Alaska Fisheries & Habitat NEWS

U.S. Fish & Wildlife Service ◆ Spring 2014 Issue 2

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Working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people

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Tim Jennings
Assistant Regional Director
Fisheries and Ecological Services
U.S. Fish & Wildlife Service, Alaska

Welcome to the second issue of Alaska Fisheries and Habitat News!

We received a lot of positive feedback about our first issue and want to continue improving this publication so it's useful to you and helps shed light on the Alaska fish and habitat issues you care about. Please don't hesitate to provide us with suggestions.

This issue's theme—Chinook salmon—is timely. Widespread concern over statewide declines is a testament to the importance of the "King" of fish to people here in Alaska and elsewhere. It underscores a common desire to ensure that our grandchildren and their great-grandchildren benefit from healthy Chinook salmon populations—something many of us have been lucky enough to experience first-hand (see page 6 for a first-hand account).

Our Alaska staff are working with others around the state to better understand and conserve Chinook salmon, and we're proud of our unique role and contributions.

For example, Alaska is the only place where the Service has in-season fisheries managers dedicated to meeting escapement and subsistence needs on federal public lands—and working with the State to ensure that enough Chinook salmon reach their spawning grounds so they're available for future generations. We don't take this responsibility lightly.

Our field office staff continue to develop and pioneer innovative technologies (see a great example of this on page 10). They're using these technologies to better understand Chinook salmon that originate from tributaries that flow through National Wildlife Refuge lands and make important contributions to the Kenai, Kuskokwim, and Yukon river runs.

Our Conservation Genetics Lab (the Service's first, established in 1987 and co-housed in our Anchorage Regional Office) is using sophisticated laboratory techniques and analytical methods to provide genetics and biometric support for in-season managers and our State partners.

Our habitat staff continue to collaborate with others—including the State of Alaska, the National Fish Habitat Partnership and its Alaska network of Fish Habitat Partnerships, local governments, and many others—to put projects on the ground that benefit Chinook salmon and other species (see some highlights on pages 16-17 and 22-24).

Chinook salmon are a priority for the U.S. Fish and Wildlife Service and we look forward to continuing our work with partners to make positive progress on this King of conservation challenges.

Click *here* to receive future issues!

Katrina Mueller
Alaska Fisheries
Outreach Coordinator

From managing America's National Wildlife System to jointly administering the Endangered Species Act with NOAA Fisheries, combatting illegal wildlife trafficking, and working with willing landowners to conserve fish and wildlife habitat, the U.S. Fish and Wildlife Service wears many conservation hats!

Alaska Fisheries and Habitat News highlights the unified conservation efforts of our Fisheries Program, Habitat Restoration and Conservation Partnerships Programs, and Alaska's network of Fish Habitat Partnerships. It also provides information about Alaska's fish, their habitats, and uniquely Alaska conservation challenges and opportunities. We hope it gives you a flavor for the ways we're helping conserve fish and their habitats in Alaska and, more importantly, why that conservation matters! Contact me with suggestions, questions, or if you'd like to subscribe: katrina_mueller@fws.gov / (907) 786-3637.

On the Cover: Juvenile Chinook salmon near the confluence of the Russian and Kenai rivers. USFWS/Katrina Mueller.

Alaska Fisheries and Habitat News is a publication of the Fisheries and Ecological Services Division of the U.S. Fish and Wildlife Service - Alaska Region

editor's note

by Katrina Mueller

The theme of this second issue of Alaska Fisheries and Habitat News largely revolves around Chinook salmon. These fish have been in the news a lot lately (see subset of recent headlines above), with very low adult returns across Alaska generating much attention. In fact, the State of Alaska has listed several populations as "Stocks of Concern" and fisheries closures and gear restrictions are increasingly in play.

A lot of people have a stake and are invested in the wellbeing of Chinook salmon that originate in Alaska and the Alaskan/Canadian waters of the Yukon River. They are valued by Alaska Native peoples and Canada's First Nations, Alaska's rural and urban residents, visitors from around the world, and the many businesses (both in-state and out-of-state) that are tied to associated fisheries. Their value crosscuts ecology, culture, nutrition, recreation, and economics.

These Chinook have a complicated life cycle that takes years to complete and spans thousands of miles from headwater streams in Canada and Alaska to the Bering Sea and North Pacific Ocean. During the freshwater phases of their life cycle, they travel through large swaths of wild and largely roadless terrain where the logistics and cost to monitor returning adults and understand juvenile ecology pose a unique challenge.

They spend a large portion of their life at sea, a largely black box they enter as smolts and exit as adults. Here, they—and the other species they interact with—are exposed to cyclic changes in sea-surface temperatures, coastal and and upwelling currents, fishing pressure, and other factors. Many factors can and do cause their populations to boom and bust.

Fisheries managers have the difficult task of allocating harvest in a way that's fair to the many different users that are spread out across an immense geographical area—from subsistence users in rural/remote communities along the Yukon and Kuskokwim rivers to the sport anglers (many visiting from around the world) hoping to catch the "big one" on the Kenai River or after work in an urban setting along Anchorage's Ship Creek.

At the same time, managers must conserve these fish and their natural diversity for future generations, making sure none of the unique stocks headed for different spawning grounds are disproportionally harvested in "mixed" fisheries that occur at locations or times when salmon from different populations are mixing as they move upstream together.

Statewide declines, and how to address them, are fraught with complexity and unknowns. In Alaska, state and federal fisheries biologists use a variety of tools, techniques, and information to monitor Chinook salmon (and other species) and understand changes in their abundance, diversity, and health. These include weirs, sonar (much like a doctor's ultrasound), radiotelemetry and genetics (both require hands-on capture), overhead aerial flights, fish wheels, counting towers, test fisheries, harvest information from creel surveys and post-season mail-in harvest surveys, modeling, traditional ecological knowledge, and more.

Collectively, we've come a long way, but still have a lot to learn about what conditions Chinook salmon need to complete each and every life stage and the degree to which different stressors affect them from egg to adulthood. One thing is clear: fisheries management is complex, challenging, never perfect, always changing, and requires a collaborative effort.

All of the artwork and essays featured throughout this special Chinook issue were submitted by Alaska youth (grades K-12) for the **2014 State-Fish Art Contest.** Each year we look forward to seeing Alaska's state fish (the Chinook) and other states' fish through their eyes. This is the third year the Service has partnered with Wildlife Forever to carry out this national educational contest in Alaska and we can't wait to see the 2015 entries! Keep up the good work - while we didn't have enough space to show all of the submissions we love each and every one of them!

Jedidiah Llenado (Grade 2)

Chinook Salmon

Oncorhynchus tshawytscha

Photo: Josh Larios/Wikicommons

by Katrina Mueller

I am a Chinook salmon. As adults we commonly exceed 30-pounds, and, in rare instances, 100-pounds. A Kenai River Chinook that topped the scales at 97.25 pounds currently holds the sport fishing world record and the largest commercially-caught individual weighed in at 126.5 pounds (caught in Southeast Alaska in the late 1930s). Maybe this is why I'm also commonly called the King.

Many of my other nicknames (*spring salmon*, *June hog*, *blackmouth*) describe the timing of my spawning migration or my physical characteristics. The name of my genus, *Oncorhynchus*, is derived from the Greek *onkos* (hook) and *rynchos* (nose), in reference to the pronounced kype (snout) of spawning males. The origins of my species' scientific name, *tshawytcha*, can be traced back to the common name given to me by the native people of Kamchatka, Russia.

I emerged this spring from the gravel of a Yukon River tributary (the Chena River) from a redd (nest) my mother dug last summer using her tail.

My parents spawned in this same stretch of river as their parents. Just like countless generations before, they died soon after, providing important nutrients to the river foodweb.

This is the way it is for all Chinook salmon, for all anadromous Pacific salmon species. My story will end the same way if I survive to adulthood. Completing each stage of my life cycle will require avoiding a different set of predators and conquering what one of the last largely* freeflowing rivers in the world throws my way—a dynamic environment shaped by ice, millions of tons of sediment rolling towards the sea each year, and a discharge exceeding a hundred thousand cubic feet of water each second.

My parents left the Yukon River as smolts for the rich waters of the Bering Sea (perhaps ultimately the North Pacific) to acquire the strength and size needed to store enough energy to swim about one-thousand miles back up the Yukon.

Recognized as the official state fish of Alaska and Oregon, Chinook salmon are part of the fabric of human life throughout their range, supporting ways of life and economies associated with subsistence, personal use, commercial, and recreational fisheries.

In North America, the Chinook's natural range once spanned from Point Hope, Alaska to the Ventura River in southern California. Today, populations south of California's Sacramento River have been wiped out and a number of others outside Alaska are considered Endangered, Threatened, Candidates for Listing, or Species of Concern. Declines are largely a product of human activities significantly reducing access to historical freshwater habitats and the quality/quantity of those remaining. Even in Alaska, Chinook populations are showing signs of stress: eleven are currently considered Stocks of Management or Yield Concern.

It was not until spending several years pursuing and growing fat off the Bering Sea's smorgasbord of prey—like herring, sandlance, and squid—that they returned to this place where the beginning of my life cycle as an egg marked the end of theirs.

Ilene Fernandez (Grade 3) - emerging from gravel

Carla Coloma (Grade 1) - growing fat at sea

Angelika De Leon (Grade 10) - returning home

Worldwide, less than two dozen rivers surpass the Yukon River in length, so our migrations are some of the longest of any salmon on Earth. Originating in the Canadian Province of British Columbia, this river flows through the Yukon Territory before crossing the United States/Canada border. Flowing east to west across the entirety of Alaska, it finally fans out across the Yukon-Kuskokwim Delta (roughly the size of Oregon) before flowing into the Bering Sea.

The amount of energy needed to return home makes us Yukon kings highly prized for our unusually oily flesh—the source of heart healthy omega-3 fatty acids. I'd just as soon not get caught, but am proud to be the preferred food source for Alaska Native peoples who have subsisted on my species and my other Pacific salmon relatives since time immemorial.

As "stream-type" Chinook, we spend our early days in the headwaters of large rivers and tend to stay longer in freshwater and have longer migrations than our "ocean–type" counterparts. This makes us particularly vulnerable to freshwater habitat fragmentation, and the drying, thawing, and rising water temperatures brought about by changing climatic conditions in Alaska's arctic.

