lamprey become parasitic, attaching themselves to the bodies of fish or whales to suck blood and bodily fluids. Many species travel to the ocean for more growth opportunities. These lamprey will return to their natal streams as anadromous nest builders, and like salmon, die shortly after spawning. Several species of lamprey occur in the Klamath Basin and express both resident and anadromous life history strategies.

top photo - Pacific lamprey juvenile from Dr. William O'Connor, photo above - Pacific lamprey portrait, Tom McHugh, photo right - Juvenile Klamath River lamprey, Kristen Sellmer

The Significance of Lamprey in the Klamath Basin

Lamprey are culturally important to indigenous people throughout their range, and play a vital role in the ecosystem. Anadromous species cycle marine derived nutrients in freshwater systems, primary production is passed up the food chain and sediments are reworked by filter feeding larvae. They also serve as an important food source for humans as well as many mammals, fishes and birds.

Lamprey were historically widely distributed throughout the entire Pacific Rim and are currently present in almost all coastal streams and tributaries of the major rivers in their range. However, recent observations of substantial declines in the abundance and range of Pacific lamprey have spurred conservation interest in the species. Pacific lamprey numbers in the Klamath River appear to be decreasing. While there is no estimate of the current Klamath River population, oral history taken from tribal fishermen indicates a long-term decline in adult catch. A downward trend is suggested for out-migrating juveniles caught in rotary screw traps in the Klamath River. Scott River and Shasta River rotary screw traps exhibit long-term declines as well. Pacific lamprey are known to be extinct from four watersheds within the Klamath Basin and have declined by 50-70% in the remaining seven, including the Salmon and Scott Rivers.

In 2003, the U.S. Fish and Wildlife Service (USFWS) was petitioned by 11 conservation groups to list four species of lamprey, including the Pacific lamprey, under the Endangered Species Act (ESA) in California, Oregon, Washington, and Idaho. In the Salmon-Scott River Ranger District, the Pacific lamprey, Klamath lamprey, and western brook lamprey, were added to the Klamath National Forest Sensitive Species List in 2013.

Identifying and Addressing Critical Knowledge Gaps

Lamprey are notoriously under-represented in management plans. Lamprey are not charismatic fauna and a lack of funding and basic understanding is making recovery difficult. The same problems that have harmed salmon are related to the decline in lamprey as well: stream degradation, water quality, limited passage throughout the basin, and poor ocean conditions. In 2015, an investigation into lamprey distribution was initiated by the US Forest Service (USFS) for the Salmon and Scott River drainages of the Klamath National Forest (KNF). This is the first attempt by the KNF to target lamprey; and specifically, focus on lamprey ammocoetes as indicators of rearing habitat. During the 2016 field season, the Salmon River Restoration Council worked with the USFS on these surveys to help inform the KNF of lamprey presence for the purpose of project analysis, as well as to assist in the development of aquatic enhancement projects to improve habitat and/or access for *all* species potentially present at a site.

The SRRC is looking forward to the continuation of this collaboration to gather basic data on a Sensitive Species. The data will help support management decisions and provide a restoration framework that promotes the increased diversity necessary to sustain a productive and healthy watershed.

-Kristen Sellmer, Fisheries Coordinator

photo by Michael Bravo

New Genetic Research on Spring Chinook

Both spring-run and fall-run Chinook salmon in the Salmon River watershed are managed as a single evolutionarily significant unit (ESU) classified as the Upper Klamath-Trinity River Chinook Salmon. However, due to a perceived distinctness and value between these runs by local management agencies, tribes, residents, and area biologists, there has been a movement to manage spring-run and fall-run Chinook separately to preserve the ecological uniqueness and cultural significance they provide.

The Endangered Species Act (ESA) provides a means by which a species may be conserved until it is no longer deemed at risk of extinction. However, delineating a species for this type of protection can sometimes become very complicated because under the ESA, the term species "includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature." Considering distinct population segments and subspecies puts management objectives below the species level where little guidance from the ESA is provided.

Wildlife managers are faced with answering difficult questions about which subspecies and distinct population segments (DPS) to protect when creating a sanctuary for diversity within a species and must also work under the pressures of limited resources to do so.

The concept of an evolutionarily significant unit (ESU) has been adopted to define a basic unit of conservation to help address some of these questions. An ESU is defined as a population or group of populations that are substantially reproductively isolated from other conspecific population units and represent an important component in the evolutionary legacy of the species. Researchers have welcomed the adoption of the ESU criteria because it offers a holistic approach to protection by considering geographic, ecological, and biological data.

For Pacific salmonids, genetic methods have been used extensively by researchers to delineate ESU's and DPS's based on geographical distinctness. When different populations of the same species become geographically isolated they also become reproductively isolated. Pacific salmon for example, have a range that spreads from California to Alaska, but groups of salmon return to the same watersheds year after year and only breed with other salmon who return to that watershed as well. When researchers study salmon on a molecular level, they can see this geographical distinctness and direct appropriate management policies based on the particular river basin those fish are native to. This method has given researchers an indispensable tool for managing salmon below the species level.

