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Ahtna Intertribal Resource Commission Intern

Luke Joi Duvall
Western Washington University

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COLLEGE OF THE ENVIRONMENT

WESTERN WASHINGTON UNIVERSITY
MAKE WAVES.

Internship Title: Ten weeks as an Ahtna Intertribal Resource Commission Fisherie

Organization Worked For: Ahtna Intertribal Resource Commission

Student Name: Luke Duvall

Internship Dates: 5/1/24 8/17/24

Faculty Advisor Name John McClaughlin

Department ESCI

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STUDENT SIGNATURE Luke Duvall

DATE: 8/21/20

CENV INTERNSHIP REPORT

Ten weeks as an Ahtna Intertribal Resource Commission Fisheries Technician

Luke Duvall - August, 2024

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Abstract

This summer, I spent ten weeks working as a fisheries technician for the Ahtna Intertribal Resource Commission. My primary position duties involved taking genetic and health samples for sockeye and chinook salmon. Throughout this summer I developed knowledge in the anatomy, ecology, management, and sampling techniques associated with salmon along with gaining insight and experience in other fields while collaborating with organizations outside my own. Furthermore, I gained valuable insight into the multiple organizations and attitudes involved in the management of natural resources throughout Alaska. Coming out of this experience, I feel prepared to progress further into research and conservation work professionally and academically at Western Washington University.

Introduction

The Ahtna Intertribal Resource Commission, formed in 2011 is a non-profit focused on the conservation, development, and management of the fish, wildlife, and plant resources within the Ahtna traditional use area according to culturally relevant values. With a board of directors composed of tribal representatives who have spent their lives on the land, AITRC is committed to incorporating the best leading scientific practices with traditional ecological knowledge and stewardship. The Ahtna traditional use area encompasses a large majority of the Copper River Basin in Southcentral Alaska, in which the Ahtna cultures have resided utilizing subsidence resources for thousands of years. Traditionally, Ahtna peoples lived semi-nomadic lifestyles, employing fish camps to most effectively harvest within the salmon runs throughout the summer and fall. To this day, sockeye and chinook salmon are a vital subsistence resource for many people of Ahtna descent and not. As time has progressed, with the increased population of Alaska and the extraction of natural resources including salmon, the size and overall strength of salmon runs in Alaska have decreased. With the large decline of the Yukon and Kenai River salmon runs in the past decades, Copper River salmon runs now experience increased pressure, making it crucial to monitor and properly manage the Copper River and associated salmon. Studies theorize that diseases like ichthyophonus may be large contributing factors to low salmon returns on the Yukon River, thus increasing fear that diseases like ichthyophonus, Kudoa, and Infectious hematopoietic necrosis could threaten the future of Copper River salmon. In 2023, AITRC employed studies of histology and found cell lesions and inflammation in both sockeye and chinook salmons' hearts. This led to increased salmon health sampling in 2024, the season in which I worked as a fisheries technician.

Internship Activities

As an AITRC fisheries technician, my primary responsibilities consisted of conducting health and genetic sampling on sockeye and king salmon within the Copper River Basin. Working with both local and traveling subsistence fishers, all collected samples came from salmon caught as a food resource first and used as a scientific resource second. Fish found with deformities or filets that could show signs of diseases were often reported by fishermen to be sampled.

The AITRC fisheries team takes genetic samples solely from sockeye salmon, a process involving cutting off roughly 1cm of the pelvic fin. We then place these pelvic fin clippings onto a page of absorbent paper, where we note location, date, and sampler. Our team places these sample pages, each holding 10 pelvic fin clippings, in an airtight container with absorbent blotter paper and desiccant packs stacked on top. This minimizes sample degradation and ensures samples remain dry. AITRC stores genetic samples for the Alaska Department of Fish and Game Gene Conservancy Lab's later analysis.