Before I migrate to sea (likely after spring thaw one or more years from now), I'll move among a wide variety of freshwater habitats—mainstem rivers, side channel braids, headwater streams, and lower gradient streams with pools and wood for cover.

In fact, I may move among these different habitats hundreds of miles from my natal stream to find what I need to survive the different seasons and environmental conditions typical of interior Alaska.

It's critical that I'm able to access these habitats—a seemingly mundane culvert placed where a gravel road crosses a stream that isn't designed to pass fish can create a barrier that delays or totally prevents me from reaching suitable overwintering areas or some other key habitat that'll help me live another day.

Just as the "parr" marks along my sides camouflage me and help me avoid predators in freshwater, my coloration will change and help me blend in as I enter the salty waters of the ocean. If you were to fly over me swimming near the surface at sea, you may be able to see the blue-green-purple hues of my back, speckled with black spots; from the side, chrome; and from below looking up, white, to match the lighter sky above. Then I'm gone…perhaps you'll see me when I return. ●

Because Chinook migrate across state and international boundaries, many people have a stake in their conservation.

Maintaining broad diversity of river-specific, thus genetically-distinct, populations of Chinook salmon throughout their range is key to the resiliency and stability of the species as a whole (and associated fisheries). As the saying goes, "*don't put all your eggs in one basket.*" The same goes for salmon runs. They naturally boom and bust, but not in the same years—as a collective, they're much more stable.

Jessica Canaga (Grade 9) - seeking cover in freshwater

Mark Anthony Mabalot (Grade 5) - swimming at sea

*there is a hydroelectric dam across the Yukon River in the City of Whitehorse, Yukon, Canada.

Thanks to Jeff Adams, Jimmy Fox, Ray Hander, Trent Liebich, Doug McBride, and David Wigglesworth for their ideas and input.

Ana's King by Anasteisha Rodriguez-Nieves (Grade 1)

Chinook Salmon for Our Future

by Jessica Hildebrand

My name is Jessica Hildebrand. My parents are Rodney and Celene Hildebrand; my paternal grandparents are Victor and Edith Nicholas, and my maternal grandparents are the late Leo and Delores Kriska. I grew up on a homestead located six miles from Koyukuk and 12 miles from Nulato. On the homestead, better known as "Last Chance," is our family's house, my parent's privately owned business, our fish cutting area, smoke house, and numerous old cabins and caches. My parents also own a house in Nulato that we went back and forth to for school during the winter, but you would never catch us away from Last Chance during the summer.

This is where my best childhood memories were made and where my parents taught my siblings and I our subsistence lifestyle. In the fall we harvest moose for the winter, but my favorite time has always been the summer fishing season.

Harvesting salmon is such a beautiful experience. I love when our whole family works hard together, bonding, and putting away this important resource for Alaskan Natives. During fishing season, my dad stays out on the river all night trying to catch a decent amount of Chinook for the women in the family to work on in the morning.

Seining is typically the men's duty but when my brothers were too young to go out with my dad, I would always volunteer myself (admittedly to get out of the hard work of cutting fish in the early mornings) to go with him. Although my mom, adamant on making sure my sisters and I knew how to process salmon, would never let me sleep in when there was fresh salmon to be put away. I will never regret the lack of sleep I endured to spend my nights seining on the Yukon River with my dad.

I remember everything we talked about while drifting for hours, but one thing always stuck in my head. He told me about a time 10 years or so before when he and his friend pulled in 28 Chinook in one drift. This shocked me because we had been seining for many hours already, had drifted about 12 times, and barely caught eight Chinook. It also saddened me to realize that our precious Chinook numbers are depleting and right before my eyes.

This was when I decided that I would go to college and get a degree that would enable me to work in a field where I could help conserve salmon. So when I was 14 years old I moved to Fairbanks to receive a better education at James T. Hutchison High School, I enrolled for college with a declared major before I graduated, and I did my senior project on conserving salmon.

I was lucky enough to have Kanuti National Wildlife Refuge Manager, Mike Spindler, on my panel when I presented my senior project and he told me to get in contact with former Tanana Chiefs Conference fish biologist, Lisa Kangas. Lisa is now an environmental specialist for Alyeska Pipeline Service Company and my mentor. After I got in contact with her in November 2011, she brought me to the Service's Fairbanks Office to meet Aaron Martin, Supervisory Fish Biologist in the Subsistence Fisheries Branch.

Aaron told me all about the internships with the Service and I knew that this position would be perfect for me. Words cannot explain how happy and excited I was when I got the call letting me know I got the position. I will always be grateful for this amazing learning experience with wonderful people.

As a Data Technician, I consolidate the numbers of Chinook salmon, chum salmon, and other species

"...we all want the same thing—for Chinook salmon to last.

Jessica with a Chinook. Rodney Hildebrand

Krystal Joy Coloma Grade 4

Dustin Reft Grade 6

(Essay by Dustin Reft of Karluk, Alaska)

The King Salmon is also called a Chinook Salmon, but in Karluk we call it the King Salmon. It is Alaska's state fish. We catch them on the Karluk River in Summer. They lay eggs and die and grow up to 46 inches; some are up to 58 inches. My dad catches the king salmon up at the river. He has fun catching the King Salmon. When my dad catches fish, the first king salmon goes to the elders. That would be my little grandma, Mary, and Ronny. Then my aunts will get some of them also. Once I caught a King Salmon. I was up at the point with my brother and sisters. It was in the summer time about 5 or 4 o'clock. It was a clear and sunny day. I threw my hook in and reeled it in really slow until the fish saw my hook. When he bit he pulled and the line started reeling out really fast. He went under the boat. We brought it in and David took it off the hook. I was so happy! We had salmon for dinner!

that pass through weirs and sonar beams as they get reported in to me from the field crews daily. After this, I redistribute them to different agencies. During my daily routine, the low Chinook numbers compared to other species always hits close to home for me. However, I've been able to form objectives for myself that I think may make a difference.

For example, before I worked for the Service, I was resentful towards the restrictions and regulations that were set during fishing season. Then I became aware of the reasoning for them and now have a new outlook. I want to voice these reasons to my fellow subsistence community so we can all become aware and take action together to save our Chinook salmon for the generations to come.

The restrictions and regulations are not made to keep Chinook salmon from us; they are put in effect to protect the threatened species that are important to all of us! Instead of being bitter towards the restrictions and regulations, we need to accept them and work towards sustaining Chinook together.

I've already made an impact on my own family by persuading them to harvest more chum than Chinook last year. Chum can be just as rich as Chinook in some areas and can be harvested without having such drastic effects on their numbers.

My mom, once angry with the rules as well, now appreciates them and has been relaying the information I've given her to others in our village. She processed chum the same as Chinook last year, and has been showing others that there is not too much of a difference between the two when stripped, filleted, jarred, or canned.

I believe that if we all make the sacrifice of choosing to harvest chum and let the Chinook pulses pass through to get to their spawning grounds that their numbers will begin to rise as more make it there. Making the sacrifice now can help save the Chinook salmon from becoming extinct and the subsistence community needs to be aware of this.

As a Koyukon Athabascan who lives a subsistence lifestyle, I do understand where the frustration is coming from. But it is time to stop fighting the restrictions and regulations and do our part because we, the Service, and Alaska Department of Fish and Game all want the same thing—for Chinook salmon to last. Knowledge is power and the more people who become aware and make the sacrifice, the more we will help make a difference in saving Chinook. So voicing the reasoning for the restrictions and regulations, and persuading others to choose to make the sacrifice or even just cut back a little on what Chinook is taken, is very important to me and what I hope to achieve. ●

> ***"...before I worked for the Service, I was resentful towards the restrictions and regulations...***

Jessica's article was originally published in the Yukon River Drainage Fisheries Association's newsletter. She is a student at the University of Alaska, Fairbanks working towards a Bachelor of Science degree in Biological Science. This past summer she completed her second summer as a seasonal Data Technician with our Fairbanks Fish and Wildlife Field Office's Subsistence Fisheries Branch.

Uniquely Alaska Logistics

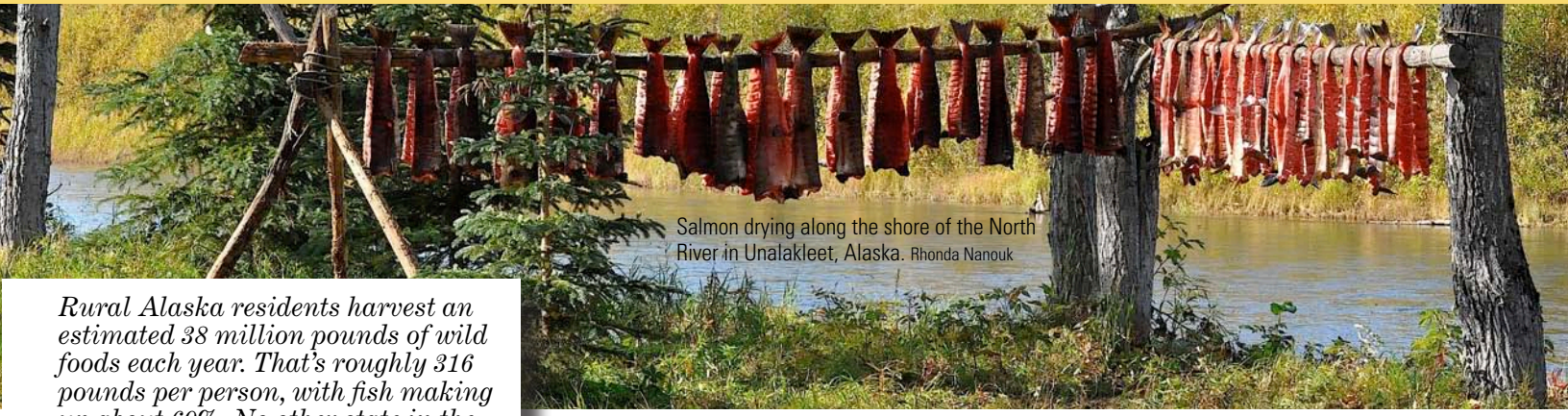
The Killey River weir site sits 24 miles by helicopter from the Soldotna Airport, deep in the Kenai National Wildlife Refuge—one of 16 Refuges in Alaska managed by the Service that, together, cover 76 million acres (nearly 20% of the state).