Of course, as genetic methods and our own ecological and biological knowledge of salmon have become more advanced, researchers are seeing where even these measurements are lacking. The current challenge that

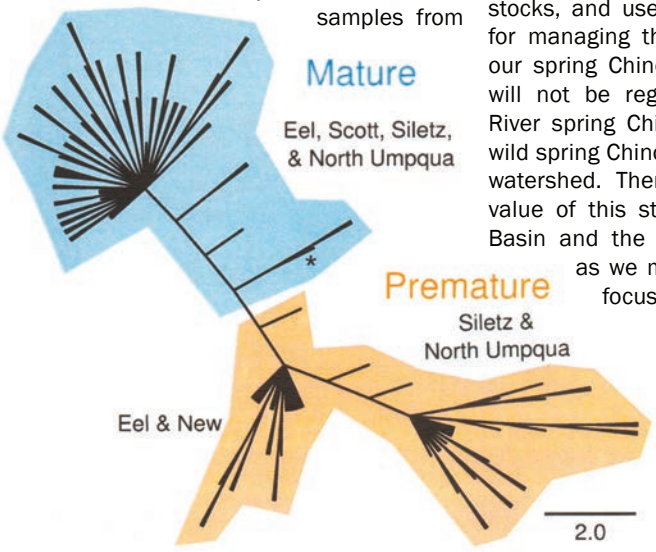
researchers have discovered is that even within these geographically distinct ESU's there are groups of fish that are migrationally distinct and therefore reproductively isolated. Migrationally distinct groups of fish within the same ESU's are more commonly known as spring, summer, fall, or winter run types. It is possible for geographically distinct populations to interbreed, but not probable because they are not genetically predisposed to do so. However, it has been assumed that the traits that make fish migrationally distinct are more flexible and that run types can be easily replaced by individuals from other runs within that ESU. Therefore multiple migrationally distinct run types are often times managed as one unit. In recent years though, this assumption has been the point of much controversy, especially in the Salmon River watershed.

Biologists have long suspected that migrationally and spatially distinct fish runs within the same watershed, such as spring and fall Chinook in the Salmon River, have adapted to reproduce with their conspecifics that migrate at similar times and back to similar spawning areas, akin to geographically distinct ESU's from different river basins. Although past genetic research has not supported this theory, new methods have recently been developed by researchers at UC Davis that allow more thorough genetic mapping. To answer this question, they obtained tissue samples from separate runs of both steelhead and Chinook salmon from watersheds along the west coast, including the Salmon River.

A genetic analysis of this tissue revealed that fish separated out into distinct categories depending on their run-timing irrespective of their geographic location (*see figure below*), and the adaptation for early run timing is shared by both spring Chinook and summer Steelhead salmon, which diverged from each other over 15 million years ago. The adaptation arose as a single evolutionary event within each species, and spread to other populations through straying and positive natural selection. This means that the mechanisms involved in producing this particular difference in run timing are rare and the chances of this specific genotype reappearing after it is lost are extremely low. Therefore we can't expect that if Klamath River spring Chinook are extirpated (e.g. through loss of habitat), that they could re-evolve from fall Chinook in the same ESU randomly recolonizing their habitat (e.g. habitat made available by removing a dam) on a time scale that could meet current conservation objectives for salmon in the Pacific Northwest.

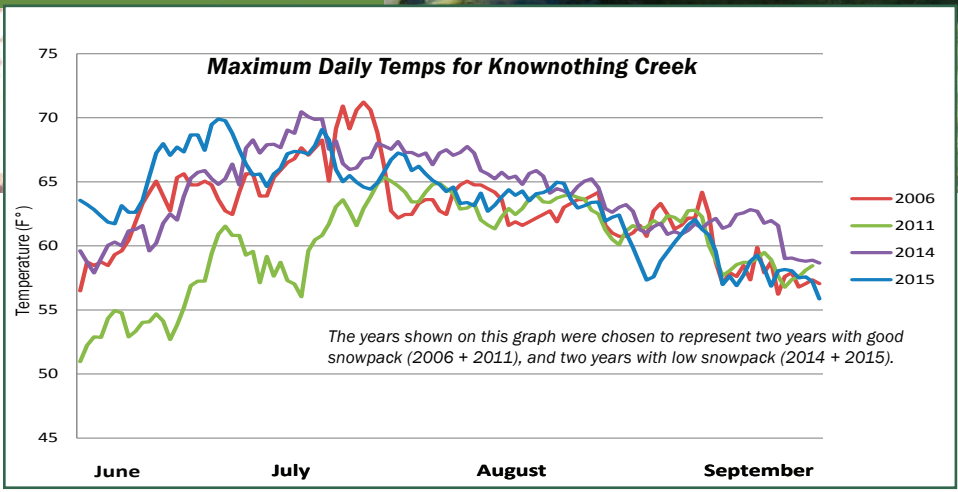
In considering long-term conservation strategies for improving the remaining runs of Chinook salmon in California, it is critical that we focus on preserving existing high-quality habitat and healthy native salmon stocks, and use the best available science for managing these resources. Once lost, our spring Chinook and summer steelhead will not be regained. Today the Salmon River spring Chinook run is the last viable wild spring Chinook run in the Klamath River watershed. Therefore, we must consider the value of this stock for the entire Klamath Basin and the implications of our actions as we move forward with where we focus our management efforts.

- Kristen Sellmer, Fisheries Coordinator



left, Phylogenetic tree for all individual steelhead sampled, depicting genetic differences in run timing for summer (premature) and winter (mature) runs irrespective of geographic location.

