AN ABSTRACT OF THE FINAL REPORT OF

Mona E. Derby for the degree of Professional Science Masters in Fisheries and Wildlife Administration, Department of Fisheries and Wildlife, presented on October 8, 2018.

Title: Converting a Production Fish Hatchery to a Fisheries Research Center: Lessons Learned from a Six Decade Transition

Internship conducted at: Abernathy Fish Technology Center

1440 Abernathy Creek Road

Longview, WA 98632

Supervisor: Dr. Patricia Crandell, Center Director

Dates of Internship: February 2018—August 2018

Abstract:

The mission of federal fish hatcheries has evolved over decades under budgetary changes and new conservation regulations and policies. I evaluated the US Fish and Wildlife Service Abernathy Fisheries Technology Center, which has experienced this evolution from a production fish hatchery with research programs to a non-production, cutting edge, basic and applied research station in fisheries nutrition, conservation genetics, physiology, and ecology. After conducting an analysis of the historical record through interviews, observations, and use of archival documents, all pertaining to the bureaucratic transition and current operations, I extracted the following lessons learned:

(1) Government agency cultures are unique unto themselves and should be considered by managers as they hire and retain employees through a unit's transition;

(2) Moving a bureaucratic unit to a paperless culture potentially has many benefits, but resistance should be expected and planned for;

(3) Expect change from external forces as a unit experiences its own transitional changes;

(4) Consider establishing an institutional animal care and use committee at a transitioning fisheries research station because it increases research funding opportunities and partnerships;

(5) During bureaucratic transition, regular and frequent communication is essential, even in the absence of visible employee push-back;

(6) Leadership and staff must be knowledgeable and responsive to changing agency priorities and this is essential for a unit to endure and remain relevant;

(7) Managers should not underestimate the importance of providing a nurturing work environment, in part, because in times of rapid change, employees will be asked to move out of their comfort zone;

(8) Field units must respond to changed policy and budget priorities or that unit may be phased out.

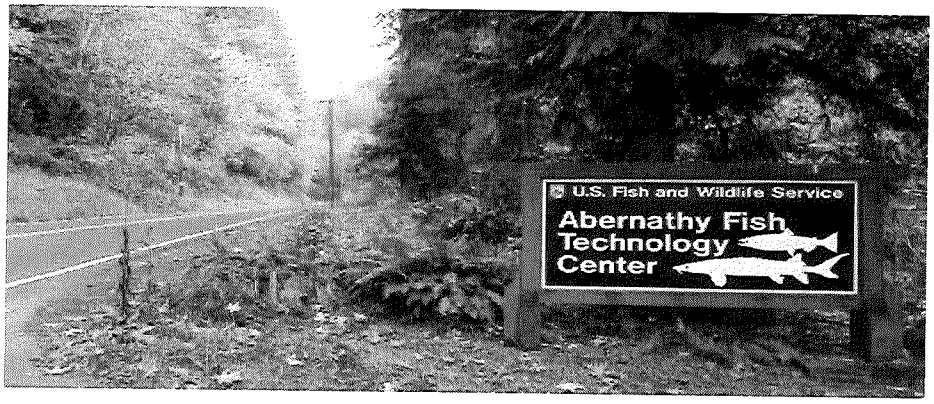
The physical and bureaucratic structures that make up a fish hatchery can persevere through budgetary constrictions and shifts in programmatic missions by shifting to a new management mission, particularly one of a fisheries research station. A hatchery can sustain operations by implementing new research focus areas that bring funding and partnership opportunities, but the transition is not easy.

Abstract Approved:

Robert T. Lackey

Major Professor Robert T. Lackey

Converting a Production Fish Hatchery to a Fisheries Research Center: Lessons Learned from a Six Decade Transition



by

Mona E. Derby

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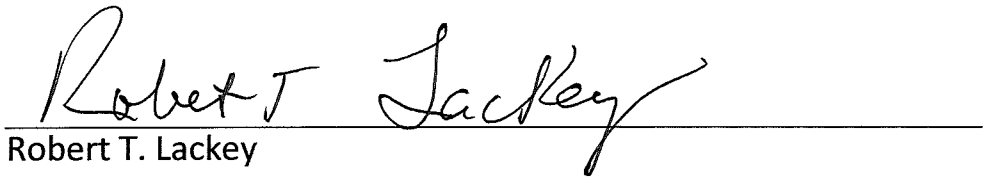

Robert T. Lackey

Major Professor, representing Department of Fisheries and Wildlife, Oregon State University

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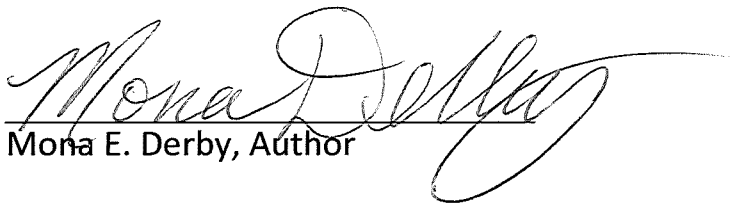

Mona E. Derby, Author

Table of Contents

Appendices

Introduction

To remain relevant and prosperous in a competitive budget environment, fish and wildlife bureaucratic units must change over time. Over the past few decades, federal fish hatcheries, for example, have often been on the budget chopping block. Some have been transferred to state agencies or closed. Given the changing budget priorities, others have made a concerted effort to reinvent themselves as a unit that serves a great need to the agency in a new role beyond production and thus have a much better chance at surviving.

My goal is to evaluate the management lessons that one of those hatcheries learned after six decades of shifting from a production hatchery and research station to solely a research station. In my internship, I observed fisheries scientists working in the completely reinvented Abernathy Fish Technology Center and have extracted practical lessons that might be useful in other bureaucratic frameworks for fisheries and wildlife managers. I saw a glimpse of the present operations of the research unit and I will present the observations I made of the unit were it exists today.

My observations of the time-tested lessons provided empirical evidence of agency operations with influences from my work experience and academic training. I earned my fisheries science undergraduate degree from Oregon State University in 2000 with an emphasis in stream and wetland ecology and restoration. I have held 14 seasonal and term employment appointments with four federal agencies, the US Forest Service, the US Geological Survey, the Bureau of Land Management, and the US Fish and Wildlife Service as a fisheries technician, a wildlife technician, a fisheries biologist, and an interpretive ranger. I have also volunteered for two decades in fisheries education and outreach roles for state agencies and non-profit organizations. I completed a year of Americorps' service as a grant writer with a national non-profit organization.

The needs of Abernathy Fish Technology Center (AFTC), and the US Fish and Wildlife Service (FWS) regional office, synthesized well with my internship projects. AFTC was already working to achieve the regional priorities set out for them. The list of possible internship projects were developed using the stations priorities and the 2018 Pacific Region Fish and Aquatic Conservation Priorities from the FWS (Appendix E). My internship duties are very different than my duties as a field-going fisheries and wildlife biologist; I have never worked in a hatchery, a laboratory setting, or in an administrative role outside of academic and volunteer opportunities. I was interested in learning how fisheries research conducted at AFTC fit into my past work experience with the FWS as a biologist working in fisheries ecology.

On a broad scale, the FWS mission is to "work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people (FWS, 2018)." Within this mission, seven FTC's provide leadership in aquatic resource management through the development of new concepts and techniques to solve specific and practical problems in aquatic restoration and recovery activities across the country. Abernathy has three research focuses: (1) Quantitative Ecology and Technology; (2) Nutrition and Physiology; and (3) Conservation Genetics (FWS, 2018).

The work I have completed here indirectly meets these missions through administrative support of the research programs at AFTC that serve the public and fisheries science community. My projects include the organization of a house into offices, document storage, and meeting space, a public outreach project, forming a timeline for the research unit, laying the foundation for establishing an Institutional Animal Care and Use Committee (IACUC), and shadowing administrative personnel and other staff.

First I will discuss the formation of the timeline for Abernathy. Secondly, I will discuss the possibility of forming an IACUC for Abernathy. Lastly, I will discuss the lessons learned in detail.

I will specifically interpret how my lessons learned are valuable to a fisheries biologist for developing their career and successfully working as a manager in government fisheries unit. I will also speak to how my academic and professional experiences influence the lessons I have learned in my administrative internship experience at AFTC. The progression of six decades in the conversion of AFTC from a production hatchery to research station has led to a cultural shift; the lessons learned are insightful to a cultural progression that I observed the outcome of during my brief internship. I do know that the positive lessons I will share have been vetted with time and application at AFTC, which remains an emergent leader in its areas of fisheries research.

History and Timeline for Abernathy Fish Technology Center

AFTC was originally built as a salmon production hatchery in 1958-1959. The first season of salmon production as a National Fish Hatchery (NFH) was the last season of Abernathy as a NFH. That was in 1960. The property has remained under FWS ownership as a research facility that did have a salmon production program until 1997. A genetics laboratory and office space was built in 2002 with an additional office building and an ecology and wet lab were added in 2005.

My internship coordinator, Dr. Patricia Crandell, gave me a packet of historical documents pertaining to AFTC. The agency correspondence, land surveys, and scientific reports are from the 1950's and 1960. Dr. Crandell hoped I could use the documents and she told me, to paraphrase, that she found them interesting with the staffing data, pay rates, and the cost of

the land from the 1950's as compared to now. I read the documents, more than once. I did not know how to organize the information in a way that would be accessible and approachable to not only interested staff, but other FWS employees and the public.

I used an organic approach in my methodology in completing this project. After I came up with the timeline concept, I was struggling with how I could refine the information down into succinct enough phrasing to be presented across the timeline. I was able to chart Abernathy's history as a research "unit" across Washington State from Leavenworth, to Entiat, to Abernathy near Longview, Washington. I was able to draw a parallel between the changing scope and mission of the Mitchell Act and that of AFTC's (Harrison, 2018) mission as I traced the events.

Do other Fish Tech Center's across the country have such long roots or is this unique to the Pacific Northwest. Is it because of the salmon fishery? Is it because of fisheries scientist Roger Burrow's pioneering work in fish hatchery science in the 1940's and 50's? These questions and insights developed from researching the historical documents I was given, and found, for the timeline.

I also relied on staff interviews in conducting my research. First, I spoke with John Holmes, a hatchery biologist who has been at AFTC since the 1980's, about the last production runs of fall chinook to be raised at AFTC. We had a good talk about the decrease of Mitchell Act funding being the impetus for the change to no production at the facility in the 1990's. Then I spoke with James Barron, a fish biologist with nutrition and physiology, Rachel Headley, a fisheries technician for nutrition and physiology, and Dr. Ann Gannam, the Regional Fisheries Nutritionist, about the types of aquatic animals they have worked with in projects here at AFTC, to reflect the change of the center's name from a Salmon Center to a Fish Center. I spoke with a group of geneticists about fish they have worked with in their research and when the genetics program began. What a little question to ask. It is the regional conservation genetics lab covering the west coast and south west for fisheries and even plants. I asked deeper questions of Christian Smith and Matt Smith. Christian is the Regional Conservation Geneticist and Matt is a Conservation Geneticist. They told me the fish they had worked with that are listed under the Endangered Species Act and are in the news as the fish I should list in the timeline, as they are some of the most pivotal work, they feel, they have been involved in.

I added a citation at the end of the timeline stating that the information all came from historical documents that are housed here at AFTC. This was the best and most concise statement to place on the timeline. After further discussion with my mentor about where the information came from for the timeline, she recommended that I cite the documents that I used in constructing the research.

She is correct that I should properly cite my sources on the web page. I researched how to properly cite archival sources by using the Library of Congress, the Purdue Online Writing Lab, and the guidance of Professor Stefanie Buck, the OSU E-Campus Librarian. The plan is to make the citations "live-links" to the documents so they are digitally available to the public. I used a scanner to upload the documents so they can be placed on the AFTC website with the timeline.

The design of the timeline and ability to download quality source documents as PDF's makes the project accessible to all people. I learned that the DOI's digital information, or webpages, must be accessible to all DOI employees and citizens with disabilities to comply with the Section 508 of the Rehabilitation Act of 1973 (29 U.S.C. § 794d), the U.S. Access Board Accessibility Standards, and other Federal laws and regulations (DOI, 2018). This entails designing the text and background with a high color contrast. Making the PDF's accessible also requires that they have enough contrast of color and brightness of the page when the document is scanned to make them easily read on-screen or when printed.