More than half of the Kenai River's early-run Chinook salmon are thought to spawn in this important tributary. The weir provides a platform to monitor Chinook salmon that have returned to spawn. Read more about our use of weirs starting on **page 10**.

Pictured from left: Service biologists Jim Boersma and Ken Gates from our Kenai Fish and Wildlife Field Office, and Jordan Head from the Alaska Department of Fish and Game, removing ice from the Killey River's bank in preparation for installing a weir used to monitor Chinook returning to its waters to spawn. USFWS/Ben Schubert

- *Biggest state with more coastline than the lower 48 states combined*
- *Produces ~80% of the worldwide supply of wild salmon*
- *Largely roadless. Heavy dependence on other, often costly transportation modes*

Uniquely Alaska Subsistence



Salmon drying along the shore of the North River in Unalakleet, Alaska. Rhonda Nanouk

Rural Alaska residents harvest an estimated 38 million pounds of wild foods each year. That's roughly 316 pounds per person, with fish making up about 60%. No other state in the U.S. has such a heavy reliance upon wild foods.

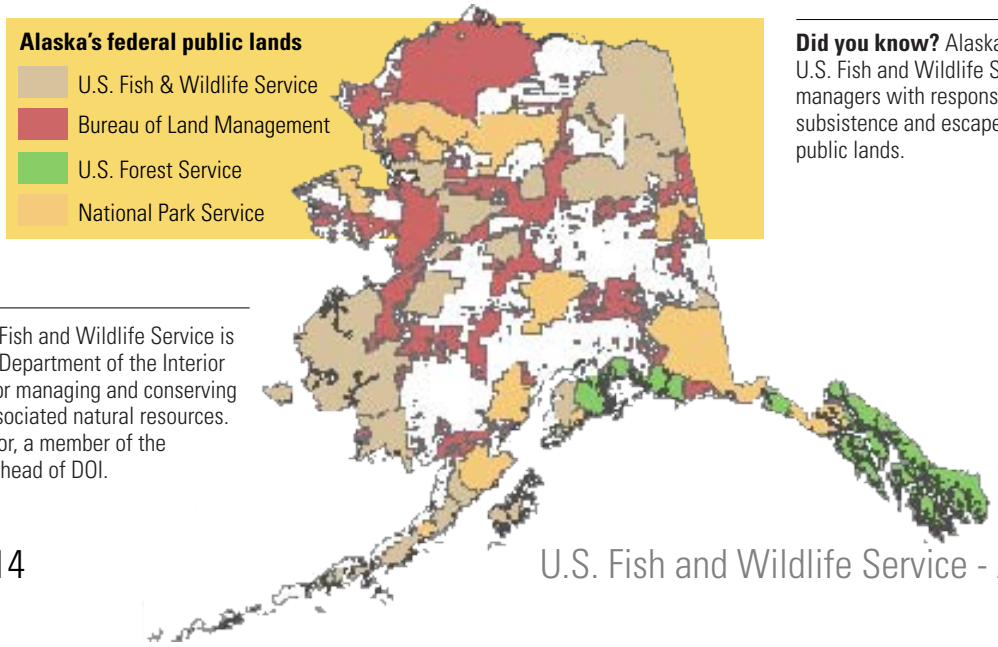
The Alaska National Interest Lands Conservation Act, or ANILCA, (passed by Congress in 1980) mandates that rural Alaska residents be given priority for subsistence uses of fish and wildlife over other uses on Alaska's federal public lands. The Secretaries of the U.S. Departments of the Interior and Agriculture are responsible for upholding this subsistence priority. The Federal Subsistence Management Program was established to help them meet this responsibility and is a multi-agency effort led by the U.S. Fish and Wildlife Service.

As lead agency, the Service provides the administrative and technical support needed to run the Federal Subsistence Management Program. This is done via the Office of Subsistence Management (OSM), a branch of the Service, staffed with Service employees and created solely to support the Program's decision-making body (the Federal Subsistence Board) and it's 10 Regional Advisory Councils (generally divided along indigenous cultural boundaries).

OSM also administers a competitive grant program known as the Fisheries Resource Monitoring Program (FRMP). FRMP projects monitor the fish populations important to rural subsistence users. These projects inform fisheries management and the "in-season" managers who make decisions aimed at conserving fish and providing continued opportunities for subsistence.

FRMP has funded hundreds of fisheries research and monitoring projects since its inception. In fact, fisheries studies carried out by the Service's Fisheries Program staff are regularly funded by FRMP—for example, to operate weirs on Yukon and Kuskokwim river tributaries to monitor returning Chinook salmon (**see page 10**). ●

Contributors: Trent Liebich and Pippa Kenner, Office of Subsistence Management; Andrea Medieros, External Affairs



Did you know? Alaska is the only state where the U.S. Fish and Wildlife Service has in-season fisheries managers with responsibility and authority to ensure subsistence and escapement needs are met on federal public lands.

Did you know? The U.S. Fish and Wildlife Service is an agency within the U.S. Department of the Interior (DOI). DOI is responsible for managing and conserving most federal lands and associated natural resources. The Secretary of the Interior, a member of the President's Cabinet, is the head of DOI.

by Katrina Mueller

Weirs & Video Technology

Windows into the world of migrating fish

The Service operates weirs on Kuskokwim, Kenai, and Yukon River tributaries that flow through National Wildlife Refuges. These weirs provide a platform to gather key pieces of information needed to conserve Alaska's salmon populations and manage associated fisheries. The weirs highlighted on the next few pages share something in common—they help us monitor Chinook populations.

Yukon River tributary weirs:
Andreafsky River
Gisasa River

Andreafsky weir. USFWS

Kuskokwim River tributary weirs:
Tuluksak River
Kwethluk River

The Tuluksak and Kwethluk rivers both originate in the Kilbuck Mountains and flow through Alaska's Yukon Delta National Wildlife Refuge. USFWS/Kristine Sowl

Kenai River tributary weirs:
Killey River
Funny River
Quartz Creek

Video still of a large male Chinook and a group of chum salmon passing upstream through a weir. USFWS

How it works!

We construct our weirs with evenly spaced PVC pickets aligned parallel to the direction of flow. The upstream end of each panel is anchored to the river bottom and the downstream end is lifted above the surface by a resistance board that planes upward in flowing water. Standard video components include a sealed box to house the video camera, pond lights and a digital video recorder (DVR) equipped with motion detection software. Migrating fish enter a narrow chute on their way upstream and pass in front of the video box. The analog video signal is routed to the DVR and converted to digital format instantaneously. The DVR removes blank footage and only reports motion events. We also incorporate fish traps to collect samples (e.g., scales for ageing or a small fin clip for genetic analyses) and use microwave technology to monitor remote sites. We power our remote video systems with a combination of solar and thermoelectric energy. After passing through the weir, fish continue their migration upstream to their spawning grounds.

**Special thanks to Jeff Anderson, Fred Bue, and Aaron Martin for their input and review.*

Feature: Weirs

Above: The Kwethluk River, a Kuskokwim River tributary that flows through the Yukon Delta National Wildlife Refuge, taken from Three Step Mountain in Western Alaska by one of our past interns.
Below: The Kuskokwim River. USFWS/Palma Ingles

Kuskokwim—The Kuskokwim River flows through the remote and wild landscape of southwest Alaska into the Bering Sea. This noteworthy river—over 700 miles long—is particularly significant in terms of supplying food for Alaska Native peoples and other rural residents: Alaska's largest subsistence harvest of Chinook salmon (on average, 84,000) is taken from its waters each year.

A shrinking number of salmon returning to the Kuskokwim—particularly Chinook (which are in a period of decline statewide)—is of concern to users and managers alike. 2012 and 2013 saw the lowest numbers of Chinook reach their spawning grounds in documented history.

For several years running, the total salmon *escapement* (the number of spawners that escape harvest and reach their spawning grounds) in several tributaries has been at or below the level thought necessary to sustain Kuskokwim Chinook.

The State of Alaska recently adopted a new basin-wide escapement goal, and preliminary analyses indicate it was not likely met in 2013. Low returns have prompted commercial, sportfishing and subsistence fishing closures and gear restrictions for the Kuskokwim and its tributaries.

Fisheries biologists from our Kenai Fish and Wildlife Field Office use weirs as their primary platform to monitor the salmon that return to two Kuskokwim River tributaries—the Kwethluk and Tuluksak rivers. Daily escapement numbers are relayed to managers charged with in-season (realtime) management of fisheries in the lower reaches of the river.

Both the Kwethluk and Tuluksak flow through the Yukon Delta National Wildlife Refuge and support Chinook runs that make an important contribution to the overall natural diversity of the Kuskokwim's Chinook run.

These two populations experience heavy fishing pressure as they pass through the lower reaches of the Kuskokwim. As a result of low escapement, sport and subsistence fisheries have been restricted in both systems, as well as in the mainstem Kuskokwim River near the villages of Kwethluk and Tuluksak, to help protect these spawning populations.

Our Kenai fish biologists have used underwater video technology at these two weirs since 2010 to get an even clearer picture of the runs in real time. For example, clear footage lets them determine sex ratios for each species without handling the fish. This information is helpful in understanding changes in, for example, the size of Chinook salmon and the ratio of males to females over time.

Feature: Weirs

The Kenai River near its mouth. Katrina Mueller

Weirs continued. **Kenai**—The turquoise waters of the Kenai River—Alaska's premier sportfishing destination—flow over 80 miles westward across the Kenai Peninsula from Kenai Lake through the National Wildlife Refuge that bears its name before meandering into Cook Inlet.

Recreational anglers begin and end the fishing season on the Kenai's banks between April and November to fish for salmon, rainbow trout, steelhead, and Dolly Varden char. This river supports Alaska's largest sport fisheries for sockeye, coho, and Chinook salmon, with anglers dedicating over 250,000 "angler days" (i.e., the time spent fishing for any part of a day by one person) each year fishing for Chinook salmon alone. The biggest Chinook ever to be landed with rod and reel—just shy of 100 pounds—was a Kenai River king.

Recreational salmon fishing throughout the Kenai River watershed overlaps with a uniquely Alaska "personal use" dipnet fishery for Alaska residents in the lower river, marine recreational fisheries, and set and drift gillnet commercial fisheries in Cook Inlet.

