Land Trust Works to Protect More Anchor River Land, Will Incorporate New Research into KHLT's Kenai Peninsula Resource Mapping

Kchemak Heritage Land Trust recently received funding from the Pacific Coast Joint Venture to build on the previous successes of our Anchor River Project. We are contacting Anchor River landowners with properties ranking as "high priority" in our recent conservation resource mapping. Landowners will receive information describing our work and the importance of riparian lands. In previous outreach, we provided these landowners with a fact sheet describing the Anchor River. See KHLT website http://kachemaklandtrust.org/Anchor%20River.htm. In the current packet, KHLT will brief landowners about new Anchor River research by Kachemak Bay Research Reserve, Homer Soil and Water District, and Cook Inletkeeper. KHLT will add the new data to the maps created in our recent resource mapping. This important layer will strengthen the maps to help identify conservation priorities. By prioritizing conservation of land with important salmon habitat, KHLT will play an important role in protecting the Anchor River.

Update on Kachemak Bay Research Reserve Research

Pacific salmon give perhaps the ultimate sacrifice when they die after spawning, contributing their decomposing carcasses as food not only for young salmon, but also for the entire watershed ecosystem. Young salmon are born in freshwater streams. They travel out to the ocean as soon as they are old enough, where they spend several years growing, gaining 90% of their weight before returning to the freshwater streams where they were born to spawn, die and decompose. Kachemak Bay Research Reserve scientists teamed-up with researchers from the US Geological Survey, the University of Alaska and Alaska Department of Sport Fish Division to study the effects of the nutrients brought into the Anchor River watershed, and other local streams, when the returning salmon die. The nutrients are called "marine derived' because the bulk of the body mass of the adult salmon developed in the ocean. Using intensive field sampling coupled with sophisticated laboratory analysis (stable-isotope analysis and fatty acid analysis), Kachemak Bay Research reserve scientists were able to track the presence of marine-derived nutrients in the Anchor River's stream food webs, and to understand the importance of these nutrients to juvenile salmon and Dolly Varden health. Through this study, they gained a better understanding of how returning salmon affect the productivity local watersheds.

Additional research by Kachemak Bay Research Reserve, in collaboration with Baylor University and the Smithsonian Environmental Research Center, conducted on streams in the uppermost reaches of the Anchor River, Stariski Creek, Deep Creek, and the Ninilchik River revealed that juvenile salmon and stream use different types of headwater streams at different life stages. This means that is important to maintain a diversity of habitats for these salmonid species that spend a year or more in freshwater. For more information, contact Coowe Walker at 226-4651 or email: coowe.walker@alaska.gov.

Update on Cook Inletkeeper and the Homer Soil and Water Conservation District Research

Homer Soil and Water Conservation District and Cook Inletkeeper have been monitoring water quality on lower Kenai Peninsula salmon streams for 10 years in an effort to keep our community informed of changes occurring within our watersheds. As early as 2002, these organizations measured water temperatures consistently above Alaska's water quality standards set to protect salmon health and productivity. Temperatures even soared above 21°c (70 f) in the summers of 2004 and 2005 in the Anchor River. Water temperature plays a critical role in all phases of the salmonid life cycle, especially in freshwater systems where fish hatch from eggs and later return to spawn. Warm stream temperatures are frequently associated with increased stress in fish, making them increasingly vulnerable to pollution, predation and disease

In 2006 and 2007, Cook Inletkeeper's Stream Ecologist worked with a UAF graduate student to identify what types of habitat provide cooler water conditions for salmon in the Anchor River. Habitat types, such as deep pools, overhanging vegetation, undercut banks and large woody debris, have the potential to provide some refuge from the warmest temperatures. Other habitat conditions that influence stream temperatures are shade, flow rate, channel width, channel depth, solar angle and aspect. Once critical habitat types were determined, the next step was to identify reaches along the lower Anchor River that provide these habitat types and to encourage their protection in an effort to improve watershed resiliency to climate change. These reaches can lose their critical habitat features by human activities, such as: loss of shade by removal of stream-side vegetation, loss of floodplain connectivity due to channel straightening, and less water storage due to wetland loss. For more information, contact Sue Mauger at 235-4068, or email: sue@inletkeeper.org.

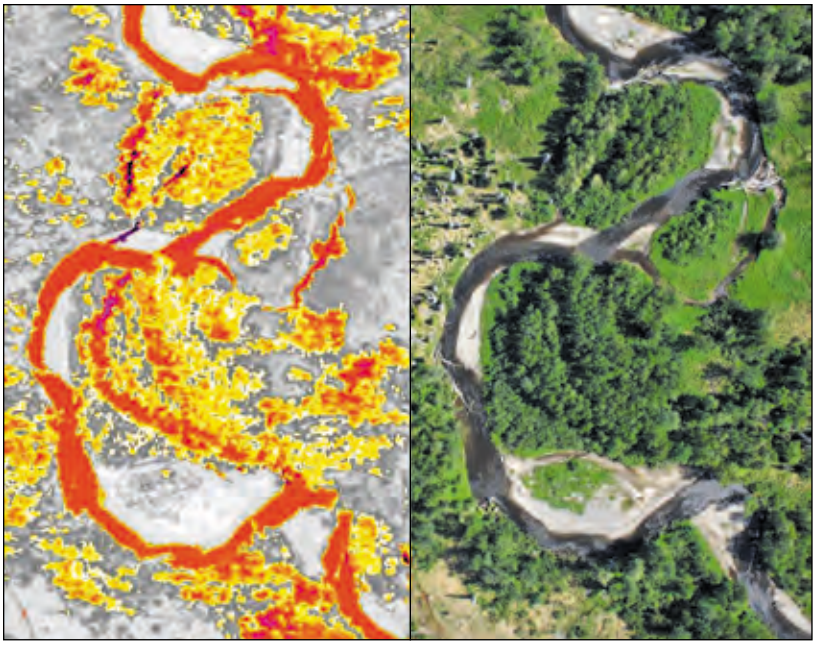

photo © Cook Inletkeeper

Cold Water is Critical.
The survival and persistence of salmon is highly dependent on water temperature. Research on the Anchor River identifies critical salmon habitat.