Water Monitoring Program



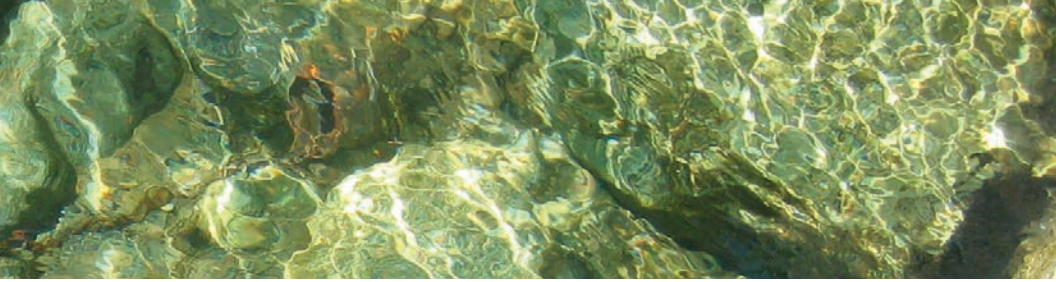
For close to twenty years, SRRC's Water Monitoring Program has been collecting data throughout the Salmon River watershed. Using Onset Hoboware© devices, SRRC has been monitoring approximately 50 water temperature sites and ten air temperature sites which provide continuous data every summer since 1996. Peak temperatures and low flows are some of the vital data collected. The data is available online on SRRC's website and is frequently sent to other agencies for research and climatology modeling. As the climate changes so does the watershed, and temperature data assists in identifying warming trends and problem areas for the health of fish and other aquatic species. Once problem areas are identified, we can evaluate where restoration projects have the potential to reduce temperatures on localized levels. This process has led to a number of projects that are currently in progress to enhance floodplains, riparian zones and river diversity with the goal of reducing summer temperatures and restoring habitat.

While the clear, beautiful water we enjoy daily in this watershed appears to be pristine, there is a long history of mining and logging that has negatively impacted the health of the Salmon River. Tailing piles from large scale historical mining still influence the functionality of the

Watershed Education Program

SRRC has been providing high quality, place-based watershed education for the students in our river communities for nearly 25 years. The purpose of the program is to increase environmental awareness among students, their families and the local community, and to promote responsible stewardship of the Salmon River watershed. With hands-on participation in watershed stewardship activities, we try to give the community a vested interest in all aspects of Salmon River restoration efforts.

One of the focuses of the Watershed Ed program the past couple of years has been the Student Monitoring Project. Students at Forks and Junction Elementary Schools have been doing twice yearly monitoring and biological



floodplain and act as heat sinks that promote higher summer temperatures along with reduced habitat diversity. While river bars are a normal part of a healthy river's natural habitat, the size and scale of the Salmon River's warming zones are out of proportion due to impacts from early mining. The natural landscape of the Salmon River is already prone to landslides due to its unstable geology and steep rugged terrain. Poorly maintained logging roads and high intensity fires increase the risk of large sediment loads negatively impacting fish habitat when heavy rain events happen over these already sensitive soils. In our current climate, these sediment events, intermingled with hot summer temperatures and lack of snowpack are an annual threat to salmon and other aquatic life.

Our long term data set encompasses drought years, variable snowpack years and the hottest temperatures on record for our area (see graph). The last time we had a big snow pack year that fed the river throughout the summer and kept water temperatures low was 2011. 2006 also had good snowpack but high early summer air temperatures increased water temperatures. In 2006, 2014 and 2015 a surprising result of large fires was that there was enough smoke cover to significantly reduce river temperatures despite record heat. As the climate continues to change, flows drop and temperatures warm, more changes will occur. Over the last two decades we have gathered data on riparian habitat, temperature and water levels with the hope of making changes for a better future. We are currently working with Riverbend Sciences to conduct a thorough long term trend analysis of the conditions in the Salmon River watershed that will enhance present and future projects.

-Bonnie Bennett, Monitoring Coordinator

There is a water monitoring Hobo Temp attached to a chain in the photo above and an air monitoring Hobo Temp, left. below left, Students retrieving a water Hobo in fall and below, taking data from a fall Chinook carcass.

assessment field trips at four creek study sites. In 2015-16, over 48 students were involved in the stewardship, monitoring, and restoration of the Salmon River watershed through participation in fieldwork, nature trail walks, and by working alongside natural resource biologists.

Students learn about the study of water quality by measuring temperature, dissolved oxygen, pH, nitrates, phosphates, stream flow, substrate, turbidity, and canopy cover. Biological assessments at sites included plant, wildlife, bird, aquatic insect, and fish inventories. Invasive plants were also monitored and removed, with students pulling more than 3,000 weeds. Student's participation in our annual Fall Chinook

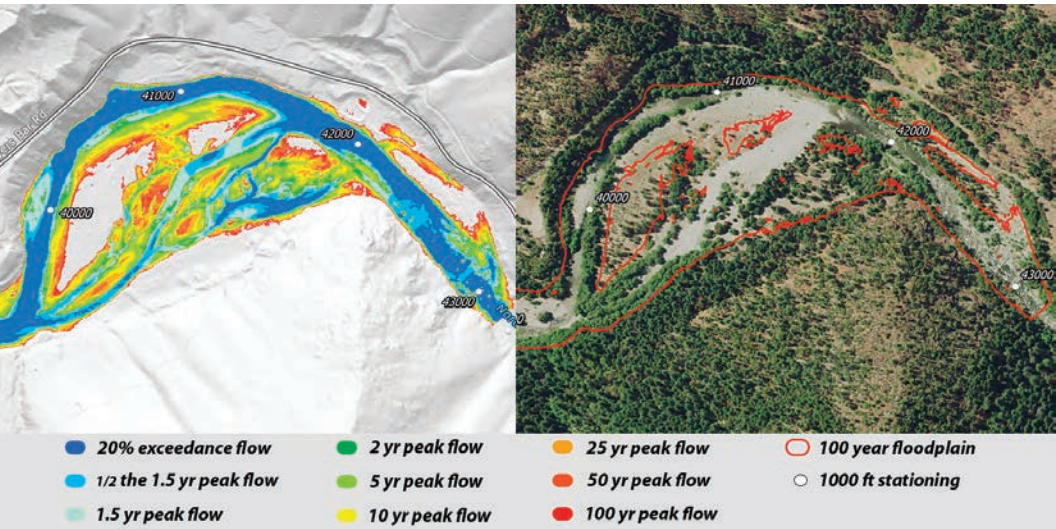
Carcass Surveys is a nice compliment to this project, since they are able to collect meaningful data on our salmonid populations that are used by agencies to make real-life fisheries management decisions. Many parent, school, and community volunteers also participated in these activities, learning and engaging along with the students.