From my one nebulous concept of how I would organize AFTC's historical papers into an accessible and thought-provoking story of the temporal development of fisheries science came all of this work. The amount of detailed work involved has had a positive impact on my view of historical studies, giving me a new respect and appreciation for the work involved in historical research.

How to apply this project's personal insights and professional experience to fisheries administration was not clear when I started the project. In fact, I first thought of it as an extraneous task assigned to me by my mentor as a filler-project to only follow-up on if I had free time. It turned out to be very insightful to my view of administration within a government agency, or any long-enduring organization. The AFTC Timeline I constructed is 68 years old. The FWS is 147 years old, established in 1871. The FWS grew from a fisheries agency with the addition of the Bureau of Biological Survey in 1940. Ten years later, the AFTC timeline begins in 1950. Over 68 years, the laboratory has had six names, three locations across Washington State, and shifting research focuses and missions. To say that this timeline measures the chronology of AFTC is oversimplifying the dynamism of the organization's history. At what scale is history measured? I had never questioned that concept. What unit of scale is measured? For AFTC, temporal, spatial, cultural, and scientific events could all be the measure of time.

The following two slides are the final timeline submitted for use on the AFTC website's historical page.

Timeline for AFTC Webpage

Abernathy Fish Technology Center: 80 Years of History

The Early Years

1940's: FWS Scientist Roger Burrows creates a fish culture school for hatchery managers at Leavenworth National Fish Hatchery in Leavenworth, WA. It is called the **Leavenworth Laboratory.**

1951: The Leavenworth Laboratory moves to the Entiat National Fish Hatchery in Entiat, WA. The hatchery becomes **Entiat Applied Research Laboratory** where work focuses on salmon nutrition, disease control, and improvements of hatchery methods and techniques.

1955: Washington Dept. of Fish and Game **buys 1.9 acres of Abernathy Creek land** for proposed state chinook salmon hatchery.

1956: US Fish and Wildlife Service scraps plans for a National Fish Hatchery on Germany Creek after **purchasing Abernathy Creek land for $1** from the state. Washington State Fish and Game builds larger hatcheries on the Elochoman River and Beaver Creek instead.

1957 & 1958: FWS purchases 100 more acres of Abernathy Creek land for $10,000.

1959: Construction of **Abernathy National Fish Hatchery** is completed at a cost of $300,000.

1960: The Entiat Applied Research Laboratory moves to Abernathy National Fish Hatchery, which becomes the **Abernathy Salmon Cultural Laboratory.**

1960: The **first runs** of chum, pink, and tule fall chinook salmon are released from Abernathy National Fish Hatchery.

1961: Tule fall chinook salmon continue as the single production species within the new research mission of the laboratory.

Abernathy Fish Technology Center Historical Timeline

The Abernathy Years

1960's-70's: In 1972, renamed the **Abernathy Salmon Cultural *Center*** to reflect the wider breadth of research being conducted and made available to the fisheries science community. The originator of the lab in the 1940's, Roger Burrows retires in 1970.

1980's-90's: Abernathy Salmon Culture *Technology* Center is so renamed in 1984 to signify a shift to applied research occurring in fisheries nutrition, hatchery sciences, and physiology. Last brood year of production tule fall chinook are released in early 1997 as unfed fry due to cuts in Mitchell Act funding.

2000's: In 2000, **Abernathy Fish Technology Center's** new name shows it is no longer a salmon production facility researching only salmon and trout. **Species can include:** mussels, Pacific lamprey, white sturgeon, Lost River sucker, short-nosed sucker, brine shrimp, Devil's Hole pupfish, Oregon chub, and the Olympic mud minnow.

New regional **research programs** are developed: **Conservation Genetics** begins in 2000 and a laboratory is built in 2002. **Quantitative Ecology and Technology** is established and housed in a new facility in 2005. At the same time, **Physiology** joins the longstanding **Nutrition** program.

Will the Future Catch the Past?

In 2009, the National Oceanic and Atmospheric Administration's Hatchery Scientific Review Group recommends a tule fall chinook hatchery program restart at Abernathy Fish Technology Center to seed lower Columbia River tributary streams.

Information was gathered from historical agency correspondence, land surveys, and scientific reports, housed at Abernathy Fish Technology Center.

AFTC Timeline Bibliography (Sources Listed in Chronological Order)

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3) Burrows, Roger E., Memorandum to Director (name unknown), FWS, Branch of Fishery Biology, Washington DC. "Eniat Transfer." 4 December 1950. Roger Burrows Papers, Middle house—Ann's Room, historic file cabinet, "Transfer Files" drawer, file name: Program 1950. 1950-1970.
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12) Department of the Interior, USFWS, Bureau of Sport Fisheries and Wildlife. "Annual Report, Calendar Year 1960." 20 January 1961. Pages 1-14. Abernathy National Fish Hatchery, Longview, WA. Edward B. Horn, hatchery manager.
13) "Existing Facilities" form as taken from Abernathy SCTC Station Development Plan—1985, Pg 12.
14) GSA Standard Form 30. "Amendment of Solicitation/Modification of Contract" 10/31/2002. Final contract on AFTC genetics lab construction costs.
15) GSA Standard Form 30. "Amendment of Solicitation/Modification of Contract" 05/03/2005; 09/12/2005. Final contract on AFTC physiology lab construction costs.

Formation of a working Institutional Animal Care and Use Committee at AFTC

The USFWS and AFTC do not have an Institutional Animal Care and Use Committee (IACUC) agreement. Some AFTC scientists feel this is detrimental to their ability to compete for research funding and peer reviewed publication opportunities. Specifically, this can bring funding for new basic research from AFTC's Nutrition and Physiology departments as it currently has a majority of duties in applied research. The Genetics and Ecology departments do not need to be covered under the IACUC. The Genetics lab uses tissue samples collected by partnering entities such as the AFTC's Nutrition department, federal and state government agencies, FWS field offices, tribal agencies, universities, non-profit organizations, and industry. Field work with wild animals, conducted by Ecology staff, must follow a separate set of guidelines under an IACUC than that required in the laboratory animal use guidelines. Currently there are no IACUC's in place for any fish or wildlife studies conducted by FWS staff on refuges, at federal hatcheries, or five out of the six national fish tech centers.

Federal research grants from the following agencies require a working IACUC: Centers for Disease Control and Prevention, National Institutes for Health (NIH), the Food and Drug Administration, the Department of Defense, the United States Department of Agriculture—Agricultural Research Service (USDA-ARS), and the National Science Foundation. Many universities also require an established IACUC before partnering and funding research with AFTC. Many peer reviewed journals also require an IACUC to publish work from institutions researching animals.

This month long project was not included in my internship proposal, yet it came about because I was organizing the house. I was clearing out a desk and small file cabinet with a station scientist. Dr. Gannam helped me determine what documents needed shredded and what

documents could be recycled or kept as this was the desk of one of her past employees. One file was simply labeled "IACUC." I asked what that acronym stood for as I didn't recognize it from the government alphabet soup I am accustomed to reading. I received a near visceral response from Dr. Gannam about how that was a file from 2011 or 2012...It was a mess and never happened, so AFTC still doesn't have one. So, I pressed a little more to find out what an IACUC was and why AFTC needed one so badly. It clicked. I had one lesson about IACUC's in my science ethics course.

A week later, I learned more about AFTC's IACUC story by speaking with staff members as we drove from a conference at the regional office in Portland. I went on to speak with scientists around the station to learn more before taking this to my mentor.

I found that staff had attempted to formulate an agreement in the past for only AFTC, but it was taken up by the regional office, who sent it on to the national office in Washington D.C. The national office said the FWS could not make a blanket agreement for the agency. Nothing happened after that announcement, either locally or regionally. Currently, "Guidelines for the Use of Fishes in Research" (American Fisheries Society, 2014) is the animal care agreement being followed. This agreement requires no oversight by a committee and or a veterinarian, so it is thought to be not nearly as stringent as it could be by government and educational institutions.

I asked staff if any of the six other FTC's had IACUC agreements or did they follow the AFS guidelines as well. They only knew that the Bozeman FTC works under the umbrella of Montana State University's IACUC agreement. (Incidentally, a Bozeman FTC FWS scientist is an advisor for the 2014 AFS guidelines.) I found that nearby Washington State University—Vancouver has an Office of Graduate Research with an IACUC in place. Why couldn't AFTC be served by this same committee? I spoke with Dr. Gannam, the scientist that I initially spoke with about this lack of an IACUC, and she told me that she had asked the University of Washington, Washington State University, Oregon Health Sciences University, and even the local community college's nursing program. All of the schools refused to share their IACUC under concerns of liability and the possibility of losing their own research funding.

Further, I asked staff why they felt AFTC didn't have an IACUC in place. It was felt that "we are just set-up for production" and "production means killing animals in a not so humane way." I thought this meant Abernathy was set-up for production since it was built as a hatchery and that the physical constraints of the labs meant an IACUC would be hard to certify and follow. I was wrong. Richard told me it was the agency structure that makes it a production system for fisheries, not the physical structure of the labs. He felt that is why the request for an IACUC "went all the way up the chain" only to be abandoned. The administrative system of the agency could not support the requirements of an IACUC across its' many missions working with

animals, particularly in fisheries. Additionally, I learned, an IACUC is meant to be a local entity in scope and application.

The Animal Welfare Act of 1966 is the only federal legislation regarding the minimum acceptable standards for the care and use of animals in research, exhibition, transport, and by dealers. (USDA, 2018) Nowhere in the Code of Federal Regulations (CFR) Title 9, Chapter I, Subchapter A—Animal Welfare, §1-12 is the care for fish mentioned beyond that of fish being fed to marine mammals. If you have ever seen an animal burned by electric current that is not properly adjusted for the waters being electroshocked, you would assume that fish and amphibians possess nociceptors. An inability to feel pain is the justification for not including fish under the USDA-Animal Welfare Act Regulations (AWR's).

I argue, this is another reason it has been hard for AFTC and the FWS to establish an IACUC. CFR Title 50 covers wildlife and fisheries management, production, and harvest, but not humane research practices. There is no law dictating how fish should be cared for and treated in a research setting. The FWS has no guidelines for AFTC to utilize in establishing its IACUC. Fisheries research guidelines for the recommended care and use of fish and aquatic animals is promulgated by the AFS Guidelines. A more humane and voluntary set of guidelines has been published by the NIH's Office of Laboratory Animal Welfare's (OLAW) IACUC Guidebook built as an addition to the AFS Guidelines (OLAW, 2002).

I believe the OLAW guidelines are more humanitarian than the AFS Guidelines alone because the OLAW guidelines are strict in regards to acceptable end point options for research animals. OLAW recommends fish and amphibians be anesthetized using prolonged exposure to MS 222 to produce death as a chemical means. A physical method would be to stun the fish, via anesthesia or electric shock, followed by decapitation or pithing the brain. The OLAW recommendations are currently acceptable to all federal granting agencies as well.

The AFS Guidelines' Final Disposition of Experimental Animals allows for the cold-shock, or freezing, to stun or dispatch fish, as is common at most production hatcheries. Further, the AFS Guidelines do not address oxygen deprivation as an end point, where OLAW says these two options are not acceptable in a research setting, whether in a lab or in the field. My personal opinion is that OLAW's recommendation of double pithing by puncturing the brain and the spine, or by using decapitation, are the best end points available. This is particularly relevant when anesthesia or electroshocking are not applicable.

Determining the end point of the research animals is so important to the ethics of the research, the researchers, and the care of the animals. I asked one scientist what will happen to the animals used in his recent studies at AFTC, or their endpoint. Since he supports an IACUC being in place, his surprise at my question was of interest to me. He said the research on this fish

species is new to the station and he hadn't thought about that question. An IACUC would require asking, and answering, these questions before the research project begins.

After gathering the staff scientists' views on the matter, I felt I had enough information at this point to speak with my mentor about what I learned about AFTC having an IACUC. One scientist told me unit leaders had been planning to make an IACUC for the station. One morning, I spoke with Dr. Crandell about establishing an IACUC for AFTC. My mentor, and AFTC Director, had picked up the effort in 2016 but had not been able to fully address the matter. She gave me an NIH-OLAW IACUC text and an Animal Welfare Act text, with numerous documents on the computer network. Some of the documents are what AFTC had done in 2012 for an agreement or forms from online resources (USDA--APHIS, 2018).