These fisheries intercept migrating salmon at different points along their migration through Cook Inlet and up the Kenai River—from the beginning of the earliest run to the end of the latest.

While 2013 was a bumper year for Kenai River sockeye salmon, the total number of Chinook returning to the Kenai is declining, with 2012 and 2013 returns being the lowest on record.

Based on when they migrate ("run") upstream and where they spawn, Kenai River Chinook fall into two main groups: early- and late-run. Most early-run Chinook spawn in Kenai River's tributaries within the Refuge and tend to begin migrating up the Kenai between late April and early July. Late-run Chinook return between mid-June and mid-August to spawn in the Kenai's mainstem.

To better monitor the early-runners, our Kenai Office operates weirs fitted with underwater video technology on three Kenai River tributaries that flow through the Kenai National Wildlife Refuge: the Funny River (operated since 2006), the Killey River (operated since 2012), and, in 2013, Quartz Creek—a smaller tributary that provides another important spawning area for early-run Chinook.

It's important that early-run Chinook reach these tributaries—over half of the Kenai's early-run Chinook are thought to spawn in the Killey and approximately 20% are thought to spawn in the Funny River, although the latter number has been less in recent years (10-11%).

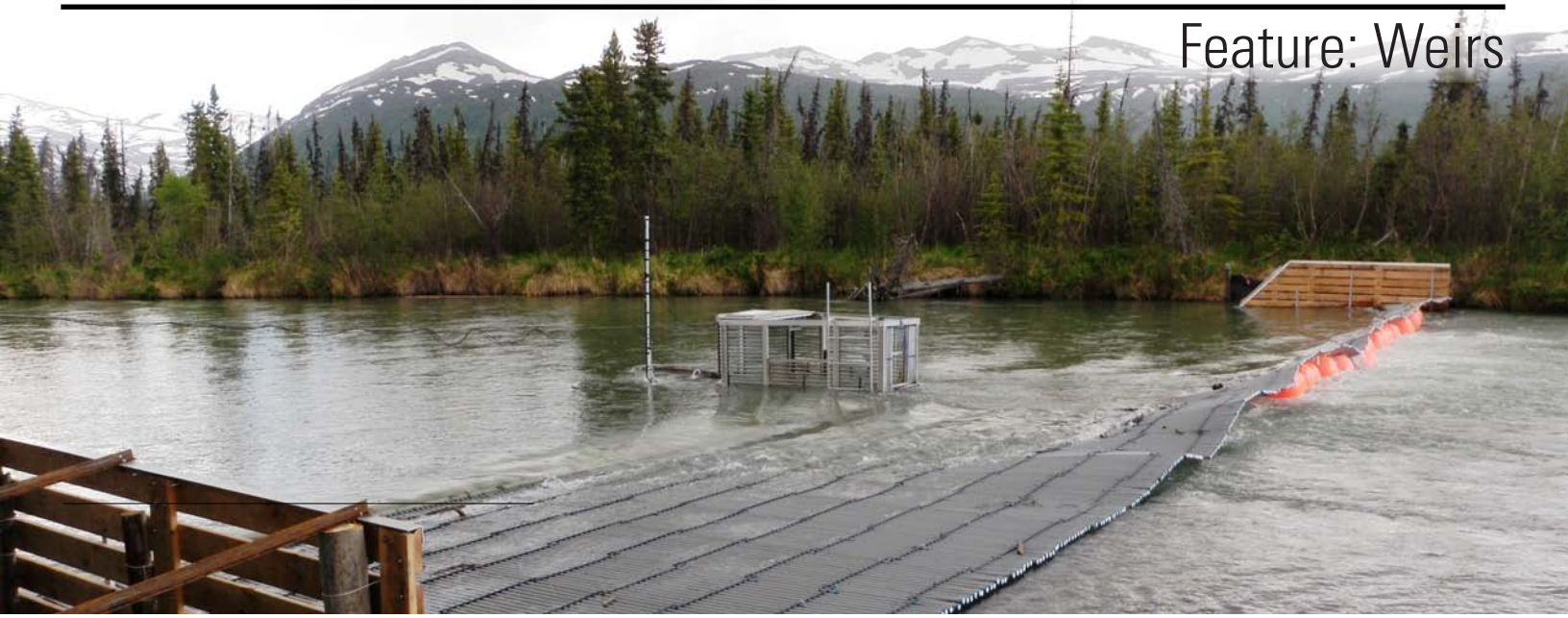
Our Kenai Office monitors the Funny's Chinook run (and a small, recently-discovered steelhead population) at a weir located less than a mile upstream of where the Funny enters the Kenai.

They're finding that returning Chinook are smaller and younger when compared to other populations in Southcentral Alaska. These smaller, younger fish tend to make less eggs than large, older fish, and the eggs are smaller. Small fish dig shallower redds and eggs are more likely to get scoured out during high flows.

The Killey River also flows almost entirely within the Kenai National Wildlife Refuge, with its lowermost section flowing through private lands. The weir site is located two miles downstream of the Killey's confluence with Benjamin Creek. Like the weir on the Funny, the Killey weir allows biologists to count the number of Chinook passing upstream and document their age, sex, and length.

JoJo's King Salmon by Jordan Carlos, Grade 2

Below: Funny River weir. USFWS/K. Mueller



The Killey River weir. Over half of the Kenai River's early-run Chinook salmon are thought to spawn in this glacially-fed tributary. USFWS/Lucas Young

Weirs continued. The need to better understand specific spawning populations prompted the development of the Killey River weir project as part of a larger cooperative project with the Alaska Department of Fish and Game (ADF&G). The information gathered from the weirs on the Killey and Funny Rivers, and most recently Quartz Creek, is being used in combination with radiotelemetry data, genetic data, and harvest information to generate population abundance estimates for comparison with information being gathered by ADF&G with new sonar technology.

Ultimately, a better understanding of the Kenai's different populations can help ensure their conservation.

Spotlight on Technology

For over a decade, our Kenai Office fisheries biologists have been pioneering innovative underwater video technology at weirs, allowing them to provide more accurate counts of abundance with less manpower. For example, artificial lighting and a sealed camera box filled with clear water can record passing fish 24 hours a day even when the water is cloudy. Motion detection software only records motion events, saving staff many hours during review.

They are now exploring a novel use for another technology: *Graduated Electric Field Fish Barriers (GEFFBs)*. Although floating resistance-board weirs are an advance over fixed picket weirs in their ability to operate in waters carrying a lot of debris (e.g., downed trees), they are difficult or impossible to install and operate in certain high flows. This reduces the accuracy of escapement estimates. It's a currently available technology that could potentially help address these limitations.

GEFFBs, which use mild fields of non-lethal, pulsed DC electricity, have been used extensively in North America and Europe to block the movement of invasive species, like Asian carp, and guide fish away from hydropower and water intake canals and irrigation ditches.

Staff are currently exploring the possibility of piloting a modified electronic guidance array to guide migrating adult salmon upstream through a fish trap and video counting chute. Theoretically, migrating fish spread out across the total width of a river at various water depths could be redirected to one side of the river channel with a very low power, pulsed DC waveform and allowed to travel unimpeded through a smaller and more manageable corridor affixed with an underwater video system. If successful, such a system could replace more costly and labor-intensive resistance-board weirs (in terms of annual material costs and maintenance).

A video still of Chinook and chum salmon passing through one of our weirs that's equipped with video technology. USFWS

This application of GEFFBs is still in the planning phase, and initial project development would likely occur as a small-scale controlled test on the road system where our Kenai staff would have control over many of the variables that may affect safety and system performance. ●

Yukon River. Stan Zuray

Weirs continued. **Yukon**—the massive Yukon River and its tributaries drain a remote and still-wild swath of land in Alaska and Canada that's the size of Texas and Louisiana combined. Fewer than two dozen of the world's rivers are longer—in the U.S., only the Missouri and Mississippi surpass it in length.

Yukon River salmon are equally impressive, with some Chinook and fall chum salmon undertaking a Herculean journey up the entirety of its length (~2,000 miles)—those that spawn in its headwaters in British Columbia have one of the longest freshwater migrations on Earth.

The fish that make a living in the Yukon—salmon, whitefish, lamprey, northern pike and others—have provided a vital source of food and traditions for Alaska Native peoples and Canada's First Nations for thousands of years. Today, these fish continue to provide a key food source for over 60 rural Alaska communities and reach commercial markets as far as Southeast Asia (Pacific lamprey) and New York City (Bering cisco).

Because Yukon River Chinook and, increasingly, fall chum (as Chinook numbers decline statewide) have such importance, the U.S. and Canada established a long-term commitment to manage and conserve these two species as a shared resource and give priority to subsistence uses via the Yukon River Salmon Agreement of 2001.

To help meet the obligations of this agreement and the ecological and subsistence mandates of ANILCA, our Fairbanks Fish and Wildlife Field Office has a Subsistence Fisheries Branch with a permanent staff of six biologists. They monitor and work jointly with the State of Alaska to manage the in-season harvest of salmon on federal public lands and determine if subsistence needs are being met in Yukon River communities.

The Service coordinates with ADF&G and numerous other agency and non-agency partners to piece together a greater understanding of the salmon's part in the ecology of the Yukon River for the benefit of the people who rely upon this important resource in their everyday lives.

For 20 years, the Service has annually collected data on salmon abundance, run-timing, age, sex and length as Chinook, chum, and other species that move upstream through weirs located on several key Yukon River tributaries that flow through Refuge lands, including the Andreafsky and Gisasa Rivers. Video technology is being incorporated in 2014.

Below: Hanging fish to dry by the Yukon River near Forty Mile circa 1930. Claude B. Tidd Collection

Feature: Weirs

Weirs continued. The 120-mile long Andreafsky River and its East Fork flow through the Yukon Delta National Wildlife Refuge and converge near the village of St. Mary's (population ~500). This highly productive river supports some of the Yukon's largest runs of Chinook, chum, coho, and pink salmon. Andreafsky River salmon contribute to a significant mixed stock subsistence fishery that takes place in the lower Yukon River. The East Fork is one of many rivers along the Yukon River system where the number of salmon escaping to their spawning grounds is being tracked.