Habitat Restoration Program

People can be deceived by the Salmon River's apparent pristineness. Despite its relatively good water quality and fish habitat, the fishery of the Salmon River is a remnant of what it once was. Anadromous salmonid fisheries are impaired due to elevated water temperatures and lack of functional floodplains, among other things. Much of the damage occurred long ago from activities such as large scale hydraulic mining, and some of it is the result of on-going activities like clear-cut logging, fire suppression, and poorly planned road building. The damage from such landscape level disturbances does not repair itself quickly. If we hope to restore our fisheries, a pro-active approach to restoration on the Salmon River and its tributaries is needed. Water temperatures can be cooled by methods such as increasing riparian shade and restoring the floodplain. In combination with increasing habitat complexity and spawning habitat, cooler water temperatures will provide refugia for rearing and spawning fish and in the long-term result in resilient populations that will better withstand the effects of climate change. Target species for restoration efforts include spring and fall Chinook salmon, coho salmon, winter and summer steelhead, lamprey, and sturgeon throughout the watershed.

In order to actively begin addressing these issues, SRRC created a new Habitat Restoration Program and hired a full-time Coordinator in the spring of 2015. A number of projects are currently in progress.

Two tributaries on the South Fork will be enhanced with large wood in-stream structures, which will increase channel complexity. The structures encourage scour, which results in deeper pools. They slow water velocity which results in increased subsurface flows that



cool water temperatures and improve riparian vegetation and stream shade (*see example site above*). They provide cover for juveniles in slow water pools preferred during high flow winter rearing conditions. Additionally, the structures improve gravel sorting, which results in increased spawning gravel, in pool-tails and low gradient riffles. SRRC is also seeking funds to enhance a tributary of the Mainstem in the same way, with a complimentary engineered log jam at the mouth of the creek.

SRRC has been working to collect baseline data and develop restoration designs for two off-channel river habitat restoration projects. These projects on the North Fork would include large wood structures in combination with channel improvements providing slow water refugia for juvenile salmonids to shelter from winter high flows, improved spawning habitat and increased riparian shade and cool water habitat.

Over the years, the lack of a coordinated restoration strategy has been identified as one of the most important limiting factors to fisheries restoration on the Salmon River. To address this hurdle, SRRC coordinated an effort to bring a diverse group of community, tribal, agency, and other fisheries specialists together, forming the Salmon River In-Stream Working Group. This Technical Advisory Committee has worked over the past few years to identify, agree upon, and prioritize river and tributary restoration needs throughout the watershed. This is a work in progress and we are very appreciative of the efforts of all of our partners in this collaborative process. To compliment this effort, a comprehensive assessment of mine tailing and floodplain restoration needs using field surveys and LiDAR data (see image left) is also in progress.

Two fish passage barriers on important tributaries of the South Fork Salmon River have been identified and are in differing stages of development. A project on Taylor Creek, which has been designed and will be implemented within the next year, aims to remove and replace a failed crossing that is blocking seasonal fish migration. Another fish barrier at Hotelling Gulch, formed by undersized culverts, is in design phase to remove the barrier and improve the stream channel. The removal of these two barriers will finalize addressing all of the high priority fish barriers within the Salmon River, a process that has taken 14 years. We are very thankful for all the support in improving fish migration in this watershed.

And finally, SRRC is seeking funds to develop a documentary in collaboration with The Watershed Research and Training Center about the historic and ecological importance of the last remaining wild spring Chinook populations in the Klamath River; the Salmon River and South Fork Trinity River populations.

Folks helping us with this program include CDFW, Fiori Geosciences, HSU, Karuk Tribe, Mike Love & Associates, MKWC, NCRWQCB, NMFS, NOAA, NRCS, Pacific Watershed Associates, Stillwater Sciences, Sweet River Sciences, USFS, USFWS, and Yurok Tribe.

-Mel Van Scoyoc, Habitat Restoration Coordinator

Noxious Weeds Program

SRRC crew and volunteers digging Canada thistle at Carter Meadows. Without such action, this type of non-native plant aggressively replaces native habitats. Community involvement is crucial for our relatively wild watershed!

Last winter's rains brought relief to the many plants in our watershed, which emerged in spring with renewed vigor. Unfortunately, this included the invasive species that threaten rare native habitats. Thankfully, the SRRC Noxious Weeds Program's small crew, dedicated volunteers, and brand new coordinator also emerged in spring to safely control the invaders. The team maintained SRRC's long record of successful population control *without* the use of chemical pesticides by methodically digging top-priority species - namely spotted knapweed, oblong spurge, and Italian thistle. We also strategically removed weeds in areas with a high likelihood of dispersal, such as trailheads, campgrounds, river accesses, and roadways.