I began my research by reading the Institutional Animal Care and Use Committee Guidebook (OLAW, 2002). I went on to review the proposed draft IACUC for AFTC from 2012. It did not have forms for research proposals or for committee duties such as lab inspections, study proposal forms, and yearly reporting forms. I found all of these on the National Institutes of Health web site (NIH--OLAW, 2018). I learned that after you make the IACUC, it is not necessary to register with the Office of Laboratory Animal Welfare with the NIH because they will contact any entity that applies for a grant with the NIH, FDA, CDC, or the NSF. This is called an "Assurance" document and is not needed with grants from the USDA or the DOD.

It has been a lot of study to develop an understanding of what is involved in establishing and maintaining a successful IACUC (see Appendix 2b). In this process, I have also been learning more about captive rearing of fish...something I know very little about. This is good.

In my research, I found an NIH-OLAW led IACUC course for lab administrators that was hosted by University of Oregon, Oregon State University, and Oregon Health Sciences University in Portland. I recommended it to my mentor and she has taken the course. That makes my work on the IACUC research seem all the more worthwhile. We discussed the training afterwards and she felt more confident with what she needs to do to put together an IACUC for the station, when, and why. She even felt more directed on how to partner with academic institutions first, to access federal funding through collaborative research proposals to federal funders. She also felt she more clearly understood my earlier recommendations, also.

After discussing the positive reasons for having an IACUC in place, I determined that a research unit can consider IACUC duties as grant reporting duties. My reasoning is that if the IACUC adds extra work for the Center Director and staff scientists, it will be worth it if they are able to garner new funding sources previously out of reach.

Will a new age begin for AFTC's fiscal picture through new partnerships? Will new scientific advances be made, adding to the patents already developed here? Will this bring a more competitive edge to AFTC's work? Will it move AFTC further from its' roots within a salmon producing agency? Will the agency responsible for administrating the Endangered Species Act follow the example of expecting humane treatment of, yes, even fish, used in research? AFTC may be an example of how to apply such care and consideration to fisheries research within government agencies.

This project gave me an insightful view into my past treatment of fish, amphibians, and even aquatic invertebrates while participating in fisheries research.

Lessons Learned and Conclusions

AFTC's 68 year long and continuing tenure is a testament to the efficacy of the following lessons. AFTC can be seen as a successful example of a hatchery completely transitioned to a fisheries research unit because its culture is well-established with these useful administrative mores. These lessons have been vetted by time and application. My observations of these management insights are not necessarily specific to any branch of fisheries science, but are specifically useful to successful, growing organizations like AFTC.

My methods used in compiling these lessons include empirical evidence derived from my own background with conversations, interviews, and observations made during my internship at Abernathy Fish Technology Center. I also utilized agency archival documents, library research, and current agency correspondence. I kept a daily journal to record and organize my conversations, interviews, and observations so that I could use it as a reference during my analysis of the administrative workings at AFTC into the following lessons learned.

Lesson Learned 1: Government agency cultures are unique unto them and should be considered by managers as they hire and retain employees through a unit's transition

Federal government agencies have differing cultures (Brewer, 2005, Kello, 2004). Negative aspects of one agency might also exist in another; it is just how the agency handles the issue (i.e. budgetary restrictions, staffing levels, management hierarchy) that determines how good of a fit it will be for any one employee. I had worked for the Fish and Wildlife Service (FWS) after working for the Forest Service (FS), then back to the FS. Interning with the FWS I have observed a very different feeling in the organization from that of the FS. This includes at the regional level offices, from blanket emails and Skyped meetings from national level supervisors to all employees, and day-to-day interactions with fellow employees. People are eager to learn

and happy to take on new projects. People at the FS were upset, tired, and furtive in their actions. Nearly 40 percent of the FS workforce is seasonal and temporary, while the FWS has 87 percent permanent employees (US Office of Personal Management, 2018).

Does this level of permanent employment have something to do with the positive FWS culture that I observed in my internship? Is there a connection between the security of workforce's job appointments and overall work satisfaction (Pitts, 2009). I would advise managers to try to find ways to hire term and permanent employees to satisfy employees and to maintain consistency in program development and retain the accumulated human capital from the investment in hiring, training, and on-the-job experience of long-term employees. Momentum can be drawn from this consistency in human capital as employees "buy-in" to the mission of the research center's program development even as production employees find new duties as a part of the research programs' goals. While this might not hold true for all production employees, some have left AFTC to take positions at production hatcheries where they could find greater job satisfaction.

I looked at the Best Places to work Agency Rankings (Partnership for Public Service, 2018). According to the website, "overall rankings are determined by the Best Places to Work index score, which measures employee engagement" with their answers to the following questions:

- I recommend my organization as a good place to work. (Q. 40)
- Considering everything, how satisfied are you with your job? (Q. 69)
- Considering everything, how satisfied are you with your organization? (Q. 71)

The website explains how the ranking is derived from an index score, "using a proprietary weighted formula that looks at responses to the three different questions in the U.S. Office of Personnel Management's 2017 Federal Employee Viewpoint Survey. The more the question predicts intent to remain, the higher the weighting."

I was surprised to find the rankings mirror the feelings I have about working and interning at the different agencies. First, the FS and the BLM tied for the same ranking at 252 out of 339 agencies. This places them below the median ranking in the 25-50th percentile. Secondly, the USGS ranked 104 and the FWS ranked 107 out of 339, placing them both in the top of the 50-75 percentile range, or above the median.

I agree with these rankings based on my experience working for all four agencies. I could be partial because I identify with the FWS mission and long history in fisheries management, research, and regulation. It could be the high standards set out for me to achieve in my past work and in my internship that make me feel this way about the FWS, too.

A lot is expected from FWS employees to keep a high caliber in their work, from publishing to training to collaborating with other agencies, industry, and universities. They all travel so much of the time to present at conferences within and beyond the agency as well as regionally for collecting samples from hatcheries and field sites. For a top-down perspective of the agency's culture of quality science, a recent FWS newsletter opened with a letter from Greg Sheehan, the past Principal Deputy Director of the FWS (last detailed as the agency director), spoke to the strong scientific ethic of the FWS (FWS, 2018). Specifically, he wrote "...science remains, and will remain, a cornerstone of the Service." Sheehan goes on to support that this culture can endure by using "scientific and scholarly information that the Service considers...accessible, robust, of the highest quality, and the result of the rigorous scientific and scholarly processes."

One example of cultural differences among agencies can be seen through the lens of how pervasive sexual harassment has been in my experience with federal natural resources agencies. The current climate concerning sexual harassment in our society has brought much information on the issue to the fore through media, workplace trainings, and social discourse.

Via these routes, I have come to realize the treatment I received as a female, as a woman of color, and as scientist, has not always been fair and equal in these agencies (Pitts, 2009). I knew blatant moments of mistreatment when they occurred, specifically by two different incidents with supervisors in the FS, and with fellow employees in the FS, BLM, and the USGS. I did not report any of these because I thought it was something to "tough my way through." It is the normalized and insidiously acceptable behaviors that are pervasive in the culture of an agency (Kello, 2004). The FS has seen controversy due to these issues in recent decades and most recently with the 2018 resignation of the FS Chief for his own misdeeds (Flock, 2018).

For 20 years, I was unable to pinpoint why I felt more at ease with the FWS as a refuge volunteer in college, later a fisheries biologist, and now an intern. It is my proposal that the scientific mission of this agency brings higher expectations for quality work, making for a quality workplace (Feuer, 2002). I feel administrative leadership in any unit must set the tone and example of appropriate behavior. They must also make employees feel at ease with discussing any inappropriate behavior they have encountered. This is purely my empirical view.

I postulate that the other fish and wildlife agencies I have been employed by would have a safer, more supportive, and more professional workplace if an agency held their leaders, from the highest appointees to entry-level seasonal crew leaders, to the highest standards of ethics (Flock, 2018). As more women, people of color, people of all creeds, people who have disabilities, and people of all sexualities come to work in a unit, the station needs to realize that part of the transition to a new mission as a research station means a more diverse workforce

needs to be supported (Brewer, 2005). Treating all people as human beings first, and not a gender or a disability, allows employees to find job satisfaction and for employers to retain the most qualified talent.

In my internship, I have learned that my mentors walk a fine line as administrative leaders of the scientists here on station. They endeavor to keep the scientists they supervise and the administrators above them both satisfied in their work, as witnessed in the agency rankings. A satisfied, supported employee often has a positive, enthusiastic attitude, with an eagerness to learn; this is very important in an innovative environment that is transitioning to new ways of doing things (Brewer, 2005).

Lesson Learned 2: Moving a bureaucratic unit to a paperless culture potentially has many benefits, but resistance should be expected and planned for

As a part of my internship I learned about diplomacy and respect when working with fellow employees on projects. Moving to a paperless office is done with diplomacy, patience, and investing in the proper digital technology (Citrome, 2008). The move from paper to digital has come slowly and haphazardly to many bureaucracies, including the federal government. I saw this at the FS and now I am working on it directly in my daily internship duties with the FWS. This has been hard on some employees while easier for others. It has been hard for some because they are comfortable with their current routines and others are less accustomed to computer work as a part of their more labor intensive positions; both groups have had a harder time adjusting to a fully digital work environment. I have felt like a diplomat working with longtime employees as we sort and discard paperwork, journals, and periodicals. Some employees eagerly disposed of older texts and journals (take them to the thrift store or recycle them) while others keep them on-site, send them to agency archives, or take them home.

My internship mentor seems very enthusiastic about keeping a paperless office. To support this effort, the agency or the work site might offer introductory computer courses to help those who are having a harder time adapting to computer use as a part of their everyday duties. A manager might ask all hatchery technicians to attend an online training course like those found in the Department of Interior's DOI Learn or find one at a local community college or the state extension agency as a form of continuing education. They may also offer to find employees help in organizing their office and lab space as they move to a paperless office; often people resist change because they don't know where to begin so physical help and guidance could be the needed catalyst.

At AFTC, my mentor works with program leaders to develop their programs into functioning paperless entities. I know this because she offered me, and my computer filing skills, to assist a program supervisor in reorganizing his files in the network database. I checked in with him and he showed me his very clean and tidy desk as proof that he had organized his paper and digital files. He was pleased to have cleared the stacks of paper from his desk. He needed direction in using the computer skills he already had to embrace the move away from paper after working for the FWS for 30 years.

I learned how technology can be useful in keeping a paperless office. For example, each staff member who has a purchasing credit card for the agency has an efficient scanner at their workspace capable of double sided scanning. The idea is to allow the scanning of all bills, receipts, purchase orders, and packing slips needed by the procurement staff to reconcile credit card accounts to be digitally accessible and storable. Previously, all of these hard copy documents had to be kept for seven years, taking up valuable storage space. Accessing these documents would be time consuming as well. This was particularly troublesome for AFTC as its storage areas are in the basements of the two houses used for office space. There have been records and documents lost to basement flooding and general dampness over the years. Other paper files that are no longer stored in the basement are the personnel files. They are all scanned and digitally stored. They can be easily accessed by employees or supervisors online through the Department of Interior's human resources office.

The researcher that I helped in organizing her document room in one of the center's houses values the physicality of journals, documents, data, and contracts among other types of papers. When I came to understand why my internship mentor had given her an entire room to store her papers, I wasn't as quick to push for recycling or giving away her papers. She doesn't need to work with paper; she needs to have access to any references that are not accessible online. She is keeping reference materials that can now be easily accessed in an organized way. Hopefully after my work in sorting and shelving the journals and periodicals, she can access materials that the FWS cannot easily access through online academic databases. This room also includes a file cabinet of archival documents that helped me chart the heritage of the research station; setting aside a safe and secure location to store hard copy documents will allow for future generations to access archival documents regardless of the technology used today and in the future to store documents.

I also learned that clutter is a safety issue if it is allowed to get out of hand. As taken from the Center's Safety Plan section on Fire Safety, "Housekeeping shall be maintained to a standard where combustible materials, trash, etc., are not permitted to become a significant fire hazard. All exits shall be maintained with clear access." While no exits where blocked, combustible

materials where excessive and in large stacks. The house is now up-to-date with the Safety Plan's Fire Safety concerns.

