



ANNUAL REPORT
July 1, 2017–June 30, 2018

**Washington Cooperative
Fish and Wildlife Research Unit**



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Message from the Unit Leader



Welcome to a new era at the Washington Cooperative Fish and Wildlife Research Unit! This is the first annual report produced by the WACFWRU since 2001. In that time, former Unit Leader Chris Grue retired, former Assistant Unit Leader – Wildlife Glenn VanBlaricom retired, and former Assistant Unit Leader – Fisheries Dave Beauchamp moved on to serve as Chief of the Ecology Section at the U.S. Geological Survey Western Fisheries Research Center. I was hired as Unit Leader in early 2017 and have been in Seattle for about 18 months now. That is a lot of change in a short time, and most days I still feel like I'm on a roller coaster. In 2017, however, we celebrated the 50th Anniversary of the WACFWRU, reminding us that, even through change, some things endure.

I have thought a lot over the last 18 months about how to put the WACFWRU on the solid footing necessary to launch us into the next 50 years. I have developed three general priorities: ensuring our Sustainability, increasing our Connection, and serving our Community. To carry out our mission of research, education, and technical assistance effectively, we must ensure the Sustainability of our operations over the long-term. Connection is a key role of the WACFWRU, as we bring agencies and university scientists together. Finally, we must think about how we can best serve the Community of fish and wildlife professionals and stakeholders in Washington, the Pacific Northwest, and nationally. Based on these priorities, we've undertaken several major initiatives over the past 18 months.

Sustainability: My number one priority for ensuring the sustainability of the Unit is a successful search for a new Assistant Unit Leader – Fisheries. The position was advertised in August 2018 and closed at the end of September. The search committee will be looking for a research scientist with interests focusing on the ecology and conservation of fishes, particularly anadromous species, in the Pacific Northwest. By the time we complete our next annual report, I anticipate that we'll have a new Assistant Unit Leader up and running. Other efforts have included: 1) improving the functionality of the WACFWRU space in the Fisheries Science Building by removing old files, equipment, and furniture to create two offices for post-docs and visiting scientists; 2) initiating an annual practice of tracking student support through queries to university investigators so that we can better monitor our performance on this aspect of our mission; and 3) developing guidance documents for common administrative tasks to make performing these tasks more efficient and consistent.

Connection: As a key step toward improving our ability to connect our agency partners with university scientists, my goal has been to increase the visibility of the WACFWRU and the understanding of our role in Washington and the Pacific Northwest. Efforts have included: 1) developing a welcome letter for all university principal investigators starting new projects with the WACFWRU; 2) developing a 1-page WACFWRU fact sheet; 3) continuing to build and promote the Annual Student Symposium; 4) developing a WACFWRU website; and 5) producing the first published annual report in 17 years.

Community: It is my goal to improve the sense of community around fish and wildlife research and conservation, especially at our universities, in order to support excellence in research and education. Efforts have included: 1) developing a listserv to improve communication among students and investigators working in wildlife science at University of Washington, 2) developing a fish and wildlife ecology seminar series to be jointly run by graduate students from the School of Aquatic and Fishery Sciences and School of Environmental and Forest Sciences at University of Washington; and 3) establishing a new annual student award, the John Pierce Outstanding Graduate Student Award (see also, In Memoriam).

It is a real privilege to work in Washington, with all of the fantastic diversity of ecosystems, fish, and wildlife. It is also a great privilege to work at the WACFWRU, with its excellent Cooperators and history of achievement. I look forward to continuing to advance our mission in the year ahead.

Sarah Converse, *Seattle, September 29, 2018*

Unit Award Recipients

Unit Leader's Service Award

Awarded for exceptional service to the WACFWRU

Mr. D. John Pierce, Board Member, 1988-2018 (awarded October 2018)

The Gilbert B. Pauley Award

Awarded annually for best student presentation at the Annual Student Symposium

Iver Hull, Washington State University (awarded October 2017)



Photo: WDFW

In Memoriam

Mr. D. John Pierce worked for the Washington Department of Fish and Wildlife from January 1984 until his untimely death in March 2018. John served on the Unit Cooperator's Board beginning in 1988, and his peers on the board looked on him as a leader. In July 1999, John was appointed Chief Scientist of the Wildlife Science Division at Washington Department of Fish and Wildlife. He was a tireless advocate for the WACFWRU, and for fish and wildlife conservation in Washington. He will truly be missed.