The Gisasa River, located within the Koyukuk National Wildlife Refuge, is a tributary of the Koyukuk River. The Koyukuk is a major Yukon River tributary, entering the mainstem downstream of the community of Galena (population ~470). It hosts one of the Yukon's largest summer chum runs. The Service uses the Gisasa River weir to help monitor the effectiveness of various conservation actions aimed at ensuring enough Chinook and summer chum salmon escape the downstream fisheries and reach their spawning grounds.

The two decades of consistent data that have been collected at weirs like these is rare, given the logistics associated with such a large river system flowing through a remote and largely roadless area. The data is thus very important, both in terms of 1) monitoring escapement and run-timing (key pieces of information needed to inform the decision-making process for setting subsistence and commercial fishing periods in real time), and also 2) tracking how fish populations originating from Refuge lands are changing over time (e.g., number of spawners, their size, age, and the ratio of males to females).

The information collected at these weirs is being used to review population trends throughout the Yukon's basin and to create models to help reconstruct the numbers of salmon that entered the mouth of the Yukon River historically. These efforts will help improve understanding of escapement needs and ultimately aim to ensure there are healthy and diverse fish for the future.

Weirs also enable our staff to assess how well conservation efforts are working. For example, in 2010, both the Alaska Board of Fisheries and Federal Subsistence Board adopted regulations limiting the mesh size of gillnets to nothing larger than 7.5 inches. The regulation, beginning in 2011, sought to better match mesh size to harvest salmon across the wide spectrum of fish body sizes returning to the Yukon River as a way to maintain their natural variability. This was done in an effort to avoid the current selective harvesting of larger, older, Chinook salmon females that are capable of laying more and larger eggs (their big heads can't pass through the small mesh). Due to continued poor returns in 2013, the Service worked with ADF&G to further reduce the mesh size to six inches while Chinook were migrating upstream. The goal of this regulation was to more effectively harvest the more abundant, smaller chum salmon and, again, protect the low numbers of Chinook migrating simultaneously. We hope to see more Chinook and these big females passing our weirs in the coming years as a result of these types of measures.

Finally, the weirs' base camps provide a platform for other studies, such as investigating what habitats lamprey prefer and where they locate themselves in the watershed. Or collecting baseline water quality data. On the horizon? Fleshing out logistics for catching juvenile salmon to monitor their condition (to assess their overall health) as they migrate downriver to the Bering Sea. ●

Jennifer Morella with a Gisasa River Chinook. USFWS

Helping fish cross under roads, reach habitat

by Katrina Mueller

Goose Creek

Shorezone

Bird's eye view of Goose Creek estuary where it flows into the Knik Arm of Upper Cook Inlet. This project removed the last known fish passage barrier between its mouth and uppermost reaches.

Importance: Goose Creek provides spawning and nursery habitat for Chinook and coho salmon.

Problem: Three 4ft-diameter culverts at Cameo Road were constricting Goose Creek and preventing fish from reaching upstream habitats.

Solution: Replace the undersized culverts with a nearly 20ft-wide culvert that lets juvenile and adult salmon move freely under the road.

Partners: The Service, Alaska Department of Fish and Game (ADF&G), Mat-Su Borough (MSB), Mat-Su Basin Salmon Habitat Partnership.

Fish-friendly results: Juvenile and adult Chinook and coho salmon now have access to 10 miles and 400 lake acres of spawning and nursery habitat.

Project cost: $248,756 (the Service contributed $120,000).

Buddy Creek

USFWS/K. Mueller

USFWS/Bill Rice

Two undersized culverts were replaced with a new fish-friendly arch that spans Buddy Creek's entire channel (pictured just after installation), letting juvenile and adult salmon move through with ease. It can also handle a 100-year flood.

Importance: Buddy Creek is Montana Creek's biggest tributary. Montana Creek supports a very popular salmon and trout fishery two hours north of Anchorage.

Problem: Two 5ft-diameter culverts were causing a fish passage barrier and constricting 16ft-wide Buddy Creek to 10ft at Katahdin Street.

Solution: Replace the undersized culverts with a nearly 20ft-wide culvert that lets juvenile and adult salmon move freely under the road.

Partners: Same as above.

Fish-friendly results: Juvenile and adult salmon now have access to an additional four miles of spawning and nursery habitat upstream.

Project cost: $237,712 (the Service contributed $120,000).

Stay tuned: Buddy Creek has one remaining fish passage barrier that's undersized and badly damaged where it flows under Sawyer's Shady Road—the partners have received funding to install a fish-friendly culvert in 2015.

In 2013, ADF&G marked juvenile salmon with passive integrated transponder (PIT) tags and observed their movements in the vicinity of this barrier. This data—to be collected before and after Buddy Creek's last barrier is replaced with a fish- and flood-friendly crossing—will test the effectiveness of similar projects in improving habitat connectivity for juvenile salmon.

MAT-SU ASSEMBLY: NO NEW FISH PASSAGE BARRIERS

The Mat-Su Borough (MSB) Assembly has identified the protection of fish and fish habitat in southcentral Alaska as a legislative priority and continues to identify fish passage needs in state capital funding requests. In August 2013, the MSB became the third community in Alaska (behind Anchorage and the Kenai Peninsula) to prioritize fish passage by adopting fish-friendly design standards for new road-stream crossings.

The design standards include accommodating the 100-year flood and incorpating stream simulation and hydraulic methods to ensure culverts don't interfere with the movement of weak swimmers (like juvenile coho salmon) or impact habitat negatively.

The fish-friendly standards were developed by an interagency, public/private workgroup of engineers (including our fish passage engineer Bill Rice—*see right*) and biologists. The Service, MSB, ADF&G, and the State's National Flood Insurance Program Coordinator will be putting on workshops for contractors, developers, and public works staff that focus on putting the standards into practice.

In addition to being good for fish, the new standards will help reduce flood risk to private property and public roads, making installation of fish-friendly crossings when new roads are constructed a proactive means to improve public infrastructure and safety, and invest in salmon. ●

> ***"Adoption of these new standards brings the Mat-Su Borough in line with the Kenai Peninsula Borough and Anchorage in having local culvert standards for fish passage."***
>
> —Frankie Barker, MSB Environmental Planner

A juvenile coho salmon. USFWS.K.Mueller

USFWS/Rose Primmer

On January 21, 2014, Bill Rice reeled in national recognition for improving fish passage and increasing community resilience to flood events.

> ***"Bill's work helps support what all Alaskans love to do most—fish! We are proud of Bill's accomplishments, as well as our other staff, the Alaska Department of Fish and Game, and other local partners involved with fish passage projects."***
>
> —Geoff Haskett, U.S. Fish and Wildlife Service Regional Director (Alaska)

Bill has worked with local Alaskan communities for over a decade to design and install fish-friendly road-stream crossings that also reduce the risk of flood damage, support construction jobs and help sustain community economic benefits associated with salmon.

One of only seven Service fish passage engineers nationwide, Bill has a rare combination of hydrologic, engineering, and interpersonal skills that he uses to build lasting and active partnerships to improve fish passage in Alaska. His expertise is also exported outside Alaska—he just returned from special assignment in Colorado where he worked side-by-side with FEMA representatives, local and state officials and other Service staff to ensure response to recent major flood events consider the needs of both fish and communities. ●

Above right: Bill Rice accepts the National Fish Passage Program Field Biologist of the Year award from Alaska's Regional Director, Geoff Haskett, on behalf of David Hoskins (the Service's Assistant Director of Fisheries and Aquatic Conservation). USFWS/Rose Primmer. **Below:** Service Biological Science Technician Casey Smith readies a piezometer last August to evaluate upwelling and downwelling areas in Rabideux Creek, a Susitna River tributary near Talkeetna. The data will be combined with other habitat measurements and fish assessments to better understand what spawning habitats salmon prefer, and help prioritize fish passage barrier removal projects. Stay tuned for more on this and other fish passage projects in the next issue. USFWS/Katrina Mueller

"Northern Pike About to Strike" by John Paul Deering (Grade 3) of Anchorage, Alaska

WANTED: northern pike
Armed and dangerous!
Cannabalistic!
Long and lean, olive green
Light spots and razor-sharp teeth
Super predator lurks in vegetation;
ambushes unspecting bait fish
(or anything it can get in its mouth)
Streaks like a bolt of lightening when it attacks
Found in lakes and rivers all over the U.S.
Beautiful part of the ecosystem in many places
but now invading peaceful lakes where it's never been before,
aided by foolish and unethical fish planters!
REWARD: A Great Dinner
Northern pike is great eating (even if some people think its bony)

Aquatic invasives near a tipping point:
following in the footsteps of the lower 48 states?

by Katrina Mueller and Cecil Rich

Alaska may be unique in a lot of ways, but not when it comes to being acutely vulnerable to invasive species. Invasives from around the world have a growing presence across the Alaska landscape—and they're changing it, threatening the very character that makes Alaska special.

For example, *Elodea*, Alaska's first known aquatic invasive plant, has already invaded three of Alaska's foremost salmon areas: the Copper River region, the Kenai Peninsula, and Chena River (a major Chinook salmon producer in interior Alaska). What's at stake? Alaska's freshwater fish habitat and fish—*Elodea*'s already been documented choking out Chinook salmon and Arctic grayling spawning and nursery habitat.

A popular aquarium plant and teaching specimen in Alaska, *Elodea* was likely introduced via the dumping of a home or school aquarium. It spreads easily, with even small fragments being able to establish new populations after hitching a ride on boats, trailers, floatplanes, or simply being carried downstream. This invader—having also taken root in several Anchorage lakes only a short distance from Lake Hood (the world's busiest floatplane base that serves much of the state)—is only one flight away from its next invasion.

Invasives have more potential pathways into Alaska than ever before, and even more paths are poised to open up as a result of climate change. For example, loss of sea ice is projected to greatly expand northern shipping activity, increasing risks of shipping-assisted species invasions into Arctic and Bering Sea coastal waters. Increased oil and gas development in Arctic waters will likewise bring drilling rigs that have the potential to unintentionally transport invasive species.

A changing climate is also helping some invasives move northward. For example, the European green crab (an invasive that's already established itself along Canada's west coast and competes with commercially-important native crab species) is expanding its range northward along the British Columbia coast as coastal waters warm.

Invasives pose a threat to Alaska's fisheries, and its coastal economy. For example, the invasive colonial tunicate *Didemnum vexillum* was discovered in a Southeast Alaska harbor in 2010.