Going paperless is not an easy transition for all employees, but it can be done with strong leadership to guide staff with education and understanding. It can be worthwhile due to the advantages in the increased storage and accessibility for records of all kinds. It is also conserves natural resources and saves money spent on paper, printers and copiers. There is increased physical space and cleaner offices, labs, and public spaces, also. The downside is that archival, paper documents will not be easily accessible; digital documentation will need to be saved and well organized to be accessed decades later via new types of technology.

Lesson Learned 3:
Expect change from external forces as a unit experiences its own transitional changes

One administration after another often guarantees change will come to an organization. The "new administration," at the local, supervisory level, brings new ideas, new ways of doing things; what about at the executive level of the federal government? After working through many changes in presidential administration, how are these changes relevant and respected by employees? One should always expect to take new policies seriously under a new administration.

US government generally changes leadership every 4 to 8 years, bringing policy change that can be very difficult for federal employees to adapt to at times. Federal employees stay working to keep government agencies operational no matter who is in office. "It is the nearly complete turnover in senior political leadership that necessitates significant planning by each agency to ensure a secure and efficient transfer of power," according to the Center for Presidential Transition (Partnership for Public Service, 2018). There is an Agency Transition Directors Council that brings representatives from both candidates to the council during the lead up to an election, so that either candidate's administration will be prepared for the transition. The council operates to support the president in bringing a smooth transition "to facilitate an efficient transfer of power to a successor President." This process is in place under public law 114-136, The Presidential Transition Act of 1963, now called The "Edward 'Ted' Kaufman and Michael Leavitt Presidential Transitions Improvements Act of 2015." A particularly pertinent change felt by senior level officials in most agencies as the new administration brings in its appointees, from cabinet level positions to agency leaders (Partnership for Public Service, 2018).

From my own experience, and that of Dr. Crandell and Assistant Deputy Director Gordon in interviews, we have all learned a few trends repeat with each administration. There are extended hiring freezes, extreme shortages or oddly placed surpluses in budgets, no operating budget for months into a new fiscal year, and depending on the administration's relationship with the house and senate, government shutdowns can occur because there is no current budget. We know these dynamics are cyclic, leaving us all less frustrated because part of the cycle tends to be a loosening of new restrictions and regulations as an administration settles in. I try to mentally prepare to be subject to these tough trends through the first or second year of a new presidential administration.

I asked my mentor, Dr. Crandell, the AFTC Director, with 18 years of federal work experience, about trends in policy change from new presidential administrations. She agreed with me that policies changing in Washington D.C. trickle down to federal employees in major ways I have mentioned. A new occurrence is seeing all five of these trends happening at the same time. She feels restricted because she cannot fill empty positions, complete large projects, keep up with training and travel expenses for employees, or properly maintain current facilities with no purchasing power, leaving her to ask "What can I do?"

I also spoke about this issue with Judy Gordon, the Deputy Assistant Regional Director for the Pacific Region of the FWS' Fish and Aquatic Conservation Program. She agrees with Dr. Crandell's view of the most prevalent trends that occur with the change of a presidential administration. Deputy Assistant Regional Director Judy Gordon's fisheries career with the federal government is over 34 years long, beginning in 1984 under President Reagan's administration. She feels changes with each administration are expected, but this current administration is different from any other she has experienced. Assistant Regional Director Gordon told me about different types of change to give context. The change she sees now is "extreme change coupled with constant change." Assistant Regional Director Gordon and Center Director Dr. Crandell both feel that one type of change at a time is expected, but did not expect two such challenging types of change. They are trying to work within the bureaucracy to maintain their programs and hoping the pace of new regulations placed on the agency will slow down in time.

Their views lead me to believe that I may have been too complacent in my analysis of the trends I thought to expect with new presidential administrations and how those trends play out in a predictable cycle. From what Assistant Regional Director Gordon and Center Director Dr. Crandell shared, they too, were prepared for past trends to cycle through; they were not prepared for the constant change with extreme change, meaning shorter, less predictable trends.

The hatchery unit in transition experiences internal change at the local site level. It is the "rate of change in the external situation," that of the agency or department, that doesn't match this local level change (Burns, 1962) as discussed in Burns and Stalker's seminal work "The Management of Innovation." In the case study of AFTC, the current level of external change surpasses the rate of unit level and regional level change, leaving both managers overwhelmed.

The fisheries managers are unable to reconcile these disperate rates of change because their units exist in the federal government, and the agency's, rigid, heirarchical bureaucratic framework. A formal bureaucratic framework functions well under stable conditions not frequently changing conditions, "which give rise constantly to fresh problems and unforeseen requirements for action which cannot be broken down or distributed automatically arising from the functional roles defined within a hierarchic structure." (Burns, 1962) Recent organizational theories call for a hybrid of rigid, mechanistic and looser, organic structures to allow for scientific innovation in both product development and servic delivery, the two things AFTC's labs do in their research (Calantone, 2010, Sine, 2006).

Further, Burns and Stalker refer to Miller's insight into how a production environment is fit for a formal bureaucratic framework:

'Although formal organization is designed to subject production to logical planning, things never seem to go "according to plan." This is evidenced by the many "problems" managers encounter. They find that no matter how carefully they organize, despite the concern in anticipating problems, unanticipated ones always arise. For these eventualities formal organization offers little guidance because it is created as a guidepost for the routine, the typical, and the foreseeable.' (Miller, 1951)

Transitioning a production hatchery to a research station does require immense change, yet over six decades one can plan and anticipate the consequences of small, incremental change. My lesson learned about larger magnitude, constant change is that none of the five regional level supervisors I spoke with in the fisheries program, have an answer for how to handle so much change at once while successfully leading their program. Each manager claims they just pick and choose what they can and can't accomplish while moving forward with the program mission.

Dialoguing with these supervisors only brought more questions to mind: A worker is able to follow the new rules set out by the bureaucracy's changes, yet to what extent? Do you spend your day implementing new rules at a cost to your program? Do you leave the tone of the agency or program mission behind to fulfill the policy changes? Is it possible to ignore the

distraction of constant change while carrying out the science? Can you, as a manager, cut through the buzz of daily change to see the bigger picture? What do I do with permanent employees made redundant by bureaucratic changes? How can a regional administrator keep up with these changes while still directing their program scientists with how they would like their fisheries programs to develop? How well can a station director and program leaders function with less oversight from regional administrators caught in the loop of constant change?

How well an administrator handles the immense and rapid changes in budgets, priorities, and policies can set the tone for the functioning of all employees; leadership is needed and can be tested under the worst of circumstances (McNabb, 1995).

"Efficiency as an operating ideal presumes that goals are settled and that the main resources and methods for achieving them are available...Leadership goes beyond efficiency (1) when it sets the basic mission of the organization, and (2) when it creates a social organism capable of fulfilling the mission." (Selznick, 1957)

I learned we can encounter new and unknown trends with new presidential leadership. I already knew many of the trends that could inevitably occur in an agency under a newly elected presidential administration. Trying to stay open to new edicts is an effort to maintain reason. Prepare by working openly with fellow administrators, keeping politics out of your workplace if at all possible, and staying focused on the mission of the agency as set forth by a new administration's goals while keeping your unit's transition moving in the direction of its specific mission and goals.

While Assistant Regional Director Gordon continues to strongly believe in the FWS agency mission, she feels worn down more than she ever has in her career. Assistant Regional Director Gordon speaks about a number of factors coming together to add to stress from the changes in higher leadership. If no change in administration had occurred, she feels there would still be large changes coming to the FWS and the Department of Interior.

Currently, there are pronounced changes proposed for the organization of the smaller agencies within the DOI bureaucracy. This is called the DOI Reorganization. While DOI agencies often collaborate on interagency projects, they may soon be working even more closely together under these new plans.

One of these changes is the centralization of support, or core, services for the entire FWS. This has been happening in many other government agencies, academia, and industry in recent

years. The plan in the FWS is called Joint Administrative Operations (JAO). This includes IT professionals, human resources and procurement staff, and all other administrative staff that are deemed able to serve staff remotely. It is unknown where the central location will be. It is known that employees will likely stay working from their current locations in new capacities. With normal attrition, new employees will be hired to work at the centralized location. Employees, particularly in field offices, are concerned that they will not receive the same level of support services that they do now from on-site and regionally located staff.

A proposal has been made to realign the regional boundaries of all DOI agencies to overlay major watersheds (the Great Basin or the Columbia River Basin) and ecoregions. This is called the Joint Management Areas (JMA) initiative and will impact all DOI agencies, meaning that the Bureau of Reclamation (BOR), the Bureau of Land Management (BLM), and the FWS will share the same regional boundaries. Their leadership will be housed in the same regional offices with the same leaders directing three or more DOI agencies at the same time. They will be known as *Interior Regional Directors* with *Regional Directors* continuing to lead their respective agencies.

Further, there is a plan to take the National Marine Fisheries Service (NMFS), or National Oceanic and Atmospheric Administration Fisheries, under the Department of Commerce and merge it with the FWS under the Department of Interior. "This would consolidate the administration of the Endangered Species Act and Marine Mammal Protection Act into one Agency within the DOI. This merger would also combine the two Agencies' science and management capacity, resulting in more consistent federal fisheries and wildlife policy and improved service to the public, particularly on infrastructure permitting," according to Interior Secretary Zinke's intra-agency June 22, 2018 email update concerning the DOI Reorganization plan. I was able to discuss the NMFS/FWS merger idea with AFTC staff and the Assistant Regional Director Gordon, the Deputy Assistant Regional Director for Fisheries and Aquatic Conservation in the FWS's region one. There is a general consensus that Congress would need to approve such a change and would need to appropriate funds to facilitate the merger.

Merging two agencies could also mean merging information systems. There is a current project underway to reorganize and update the FWS public website and intranet. The main idea is to bring consistency and ease of use to internal and external users. This seems to be a serviceable plan to streamline content and allow for more workspaces for internal users to collaborate on "group discussions and shared resources." The expectation is that program and region wide news and announcements can be posted on the intranet to lessen the amount of email messages. Further it is hoped that employees will be able to find other employees based on areas of expertise to discuss work and share ideas.

The Outdoor Recreation Adoption Model, as promulgated by the Council to Advance Hunting and the Shooting Sports, is being implemented by the FWS (FWS, 2018). Specifically, the model emphasizes the 3 R's: Recruit, Retain, and Reactivate (Council to Advance Hunting and the Shooting Sports, 2018). The plan is to bring more conservation funding to state and federal agencies through increased revenue from hunting and fishing licenses and taxes on hunting and fishing equipment. The idea to fund fish and wildlife conservation through these revenues worked well through the last century, but with the decline of participation in hunting and fishing, revenues to state and federal conservation agencies has fallen (Rott, 2018). For the FWS this means an all-out effort to open all lands to fishing and hunting. The refuge system already opens a percentage of lands to fishing and hunting, in balance with specific refuge conservation needs. It is planned that hatchery properties will be more open to both hunting and fishing. Currently, hatcheries have been queried to find out how much land is available for hunting in regards to proximity to roads, waterways, and work areas. No particulars on how the program will be administered and regulated on traditionally closed hatchery grounds have been given. How this will affect a research station on a hatchery site, like AFTC, is also unknown.

Further change in information technology is affecting fiscal management at all levels of the agency. Dr. Crandell, my mentor, walked me through the budget organization of AFTC, showing me the current projects in all three research programs. She explained that funding, like the government's Mitchell Act funding, is tagged for research specific to Columbia Basin salmonid stocks. Research requests from private industry, academia, and even FWS units and NFH's must be under formal contract with AFTC to pay for the project. SAP is a new enterprise application software being used government wide, leaving agencies without a choice of whether or not to use the software. Dr. Crandell feels frustration with this new software's budget database as she can't balance or audit her annual budget because can't see the entire picture—only pieces of the budget. This new software is intended to cut down on embezzling, overspending, and any other misuse in an office's fiscal program. Only by calling a regional or headquarters office can the rest of the budget picture be estimated, yet still not entirely seen by higher fiscal officers in the FWS. This is new to the federal government as of 2017.

Again, all of these disparate plans may be needed and could be useful, but how is this going to work while the FWS is having its' core administration services downsized and centralized, its' regions being redrawn and combined with other DOI agencies missions, and merging with NMFS? With so much change, should a great and all-encompassing project like recreating the entire FWS website and intranet be a reality? Will the internet project likely be realized before any of the other proposed changes? What impacts will these departmental and agency level changes have on the transition of a local unit moving from hatchery production to a research

station? Is this external layer of change harder on a research station's scientific innovation that requires change to stay up and develop new technology and concepts?