Thermal infrared imagery (left) with corresponding aerial image (right) showing cold water inputs (purple) to the mainstem of the Anchor River (orange).

Anchor River Project
Protecting our Water Quality and Salmon Habitat

By Sue Mauger, Cook Inletkeeper

As water temperatures get warmer in many of Cook Inlet's streams in the years ahead, cold water areas within a stream which are persistently colder than adjacent areas – will be critical to the survival and persistence of salmon. Cold-water fish, like salmon and trout, get stressed out in warm water and become increasingly vulnerable to pollution, predation, and disease. Deep pools, overhanging vegetation and undercut banks can be important cold-water habitats. Stream areas with groundwater interactions (i.e. springs and seeps) may also result in measurably cooler water. Mapping these cold-water stepping stones that are needed for salmon to make their way up and down otherwise warming streams is the first step towards protecting critical salmon habitat in this time of thermal change.

Cook Inletkeeper, in collaboration with the Homer Soil and Water Conservation District and the Alaska Department of Fish and Game, began identifying critical habitat conditions for cool water along the Anchor River in 2006. Based on in-stream surveys, overhanging vegetation, which provided shade during the mid to late afternoon, provides some of the most significant cool water habitat for juvenile salmon.

In 2010, Cook Inletkeeper expanded this effort and incorporated state-of-the-art technology to map cold-water habitat using airborne thermal infrared (TIR) imagery along 34 miles of the south fork of the Anchor River. This exciting technology is an effective method for mapping small-scale temperature patterns in streams. The TIR imagery provides a snapshot of stream temperatures at the time of the survey. And although temperature values change year-to-year, groundwater-fed cool water areas remain persistent over time. Even in the cool summer of 2010, the location and thermal influence of 18 tributaries, 23 seeps and springs, 11 sloughs, and 9 small side channels and drains is apparent in the imagery.

In 2012, Cook Inletkeeper will collect even more imagery along 30 miles on the north fork Anchor River and 12 miles on the lower Ninilchik River. With a treasure map of these cold spots, Kachemak Heritage Land Trust will then be able to identify land parcels with critical Chinook and Coho salmon habitat.

These parcels will be the focus for permanent conservation work. This goal can only be achieved through partnerships with willing landowners. A partnership of local organizations working together with individuals in the community provides a unique opportunity to link state-or-the-art science with conservation planning and land protection strategies designed for perpetual habitat conservation to protect our way of life and a valuable and precious resource that connects all life on the peninsula- the salmon. ✧

Salmon in the Hills

By Coowe Walker, Kachemak Bay Research Reserve

Look at the picture below. Do you notice the small stream meandering through the wildflower meadow? Would you guess that hundreds of young salmon are living there?

photo © KBRR

Since 2006, the Kachemak Bay Research Reserve has been leading research efforts to learn about these often remote, and previously unstudied areas. We have learned that these tiny streams at the uppermost reaches of our watersheds are, in fact, very important nurseries for juvenile salmon. These streams are the headwaters that are the origin of our rivers.

Did you know that the headwater streams for many of the Rivers along the Lower Kenai Peninsula are unique areas to find thriving salmon habitat? Most headwater streams are too small, steep, and quickly flowing and are not conducive to juvenile fish rearing. Our headwater streams are critical to juvenile salmon habitat. We have found more than ¼ million juvenile salmonids that are using these streams!

What is so important about the headwater streams of the lower Kenai Peninsula?

In most places, headwaters have been considered fishless because headwaters in most regions are small, steep, quickly flowing systems that aren't conducive to fish. The headwaters of the Anchor River, Deep Creek, Stariski Creek and Ninilchik River are quite different in that they are important fish rearing habitat. They are also predominantly located on private property, which makes them susceptible to impacts from high traffic and development. Do you have property where there is a headwater stream? If so, then you likely have salmon in your hills.

With the new science that is emerging, KHLT and willing landowners can take steps to ensure that essential elements of the landscape are maintained to keep our headwaters, and salmon, healthy.

Why are the landscapes of the lower Kenai Peninsula so productive as salmon habitat? Our research on nutrients and streamside vegetation, shows that nitrogen coming from alders in the surrounding area is a significant driver of stream productivity. Alder is a 'nitrogen-fixer', which means that the root systems of alder are able to take atmospheric nitrogen and convert it into a form that is biologically useful. Not many plants in our landscapes can do this. As nitrogen is typically in short supply in our aquatic systems, inputs of this basic nutrient become very important to promoting algal growth, which fuels stream insect (mayflies, caddisflies, etc.) production, which in turn moves up through the foodweb as food for young salmon. We now know that alder is important keeping our headwaters healthy.

Our research has also shown that the tall grasses that grow next to the headwaters are an important food base. The grass flops over into the stream, where it becomes the framework for algae to grow on, which the insects then eat, ultimately becoming food for young salmon. We call this 'grass fed salmon'!

This research is unraveling how our landscapes are connected to headwater streams. Alders in the surrounding area provide important nutrients; grass by the streamside provides a foundation for the food web. We are continuing our research, and as we learn, we will share our findings. By understanding how our landscapes are connected to headwaters, we can make sure that we protect the essential elements of the landscape that are most important to young salmon. As an informed landowner, you are important for maintaining healthy headwater nurseries for young salmon. ✧