The control of spotted knapweed on the Salmon River is an excellent example of the Program's long term success. After 20+ years of intensive knapweed treatments, the crew considers it an exciting day if they find more than a handful of plants along a river reach. All the known sites are visited multiple times throughout the season, and veteran knapweeders are indispensable for seeking out the one or two plants along miles of river. In the past few years, several large new knapweed infestations were discovered at disturbed upland sites associated with logging and grazing disturbances. With the aid of the USFS, these sites were tarped to prevent continued spread. This year our team kept a close eye on these high-risk areas, controlling a tight perimeter around the tarps. In this way we hope to keep the infestations contained and eventually eradicated.

Oblong spurge is a relative newcomer to our weeds program. While we don't know when it arrived, it seems to be associated with old mining sites. It has taken over river bars and even some shaded hillsides in the Mainstem gorge, making it a real threat to our forest ecosystems. This year, although we discovered a couple new patches, we found 68% fewer plants than during the 2015 season. In order to maintain this success in the long term, we will continue to closely monitor sites. Given the inaccessibility of many of the sites, the help of our river's boating community is particularly crucial.

Oblong spurge site BEFORE and

We also target invasive species that are widespread elsewhere but have the potential to be fully eradicated from our watershed, such as Scotch broom *(above, being removed with a come-along),* Canada thistle, and tree of heaven. If you'd like to help, feel free to pull up tree of heaven suckers from the corner of the Forks of Salmon Park! It appears that our persistent efforts may be impacting this stubborn tree.

Although the notorious Marlahan mustard may be considered beyond control, we remove it from high-risk areas in order to slow dispersal. As a result, our roadsides and river accesses were noticeably less yellow than those of our neighboring watersheds this spring. The progress made on these lesser-rated species were primarily the result of community work days with our partners at MKWC, local river school children (*photo right)* and groups of dedicated resident volunteers.

Salmon River residents can support this program by reporting the hours and acreage they pull, whack, and mow weeds on their properties. By reporting these statistics, we are able to meet the "match" required for every dollar awarded by grants, thereby helping keep the weeds program alive. We would like to express our full gratitude to all volunteers who came out to dig with us, and to the landowners who reported their work this year, and we encourage everyone to keep track of their weeds work next year.

AFTER Petey's hand digging treatment

Funding for the Noxious Weeds Program came from the CA Dept. of Food & Agriculture, Siskiyou County RAC, Clif Bar Foundation and through the help of community volunteers.

- Emily Ferrell, Noxious Weeds Coordinator

Invasive Plant Management by the SRRC's Cooperative Noxious Weeds Program

How do we decide which invasive plant species to go after?

In 1994, when the Salmon River community said "no" to pesticide use on public lands, the SRRC accepted responsibility for managing noxious weeds. At the time, the Class A rating on spotted knapweed mandated eradication one way or the other. In the years since, faced with a plethora of non-native plant species, limited funding and a firm policy of using non-chemical methods, we've had to prioritize which species to treat. Although complicated and dynamic, our strategies always aim to protect our watershed from both invasive species and chemical herbicides. What follows is a brief description of the systems we must work with in order to accomplish this mission.

When a new site is found, such as this knapweed site, it is mapped, treated by digging the weeds out, and flagged for revisiting.

Digging Italian thistle offers fantastic views.

The chart below paraphrases the definitions of each category used in the CDFA's rating system, along with species from each category that are currently established in the Salmon River watershed.

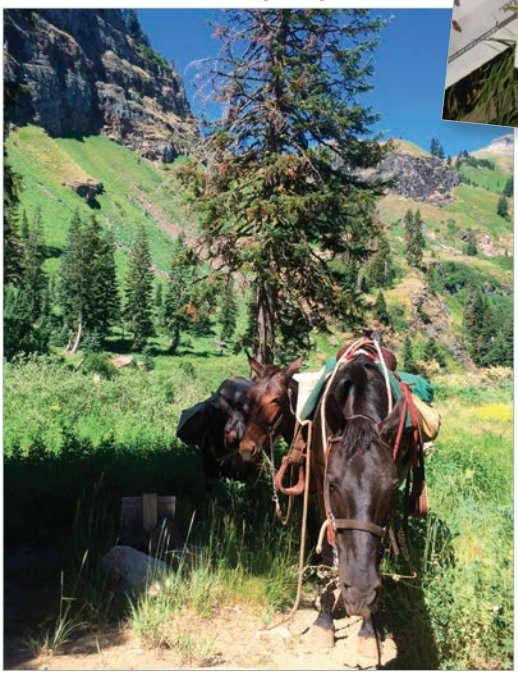
A-rated weeds either haven't been found in CA yet, or their limited distribution within the state makes eradication or containment realistic possibilities. If found entering or established in the state, these weeds are subject to state enforced action involving rejection, containment, quarantine, and eradication.	spotted knapweed, sulfur cinquefoil, diffuse knapweed
B-rated weeds, if here already, also have a limited distribution. If found in the state, these weeds are subject to state sanctioned holding and eradication only to provide for containment. At the discretion of the CAC, they are subject to containment, suppression, control, and eradication.	oblong spurge, dyers woad (Marlahan mustard), Canada thistle, white top
C-rated weeds, if present in CA, are usually widespread. At the discretion of the CAC, they are subject to regulations designed to suppress or slow down spread.	Italian thistle, Scotch broom, starthistle, tree of heaven, puncture vine

This question of "which species?" is not a new one, which is why in 1977 the state structured an "action oriented" system allowing the CA Department of Food and Agriculture to officially list plants as "noxious weeds" and rate them according to three main points: the amount of havoc the plant would wreak on the state, the present distribution of the plant within the state, and the likelihood that control efforts would be successful. Although not law, the rating system guides what actions the County Ag Commissioners (CACs) are required to enforce. The CAC can decide that specific species warrant more severe actions and control given their distribution and impact locally (i.e. oblong spurge). Because chemical treatments are typically considered the "best management practices" for controlling invasive plants, this system aids the SRRC in determining which species to prioritize for manual treatments.