This change comes from top leadership to be dealt with by regional and field station leaders. In those respective positions, Assistant Regional Director Gordon and Center Director Dr. Crandell told me that they shield their staff from the immense stresses that come with such proposed changes. This is because the changes may never come to fruition. The extreme amount of change means they are unable to access the latest knowledge because the newest information is already out of date or may not yet be available. That makes it even harder to help employees through the changes in the agency when administrators themselves do not always know what to expect.

This is a solemn and quiet duty that requires them to not share the things they do know as tasked with from higher-up leadership. They said that this is their main duty as administrators: letting scientists be scientists. At the same time, they feel they could not do their administrative duties if they themselves had not worked for decades as scientists, too. They understand how to direct their programs and answer the needs of their programs and staff because they worked as scientists before moving into leadership roles as administrators.

I find their insight both inspiring and daunting. I have worked for the federal government in entry level positions in fisheries and wildlife and as a forest ranger, giving me an expansive view of the changes that make it down to the program's lowest level employees. The impact of these changes in agency policy seemed immense at times when working as a "front-liner" with the public.

Lesson Learned 4: Consider establishing an institutional animal care and use committee at a transitioning fisheries research station because it increases research funding opportunities and partnerships

In speaking with the past AFTC director, Judy Gordon, Deputy Assistant Regional Director of Fisheries, I learned that AFTC's research program's growth had slowed by the 1990's. Much of the work was in applied research and hatchery production into the 1990's until 2000 when the genetics lab formed. This additional research focus brought new, basic research and publication opportunities as the hatchery production had recently been phased out. The genetics program helped AFTC to grow as the genetics staff grew in number. Patents on new sampling and research techniques are attained as a part of the fisheries conservation genetics research being conducted at AFTC. As applied genetics research is carried out, findings from

standout cases are being published. Assistant Regional Director Gordon sees this research transition as pivotal to the growth and forward movement of AFTC.

If an Institutional Animal Care and Use Committee (IACUC) is established for AFTC, I feel that will be a part of AFTC growing it's research funding base, publication options that require an active IACUC, and establishing new research partnerships with organizations that require an IACUC with their collaborators. It could open Nutrition and Physiology to funding opportunities for more basic research and publication. An IACUC will also bring an institutionalized cultural shift to AFTC's programs it will cover; a more humane view than what is traditionally found in a hatchery setting. Humane animal treatment will be the official and standard operating procedure. This will bring staff, and the station, into a new section of the organization's transition to a full-fledged research station.

I hope this will allow AFTC to bring forward movement to fisheries science research as an example to other stations transitioning to a research based mission. Few fisheries and aquatic invertebrate animal research stations in the US have IACUC's in place, but they might begin to with proper examples to follow. I hope AFTC can share the process with other fisheries partners pursuing IACUC's for use in their research programs to increase humane animal treatment in research, develop new funding sources, increase publication opportunities, and improve collaborative efforts with fellow research units.

Lesson Learned 5: During bureaucratic transition, regular and frequent communication is essential, even in the absence of visible employee push-back.

Regular and understandable communication with all staff is essential if an organization is to undergo a major bureaucratic transformation. My professional mentor sends out a weekly "Abernathy Highlights" summary of the goings-on at the FTC. I look forward to reading this because I get to learn about all the things being worked on and accomplished. It gives credit to staff by telling about their efforts. It brings cohesion to Center employees by imparting feelings of "WE" are getting things done. It also makes me feel like Dr. Crandell, my mentor and the Center Director and Roger Root, my co-mentor and the Center Deputy Director, know what their employees are working on and accomplishing. It is a good feeling to have management positively involved on a regular basis. I can also have a conversation with researchers about what they are working on because I read about it in the highlights; otherwise I would really have no idea what work is happening.

This newsletter is organized to highlight station happenings according to the 2018 Pacific Region FAC Program Priorities five main headings. This works well because it shows a clear application of the FWS regional fisheries priorities in AFTC's work. The organizational structure

also shows a positive valuation of the staff through their commitment and outputs in achieving the FAC regional priorities. Partners and intra-agency readers get a sense of how AFTC's work fulfils the regional priorities, over a wide range of activities, giving a regional context to the newsletter.

A larger, bi-monthly newsletter is published and widely distributed throughout the region's fisheries stations and offices. It shares articles written by AFTC staff. Each of the three program areas reports about their work. Public outreach and education opportunities staffed by employees are listed. Any professional meetings, conferences, and trainings are detailed along with all publications and reports produced. This is coordinated and published by the office assistant. Widely sharing this newsletter tells an audience of possible collaborators what services AFTC can provide to them as a fisheries research facility.

The lesson I learned is that both publications are widely shared throughout the agency and its' partners, explaining what assistance AFTC staff and research programs can offer the fisheries community at large: hatcheries, land managers, and the wide breadth of fisheries researchers in the west. For the station itself, I feel the newsletters provide: open communication to inform all staff of each other's efforts, keeps staff up-to-date, and gives a feeling of cohesion to the shared mission of the unit's staff, both hatchery production staff and research staff together.

Regular, clear communication allows for the recognition of staff achievements in a timely, if humble, manner. I have confidence speaking with the public about the mission of the Center because I am more informed through the weekly Abernathy Highlights. I know about the types of research being conducted, the kinds and amount of animals being worked with, project duration, and by which staff members.

Lesson Learned 6: Leadership and staff must be knowledgeable and responsive to changing budget priorities and this is essential for a unit to endure and remain relevant

The changes seen in the Abernathy Fish Technology Center, since its' inception as Leavenworth Laboratory in the late 1940's, follow the major changes in the Mitchell Act's mission and funding from mitigation of Grand Coulee Dam's Construction. There is a parallel between the shifting focus of the Act's funding priorities and where and how AFTC has functioned over 8 decades. An entire historical study could be written on the impacts of Mitchell Act funding on the Columbia Basin's national fish hatcheries alone. This is a simplified observation of Harrison's summary of the Mitchell Act (Harrison, 2018). I am sure that large policy changes were at play when the AFTC moved locations throughout its history. In my internship, I found

documents that showed the two moves of the lab coincided, to the year, with amendments to the Mitchell Act (Public Law 75-502).

I learned that much of the funding for salmonid research and conservation in the Columbia River Basin comes from Mitchell Act funding. It is also intended to produce salmon and trout for recreational and industrial harvest. It is important legislation worth knowing the history of and keeping abreast of ongoing amendments to the Act as it directly impacts AFTC funding.

As I learned about the Mitchell Act, I was compiling historical documents to write AFTC's timeline as I referred to in Lesson Six. I noted that lab's inception and two subsequent moves coincided with amendments to the Act. For example, in 1948, the US Army Corps of Engineers recommended $20 million in Mitchell Act funds for the development of fish ladders, irrigation screens, and fish hatcheries in the lower reach of the Columbia River below Bonneville Dam (Harrison, 2018). This could be a direct result of the AFTC's original scientist's fisheries research at Grand Coulee Dam in the 1940's. A memorandum from Roger Burrows, Lead Fisheries Biologist, Leavenworth Laboratory, Program of fish-cultural investigations, to W.F. Carbine, FWS Chief of Inland Fisheries Section in the Washington DC Office refers to past fisheries investigations at Grand Coulee Dam (Burrows, Memorandum, 1950).

This 1948 request to increase funding on the main-stem of the river saw the move of the Leavenworth Laboratory to Entiat National Fish Hatchery in 1950 so that the lab could be closer to the Columbia River and monitor the construction of the Rocky Reach Dam, just downstream of the Entiat River and NFH (Burrows, Memorandum, 1951).

In 1956, Congress expanded the reach of Mitchell Act funding from only the Lower Columbia River to include upstream reaches towards The Dalles and into Idaho up the Snake River. This same year, the FWS scouted out watersheds near present day AFTC to build a NFH. Four years later, the Entiat Lab would move to Abernathy Creek NFH.

The amendments increasing funding to geographic areas could be the cause for the labs movements. They may also be coincidental to the lab's changes, in regards to the dynamics of fisheries science and technology through time. I can see the tide of scientific history, policy priorities, and money flowing with the lab's movement up and back along the Columbia River.

The lesson learned is that change can take a long time, in human years, but may be the best for the resource. While there may be growing pains experienced by top managers or by field scientists, as read in the 1950 documents between Carbine and Burrows, agencies must adapt to set policy changes over time.

Lesson Learned 7: Managers should not underestimate the importance of providing a nurturing work environment, in part, because in times of rapid change, employees will be asked to move out of their comfort zone.

It is with a heavy heart that I write this lesson I learned in my internship. Richard Glenn, a fish physiologist, passed away here at AFTC during his afternoon break one Thursday. He was taking a quick jog through the woods down an access road when he collapsed. Other employees then found him on the ground. The events that followed where orchestrated as well as any training could have prepared the staff. CPR and an AED were administered.

I came to AFTC Friday morning and the flag was at half-staff. My mentor met me at my car to tell me what had happened. It was such a shock and such a sad time for staff and Richard's immediate family who were all mingling in the parking lot. I went inside to my desk and tried to work.

I went to the main house where I spoke with Judy Gordon, the Assistant Regional Deputy Director for Fisheries. What happens now, from the agency perspective, from the manager's perspective? What do you do to help staff? Help Richard's family? She told me we just have to be supportive of one another and give people the space they need to grieve how they need to grieve, since we all do so differently.

The decision to call in the Critical Incident Stress Management (CISM) team to work with staff at AFTC was made by agency administrators. According to the DOI—BLM document I was given, CISM is a peer-driven stress management program that combines pre-crisis preparation, stress education and post event response to help people recover more quickly from abnormally stressful job-related incidents and trauma, collectively known as "critical incidents." Further, the document explains that "a critical incident is not defined by the incident itself; it is defined by individuals and/or an organization's reaction to what occurred."

Two FWS law enforcement officers, and CISM team members, came to spend a few days at AFTC to work with staff during this time. They had a critical incident meeting where they discussed the incident in detail, talked about grief, stress, and how to work through one's grief and stress.

I came to realize that I have not gotten over the trauma of having my housemate kidnapped while I worked for the FS. In 1997, Theresa Garcia was my housemate in FS housing in Blue River, Oregon on the Willamette National Forest. She worked as a forest recreation technician taking care of campgrounds on the ranger district. I went home to NW Oregon for the

weekend. I did not know Theresa didn't come home on Saturday evening, nor did her supervisor since there was not a "check-in, check-out" system in place. Fisheries used our district biologist's wife as our dispatcher. We would radio her at 1AM after night snorkels to tell her we were returning to the compound. No such system existed on a district wide basis. Theresa was found a week later after her kidnapper let her go. There was no debriefing of staff, no changes in check-out systems at the agency level, or an increase in partnering workers or training them to avoid such situations.

Now I understand that the FS Ranger handled this situation very poorly and did not support her staff as we struggled to make sense of the situation on our own without any agency support. I didn't understand that until I encountered this terrible event with Richard's death. I feel selfish for putting these life experiences into a management perspective or processing the event with my memories of past trauma and losses in my own life, but this is where my mind has gone as I try to make sense of the situation with Richard's sudden passing.

This insight, however, has shown me the need for strong leaders to carry forth during such times to keep the staff together. The leadership here has been working with the family on everything from organizing a FWS color guard for Richard's funeral service to assisting his wife with financial matters. All the while, these same leaders are working with the staff to find stability among their grieving and continuing to work. I am so impressed with the empathy and compassion with which the staff treats one another. I have come to understand the value and importance of a supportive, attentive, and strong administration within an agency and its' units, like AFTC.

The take-home lesson from this situation is multi-layered. Preparing staff with CPR, first aid, and AED training is necessary. Changes that have been made to the station's safety plan include: three AED's are now located across the large station for ease of access, a realization that the station's rural location means an ambulance will take 30 or more minutes to arrive instead of the 20 minutes as first stated by the fire district, and the importance of debriefing all employees after a crisis to bring about healing. The importance of positive working relationships and staff cohesion is seen in how employees have supported one another through this tragedy. Many have shared that this support has helped them grieve while staying positive in their work.