The WACFWRU has established a new award in John's honor, the John Pierce Outstanding Graduate Student Award. The award will be presented annually to an outstanding University of Washington or Washington State University graduate student who best embodies the mission and spirit of the WACFWRU. Students will be nominated by their advisors and selected by a panel of university faculty and Cooperator's Board members. The first recipient will be announced in October 2018.

Annual Student Symposium

The 2017 WACFWRU Annual Student Symposium was held in conjunction with the WACFWRU annual meeting on October 24 at the Center for Urban Horticulture on the University of Washington campus. It was a particularly special Symposium as we celebrated the 50th Anniversary of the WACFWRU. In addition to current students, we were joined by College of the Environment Dean Lisa Graumlich, WACFWRU alumni Ben Maletzke and Kellie Kubena, and the former Chief of the Cooperative Research Units Program, Ken Williams. The full lineup included:

Welcome to the next 50 years

Sarah Converse, Unit Leader, Washington Cooperative Fish and Wildlife Research Unit

Welcome from the College: immersive learning, EarthLab and the Washington Cooperative Fish and Wildlife Research Unit

Lisa Graumlich, Dean, College of the Environment, University of Washington

Salmon in the city: impacts to coho raised in urban tributaries

Andrew Spanjer, MS Student, Aquatic and Fishery Sciences, University of Washington

Competition in the forest: understanding ecological relationships between cougars and wolves in eastern Washington

Lauren Satterfield, PhD Student, Environmental and Forest Sciences, University of Washington

Measuring forest habitat with deer

Iver Hull, MS Student, School of the Environment, Washington State University

The Cooperative Research Units program: a national perspective

Byron (Ken) Williams, Former Chief, U.S. Geological Survey Cooperative Research Units

The first 50 years: charting a path for the future

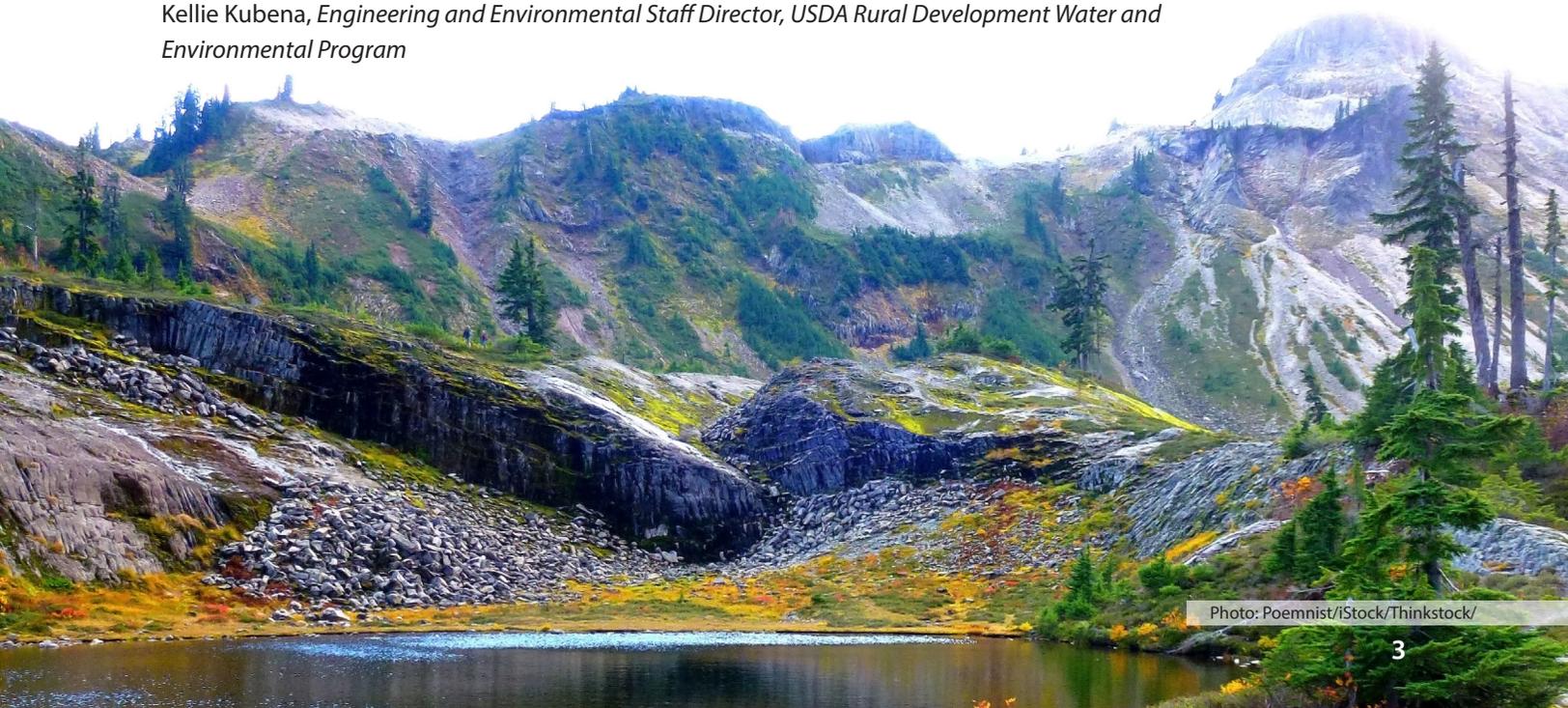
Christian Grue, Former Unit Leader, Washington Cooperative Fish and Wildlife Research Unit