Marble Mountain Livestock Grazing Allotment Assessments

This summer and fall SRRC went into the backcountry to complete monitoring and assessments of grazing impacts in the Marble Mountain Wilderness for the US Forest Service. Melissa Van Scoyoc packed into the Wilderness on multi-day hitches to collect data on botany, hydrology, and bank stability using Multiple Indicator Monitoring (MIM) protocols. She also traveled to remote photo monitoring locations to provide the Forest Service with long-term grazing impact observational trend information. The MIM protocols were developed by a multi-agency technical team in order to provide a consistent approach to evaluating livestock grazing impacts in streams and riparian areas. For more information on MIM evaluations go to http://www.blm.gov/or/programs/nrst/monitoring.php. Management plans for several allotments in the Klamath National Forest are up for review this year and will be open for public comment.

Sierra shooting star (Primula jeffreyi), a native species adapted to meadows and streambanks, typically at the higher elevation meadows in the Salmon Mountains. This forb is a component of intact meadow systems, providing pollen for native bumble bees. Native plants like these could be impacted by cattle grazing.



above, A pressed specimen of Primula jeffreyi. Whole plant specimens of all species that I found in the monitoring plots were collected as verification specimens. Additionally, there was not enough time in the field to identify all the species so I pressed specimens to use later to identify the plants. Some plants such as sedges (Carex spp.) require a dissecting microscope for identification.

left, The Team: Max, Rendezvous (Rendez), and Loretta were helpful, happy companions and essential in getting all the gear I needed to complete monitoring way out into the backcountry. I could not have backpacked in my camp and monitoring equipment, thankfully I had this crew to help me out. - Mel Van Scoyoc

Fire, Fuels & Forestry Program

SRRC's Type 6 fire truck at work along Salmon River Road during the TREX 2016 Prescribed Fire Program in October

SRRC's Fire, Fuels & Forestry Program is best known to Salmon River locals for the no-cost fuels reduction work that it has provided to landowners for the past twenty-two years. Together, SRRC's crews and landowners have worked to create defensible space around homes and reduce fuels on other important areas on private properties throughout the watershed. In fact, SRRC's crews have worked the vast majority of private properties in the watershed and this fuels reduction work has been put to the test by wildfires in 2002, 2008, 2013, and 2014 with great results.

As important and well known as this work is, it is just one integral part of SRRC's Fire, Fuels, & Forestry Program and its broader mission to restore the natural role of fire in our watershed. Here's a look at why it is important to restore good fire here and how the various components of SRRC's program fit together to help us accomplish the task.

Our area's forests evolved with the regular occurrence of fire since the end of the last glacial period, about 15,000 years ago. Fire is one of the primary natural processes that, along with climate, has determined the composition and distribution of our biologically diverse forests and plant communities. This, in turn, has determined the make-up of our wildlife and other fauna and even affects the dynamics of aquatic health and salmon runs. Natural fire underpins a healthy ecosystem.

Generally speaking, prior to human intervention through fire suppression, naturally caused fires burned any given area in the Salmon River watershed once every three to twenty years. These were most often low-intensity fires of limited size that burned up grass, leaves, fallen branches and other fuels before they bumped into another recent fire footprint and went out. Fire cleaned up the forest floor and reduced fuels on a continual basis across the landscape, keeping the amount of high-intensity fire limited while also improving wildlife habitat, increasing water yield, and helping keep forest diseases in check. Native Americans recognized the benefits of fire and utilized it to manage and improve food and fiber sources, create browsing habitat for large game, and perhaps even to create smoke to cool down river temperatures during extremely hot periods.

The past 100 years have been an era of fire suppression and natural fire is no longer allowed to fulfill its ecological functions. Ninety-eight percent of all fires are successfully suppressed, leaving us with only the hottest, most destructive fires that elude human control—these are the mega-fires we have come to know over the past 40 years: the Hog Fire, 1987 Fires, Uncles and Ukonom Complexes, the Whites Fire, and others. Decades of fire suppression have allowed fuels to build up on the forest floor and for forests to become densely packed firebombs across vast landscapes. What has become clear is that broad scale fire suppression has actually led to more damaging fires and that, as residents of a fire-dependent ecosystem, we must find a way to peaceably coexist with fire. This is the larger task for SRRC's Fire, Fuels & Forestry Program.

The Salmon River watershed is a prime setting for restoring fire: a small, fire-savvy population of mostly full-time residents occupies less than 1% of the land area while over 98% of the watershed is public land. This is a rare

combination in California and one that is conducive to fire restoration because it creates a workable opportunity to prepare private properties for coexistence with fire while also managing publicly owned wildlands in a way that will increasingly allow fires to burn when conditions are favorable. Imagine how much more difficult this would be in, for example, the Sierra foothills where thousands of homes are intermixed with forest lands owned and managed by numerous entities. The Salmon River situation is much less complex, although far from easy.

SRRC's Fire, Fuels & Forestry Program is working on different levels to help create a path toward a successful restoration of fire in our watershed. This involves important partnerships and collaborations, the expansion of our fuels reduction program to include the use of prescribed fire treatments, and the development of a local workforce trained to implement this work.