Further, the FWS has a Line of Duty Death Response Handbook that serves as a reference in preparing and responding to line-of-duty deaths within the agency (FWS, 2014). If you are an agency administrator, I would recommend knowing of your agency's documented policies should you ever need to utilize them due to the death of an employee in service.

Lesson Learned 8: Field units must respond to changed policy and budget priorities or that unit may be phased out

It is not only the tangible, physical infrastructure that plays a role in how AFTC has transformed into a research station from a production hatchery, it is the living cultural and institutional structure in which it functions (i.e. the FWS, the DOI, the federal government) that determines the most dynamics and rates of change that occur. I found I was able to understand this concept in a deeper context by researching historical correspondence from the founder of the AFTC. I developed insights into the subtleties of science operating within a bureaucracy of a large management agency of the US government, like the FWS. Across space and time, sixty-eight years, to be exact, I found one particular statement enlightening due to its not-so-subtle change over such a time span.

Firstly, I recently found an understanding of the need for the use of archival documents as a primary source of reference. Without the documentation from the historical papers I found while completing the project of cleaning, sorting, and organizing the house, I would have never found such perspective that history can provide in understanding where an entity is in the present.

In this case, it is part of the origination story of the seven Fish Technology Centers within the FWS, particularly, AFTC. Roger Burrows was a supervisory fisheries biologist with the FWS at Leavenworth National Fish Hatchery (NFH) in Leavenworth, Washington. He wrote to W.F. Carbine, the Chief of the Inland Fisheries Section of the FWS at agency headquarters in Washington D.C. on 21 April 1950 (Burrows, April 1950).

Burrows wrote:

"At present the extension service of the Leavenworth Laboratory is confined to the stations on the Grand Coulee Project. Unless prior approval is granted from the Washington Office no demonstrations of fish-cultural procedures or recommendations on disease or nutrition problems will be made to other private, State, or Federal hatcheries."

The memo was written to detail five project areas in a funding proposal to the Washington Office. The statement above is from the Education project section of the memo as the lab hoped to act as an "extension service" to provide applied research findings for fish hatchery production needs.

This statement is temporally and spatially significant because the FWS moved the Leavenworth Laboratory in 1951, and moved again in 1960 to its current location at what was Abernathy NFH. The change from a production facility to a research facility was made in the face of

agency policy that once forbade the release of research findings to even its own hatchery facilities, let alone other agencies, academia, private industry, and numerous peer reviewed journals, as AFTC does presently (Burrows, Memorandum, 1950).

Burrows 1950 statement over concerns for the research lab's capabilities to reach the wider fisheries community is very clearly addressed in the 2018 mission statements from the FWS and AFTC. I do not know when the mission of the Leavenworth Laboratory changed into one of outreach and education to service the wider fisheries community. Could it have been when the lab moved to Eniat NFH in Eniat, Washington in 1951? Or when it last moved in 1960 to Abernathy NFH on the lower Columbia River? Was this transition slow and unsteady? Was it quick and smooth? What kind of transition is it experiencing now with technological and external political changes?

From discussions with current AFTC employees, an unofficial transition from fisheries production to research is still occurring for FTC's within the FWS. While AFTC is physically located in what was a production facility, it is bureaucratically located in an agency still tasked with fisheries production. AFTC's major government funding source is allocated from the eighty year old Mitchell Act monies intended for use in salmonid production (Harrison, 2018) in the Columbia River Basin. Many of the research partners, external and internal to the agency, are from production hatcheries that work to sustain current salmon and trout runs. Other partners are concerned with population numbers as they work towards recovery of endangered and threatened stocks of both game and non-game fish outside of a hatchery setting. Both of these scenarios are reflected in the projects and types of animals used in research by all three AFTC programs: Nutrition and Physiology, Ecology and Technology, and Conservation Genetics. These ongoing extension activities of AFTC are supported in the Center's mission statement: "Within the FWS, the mission of the FTCs is to provide leadership in the scientifically based management of national fishery resources through development of new concepts and techniques to solve specific problems in aquatic restoration and recovery activities."

Further, AFTC's mission is explained in more detail as: "Abernathy FTC was built to mitigate for the impacts of Bonneville Dam on Pacific salmon. Today, Abernathy FTC has three research units: Conservation Genetics, Nutrition & Physiology, and Quantitative Ecology & Technology, that conduct applied studies and provide technical assistance and expertise to internal and external partners and stakeholders. These programs provide technical expertise to assist in conservation, mitigation, tribal trust responsibilities, restoration, and recovery efforts for fishery resources. This is accomplished through the development and evaluation of new methods, concepts, and systems, as well as the application of existing methods and concepts to emerging issues. All of Abernathy FTC's research involves collaborations with various partners:

other FWS offices and resource programs as well as various external partners (other federal agencies, state agencies, tribal governments, and non-governmental organizations)."

In my internship, I find significance in the need for publically funded scientific research, like that of AFTC, to be held to the same ethical standards of private industry and academia, and be freely available for public use (outside of patent and security concerns). I feel that this premise is central to AFTC's mission to serve the fisheries scientific community at large. Seventy years ago, Burrows, the director of AFTC, believed in the same ethic for science in public agencies, as seen in his quote above. This change in accessing scientific research for the public good is larger than any physical infrastructure changes that have come to AFTC since it moved to Abernathy Creek in 1960.

The lesson learned is that an agency's work is for the public good, the fisheries science community, and the resource itself, and this should be remembered before undertaking any endeavor taken bureaucratically, in the field, in the hatchery, or the laboratory. Sometimes the public good requires a unit to alter its budgets and priorities to fit within the needs of the larger bureaucratic framework, whether that is the agency or the federal government.

Conclusions

As a part of the laboratory fishery scientist culture, AFTC has laboratories, administrative buildings, and workshops. This tangible heritage is set in stone, like the 70 year old fish ladder in Abernathy Creek and the 59 year old hatchery buildings of AFTC (UNESCO, 2003) (Poddunykh, 2015). I was researching AFTC's "practices, representations, expressions, knowledge, and skills" that "communities recognize as a part of their cultural heritage" (Poddunykh, 2015).

Studying an individual culture, such as fisheries scientists and a sub-set of these scientists—AFTC, is an examination into the cultural diversity of the PNW's fisheries stakeholders of land managers, laboratory scientists, aquaculturists, policy makers, anglers, tribes, and industry (Poddunykh, 2015).

I realized that I am an objective visitor in the culture of AFTC as I come from another cultural sub-set of fishery scientists. I am from the land-management fisheries biologist culture. I did know I was interning with an entity whose mission is very different from my own professional

and academic background; I was surprised to find I was experiencing a new culture. My work here led me to this realization, particularly as I sorted through decades of documents in a hatchery house. I learned the history of fisheries sciences studied here: aquaculture, nutrition, physiology, and genetics. My "world-view" of fisheries has become much larger as a result of my internship at AFTC. Observing the administrative practices of the DOI and the FWS while I have been here, and with comparisons to my past work experiences, has also given me a larger view of how fisheries programs function in the federal government.

Viewing AFTC development through time gave me insight into the events and people who developed its' culture over nearly 7 decades to what it is today. I was able to physically and analytically chart the flow of time through AFTC's organizational lifespan. I did not propose to delve so deeply into the historical foundations of AFTC in my work, even with my internship project entitled: "Converting a Production Fish Hatchery to a Fisheries Research Center: Lessons Learned from a Six Decade Transition." Because of this title, my mentor gave me archival documents that attest to the founding of the hatchery and the lab. As the official FWS pamphlet says, AFTC is "Helping Meet Tomorrow's Fishery Resource Challenges Today." I thought I would be looking at the changes that have happened and that are coming to the station. I needed to look at the foundation of the organization to understand the context of the changes happening now. I didn't know the path my research would take; I have looked at elements of the past, present, and future of AFTC in context with the Pacific Region of the FWS Fisheries program, the FWS, and the DOI.

As I completed my initial project of sorting and organizing one of the hatchery houses, turned offices and public space, I found more archival documents hidden among long forgotten file cabinets. I was helping in the shift to take the office into a paperless era, yet I do value the presence of the archival paper documents. In the future, I hope the digital files left behind will tell similar stories of development and history for AFTC.

I now understand how pivotal the roots of an organization can be in determining how it will grow. I am the most satisfied with the timeline project (see Appendix 4a-c) I completed because I see it as a physical representation of the analytical work I did to understand the foundation and growth of AFTC from a small, 1940's era fisheries research team working at Grand Coulee Dam to what it is today. In tracking the growth of AFTC, I was tracking the overall growth of the culture of fisheries science in the Pacific Northwest.

Hydroelectric dams and irrigation reservoirs are discrete events in the impacts on salmon fisheries of the Columbia Basin. I argue the sum of all anthropological events impacting PNW fisheries amount to the living heritage of today's fisheries science. These impacts determine what direction new fisheries research takes to work towards society's priorities for fisheries. Support of sustained commercial fishing stocks brought about Congressional funding to found

AFTC for research to support region wide salmon production. I believe the Mitchell Act was the developing event for the timeline of AFTC.

In the analysis of my internship with the FWS-AFTC, I have found an overarching theme; an agency's history is a measure of the development of an administrative framework in which the culture of its people and mission form. I feel a bureaucratic framework and culture function in a synergistic relationship where they are dependent on one another to continue to grow. If the framework is drastically altered, the culture will change and history will attest to this shift. If the culture of the agency shifts, the bureaucratic framework will change subtly.

My mentor, Dr. Crandell, feels changing scientific and political dynamics will determine how the culture and bureaucratic framework of the FWS continues into the future. If she could chart the path, she would be hopeful that society would collaborate with science in pursuing decreased climate change impacts on animal extinctions. She is fearful that a high carbon burning civilization will continue, leading to possible mass extinctions, particularly for non-game species of fish and wildlife. Further, as our culture continues along in the digital age, Dr. Crandell feels current and future generations may not be able to find balance with digital interests and interest in natural resources conservation. If this is true, where will support for the FWS' species conservation efforts come from, she wonders. Fisheries Technology Centers, like Abernathy, play a role in fisheries conservation in a digital age facing climate change. Beyond a lack of interest in conservation, Dr. Crandell sees a trend in societal belief against some aspects of science, yet hopes Fisheries Technology Centers continue on in an applied scientific manner to support fish hatchery production and conservation.

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Appendices

Appendix A. Project 1: Organizing the House

My first project I chose from the possibilities presented to me by my mentors Dr. Patty Crandell, the Center Director and Roger Root, the Deputy Center Director, and both Supervisory Fish Biologists. I did not understand all that would be involved, yet I assumed it would be large if it was listed as a project idea. The house I was to organize is a hatchery worker's family home as AFTC was originally built as a salmon production hatchery in 1958-1959. The first season of salmon production as a National Fish Hatchery (NFH) was the last season of Abernathy as a NFH. That was in 1960. The property has remained under FWS ownership as a research facility that did have a salmon production program until 1997. (See Appendix 5) A family did live in this home until it was turned into offices in 2000.

The house has three bedrooms, one and half bathrooms, a large front room and dining room with a large fireplace and hearth, a kitchen, a large cement basement, and a conference room in what was the garage (See Appendix 6). When I arrived to begin my internship, the house organization was my first project. Dr. Crandell and I walked through the house while I took notes on the tasks that needed done. It seemed overwhelming to me that I would need to line out other staff to help me complete the project since I didn't know anyone. Thankfully, Dr. Crandell said she would call a meeting of staff that she knew I would need assistance from in completing this project. My mentor and I attended the meeting with Steve Money, Facility Operations Specialist, Alina Nestjorkina, Office Assistant, and Dr. Ann Gannam, Regional Nutritionist and a Supervisory Fish Biologist. We discussed how I would be organizing the house into a more useful and accessible area for all staff along with a room dedicated to storage of Dr. Gannam's documents and journals used by the Nutrition program. Then we walked through the house, again, as a group, designating what everyone's role would be in the project and how I could utilize their knowledge and skills to accomplish the tasks Dr. Crandell and I had found throughout the house. I felt reassured that I would be able to accomplish the large task.

Why were two family homes from 1959 turned into office space? The plan was to build a large building that could house both the administration offices and most program offices and laboratories. The plans were drawn up and proposed in the early 2000's. At the time, there was a movement in the federal government to lower overhead costs by building facilities on federally owned land instead of renting buildings. Since AFTC is not rented and all facilities are on federally owned land, the plan for a new building was scrapped. Across the grounds from the houses, a genetics laboratory and office space was built in 2002 with an additional office building and an ecology and wet lab were added in 2005.