Health samples on sockeye and chinook salmon involve very similar procedures. Fish analysis begins with dimensional data, which involves measuring the length and weight of the fish. Length diverges into two subsections: total length and mid-eye length. Total length is the measurement from the tip of the salmon's nose to the middle of the fork in the fish's tail, while mid-eye length is the distance from the middle of the fish's eye to the fork in the tail. Given that a fish's body can stiffen up and bend after being stored on ice, it is imperative to try and straighten out the body of the salmon as much as possible to get an accurate measurement. After recording dimensional data, we move on to collect scale and blood samples. Three different blood samples are collected, all drawn between the anal and caudal fins. Technicians store whole blood in vials and freeze them as soon as possible. If a freezer is not easily accessible, an ice chest can act as a temporary freezer until the samplers return to the office. The AITRC lab is equipped with a centrifuge, which effectively separates the serum from the remaining parts of the whole blood. We pipette the serum from the centrifuged sample and place it in a new vial, which is then frozen until serology can occur. AITRC stores frozen blood samples for later analysis by Texas A&M University. The third type of blood sample collected involves placing raw blood onto a nobuto strip, composed of absorbent filter paper strips. These nobuto strips are then air-dried and analyzed later. Prior salmon sampling rarely utilized nobuto strips for blood analysis, a notable example of the novelty and ingenuity of this study. This study acts as a test run, attempting to spearhead a widespread trend of incorporating the convenience of nobuto strips in remote fieldwork. A fish's time of death, size, or injuries can thicken or reduce the volume of blood in the vein. This means prioritizing collecting whole blood samples first is crucial, as delaying that could result in lower quality and/or quantity samples. After taking blood and scale samples, we start internal organ sampling. We place parts of the heart, spleen, and posterior kidney separately within formalin and DNA buffer. Formalin, a diluted form of formaldehyde, helps preserve organ samples for histological analyses of overall cell structures. In contrast, the DNA buffer helps amplify DNA so the lab can perform PCR or Polymerase chain reaction tests, helping detect

viruses or other materials only found in trace amounts. Samples placed into DNA buffer are cut into smaller pieces to better homogenize and mix the contents for PCR testing. The entire GIT track and a portion of muscle tissue placed into whirlpaks are also collected. When collecting the GIT tract it is important to avoid removing any parasites that may be found on the stomach and Pyloric caeca. Parasites are a common occurrence within salmon, though it is still critically important to monitor and identify them. Lastly, we take a tissue sample using a biopsy punch in the muscle directly in front of the caudal fin as to be minimally invasive to the filets. It is of utmost importance to maintain sterility when sampling internal organs, so gloves must be switched between external and internal handling of salmon, all while ensuring that we only use sterile tools. After all dimensional data, scale samples, blood samples, organ samples, and tissue samples are collected, any excess blood left on the outside of the fish is cleaned off before returning to the harvester. Unless there is a concerning appearance and the fisher gives express permission, the testes and/or eggs are left in the open body cavity.

Outside of my primary duties conducting salmon health and genetic sampling, I was granted the opportunity to contribute to other projects both within and outside of AITRC. Within AITRC, I worked on the Klutina Baseline Assessment, a project focused on establishing baseline data for the Klutina River and associated streams to help show how developmental decisions could affect returning salmon. To do this, we primarily recorded water and environmental conditions. Our team monitored water temperature with HOBO water temperature loggers, while using a handheld multiparameter and turbidity meter for Ph, turbidity, and conductivity. The environmental conditions of note included stream width, embeddedness, entrenchment, and adjacent vegetation. This base analysis continually monitored water temperature using HOBO loggers, while recording all other conditions monthly. Outside of AITRC, I was invited to help the Alaska Department of Fish & Game with the Copper River Basin Anadromous Streams Catalog. This project works to find and catalog streams throughout the Copper River Watershed that anadromous fish, such as different species of salmon and pacific lamprey, may use for spawning grounds. We used backpack electro-fishing techniques to capture and record both anadromous and non-anadromous fish. The study's guidelines stipulate that we needed to find at least two anadromous fish of a single species to nominate a stream as anadromous for the catalog. Streams we surveyed ranged from very remote, only accessible via helicopter or other small aircraft, to streams inside of well-traveled campgrounds easily accessible by foot off main roadways. Additionally, the native village of Tazlina invited me to collaborate with Prince William Sound College to help educate local youth about the scientific procedures and cultural practices associated with salmon. This included teaching the anatomy, ecology, and sampling techniques involved with salmon health monitoring, while also incorporating the fileting, processing, traditional knowledge, and cultural significance of the fish.

Internship Achievements

By collecting sockeye salmon genetic samples for a collaborative project between AITRC, the Wrangell St Elias National Parks Service, and the Alaska Department of Fish and Games Gene Conservancy Lab, I contributed to the process of cataloging genetically distinct populations of salmon throughout the Copper River Watershed. Through this cataloging process, the potential of stock-specific salmon management efforts can be explored, ideally leading to more effective management efforts, thus yielding larger returning runs and increasing protection for salmon as a subsidence resource.

By collecting health samples from sockeye and chinook salmon, I helped monitor and validate these two salmon species as a healthy and bountiful subsistence resource throughout the Copper River Basin.