Research, management, and teamwork

Ben Maletzke, Statewide Wolf Specialist, Washington Department of Fish & Wildlife

It's not the destination: getting a great start from the Washington Cooperative Fish and Wildlife Research Unit

Kellie Kubena, Engineering and Environmental Staff Director, USDA Rural Development Water and Environmental Program



Graduate and Post-doctoral Students

In 2017–2018, the WACFWRU provided support to 27 graduate and post-doctoral students. The students were spread across 9 different degree programs at University of Washington and Washington State University. In addition, WACFWRU projects provided support to 4 undergraduate students, as well as a high-school student. We look forward to expanding our reach in graduate education in the future.

Graduate and post-doctoral students advised by Unit Leader, Sarah Converse

Student	Degree and Program*	Project
Nathan Hostetter	post-doc, SAFS	Integrating spatial capture-recapture and telemetry data to estimate abundance and movement of marine mammals
Martina Kadin	post-doc, SAFS	Synchrony of seabird survival
Mark Sorel	PhD, SAFS	Integrating data sources to characterize demographic responses of Columbia River salmon and steelhead to threats and management actions
Amanda Warlick	PhD, SAFS	Integrated population models for species with complex life histories
Abby Bratt	MS, QERM	Using integrated population models to assess conservation actions for streaked horned larks and reduce impacts to military readiness
Hannah Sipe	MS, QERM	Understanding Common Loon distribution and abundance in Washington

* SAFS = School of Aquatic and Fishery Sciences , QERM = Quantitative Ecology and Resource Management

Graduate and post-doctoral students advised by university investigators at Washington State University (cross-reference to project list to identify advisor)

Student	Degree and Program*	Project
Meghan Camp	post-doc, SoE	The influence of fuel reduction treatments on the nutritional ecology of mule and white-tailed deer in northeastern Washington
Cassandra Doll	MS, SBS	Restoration tools for Oregon silverspot butterfly
Kelsey Gump	MS, SoE	The influence of fuel reduction treatments on the nutritional ecology of mule and white-tailed deer in northeastern Washington
Iver Hull	MS, SoE	The influence of fuel reduction treatments on the nutritional ecology of mule and white-tailed deer in northeastern Washington
Paul Jensen	MS, SoE	Snowshoe hare density
Anna Staudenmaier	MS, SoE	The influence of fuel reduction treatments on the nutritional ecology of mule and white-tailed deer in northeastern Washington

* SoE = School of the Environment, SBS = School of Biological Sciences



Photos, l to r: Morgan Bond, Sarah Bassing

Graduate and post-doctoral students advised by university investigators at University of Washington (cross-reference to project list to identify advisor)