This left visiting scientists, interns, and agency personal far from the administrative buildings and working in a large, open cubicle setting. It was decided, Dr. Crandell told me, that the middle house I was organizing would have one room for small video conference calls that could also be used for a work space, another room that could be used as a work space, and one room that would be "Ann's Room" with storage for nutrition's documents. Since this rurally located unit is a regional research station, many meetings are held via video conference in either the large conference room or in the bedroom designated as Office 2 containing a large screen monitor and two desks. While I now use one of the office spaces, Office 1, it is intended to be used by staff needing a quiet place to work in the empty house, outside of lunch time, or where they can escape from the cubicle area to practice delivering a presentation or have a private telephone call.

It was also hoped that cleaning the living area of the house would make it attractive, comfortable, and welcoming for staff and guests alike. After completing the project it has been noted that the house now seems to have an "echo." While I can understand that it is bare by comparison, it is much safer and easier to clean. Easy chairs, fresh interior paint, and wall hangings are planned for the next fiscal year.

It was a large task to accomplish the echo, because three offices had held five people and now had no people. The basement and living areas had education and outreach materials stored in cabinets, closets, and in boxes on tables and the floor. Academic journals lay in stacks under desks and on the fireplace hearth. The house had five desks in four rooms. The plan was for three desks in two rooms. Before the Ecology and Physiology building was constructed in 2005, the house had desks in the main living space to accommodate staff.

The living space had many shelves and cabinets of all shapes, sizes, and materials overflowing with piles of industry periodicals, academic journals, agency outreach pamphlets, outdated scientific text books, and even archival worthy documents mixed in among the stacks. In the middle of this chaos sits the staff lunch table, where many people meet at noon each day, using the homes kitchen facilities as well. One staff member noted that it felt as if a shelf could fall on him at any moment while he sat eating lunch at the table until one day the biggest shelf that seemed to sit in the middle of the room, was gone. I sent it away.

I labeled closet and cabinet doors so people would know the proper place to store things. Recently, for example, the easels and paper needed for a conference where nowhere to be found. They were in the other house, stashed in the closet of a new employee who had no idea they were there. Now they are all in a closet with its' labeled doors. All of the education and outreach materials are also in their own closet now. There is a large shelf holding clear plastic totes labeled with the contents. Outreach and education reference books are also stored on this shelf. All brochures for the agency are kept in a long, narrow closet that seems made-to-fit

for storing them, allowing quick and visible access. I also found separate kitchen cabinets for the vast array of coffee pots, all the disposable paper plates and cutlery, and a large bag of charcoal briquettes used at the annual summer staff barbeque. These items all floated around the living space of the house among the stacks of papers and periodicals.

Once I completed this project, my mentor paid me the highest compliment when she thanked me for how I worked with diplomacy and respect on the organization project. I learned not to push the scientist whose documents I was mostly organizing as her office had been in this building for a long time. I had to gage the amount of pressure I could place on her.

For example, I learned that I could accumulate one journal each to represent many stacks and then look up the journal in the FWS searchable databases of peer-reviewed scientific journals. I would email her the availability of the journals (years available, in which database, if full PDF's where accessible, etc.) and she would write me back. A common response was that she would check out the database and get back to me. Another was that the journals must be kept if they weren't available online. The most trying response for me was: "So are you *sure* the full PDF's are available? Going back how many years? *Are you sure?*" I learned to say that I would collect them and set them aside with the database information labeled on the stacks. After a time, I would receive an email or she would pop in my office and tell me to recycle them or store them.

Personally, I was very impressed with how at ease she was with an interloper like me coming along to sort through and discard 25 years' worth of her things. She would surprise me when I would present her with a large pile of disparate periodicals and documents by picking out only one or two to keep.

Overall, I think she just needed help sorting and finding a place for everything. She readily accepted my work as though it was helping her and thanked me as such when I finished the task. Now she has multiple, empty file cabinets and bookcases she can utilize along with the already stored files, periodicals, and journals I organized for her. My mentor was planning ahead when she thought to give her a room with empty cabinets and bookcases.

I also spoke with Judy Gordon, the Deputy Assistant Regional Director of the FWS Fish and Aquatic Conservation Program for the Pacific Region about my project. Up until two years ago, she was AFTC's Director. She was happy to see all the work being done across the station to clean up clutter. She feels that what she does in administration is people management. Keeping areas clean and safe for employees is a part of that management. She started changing the station and her past deputy, Dr. Crandell, the current Center Director has moved it forward in the physical changes.

I did wonder why the offices that had been in this house were now in other buildings; I haven't asked. Initially, I wanted to know why people had been moved out of this space. I took Dr. Crandell's word that the house was going to be used for visiting FWS employees, scientists, and students while other office space is available on the station. Months later, speaking with Dr. Crandell and Assistant Regional Director Gordon, I came to understand that I was never going to be privy to the details of another possible reason. It is a tough reason that makes sense the way Assistant Regional Director Gordon and Dr. Crandell spoke about the process of physically isolating "problem" employees. It is a tactic used to keep unhappy employees away from other employees. The old adage of "one bad apple ruins the barrel" comes to mind. It is just harder to pluck out a bad apple when one is a fully vested public employee. It is also fiscally irresponsible to do away with a competent, trained employee who happens to have a poor attitude.

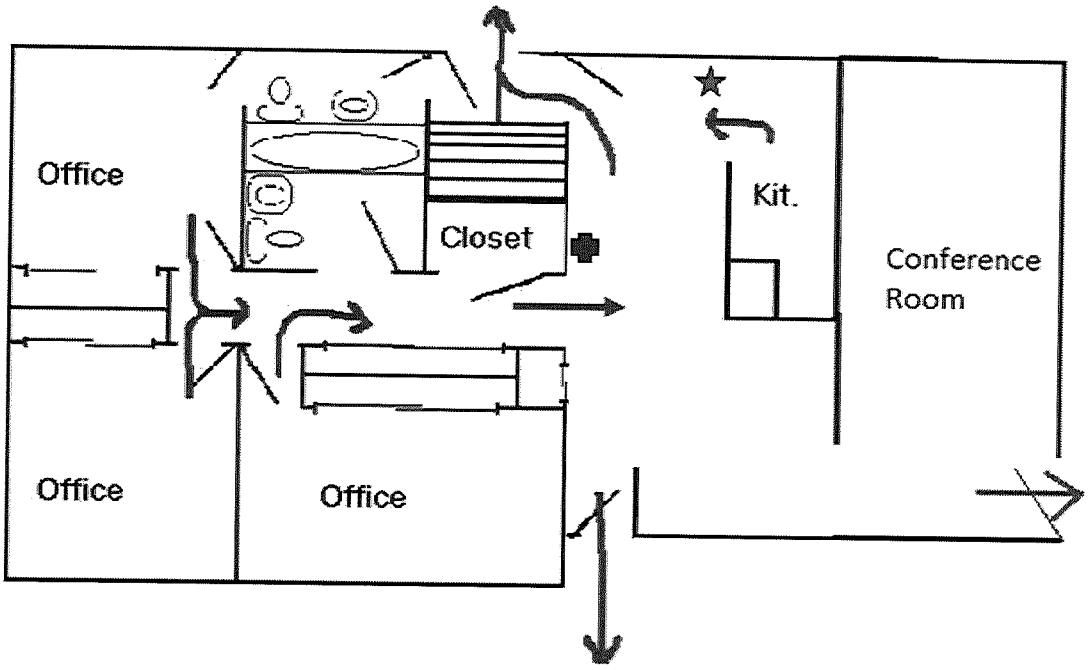
I thought about who had offices here most recently, personal dynamics I had encountered among staff, and I began to understand. I thought about the entire station and where people are situated in their offices. I understood more. I also thought about my career and where employees were physically isolated in federal offices where I had worked. I thought about where I had ever been placed. I have had my own desk and I was never off by myself. Now I know why my Dr. Crandell initially felt bad that I would be off by myself in the office I am in now. I didn't think anything untoward about the placement. I like the quiet and calm that has been sorely lacking in any FS ranger station I ever worked in.

Dr. Crandell and Assistant Regional Director Gordon did not share who these "problem" employees are and I don't want to know. I had wondered about past situations in my work when permanent employees where off by themselves, seemed genuinely unhappy, and seemed unfriendly around the office. I learned that this is one technique that can be used to maintain the cohesiveness of the program and take care of happier employees with the management tools available in civil service.

As the paper library was already dismantled before my arrival, I know that the changes were in the works across the station. This move to a paperless organization is one more measure of the dynamism of AFTC through time. Recommendations for finishing the reorganization of the middle house project include: adding a few comfortable chairs, painting the interior and hanging framed art work and photographs. My mentor, Dr. Crandell, and I agree that these two actions will add a warm and welcoming aesthetic to the public space and the individual office spaces.

House Schematic for Building Organization Project

MIDDLE OFFICE & CONFERENCE ROOM



★ **Indicates Location of a Fire Extinguisher**
✚ **Indicates Location of a First Aid Station**

Appendix B. Outreach Project 1: The Fish Wheel

I worked with Alina Nestjorkina and Dr. Gannam to think of an outreach idea that could be useful to AFTC. A paper brochure takes years to be approved through the agency and the

government printing office. An open house for the area's neighbors to come visit AFTC had been done once in the past decade and one family showed up. I was having a tough time when Alina remembered a fish migration game Dr. Gannam had shared with her. The board game is from Spain, where there aren't too many rivers, but I looked it over anyway. Alina and I brainstormed on ways we could make the fish migration game quick and accessible for use on a table top at a fair booth.

After a few days I came back with the idea that I could make a wheel for the game to be played on. The upright wheel would have wedge-shaped game pieces dictating what the steelhead trout is doing (see Appendix 3b). The player spins the wheel, as they are the steelhead, to determine if they are eaten by an otter or overwintering in a beaver pond. I made negative and positive possibilities for the steelhead to encounter on his migration back to Abernathy Fish Technology Center's holding ponds off Abernathy Creek. Reaching AFTC is the ultimate goal for the returning fish.

Due to time and cost, we opted not to have in-house facilities staff make a wheel, but instead I found one online for $60 and my Amazon purchase was approved by Roger Root, the Deputy Center Director. After the wheel arrived, I worked hard to make the game pieces for installation. I made each picture and phrase on the computer, printed them out, and pasted them onto two halves of a circle to fit on the wheel. I also made a laminated map of the lower Columbia River for players to move river rocks, as markers for their fish, as they played to reach AFTC on the map.

We took the Fish Wheel to the local Earth Day Fair on April 28, 2018. The fair was well attended by children and their families. Our booth was staffed by two AFTC—FWS employees, Dr. Gannam, the Regional Fish Nutritionist and Alina Nestjorkina, the Office Assistant, as well as myself. All three of us worked from 9:30 AM to 4 PM with a short break each. We were busy interacting with children and parents as they played on a large wooden Chinook salmon anatomy puzzle and spinning the fish wheel.

So, how did this beta test on the fish wheel game turn out? It was immediately apparent the game rules that I had written up were not clear to my coworkers. The proposed game would work well in a small group using the map and game pieces, but not in the high turnover chaos of the Earth Day Fair. Instead, my veteran, fair-going counterparts said we should offer each person three spins and then we could speak with them about the outcomes of each spin.

This worked well but for the loud live music that persisted throughout the day. I was also worried that the children's enthusiastic spinning would break the wheel. It turned out that the main washer and wing-nut need to be more secure; possibly with a locking nut. I need to research this further. Some of the game pieces didn't make sense to my counterparts either, as

I come from an ecology and stream habitat background and they are not. For example, I was telling people landslides have good and bad effects on streams, but are a needed, healthy form of input for the hardscape of river systems (GH Reeves, 1995). Initially, my counterparts were telling people landslides into rivers are bad. I included "Eating a mayfly" because that showed that an intolerant macroinvertebrate is present in the stream, so the stream should have decent water quality and available spawning gravels (AT Herlihy, 2005). That solicited sidelong glances from my counterparts, as well. The piece with the maximum jump height for steelhead being advantageous to the fish accessing cascading streams—"I don't even know why you included that piece"—was commented and I didn't counter or try to explain.