The samples collected will help ensure that salmon being used as a subsidence resource are both healthy for consumption and healthy in terms of continuing a thriving population for strong returns in future seasons.

My contributions to the Klutina Baseline assessment help catalog the conditions of the Klutina River and associated anadromous streams, allowing better examinations of how changing water and stream conditions could affect Klutina River salmon returns.

Through my contributions to larger projects within my organization and in collaboration with other organizations, I developed an intensive knowledge of the anatomy, ecology, management practices, and scientific practices associated with Copper River salmon. I also expanded my knowledge in the use of specific scientific equipment, such as backpack electrofishing technologies, centrifuges, HOBO temp loggers, multi-parameters, and turbidity meters. Furthermore, I was exposed to the unique methods of field sampling in remote and bear-ridden territories. The rural frontier landscape of Southcentral Alaska warranted education in the safe use of ATVs and Helicopters for transportation, as well as training in the use of bear spray, firearms, and overall bear behavior to avoid and survive grizzly and black bear encounters. In this position, I worked closely with subsidence fishers with a wide array of opinions on various management organizations, management strategies, the state of Copper River salmon as a whole, and the intricacies of different groups that use Copper River salmon as a subsistence resource. Through this, I gained valuable skills in communicating the goals of scientific projects in a way that respects the opinions and properties of the Copper River Basin community to foster future cooperation, collaboration, and understanding.

I feel my work over the summer has not only given me immense knowledge and skills specific to Copper River salmon and salmon sampling, but I also gained a set of broader skills and knowledge with relevant applications within my professional and academic career moving forward.

Discussion

Working as a fisheries technician for the Athna Intertribal Resource Commission exposed me to the nuance involved in the management and conservation of Alaska's natural resources. This also showed me the valuable role subsistence hunters and fishers can play in conservation with their invaluable traditional knowledge. Coordinating and collaborating with Subsistence fishers across the Ahtna traditional use area, I got to see how views on different management groups and strategies varied from person to person and group to group. Whether it be traveling fishermen, people of Athabascan descent, non-native Alaskan residents, or people working for management groups, everyone seems to have a resentment towards another group. Because of this resentment, properly explaining the goals of AITRC and the projects I as a fisheries technician was helping with was imperative to conflict-avoidance and resolution along with fostering future collaboration and support. Other than trying to explain what our sampling is for the hopeful outcome of the overall projects, trying to hear other people's perspectives was immeasurably important. Through listening to different people's opinions on the management of the Copper River salmon stock and why they may have reservations, I gained a thorough insight into the social attitudes toward Alaska's natural resource management. This also helped me fine-tune the way I interact with different people to ensure a high likelihood they would be willing to collaborate with us and support our work. Conducting "opportunistic" research, meaning only taking samples from animals already killed for subsistence, shone light on the valuable role citizens can play in science and conservation. Using harvested organisms provided by subsidence hunters or fishers not only means you can collect from more individual organisms than possible on your own, but it also gives you a chance to involve the public in science and explain why certain projects are important. Maintaining healthy relationships between conservation groups and the public means ensuring an increased likelihood of future community involvement.

Evaluation

My experience working as a fisheries technician has helped me achieve most if not all of my original learning objectives. I developed an intensive knowledge of salmon ecology and the associated sampling processes, while also gaining an understanding of the nuances and multiple stakeholders involved in Alaskan natural resource management and conservation. Through performing genetics and health sampling on salmon, I further learned how to maintain sterility, manage and organize important data, and hold myself to an expert level of sample quality. Outside of direct sampling work, I also gained skills using ATVs, helicopters, backpack-electro-fishing technologies, and the use of firearms and bear spray to stay safe in bear territory. Communicating and coordinating with subsistence fishers throughout the Ahtna traditional use area to collect samples exposed me to many different outlooks on the groups and strategies involved with the management of Copper River salmon. Many of the people we worked with had resentment toward either state-funded research and management groups or

resentment towards the Indigenous resource management groups. This resentment made the effective communication of our non-profits' general and project-specific goals imperative to conflict avoidance, tension resolution, and fostering future collaboration. Working so closely with subsistence hunters and fishers also showed me the important role the public can play in research, either by providing first-hand accounts of how local resources have changed or by providing already harvested resources to sample. Furthermore, working for a group focused on traditional land stewardship reinforced in me the importance of implementing traditional Indigenous knowledge into modern research and conservation techniques. Overall, I feel that the ten weeks I have spent working as a fisheries technician for the Ahtna Intertribal Resource Commission have thoroughly prepared me to finish my degree at Western Washington University and move forward into a career in ecology and conservation.

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