Student	Degree and Program*	Project
Matthew Hendricks	Post-doc, DoI	Transgenerational impacts of endocrine disrupting chemicals on innate immunity
Sean Jeronimo	Post-doc, SEFS	Washington Department of Natural Resources 20 Year Plan
Julie Schram	Post-doc, CEE	Quantitative diet reconstruction of the food webs supporting juvenile suckers in the Upper Klamath Basin using fatty acid based mixing models
Martin B. Bagaram	PhD, SEFS	Integer programming techniques that will improve forest estate models used in forest land planning for Washington Department of Natural Resources-managed state lands in the Olympic Experimental State Forest
Sarah Bassing	PhD, SEFS	Ungulate-predator dynamics in northern Washington
Elizabeth Brasseale	PhD, SoO	Shoreline monitoring toolbox – protocol implementation and data management
Taylor Ganz	PhD, SEFS	Ungulate-predator dynamics in northern Washington
Daniel Hernandez	PhD, SAFS	Adaption of IHN virus to Pacific Northwest Chinook Salmon and impacts on other salmonids
Amanda Manaster	PhD, CEE	Prescription scale effectiveness monitoring project
Lauren Satterfield	PhD, SEFS	Ungulate-predator dynamics in northern Washington
Catherine Austin	MS, SAFS	Skagit River Chinook spawning phenology and multispecies salmonid distribution
Michaela Lowe	MS, SAFS	Inferring habitat use and migratory behavior of bull trout in the White River using microchemistry
Kelly Martin	MS, SMEA	Crab team: European green crab early detection and monitoring, phase 2
Brian Tracey	MS, SMEA	Rockfish remotely operated vehicle - MESA video review
Catrin Wendt	MS, SAFS	Ichthyophonous in Pacific herring

* DoI = Department of Immunology, SEFS = School of Environmental and Forest Sciences, CEE = Civil and Environmental Engineering, SoO = School of Oceanography, SAFS = School of Aquatic and Fishery Sciences, SMEA = School of Marine and Environmental Affairs

Research Projects – Unit Staff

Sarah Converse, Unit Leader

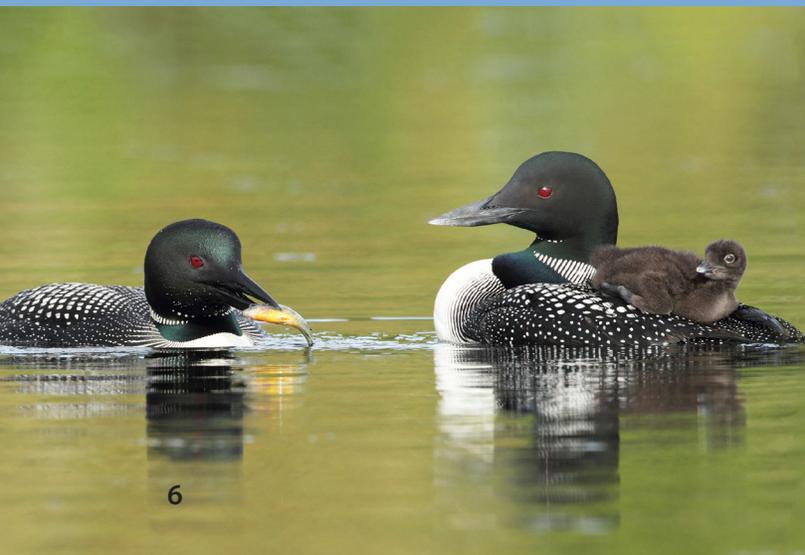
Understanding Common Loon distribution and abundance in Washington

- Personnel: Hannah Sipe (MS student)
- Funders: Washington Department of Fish and Wildlife, University of Washington, U.S. Geological Survey
- Partners: Washington Department of Fish and Wildlife
- Objectives:
 - Develop an integrated multi-state occupancy modeling approach based on 2 datasets: state surveys and citizen science information gleaned from eBird, to determine the factors influencing occupancy and breeding on sites (lakes) by Common Loons during the breeding season
 - Develop a simulation study for evaluating the efficiency of survey protocols, in terms of spatial configuration of sampling and overall effort, for Common Loons in Washington
- Expected completion September 2019

Using integrated population models to assess conservation actions for streaked horned larks and reduce impacts to military readiness

- Personnel: Abby Bratt (MS student)
- Funder: University of Washington
- Partners: Washington Department of Fish and Wildlife, Center for Natural Lands Management, Joint Base Lewis-McChord
- Objectives:
 - Develop an integrated population model—using data collected on JBLM and neighboring properties—to evaluate management effectiveness and assess strategies to lessen military impacts while benefiting streaked horned larks
- Expected completion June 2021

Photos, l to r: iStock/BrianLasenby, Eric Regehr



Integrating data sources to characterize demographic responses of Columbia River salmon and steelhead to threats and management actions