This species threatens to foul marine areas in Alaska (including bottom habitats, shellfish aquaculture areas, maritime structures) as it has in many areas along the west and east coasts. For example, off the coast of New England, in Georges Bank, it's already formed dense mats over hundreds of square miles of groundfish and scallop habitat. There's great concern that this species will continue to spread in Alaska, impacting regionally-important subsistence and commercial fisheries such as Pacific herring that are so important to coastal communities.

Documenting and rapidly responding to invasions in Alaska poses a unique challenge given the state's size, its complex and lengthy coastline (Alaska has more than half of the total U.S. coastline), the extremely large number of water bodies compared to other states, and the relative lack of human capital and manpower to detect and respond to new invasions.

Despite this, Alaska does have one unique advantage: invasions are still somewhat contained. Thus the opportunity still exists to avoid the crippling economic impacts and habitat losses resulting from new species invasions. Annually—in the contiguous United States—aquatic invasive species alone already cost tens of billions of dollars in damages and control efforts.

Effectively responding to invasive species in Alaska requires prevention and a readiness for rapid response when they arrive—whether by herbicide to rid a lake of *Elodea* or removal of marine structures fouled by invasive tunicates. To get there, we all need to be informed about how invasives enter Alaska and spread. The State of Alaska, the Service, and a growing number of other partners are working together, and with the public, to keep aquatic invasives at bay. ●

-2013-

The first annual ***Chena River Watershed Summit*** focused attention on the river and its Chinook salmon run on May 1st.

On May 17, Neil Stichert and John Hudson (our Habitat Restoration Team based in Juneau) received the Alaska Chapter American Society of Landscape Architects' ***GreenBelt Award*** for improving habitat in public spaces.

Legendary river restorationist ***Dave Rosgen*** spent a week in Anchorage in June teaching applied fluvial geomorphology and river restoration.

USFWS/Katrina Mueller

Gene Peltola Jr. began his new role as the Assistant Regional Director for Alaska's Federal Subsistence Management Program in August. Gene, who is Yup'ik/Tlingit and born and raised in Bethel, is a lifelong subsistence user. He's been working for the Service for 29 years, most recently as manager of the 22 million acre Yukon Delta National Wildlife Refuge in western Alaska.

On August 20, the Matanuska-Susitna Borough became the third community in Alaska to prioritize fish passage by adopting ***fish-friendly culvert standards*** for new roads crossing salmon streams.

The first ***Southeast Alaska Watershed Symposium*** was held November 4-6 in Juneau and hosted by the Southeast Alaska Fish Habitat Partnership and the Southeast Alaska Watershed Coalition.

The 6th annual ***Mat-Su Salmon Science and Conservation Symposium*** was held November 13-14 in Palmer.

The ***Southwest Alaska Salmon Habitat Partnership's*** science workshop was held December 3-5 in Anchorage.

-2014-

On January 22, Bill Rice received the Service's ***National Fish Passage Program Field Biologist of the Year*** award.

The ***Southeast Alaska Fish Habitat Partnership*** became the nation's 19th Partnership to receive formal recognition by the National Fish Habitat Partnership Board on March 10. *http://www.seakfhp.org/*

USFWS/Rose Primmer

Fisheries Program Biologists Ray Hander, Jon Gerken (left, with Regional Director Geoff Haskett), and Steve Miller were recipients of ***Regional Director's Excellence Awards*** on March 17 (Fostering Partnerships, Innovation in Conservation, and Diversity Champion, respectively).

Chuck Ardizzone joined the Service's Fisheries and Ecological Services Division as Regional Subsistence Coordinator on March 31. This is a key position for the Service's participation in the federal subsistence management process in Alaska. He has previously served as a wildlife biologist and as Wildlife Division Chief with the Office of Subsistence Management, and as Statewide Subsistence Coordinator with BLM.

May 5-9 - ***Stream Simulation Design Approach for Providing Aquatic Organism Passage at Road-Stream Crossings Workshop*** (Anchorage). Contact Angela: *ajcoleman@fs.fed.us* / (907) 288-7728.

May 7 - ***Chena River Watershed Summit*** (Fairbanks).

May 24 - ***World Fish Migration Day***. A one day global event to call attention to open rivers and migratory fish.

October 1 - short film submissions to the 2014 ***Alaska Fish Film Festival*** are due. More information available by June 1 at: *http://www.afs-alaska.org/annual-meetings/2011-2*

October 20-24 - The 41st annual meeting of the Alaska Chapter of the ***American Fisheries Society*** will be held in Juneau.

December 15 - ***Chinook Life Cycle youth art contest*** entries due. More information: *Katrina_Mueller@fws.gov* / (907) 786-3637.

December 2014 - Apply for funding through the Office of Subsistence Management's ***Partners for Fisheries Monitoring Program***. Contact *Palma_Ingles@fws.gov* / (907) 786-3637.

March 31 annually - Entries for Wildlife Forever's ***State-Fish Art Contest*** are due. *http://alaska.fws.gov/fisheries/fish/contest_art.htm*

Kate Deering Grade 2

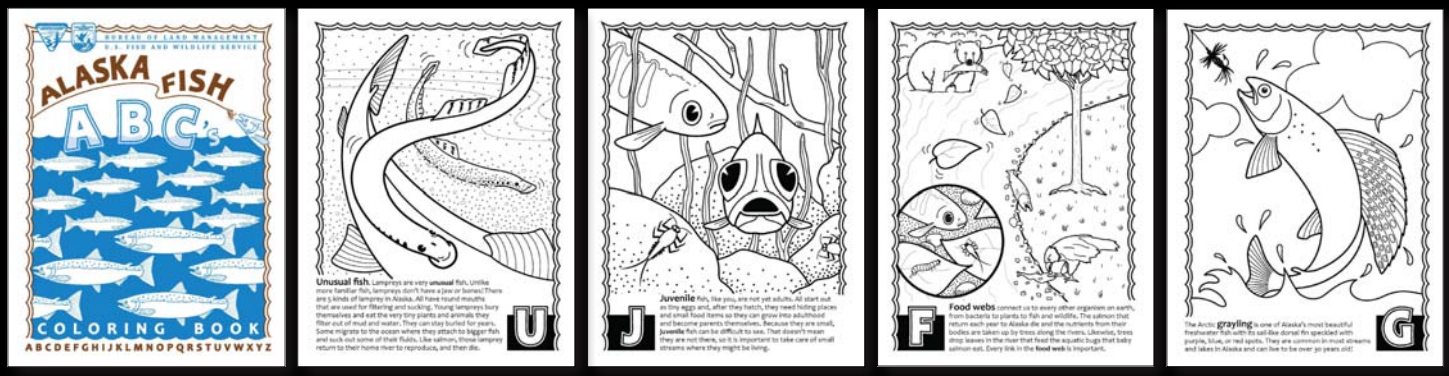
Kurk Cabudor Grade 2

Lucas Charliaga Grade 4

Antonete Partido Grade 5

Ocean Reft Grade 5

INTRODUCE A YOUNGSTER TO ALASKA'S COLORFUL CAST OF "CHAR"ACTERS!



Download and print the Alaska Fish ABC's coloring book!
http://www.fws.gov/alaska/fisheries/fish/pdf/alaska_fish_abc.pdf

From Creek to Plate

by Katrina Mueller

Anchorage: Alaska's largest urban center. K.Mueller

The next several pages highlight just a few of the ways we're helping invest in the future of conservation by engaging, educating, and employing youth and young adults.

Below: Male pink salmon chase a female up Ship Creek last fall through Alaska's most frequented urban fishing area. USFWS/Katrina Mueller

We are partnering with Anchorage's Boys and Girls Clubs, the Alaska Department of Fish and Game (ADF&G), and the Alaska Department of Natural Resources (ADNR) to connect urban Anchorage youth to safe fishing opportunities nearby. We began permanently housing quality salmon fishing equipment and life vests at the Northeast Muldoon Club (a hub for 700+ youngsters) in 2013; the Spenard Club is participating in 2014.

Anchorage is Alaska's largest urban center with a population just shy of 300,000 people. It's got big city diversity with 95 languages spoken within the Anchorage School District (behind English, the top five are Spanish, Hmong, Samoan, Tagalog, and Yup'ik).

In combination with its urban character, Anchorage offers some of the wildest outdoor opportunities in the country, including 135 miles of paved trails and 300 miles of unpaved and wilderness trails that offer access to multiple rivers with all five species of Pacific salmon, close-encounters with moose, migratory bird viewing, and thousands of acres of habitat.

Despite proximity, a surprising number of Anchorage's youth are unaware of or don't have the means to access and enjoy outdoor opportunities literally within blocks of their homes and schools.

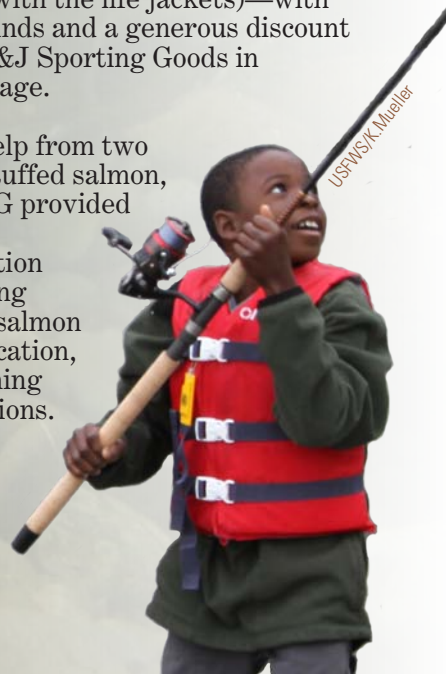
In Alaska, our agency's Connecting People with Nature Team is dedicated to just that. In 2012-2013, we distributed $31,250 towards projects in Alaska that connected people to nature (including Creek to Plate); the funds were made possible by the Department of the Interior's Youth in the Great Outdoors (YGO) Initiative.

Like the Service, Anchorage Boys and Girls Clubs want to build capacity to get kids outdoors. A growing body of research shows that kids who spend more time outdoors and less time inside using smart phones and television are generally happier, healthier, and do better in school. According to Muldoon Club's Athletics Director, many of the youth have never been exposed to fishing, nor do they (or the Club) have the equipment or know-how to gain that experience on their own.