Salmon River resident Sam Berry assisting with a prescribed burn at Black Bear Ranch in October 2015

Beginning in 2014, SRRC began helping landowners restore fire on private properties by conducting prescribed burns in early fall when conditions are right for low-intensity burns. Thus far, we have successfully burned over 100 acres on eight properties in the Salmon River watershed via the Klamath River Prescribed Fire Training Exchange, better known as TREX. This program is a multi-year partnership between the US Forest Service, The Nature Conservancy, the Karuk Tribe, Mid Klamath Watershed Council, SRRC and Cal Fire. The goal is to provide training for all levels of prescribed fire practitioners from first-timers to seasoned career professionals and qualify them according to national standards for wildland firefighting.

In particular, TREX is working to create a locally based, highly qualified team that is identical in structure to a wildfire incident management team but for the purpose of implementing prescribed burns rather than suppressing wildfires. With three years of TREX completed and two more planned, we have trained and certified over 50 locals as basic wildland firefighters and given them critical prescribed fire experience. Others are gaining qualifications in advanced fire positions. This is practical, hands-on training: in the past three years the TREX program has successfully burned over 1000 acres, most of it highly technical burns around homes and communities.

TREX is also the launching off point for SRRC's own prescribed fire program. By increasing our skills and capacity for working with prescribed fire, we now have the ability to implement small-scale burns to help maintain fuels reduction, improve forest health, habitat and food sources as well as to further prepare private properties for coexisting with the inevitable wildfire.

By being able to implement this work with a locally based crew supplemented with outside resources as needed, we will be able to be flexible on timing and choose the best burn windows to achieve maximum benefit with minimized risk. SRRC now has five employees certified to work on the fireline, develop burn plans, and prepare units for prescribed fire. We also recently purchased a very charismatic and hard-working Type 6 fire truck to support these burn operations.

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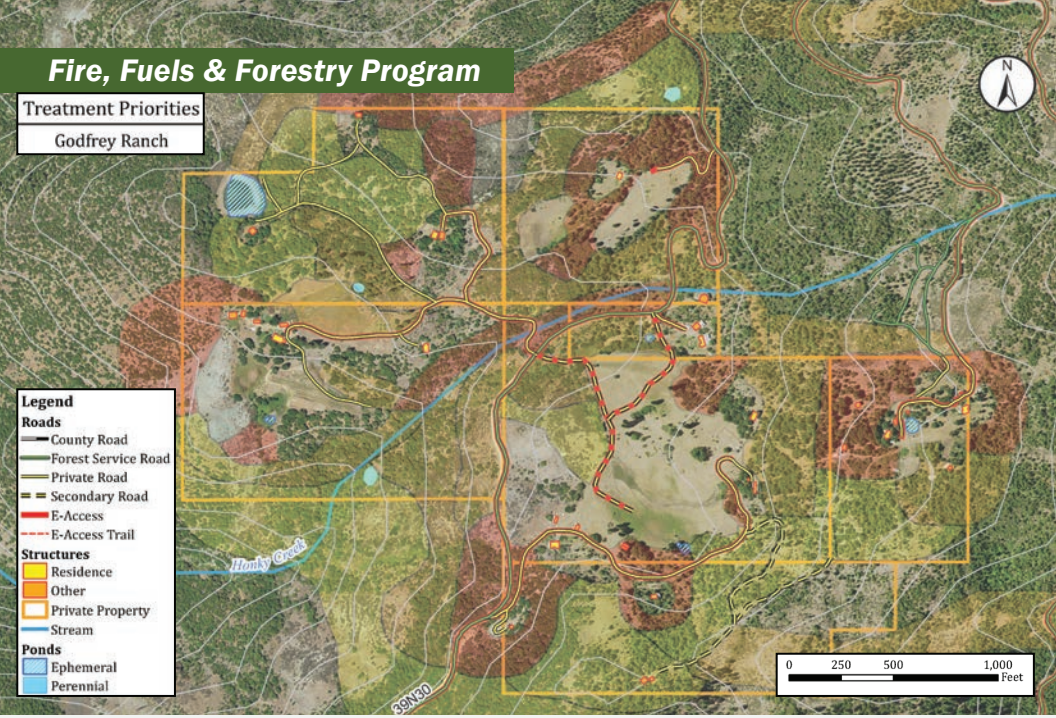


SRRC's fuels reduction work at Godfrey Ranch is guided by detailed GIS maps and the new Bear Country Neighborhood Fire Plan that was developed collaboratively with residents and landowners.

Don't worry: SRRC is not about to abandon its fuels reduction work in favor of prescribed burning. Rather, the two are becoming more integrated and a greater amount of long range planning is going into our fuels reduction projects to maximize benefits for landowners.

SRRC currently has over 200 acres of fuels reduction projects in queue, split between the upper North Fork and the Bear Country Neighborhood (Godfrey, Black Bear, Blue Ridge, and Harris Ranches). This fuels reduction work is being planned out strategically to create linear fuels reduction zones that will provide the opportunity for better managing an unplanned wildfire as well as to provide a fuel break that can be used for implementing prescribed fire where appropriate.