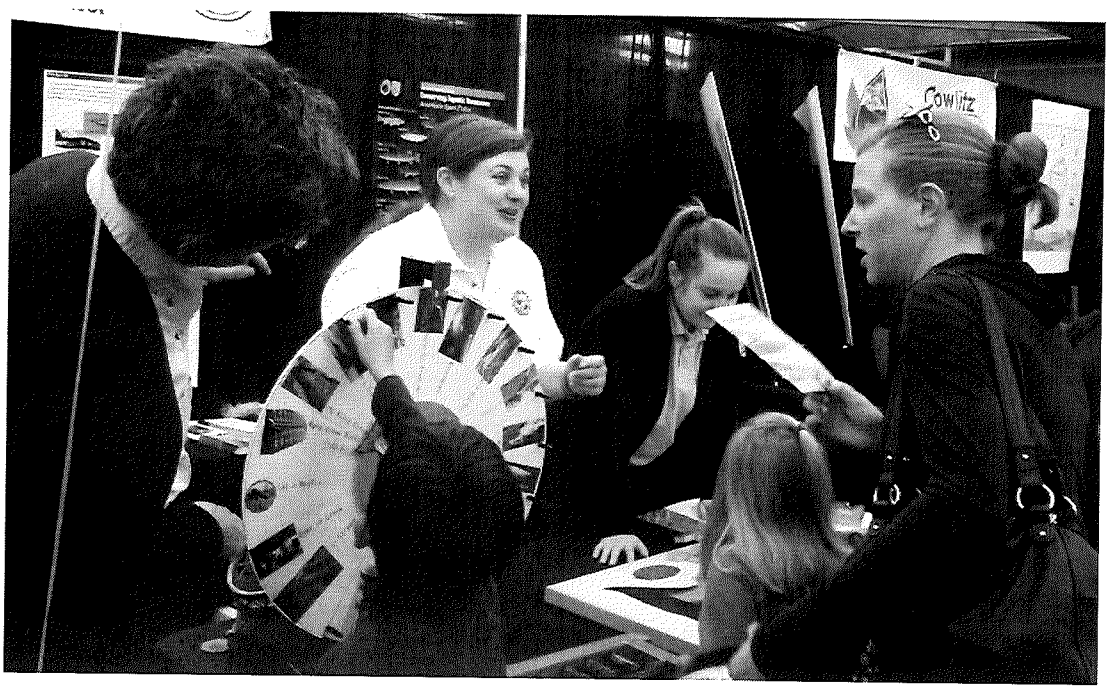
I learned that I needed to educate my coworkers on my intentions for the game and the game pieces. I didn't prepare them with the proper background information. I could have reviewed the game pieces with them first, while I was making the wheel to make sure we all understood my vision and that it made sense to all of us. I could have included pieces that they recommended, too.

In hindsight, I should have matched up my outreach project's plan with the regional fisheries overall outreach plan for 2018 (see Appendix 7). It turns out that I did pretty well fitting into the agency plan. The fish wheel game met one strategic goal to "Educate and Engage the Public and our Partners to Advance our Conservation Mission." Further, the game achieves this goal's objectives to "conduct hands-on, community-based, recreation and education programs to engage the public..." and to "use communication tools to engage and educate the public in the Service's conservation mission."

The agency's recommended communication approach to bring science to a non-scientific audience is to "flip the narrative." Provide the key points, or results, first, then tell why it's important with supporting details. This is what the wheel game is all about; land on a game piece, guess if it is good or bad for the steelhead, and then discuss why that is true and important to steelhead conservation.

Bringing an outreach project to AFTC's outreach program fulfills two needs: firstly, the 2018 FWS Regional Priorities call for expanding conservation education efforts and secondly, an unfilled outreach position exists for AFTC but has not been filled in decades due to budget restrictions. These two antithetical considerations mean that my contribution is welcome by the staff, even if I made mistakes on my first try.

Fish Wheel Game Details



(L to R) Dr. Ann Gannam, Mona Derby and Alina Nestjorkina at the Cowlitz County Earth Day Fair.

Photo Credit: Arlene Hack

List of game pieces for steelhead (Oncorhynchus mykiss) migration game:

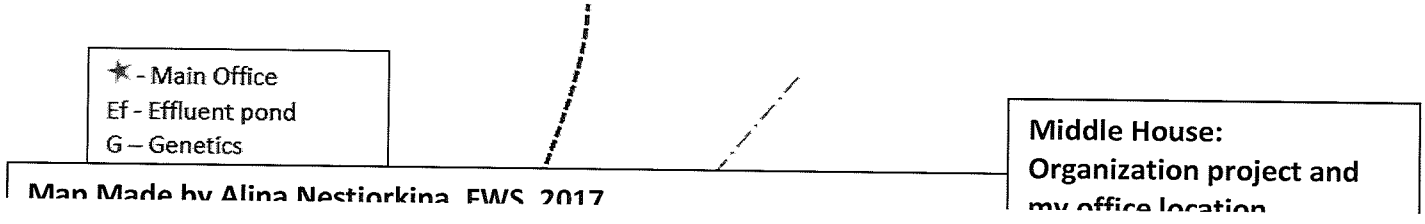
1. *Eaten by a sea lion*
2. A cool pool on a hot day
3. *Caught by a fisher girl or boy*
4. Eat a big mayfly/caddis fly/stone fly
5. Jump up a small waterfall
6. *Eaten by an otter*
7. *Drought—not enough creek water*
8. *Creek water warmer than 63.5°*
9. *Record Snowfall—flooding*
10. *Accidental pollution discharge from mill*
11. Landslide of mud, rocks, trees into creek—free spin
12. *Cows in creek*
13. Trees Planted Along Creek
14. Restore stream with logs and boulders—free spin
15. Human walking up stream
16. Clean gravel stream bottom
17. Deep pool for a Winter Home
18. Back to Abernathy Fish Tech Center

Steelhead Migration Wheel Game Rules

How to play the Migration Game:

1) Spin the Wheel three times.
2) You might land on a negative space (Cows in Creek) or a positive space (Cool Pool). You can earn a free spin, which means you get to spin again.
3) With each spin, the piece landed on is used as a question of "Good or Bad" for the steelhead fish. Briefly discuss this with the player, or child, to help them understand the situation (why a Cool Pool is a good thing on a hot day). Then let them spin again.
4) If the wheel lands on Abernathy Fish Technology Center, you are an Instant Winner.
5) The game cannot be won or lost. It is just for fun. Each player who spins three times and discussed the pieces landed on receives a small prize (temporary salmon tattoo, fish conservation rubber bracelet, salmon sticker).

Appendix C. AFTC Map



Appendix D. *FWS Region 1 Fisheries Outreach Plan FY 2018*

FY18 CRFWCO Outreach Plan

Overarching themes: Communicate Service, Fish and Aquatic Conservation Program, and Columbia River Fish and Wildlife Conservation Office's Mission, organization, accomplishments, (contrast with states and other federal organizations). Communicate benefit of USFWS science and how we apply science to natural resource management and fish and aquatic conservation.

Geographic focus: Columbia River Basin, Lower Columbia River, Oregon Coast, and Oregon-focused activities (e.g. Portland Metropolitan area, Willamette Valley, Central and Eastern/Southeastern Oregon)

FAC 2016-2020 Strategic Plan Linkage

Strategic Goals:

Goal 5: Enhance Recreational Fishing and Other Public Uses of Aquatic Resources

Goal 7: Educate and Engage the Public and our Partners to Advance our Conservation Mission

Objectives:

Goal 5. Objective 3: Increase recreational fishing and other public uses and enjoyment of aquatic resources.

Goal 7. Objective 1: Use communication tools to engage and educate the public in the Service's conservation mission. Objective 2: Conduct hands-on, community-based recreation and education programs to engage the public in outdoor recreational activities and the Service's conservation mission. Objective 3: In partnership with other federal agencies, states, tribes, and the private sector, develop and implement a comprehensive and unified national public outreach and education strategy.

Audiences: Non-scientists, tribes, state natural resource agencies, NGOs, K-12 and college students (graduate and undergraduate), other Service programs in the Pacific Region and the agency, other federal agency partners (e.g. NOAA-Fisheries, U.S. Army Corps of Engineers, U.S. Forest Service, etc.).

Universal concepts: How do we make this relevant to our audience? (e.g. food, shelter, family, clean water, etc.). Use interconnections between humans and the natural world to make relevant. Use of tools and technology to solve problems (think cutting-edge science and people's interest in tools/technology).

Communication approach: Important to communicate science and natural resource conservation effectively to non-scientific audience. This can be more effective when we 'flip the narrative'. Providing key point first (results), then why it's important and supporting details. What we/USFWS/FAC/CRFWCO do, why people should care and then explain how we do it.

Focal Areas: Oregon Zoo: connecting USFWS to people (Zoo facilities available to us. We have no visitor facilities at CRFWCO)

- One visit per month (include other CRFWCO employees and partner with other field stations)
- Aquarium in the NEST hopefully fall and then again in winter (partnering with Cheri Anderson, Leah Schrodt and possibly others)

K-12 connection

- Salmon in the Classroom (continue to revise curriculum to meet grade-age)
- Career Days (Local high schools)
- Zoo Camps (provide expert perspective, highlight technology used by professionals, introduction to the profession)
- Watershed Congress (Clark county area school event held at WSU-Vancouver)
- Pacific lamprey conservation /Lamprey in the Classroom (technical assistance and curriculum development support)
- Aquatic Invasive Species education trunk

Events (possible attendance)

- Watershed Congress
- Celebration of Wild Steelhead (Every September)
- World Fish Migration Day 2018 (WFMD is a bi-annual, one day event).
- Sturgeon Festival

Website

- Maintain and update content, user interface
- Rotating features (will include highlight descriptions of select reports and projects to reach non-scientists)
- Rotating Highlights (will elaborate on select events, employee accomplishments written to reach non-scientists)
- Reports and Publications (continuing our legacy of easy access to our products)

Social Media

- CRFWCO Facebook page
- Pacific Region Tumblr Blog
- USFWS Pacific Region, national FAC Facebook pages (work with RO FAC, External Affairs FAC Public Affairs Officer, national FAC Facebook page coordinate to encourage 'shares' of CRFWCO-generated FB and/or web content)

CRFWCO Written Content, Announcements (*when opportunities exist to feature CRFWCO staff and program achievements*)

- Fact sheets, briefing papers, brochures (likely electronic based)
- Quarterly National FAC Conservation Education Newsletter
- The Zone/People One/Program One
- Pacific Region FAC Program Annual Highlights Report (work with RO to showcase at least one CRFWCO-focused accomplishment
- Other Blogs: AFS's 'The Fisheries Blog;' national USFWS 'Open Spaces' Blog (if opportunities exist to publish pieces in these blogs in lieu of our regional sites)

Appendix E. ***FWS Region 1 Fisheries and Aquatic Conservation Program Sheet***

2018 Pacific Region FAC Program Priorities

Science and Conservation Stewardship

- Apply the best scientific practices to achieve sustainable fishery resources for the continuing benefit of the people of the Pacific Region, and the Nation.
- Use best science practices to support conservation stewardship of the fish and aquatic habitat resources throughout the Pacific Region.
- Use best science practices to promote the control of invasive species.
- Expand conservation education and awareness efforts within our facilities as well as through partnerships with others.

Strengthening Federal, Tribal, and State Partnerships

- Support and strengthen existing Federal, Tribal, and State relationships.
- Develop additional opportunities for new collaborative relationships with local governments and NGOs.
- Provide detailed technical support and assistance to our Partners as needed.

Workforce Development and Culture

- Invest in, develop, and value our employees.
- Promote workforce diversity and adhere to our Zero Tolerance Anti-Harassment Policy to ensure a work place free of discrimination and hostility.
- Recognize and celebrate staff achievements in a timely and appropriate manner.
- Support and enhance effective supervisory leadership.

Access to Hunting and Fishing

- Improve information availability of local area hunting and fishing opportunities.
- Improve fishing access and outreach at our facilities.
- Work with industry partners to promote hunting and fishing.
- Continue the production of NFH fish in support of fishing opportunities.

Maintain and Modernize Infrastructure

- Maintain and support existing facilities and equipment to achieve our mission.
- Modernize facilities and embrace new technology to achieve efficiencies and optimize use of resources.
- Improve the capabilities of, and coordination among, our engineering and facilities maintenance staff.