Introducing youth to fishing in Alaska has many benefits. It gets them outdoors pursuing a healthy food source. Salmon and other Alaska native fish are well-known for their heart-healthy omega-3 fatty acids that also benefit brain development and function. Fishing also contributes significantly to the state's economy and funds generated from license fees and equipment help support fisheries management and conservation.

Creek to Plate was piloted in 2013. To connect Muldoon area youth to safe fishing opportunities nearby, ADNR's Office of Boating Safety supplied "Kids Don't Float" life jackets and instruction on their proper use and coldwater safety. The Service purchased quality Chinook and coho salmon fishing equipment—to be housed permanently at the Club (along with the life jackets)—with YGO funds and a generous discount from B&J Sporting Goods in Anchorage.

With help from two giant stuffed salmon, ADF&G provided lively instruction on fishing ethics, salmon identification, and fishing regulations.



USFWS/K.Mueller

Students were prepped on how to use a rod and reel before heading down to Ship Creek in Anchorage to catch coho salmon. USFWS/Katrina Mueller

The classroom portion of the day wrapped up with casting practice.

With the basics behind us, we loaded excited kids into the Club's van and headed to Ship Creek, Alaska's most urban fishing spot—and one of its most frequented. It was August 1st and the coho salmon were just starting to show up. We started our trip with a stop to see salmon schooling just below the Knik Arm Power Plant dam fish ladder. From there, we headed downstream, learning about salmon habitat and viewing habitat restoration sites as we walked to where we would be fishing—just below the old timber-trestle (now pedestrian) bridge.

The fishing was slow—VERY slow—but there was never a dull moment. The new anglers experienced tangled lines, forgot to engage reel bails, and crisscrossed lines. Other anglers gave our group an extra wide berth. The fish likewise avoided us during this first outing, but enthusiasm grew as casting technique improved, fish were sighted from the bridge, and other anglers allowed the kids to view and handle the pink and coho salmon they had caught.

The final take home message? It's called fishing, not catching… and there's more to fishing than catching.

A nice, albeit fishless, day spent outside during the short but sweet Alaska summer was further improved with a shore-lunch among friends, and culminated with a tour of the State's new state-of-the-art William Jack Hernandez Sport Fish Hatchery just upstream (and lucky photo-op with Alaska fish artist Ray Troll, visiting from Ketchikan).

Getting out a little tangle. Sydney West/Boys&GirlsClub

Youth enrolled with the Club now have direct access to the fishing and safety gear housed there. Service, ADF&G, and ADNR staff will interact with a subset of these youth up to two times a year—when the Kings are running in May and when the coho salmon run up river in August.

This year, another set of fishing and safety equipment is going to the Woodland Park Boys and Girls Club in the Spenard neighborhood. With Anchorage serving as a gateway to Alaska's world class fisheries and 16 National Wildlife Refuges covering more than 76 million acres, this effort is taking a small, but important step toward engaging the next generation of conservation stewards in Alaska. ●

2013 volunteers included Jay Baumer (ADF&G), Annie Grenier (ADNR), Forrest Hannan (Marine Mammals Management), Trent Liebich (Office of Subsistence Management), and Katrina Mueller (Fisheries and Ecological Services).

As they hone their technique, Jenessa, Taurean, and Zach will be able to land a coveted salmon and bring it from creek to plate (these two silvers were kindly lent for this photo-op by a lucky angler). Sydney West/Boys&GirlsClub

Schoolyard Habitats

Schoolyard habitats make school grounds or nearby lands more suitable for native fish and wildlife, and provide an accessible place outdoors for children to learn about and connect with nature on a daily basis. Through the Service's Partners for Fish and Wildlife Program, local staff provide funding and work closely with the school community on planning and implementation. Schoolyard habitats benefit students, teachers, and communities while helping the Service acheive its conservation mission.

Here's a sampling of the schoolyard habitats that received support from our Fairbanks, Kenai, and Anchorage Field Offices in 2013. Stay tuned for updates as these living projects are ever-evolving to meet the shared needs of the schools and Service.

Woodriver Elementary School (Fairbanks) installed two native plant rain gardens to address stormwater and erosion concerns, created a year-round outdoor classroom/nature trail, and removed invasive plants. *Partners: 4H clubs, Seekins Ford Lincoln, Design Alaska, Fairbanks Soil and Water Conservation District, Youth Corps, local artists, and construction firms.*

West Homer Elementary School designed and developed a half-mile interpretative trail featuring forest succession, native wildlife and habitat, and a natural amphitheater. *Partner: Homer Soil and Water Conservation District.*

Seward Elementary, Middle and High Schools, along with numerous volunteers, community members, and children's groups, put in hundreds of hours transforming school grounds into a variety of native plant parks, making them inviting to birds, bees, butterflies, and small mammals. *Partner: Resurrection Bay Conservation Alliance.*

Tustumena Elementary School widened and extended the existing trail system that features native aspen, fungi, multi-colored berries and a historical cultural resource site with fish pits. *Partners: Kenai Soil and Water Conservation District and Spruce Bark Beetle Mitigation Program*

Sterling Elementary School designed, developed and began constructing interpretative trails (below) to bring attention to native wildlife and their habitats.*Partner: Kenai Soil and Water Conservation District.*

USFWS/Cheryl Anderson

Government Hill Elementary (Anchorage) engaged ~400 students in celebrating International Migratory Bird Day in their schoolyard habitat. The school (in partnership with the Service, Alaska Department of Fish and Game, and many others) began to transform the school grounds from an unused lawn into wildlife habitat in 2011 with special emphasis on birds that migrate between Alaska and Central and South America.

Mitch Osborne/USFWS

Above: Woodriver Elementary students water newly-planted native vegetation along their nature trail.

Machentanz Elementary School (Wasilla) designed and developed a boreal forest, an alpine garden simulating a mountaintop, and a wetland/raingarden to restore about a half acre degraded school grounds with native plants to attract migratory birds and pollinators. *Partners: Mat-SuMat-Su Resource Conservation and Development Council and Mat-Su Conservation Services*

Wasilla Middle School designed and planted a rain garden to improve stormwater quality and stream health, attract native wildlife, and learn about environmental stewardship. *Partners: Mat-Su Resource Conservation and Development Council, Mat-Su Conservation Services, Girl Scouts.* ●

Below: Knik Elementary students learn about native wildlife from a Service biologist before planting native trees and shrubs. USFWS/Katrina Mueller

Machetanz Elementary's rain garden. Catherine Inman/Mat-Su Conservation Services

Just Say "YEP" to Habitat Restoration

by Katrina Mueller

The Anchorage Park Foundation's Youth Employment in Parks (YEP) is a 10-week summer program that hires Anchorage teens aged 16-19. Each year (since YEP's inception in 2007) our Anchorage Office has provided funding and staff time to support YEP for a week-long Anchorage creek habitat restoration project.

The 2013 project improved streamside habitat along Chester Creek. Teens planted hundreds of native trees and shrubs and added topsoil and reseeded banks near the outlet of Westchester Lagoon with native grasses to compliment ongoing efforts to control invaisve reed canary grass. This project (including the cost of the YEP crew, contractor, and materials) was supported by the Alaska Department of Fish and Game's Cost Share Program agreement with the Service via its Coastal and Partners for Fish and Wildlife Programs. The Service's contribution was matched dollar for dollar by the Anchorage Park Foundation.

This year, teens will focus their efforts on Campbell Creek.

These hands-on week-long projects provide the perfect environment for participating teens to learn about local creeks, fisheries, water quality, and habitat restoration techniques. They also contribute significantly to the collective, ongoing community effort to improve habitat quality and connectivity within Anchorage.

These projects support the Service's mission of working with others to conserve fish, wildlife, and their habitats and closely align with our agency's desire to connect people with nature and, in so doing, ensure the future of conservation. In fact, YEP has been recognized by the Department of the Interior for its outstanding efforts to engage youth (especially populations under-represented in natural resource fields) in on-the-ground habitat improvements that benefit fish, wildlife, and people. ●

Chester Creek flows west from its headwaters in the Chugach Mountains through the City of Anchorage and into the Knik Arm of Cook Inlet via Westchester Lagoon. Over 65,000 Anchorage residents live within its 27 square mile watershed (just shy of half the size of Washington, D.C.).

USFWS/Katrina Mueller

For many teens employed by the Anchorage Park Foundation's Youth Employment in Parks, this is their first job. Above, two teens replant native trees along Chester Creek near the heart of downtown Anchorage.
Below: A SAGA crew at a habitat restoration site along Pullen Creek in Juneau, Alaska.

A Restoration SAGA

Our Juneau Habitat Restoration staff have worked with the Southeast Alaska Guidance Association (SAGA) since 2005 and, in 2013, partnered with the Juneau Watershed Partnership to employ a 6-person crew (aged 19-25) to improve habitat along salmon streams in the Juneau area. Youth worked alongside a professional biologist, learned on-the-ground revegetation and invasive plant management techniques, and became active participants in conserving important habitats. ●

"With much of our habitat restoration work taking place in sensitive habitats with limited access, large machines are usually not an option. SAGA crews get the job done with hand tools, strong backs, and smiles.

—John Hudson, U.S. Fish and Wildlife Service Biologist (Juneau)

Restoring Habitat, Improving Public Spaces in Southeast Alaska

by Katrina Mueller

Last year, the Alaska Chapter of the American Society of Landscape Architects (ASLA) awarded our Juneau-based biologists Neil Stichert and John Hudson with their GreenBelt Award.

What does landscape architecture have to do with habitat restoration? Both benefit people! The GreenBelt Award recognizes colleagues who are not landscape architects but support ASLA's mission "to lead, educate and participate in the careful stewardship, wise planning and artful design of our cultural and natural environment."

Michele Elfers, a landscape architect with the City and Borough of Juneau, sees Stichert in particular as setting a great example of how to foster effective communication between construction operators, regulators, and landowners and provide guidance during the construction phase of habitat restoration projects.

> ***"That's a skill and that's why they're so successful.***

Stichert and Hudson frequently bring disparate interest groups and stakeholders together and work collaboratively towards conservation outcomes that make a positive difference for people, salmon, and other wildlife. ●

> ***"they offer such great technical support... they'll come out to a site and are really in tune with the reality of construction."***
>
> —Michele Elfers

Above: Neil Stichert (middle) and John Hudson (right) receive the 2013 Greenbelt Award. **Below:** Wetlands created in place of gravel dredge ponds on Nancy Creek in Mendenhall Valley, just northwest of downtown Juneau. They offer improved habitat, water quality, and aesthetics.