- Personnel: Mark Sorel (PhD student)
- Funder: NOAA Fisheries Northwest Fisheries Science Center
- Partners: NOAA Fisheries Northwest Fisheries Science Center, Washington Department of Fish and Wildlife
- Objectives:
 - Develop an integrated population modeling framework for spring-summer Chinook Salmon in the Columbia River, by combining data on 1) adult counts; and 2) mark-recapture data from young fish marked with PIT tags at screw traps in the Interior Columbia and subsequently detected at dams along the length of the river throughout their lives
 - Use the modeling framework to evaluate the effects of 1) stream habitat quality, 2) oceanic conditions, and 3) marine mammal predation, on Chinook survival, productivity, abundance, and viability
- Expected completion June 2022

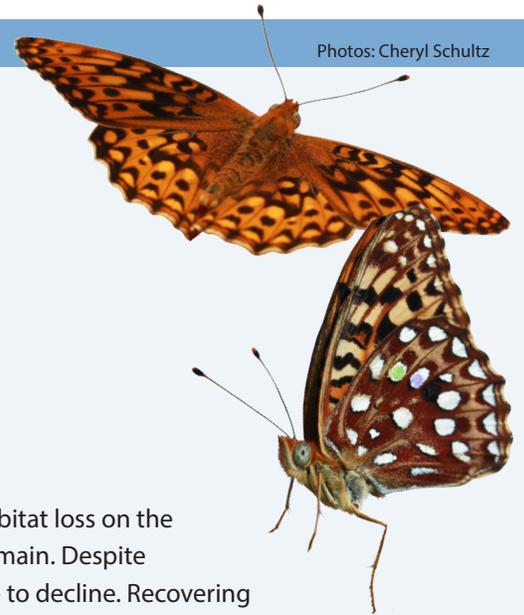
Photos: Cheryl Schultz

Project in the Spotlight

Restoration tools for Oregon silverspot butterfly

- Personnel: Cheryl Schultz (co-PI, Washington State University), Cassandra Doll (MS student, Washington State University)
- Funder: U.S. Geological Survey Science Support Program
- Partners: U.S. Fish and Wildlife Service, Washington State University
- Expected completion August 2020

The Oregon silverspot butterfly is at great risk of extinction due to extensive habitat loss on the coast of Oregon, Washington, and Northern California. Only five populations remain. Despite decades of captive rearing and reintroduction, remaining populations continue to decline. Recovering the butterfly will require management and restoration to recreate habitat in the wild. A major barrier to habitat management is aggressive invasive species that radically change the structure of the plant community. Critical to Oregon silverspot is the early blue violet, the butterfly's larval host plant. In coastal prairies, violets are overtopped by invasive forbs and grasses. Selective use of herbicides provides one promising tool to rapidly reduce invasive plant species, but direct effects of the herbicide on Oregon silverspot demography are unknown. With this work, we will evaluate the expected effectiveness of herbicides as a tool to restore Oregon silverspot populations. First, with a surrogate butterfly species, the Zerene silverspot, we are testing the direct effects of herbicides on butterflies. We are evaluating clopyralid, a forb-specific chemical, and fluzifop-p-butylal, a grass-specific chemical. We are conducting experiments in the greenhouse at Washington State University-Vancouver in summer/fall 2018 to quantify effects on larval and adult survival, development time, sex ratio, adult fecundity, and egg viability. Second, we will convene a workshop with managers and other experts to develop a decision-analytic framework for identifying best habitat management approaches. We will synthesize what is learned from the experiments with prior knowledge of butterfly and habitat ecology to produce demographic models capable of evaluating expected effectiveness of management alternatives for advancing recovery of this endangered butterfly.



Integrated population models for species with complex life histories

- Personnel: Amanda Warlick (PhD student)
- Funder: National Science Foundation Graduate Research Fellowship, Achievement Rewards for College Scientists scholarship
- Partners: Puget Sound Environmental Monitoring Partnership, Guillemot Research Group, NOAA Fisheries Alaska Science Center
- Objectives:
 - Develop integrated population models for species with complex life histories, Current projects: Puget Sound pigeon guillemots, Steller sea lion
 - Conduct simulation studies to determine factors influencing the behavior of these models
- Expected completion June 2022

Evaluating statistical methods for estimating density of invasive brown treesnakes from camera trapping data

- Personnel: Stacy Amburgey (Post-doctoral scientist, starting February 2019)
- Funder: US Navy – Commander Joint Region Marianas
- Partners: USN CJRM, U.S. Geological Survey Fort Collins Science Center, US Department of Agriculture Wildlife Services
- Objectives:
 - Evaluate several published models for their ability to provide robust estimates of brown treesnake density
 - Develop and evaluate novel models as necessary
- Expected completion July 2020