A good example of well-integrated fuels reduction work is the half-mile long fuel break that SRRC's crew has all but finished at Godfrey Ranch. Rather than simply focusing on defensible space around homes, the strategy with the linear fuel break is to create a barrier to the movement of fire across the landscape. This particular fuel break spans four different properties and is anchored on one end by a prescribed burn area from the 2014 TREX program and terminates at the main access road on its other end. In between, there is a long zone of fuels reduction that connects driveways and large meadows together to maximize the effectiveness of the fuel break. The fuel break will slow the spread of wildfire coming up Negro Creek toward Godfrey Ranch, as it did in the devastating fires of 1977 and 1987. It also provides an anchor for implementing prescribed burns to maintain the fuel break though time and to reintroduce the low-intensity fire now needed to help restore the hardwood forests at Godfrey Ranch.

As partnerships, collaboration, and on-the-ground work continues, we hope to see similar efforts made to restore good fire on the other 98.8% of the Salmon River watershed that is managed by the US Forest Service. By working to prepare private properties for a peaceful coexistence with fire, we are helping create the environment that will allow for the needed shift in federal fire management to occur.

-Scott Harding, Fire, Fuels & Forestry Coordinator

Western Klamath Restoration Partnership

Megafires resulting from a century of fire exclusion are heavily impacting communities and ecosystems in the Klamath Mountains at a rapidly increasing pace and scale. While the majority of these burned areas are ecologically beneficial, proportionally more areas are burning at high severities than ever before due to accumulated fuels, climate change, and fire suppression policies.

The Western Klamath Restoration Partnership (WKRP) is an open collaborative group of local, tribal, state and federal participants coming together around mutually held social, ecological, economic, and cultural values to create resilient ecosystems by restoring fire process and function on the landscape. WKRP's work emphasizes place based management and is founded upon Traditional Ecological Knowledge. Through intensive collaborative workshops, starting in 2013, partners created a shared vision and shared values, and based in these values, were able to come to agreement on where upslope restoration needs to occur, within the 1.2 million acre planning area, and what strategies are best suited to get us there.

After extensive work coming to agreement in principle, WKRP is moving forward with three distinctive pilot projects. The Somes Bar and Happy Camp Integrated Fire Management projects focus on restoring fire process to areas around communities that haven't seen fire in over a century; preemptively treating these high risk areas with strategic linear fuel breaks and prescribed fire before they burn in the next wildfire event. These strategies aim to protect local communities from high intensity wildfire while allowing for increased ability to manage wildfire on surrounding wildlands with less need for direct fire suppression.

On the Salmon River we're addressing similar goals from a different angle. Rather than looking at the areas that haven't seen fire over the past century, we are focusing on an area that has seen the most fire. In the past 10 years over 40% of the Salmon River watershed has burned in large megafires. This is a trend that is only increasing throughout the West. For this reason, it is essential that we develop and test strategies to restore healthy fire process to these recently burned landscapes. Recent fire footprints, and areas that have seen frequent fires over time, offer many opportunities to restore fire process safely and with minimal resources.

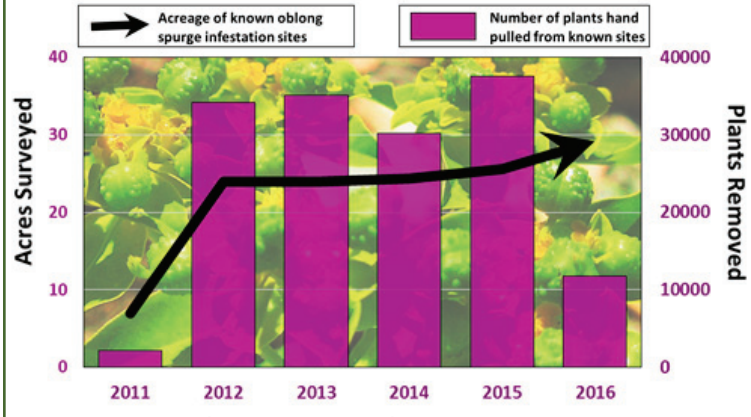
The reduced fuel loading makes implementing prescribed fire at large scales much more feasible than in the dense brushy forests resulting from fire suppression. Additionally, not restoring fire process in these landscapes comes with considerable risk. If we wait too long, fuels build up to levels where prescribed fire is increasingly dangerous, manual and mechanical fuels reduction is cost prohibitive, and wildfires are likely to burn at high intensity. The goal isn't to stop wildfire, but to jumpstart fire process by taking advantage of the heavy lifting of recent wildfires, creating a patchwork of diverse fire regimes that promote resilient ecosystems and act as a break between local communities and wildfires in the backcountry.

Through multiple workshops and meetings we have chosen the Yellow Jacket Ridge landscape, from Forks of Salmon to the Little North Fork for our pilot project. We are still in the early stages of developing this project and would love to have more local engagement. If you are interested in taking part please contact Karuna or Scott at the SRRC.

-Karuna Greenberg, Restoration Director

Salmon River Restoration Council
PO Box 1089
Sawyers Bar, CA 96027
www.srrc.org

Manual Treatment of Oblong Spurge (*Euphorbia oblongata*) on Public Lands in the Salmon River Basin, 2011-2016



Increased surveying for oblong spurge after its discovery led to greatly increased acreage (up 244%) and total number of plants treated (up 1500%), from 2011 to 2012. Between 2012 and 2015 discovery rates slowed to an average of 0.8 acres/year while the number of spurge plants remained relatively stable, ranging from 30,000 to over 37,000. The hard work of our weeds crew paid off; in 2016 we found and treated 68% fewer plants than in 2015, despite the discovery of a 3.7 acre site. These results suggest that five years of consistent monitoring, tracking, and treatment are both controlling the spread and causing a decline of oblong spurge populations growing on public lands in the Salmon River basin!

Return Service Requested