Juneau Habitat Restoration Team

Staff: Neil Stichert and John Hudson

Tell us a little about what you do.

- We help communities conserve intact habitats and restore degraded habitats across Southeast Alaska, from Ketchikan to Yakutat. Recently we've worked with partners in Skagway, Gustavus, Haines and Juneau and have upcoming projects in Hollis and Thorne Bay.
- Each year we work closely with Southeast Alaska Guidance Association (SAGA) crews to improve streambank habitats and control invasive species.
- We've been involved in all phases of a number of fish passage and wetland improvement projects, and also work closely with partners during the project assessment and design phases.
- We support projects that inform on-the-ground work—for example, we worked with the Takshanuk Watershed Council to prioritize fish passage barriers for removal in the Haines area and with the Juneau Watershed Partnership to identify and map important habitats in Juneau-area watersheds.
- We always try to leverage Service dollars and our technical expertise with others to get the biggest return on investment. At the same time, we try to optimize the strengths and flexibility of the Service programs we extend to partners here in Southeast Alaska [Coastal Program, National Fish Passage Program, and Partners for Fish and Wildlife Program].

What are some of the threats to fish habitat in Southeast Alaska communities?

- Stormwater discharge into salmon streams and development that's encroaching into riparian corridors, a weak regulatory climate for wetland and stream protection, and fish passage barriers where roads cross streams.

Neil, you're the Chair of the Southeast Alaska Fish Habitat Partnership...what's unique about it and why is it important?

- The partnership spans the entire southern panhandle of Alaska including the Alexander Archipelago.
- This region ranks as one of the largest, most complex, and intact estuarine and temperate rainforest on earth. Many small, vibrant communities with economies and ways of living linked closely to fish and fishing dot the landscape. With the exception of three, none have road connections outside their locale.
- The partnership provides coordination support for partners operating across this island-dominated landscape and helps to facilitate a coordinated delivery of on-the-ground habitat restoration and conservation projects.

An active member of the Mat-Su Basin Salmon Habitat Partnership, Great Land Trust (GLT) has concentrated much of its conservation efforts on wetland and estuary habitats in the Upper Knik Arm of Alaska's Cook Inlet. With partners, GLT has helped conserve over 9,825 acres, including 5,000 acres of wetlands and 43 miles of shoreline habitat important for all five Pacific salmon species.

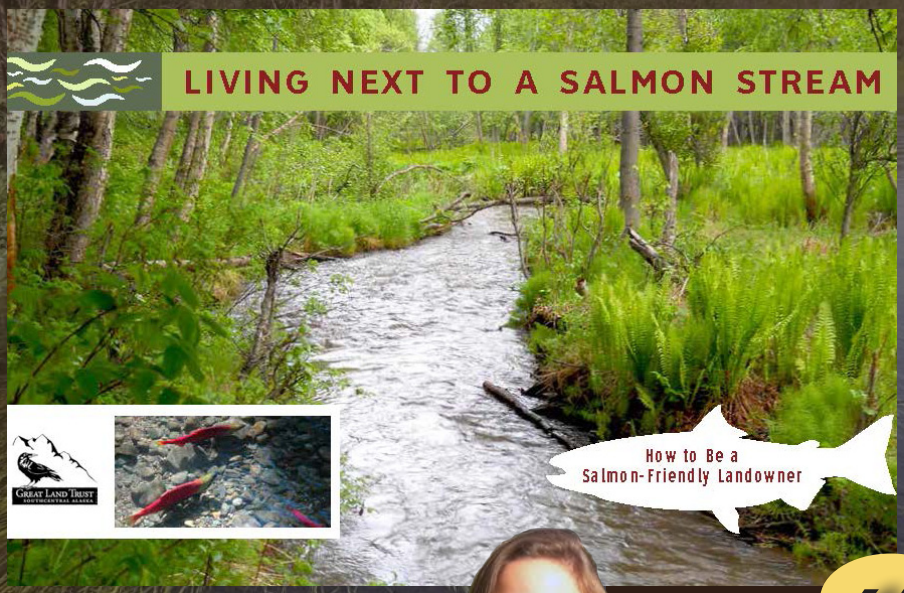
GLT is also in the midst of launching its **KING MAKER** campaign to acknowledge, honor, and celebrate those local people taking action for wild salmon. You can find videos featuring landowners who have conserved salmon habitat on their property to help ensure that adults keep coming back to spawn and that their offspring have access to high quality nursery habitat at *www.greatlandtrust.org*. ●

YOU MIGHT BE A KING MAKER IF YOU…

… maintain native vegetation along your waterfront property
….use non-toxic natural fertilizers on your lawns and in your gardens
….regularly maintain your septic
….utilize designated stream crossings when out recreating
….remove invasive plants (e.g. reed canary grass) from your property
….support local efforts to conserve salmon and their habitats

Background: Fish Creek in Wasilla, Alaska. USFWS/Katrina Mueller

Landowners: ask Kim for a copy!



Contact:
Kim Sollien
Mat-Su Program Director
ksollien@greatlandtrust.org
907-746-6406

"We're very thankful to those landowners who have chosen to work with us to conserve and/or restore salmon habitat on their lands...and we're excited to share their stories and to hopefully inspire others to become King Makers, ensuring that salmon continue to have a strong presence in the place we call home. If you are (or know) a King Maker, GLT would love to tell your story too!"

ADFG/Justin Crawford

Suresh standing on the Chukchi Sea last June.

SURESH SETHI, PhD

Office: Conservation Genetics Lab
Branch: Fisheries
Job: Biometrician

What is a biometrician? Technically, a biometrician is an applied statistician working in the natural sciences; I think "*all purpose quantitative guy*" better describes my job. I advise biologists and managers working on Chinook salmon in Togiak National Wildlife Refuge, Pacific walrus in the Chukchi Sea, invasive plants in Southcentral Alaska and everything in between.

What role do statistics play in fisheries management and conservation? Managers have the tough job of making decisions which affect ecosystems and the people who rely on them. They need objective information—informed by observations, scientific theory, and experimentation. Statistical analyses help us interpret data collected in the field and reach objective conclusions to inform management and conservation.

What's the most complex/interesting project you're working on right now? I'm part of a multi-agency team led by the Service to assess the population of Pacific walrus. This project spans applied statistics, marine mammal biology, and population genetics, representing cutting edge wildlife science. Walrus are fascinating and they're on the front line of climate change. They are an important resource for many Alaskan native communities. This project will help inform future management decisions and I'm helping design a mark recapture study using animals' unique genetic codes as the mark.

Any advice for budding statisticians interested in conservation careers? Diversify your analytical skill set and experiences. I use many different approaches to address research and management questions ranging from computer simulations and complex applied statistics to thought exercises and structured conceptual modeling. Natural resource management is more than mathematics and number crunching. Get out in the field, collect data, and experience the ecosystems and the people who rely on them.

LISA SCHOMAKER

Office: Kenai Fish & Wildlife Field Office
Branch: Fisheries
Job: Seasonal Biological Science Technician

Lisa looking for invasive *Elodea* last summer in a Kenai Peninsula lake. USFWS/Cheryl Anderson

How did you help make a difference this past summer? I hope the aquatic plant surveys we conducted will help curb the spread of *Elodea*, a common aquarium plant and aggressive non-native in Alaska. Determining the extent of its invasion in Kenai Peninsula waters is a precursor to eradication. We also collected, pressed, and mounted samples of the native flora for a new regional collection. It's exciting to be able to identify and inventory (nearly) every aquatic plant near shore, and to think that in 20 years some scientist might use my samples to better understand the aquatic ecology of the region!

What was the most memorable thing you saw/did this summer? Taking my first helicopter ride was pretty neat, and filling over 700 sandbags was certainly memorable, but I think the most rewarding was getting age-sex-length samples from 60 Chinook salmon at midnight at the Funny River weir. To see up close (if only for a brief moment) so many of these fish that are so revered locally and around the world is an impressive experience.

What about your experience would you like to share with other young people? As a seasonal technician you have unlimited opportunities to learn and to discover what is most fulfilling to you. The most important thing: try everything. Don't be afraid to drive a boat, operate a chainsaw or camp out for weeks on end. I had never taken a fisheries course or been fishing before coming up here. It turns out I love fisheries and have learned so many new and interesting things because of it. This past summer I was able to marry my background in plant science with my field experience in fisheries and am thinking about pursuing graduate school in aquatic ecology.

Fisheries & Habitat Staff

Anchorage
Libby Benolkin, Meg Purdue, Jon Gerken, Bill Rice, Doug McBride, Theresa Tanner

Juneau
John Hudson, Neil Stichert

Fairbanks
Jeff Adams, Ray Hander, Fred Bue, Aaron Martin, Randy Brown, Gerald Maschmann, Jeremy Carlson, Jeremy Mears, Laurel Devaney, Jeff Melegari, Mitch Osborne

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WANTED: FISH PHOTOS!

Celebrate Alaska's fish. Build awareness about their conservation.
SHARE YOUR FISH PHOTOS!

Visit our "Fish From Your Point of View" webpage for details: ***http://www.fws.gov/alaska/fisheries/fish/contest_photo.htm***
or contact Katrina Mueller: katrina_mueller@fws.gov / (907) 786-3637

CATEGORIES

FISH DOING FISHY THINGS. Like migrating, spawning, feeding, fighting, hiding, and jumping in their natural, Alaskan habitats. Any species, any time of year…If they do it, we want to see it!

WHAT A GIRL WANTS. Male fish go through a lot to impress the ladies. Watch for these amazing changes and send in your best close-ups!

FISH FOR THE FUTURE. Children are the future stewards and beneficiaries of Alaska's incredibly rich fisheries resources. Send in shots of youth fishing, helping with fishing gear, holding/releasing fish, or otherwise interacting with Alaska's fish/ participating in related Alaskan traditions!

UNIQUELY ALASKA. Alaska's fish support subsistence, personal use, recreational, and commercial fisheries. Capture these unique fisheries and the settings in which they occur. If you catch and release, send in your best shots of fish that are alive and partially (or fully) submerged in their natural habitat!

Made in Alaska: Rainbow Trout
Togiak National Wildlife Refuge

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