Integrating spatial capture-recapture and telemetry data to estimate abundance and movement of marine mammals

- Personnel: Eric Regehr (co-PI, University of Washington), Nathan Hostetter (Post-doctoral scientist)
- Funder: North Pacific Research Board
- Partners: U.S. Fish and Wildlife Service, U.S. Geological Survey Patuxent Wildlife Research Center
- Objectives:
 - Develop and evaluate integrated SCR-telemetry models to estimate density and movement from spatial capture-recapture and telemetry data
 - Evaluate integrated SCR-telemetry methods using spatial capture-recapture and telemetry data collected for polar bears in the Chukchi Sea during 2008-2016
 - Provide study design and sampling guidelines for the use of integrated SCR-telemetry models in research and monitoring projects aimed at estimating abundance and movement
- Status: Expected completion March 2020



Photos, l to r: Cassandra Doll, Bjorn Lardner; below: Pascale Gueret



Synchrony of seabird survival

- Personnel: Martina Kadin
- Funder: Swedish Research Council
- Partners: Swedish Museum of Natural History, Aarhus University
- Objectives:
 - Combine survival and food-web models to investigate seabird survival under different alternatives for regional management
 - Develop hierarchical survival models to investigate seabird survival in multiple populations
 - Find shared drivers, quantify variability, and examine synchrony in survival among populations across spatial and ecological scales
- Expected completion April 2020

Seabird status and conservation at Tetiaroa, French Polynesia

- Personnel: Beth Gardner (co-PI, University of Washington), Julia Parrish (co-PI, University of Washington), Olivia Sanderfoot (PhD student – with Gardner)
- Funder: Mr. Daniel and Mrs. Harriett Alexander
- Partners: Tetiaroa Society, Société d'Ornithologie de Polynésie – Manu
- Objectives:
 - Develop baseline estimates of abundance and/or demographic parameters for various bird species for use in evaluating effects of rat removal
 - Better understand potential threats to the populations and provide recommendations for mitigation
- Expected completion November 2020

Research Projects – University Investigators

The WACFWRU is pleased to have facilitated over \$2,286,430 in new research in 2017–2018 and over \$6,263,898 in continuing research in 2017–2018 between state and federal cooperators and university investigators. Projects are listed below by university and funder, with project title, principal investigator, department, and project dates.

University of Washington

Bureau of Reclamation

New

- Quantitative diet reconstruction of the food webs supporting juvenile suckers in the Upper Klamath Basin using fatty acid based mixing models, Michael Brett, Civil and Environmental Engineering, August 2017–September 2018

National Oceanic and Atmospheric Administration

New

- Evaluating alternatives to reduce whale entanglements, Ryan Kelly, School of Marine and Environmental Affairs, August 2017–May 2018

U.S. Fish and Wildlife Service

New

- Inferring habitat use and migratory behavior of bull trout in the White River using microchemistry, Daniel Schindler, School of Aquatic and Fishery Sciences, October 2017–September 2019

Continuing

- Population assessment of Wrangel Island Snow Geese using satellite imagery–Phase 2, Christian Grue, School of Aquatic and Fishery Sciences, April 2015–March 2019
- Fish virus ecology, molecular epidemiology, and evolution, Carolyn Friedman/Kerry Naish, School of Aquatic and Fishery Sciences, November 2013–September 2017
- Adaptation of IHN virus to Pacific Northwest Chinook Salmon and impacts on other salmonids, Kerry Naish, School of Aquatic and Fishery Sciences, August 2016–September 2021

U.S. Geological Survey

New

- Transgenerational impacts of endocrine disrupting chemicals on innate immunity, Ram Savan, Department of Immunology, September 2017–August 2020
- Ichthyophonous in Pacific herring, Chelsea Wood, School of Aquatic and Fishery Sciences, January 2016–January 2022

Continuing

- Development and application of a juvenile salmonid health index at selected NAWQA sites, David Beauchamp, School of Aquatic and Fishery Sciences, March 2015–December 2017
- Assessing marine biodiversity in the Elwha River nearshore using eDNA, Ryan Kelly, School of Marine and Environmental Affairs, March 2016–January 2018

Washington Department of Fish and Wildlife

New

- Crab team: European green crab early detection and monitoring, phase 2, Kate Litle, Washington Sea Grant, November 2017–December 2018
- Shoreline monitoring toolbox - protocol implementation and data management, Kate Litle, Washington Sea Grant, January 2018–January 2020
- Skagit River Chinook spawning phenology and multispecies salmonid distribution, Thomas Quinn, School of Aquatic and Fishery Sciences, March 2018–June 2020



Photo: Martina Kadin

Continuing

- Causes of seabird mortality, Julia Parrish, School of Aquatic and Fishery Sciences, March 2015–July 2018
- Ungulate-predator dynamics in northern Washington, Aaron Wirsing/Laura Prugh/Beth Gardner, School of Environmental and Forest Sciences, July 2016–June 2021
- Do wolves indirectly affect mule deer fawn survival by modifying coyote predation? Aaron Wirsing, School of Environmental and Forest Sciences, March 2015–December 2017 (vehicle use agreement)

Washington Department of Natural Resources

New

- Long-term monitoring and focus studies in shoreline biota in Puget Sound: 2017–18 data analysis and 2018–19 data collection, Megan Dethier, Friday Harbor Laboratory, October 2017–June 2019
- Roads prescription scale effectiveness monitoring project, Erkan Istanbuluoglu, Civil and Environmental Engineering, October 2017–June 2019
- Landscape evaluations for 20-year plan, Van Kane, School of Environmental and Forest Sciences, April 2018–June 2019
- Scoping an extensive riparian monitoring implementation pilot project, Monika Moskal, School of Environmental and Forest Sciences, December 2017–September 2018
- Wetland mapping tool project, Monika Moskal, School of Environmental and Forest Sciences, February 2017–August 2017
- Washington state logistic regression model, Luke Rogers, School of Environmental and Forest Sciences, April 2017–December 2017
- Washington Department of Natural Resources Science review 9: work plan for the University of Washington in managing and facilitating a scientific review process for CMER by the Independent Scientific Peer Review Program, Daniel Vogt, School of Environmental and Forest Sciences, January 2018–June 2019

Continuing

- Road prescription scale effectiveness monitoring project, Erkan Istanbuluoglu, Civil and Environmental Engineering, September 2016–September 2017
- Washington Department of Natural Resources Data: model data for DNR13-14, Clifford Mass, Atmospheric Sciences, July 2013–June 2018
- Extensive riparian vegetation monitoring-remote sensing pilot study, Monika Moskal, School of Environmental and Forest Sciences, November 2015–December 2017
- Washington Department of Natural Resources Forest Modeling - Integer programming techniques (formulating and solving techniques) that will improve forest estate models used in forest land planning for Washington Department of Natural Resources -managed state lands in the Olympic Experimental State Forest, Sandor Toth, School of Environmental and Forest Sciences, September 2012–August 2019

- Washington Department of Natural Resources Science Review 8: work plan for the University of Washington in managing and facilitating a scientific review process for CMER by the Independent Scientific Peer Review Program, Daniel Vogt, School of Environmental and Forest Sciences, July 2015–June 2018

Washington Department of Ecology

New

- Non-targeted screening analysis of six freshwater fish fillet samples, C. Andy James, Center for Urban Waters, April 2018–October 2018
- eDNA monitoring for aquatic invasive plants in Washington State, Julian Olden, School of Aquatic and Fishery Sciences, July 2017–June 2019

Continuing

- Washington wetland mapping, Monika Moskal, School of Environmental and Forest Sciences, May 201–June 2018

Other

Continuing

- Predator abundance and predation impacts on juvenile Chinook and Sockeye Salmon, David Beauchamp, School of Aquatic and Fishery Sciences, October 2016–December 2017 (King County, Washington)
- Marine survival of Puget Sound Chinook and Coho Salmon: size-selective mortality, growth limitation, and critical life stages, David Beauchamp, School of Aquatic and Fishery Sciences, February 2014–July 2017 (Long Live the Kings)
- An Ecosystem Approach to Investigate Direct and Indirect Effects of Geoduck Aquaculture Expansion in Washington State, Glenn VanBlaricom, School of Aquatic and Fishery Sciences, February 2014–August 2019 (Sea Grant)

Washington State University

Washington Department of Fish and Wildlife

New

- Integrated weed control project 2018/2019 work plan, Jennifer Andreas, Agriculture and Natural Resources Program Unit, March 2018–June 2019
- Snowshoe hare density, Daniel Thornton, School of the Environment, August 2017–August 2020

Continuing

- The influence of fuel reduction treatments on the nutritional ecology of mule and white-tailed deer in northeastern Washington, Lisa Shipley, School of the Environment, July 2013–June 2019
- Research mitigating wolf livestock conflict, Robert Wielgus, School of the Environment, July 2013–February 2018

Washington Department of Ecology

New

- Washington State University beach watchers 11, Chrys Bertolotto, Snohomish County Extension, February 2017–October 2017
- Washington State University beach watchers 12, Chrys Bertolotto, Snohomish County Extension, February 2018–October 2018
- PFAS chemical action plan, Chris Page, The William D. Ruckelshaus Center, July 2017–December 2018
- Defining net ecological benefit for implementation of ESSB 6091, Jonathan Yoder, Washington State Water Research Center, March 2018–May 2018

Project in the Spotlight

Ungulate-predator dynamics in northern Washington

Principal Investigators: Aaron Wirsing, Laura Prugh, and Beth Gardner,
School of Environmental and Forest Sciences, University of Washington

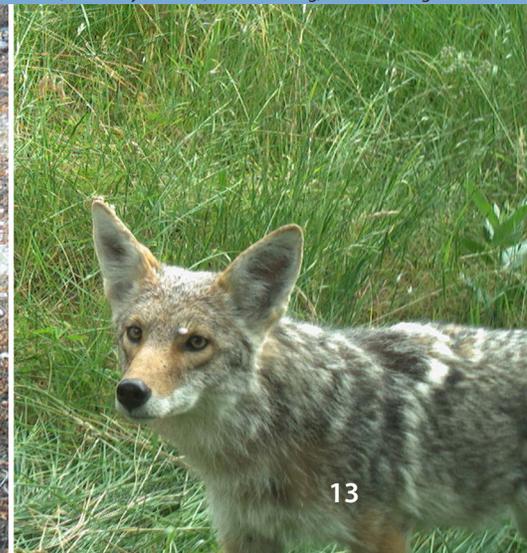
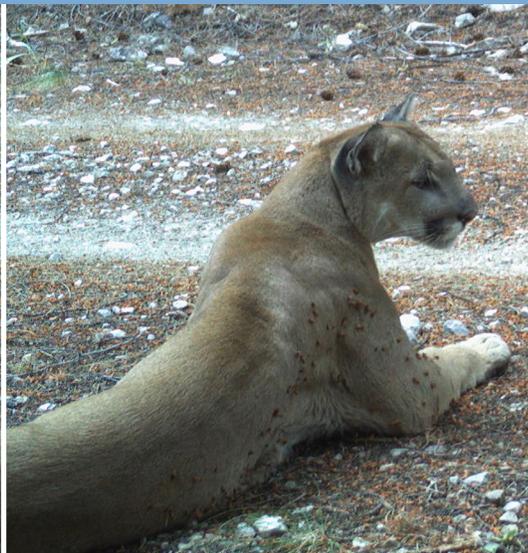
Personnel: Sarah Bassing, Taylor Ganz, Lauren Satterfield

Funder/Partner: Washington Department of Fish and Wildlife

After an absence of nearly 80 years, gray wolves began recolonizing Washington in 2008 and their numbers continue to grow. Wolves rely on wild ungulates such as deer, elk, and moose as their main food source, raising concerns that a growing wolf population could lead to declines in populations of these important ungulates. The impacts of wolf predation on Washington's ungulate populations are currently unknown, but are likely influenced by the availability of alternative prey, other large carnivores, habitat quality, environmental variables, and people. Thus, a more complete understanding of how Washington's ungulate populations will respond to wolves requires research that addresses all of these factors.

In December 2016, the Washington Department of Fish and Wildlife and the University of Washington partnered to initiate a large scale, field-intensive research project on predator-prey dynamics in systems with established and colonizing wolf populations. The primary objectives of this project are to: 1) estimate rates of wolf-caused mortality on deer and elk and determine the pressures to which ungulate populations are most sensitive; 2) determine what effects wolves have on cougar space use, foraging ecology, and population dynamics that could indirectly affect ungulates; and 3) determine the habitat use and daily activity patterns of predator and prey species in the study areas. We are addressing these objectives using a combination of approaches including GPS collaring of cougars and ungulates, investigation of cougar and wolf kill-sites as well as mortality site investigations (of collared ungulates), scat collection for diet analyses, and camera trapping. Our system-wide approach will allow estimation of the net impacts of recolonizing wolves through multiple ecosystem pathways, thus contributing to improved science-based wildlife management.

Photos, l to r: Taylor Ganz, Sarah Bassing, Sarah Bassing



Unit Staff and Cooperator's Board Members

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