2009 BBC Project Activity

Univ. of Washington

Research

- UW SAFS - Kerry Naish (PI) / Jeff Hard (NOAA)
  Coho Life History

- UW SAFS - Mackenzie Gavery (GS) / Steven Roberts (PI)
  Pacific Oyster monitoring

- UW SAFS - Marine Brieuc (GS) / Kerry Naish (PI)

- UW SAFS - Aaron Galloway (GS) / Tim Essington (PI) / Sean McDonald (Post-Doc)
  Cooperative Fish and Wildlife Research Unit
  Molluscan Study

  Over the last 3 summers our group stayed at the BBC a few times during our fieldwork weeks. Our research purpose was to conduct a survey of subtidal geoducks clams and California sea cucumbers in Hood Canal, in part to investigate how these organisms may contribute to/be affected by periodic low oxygen levels in the canal. In year 1, we conducted surveys using divers in near shore areas (<20 m deep); in year 2 we completed diver surveys and experimented with drop cameras and a remote operated vehicle (ROV) for surveys of deeper water (>20 m); in year 3 we spent a couple of weeks just doing drop camera surveys and a small amount of diving. Approximately 90 sites were ultimately surveyed at ~ 2 mile intervals along the entire length of both sides of the entire canal. The data will be used for generating a canal wide population estimate of subtidal geoducks clams and ultimately modeling how much water filtration these organisms may provide.

- UW SAFS - Eric Larson (GS) / Julian D. Olden (PI)
  Distribution of native and non-native crayfish in Washington lakes

  Native crayfish of Washington State are poorly studied, with no recent investigations of their distribution or population status. Furthermore, Washington State is increasingly invaded by introduced crayfishes of the eastern United States. As part of my dissertation research at the University of Washington, I am conducting distributional sampling for crayfish in Washington State lakes with the intent of a.) assessing current distributions of native crayfish, and b.) identifying distributions and potential landscape-scale patterns of introduction of invasive crayfish. Results will benefit natural resource management and aquatic conservation in Washington State by updating the distributional status of native crayfish and isolating populations of new invasive species.

  We have used the Big Beef Creek facility as a base of operation for parts of this project, staying at the cabins while sampling lakes on the Kitsap and eastern Olympic peninsulas, and have also used hatchery equipment (freezer) for processing and storage of our field samples. Big Beef Creek has been a valuable resource for efficiently completing this work, which will be analyzed in autumn 2009 and winter 2010.

  Rental of one cabin for June 16 to 19 and June 23 to 26, 2009

- UW Earth and Space Sciences (GS) - Maria Martin / Joanne Bourgeois (PI)
  Ph.D. Candidate
  Puget Lowland Paleoseismology
  A partially mapped series of east-west trending faults cross the Puget Lowlands. Portions of these faults have been mapped based on evidence for land level change, seismic surveys, and geophysical surveys, and LiDAR. However, while the Seattle fault has been well mapped, evidence for the fault tapers out west of Green and Gold mountains. The other faults, including the Olympia and Tacoma faults, are less understood. Several of the faults have been mapped to cross Hood Canal, but only two locations along Hood Canal have mapped coseismic land level change. There is a hypothesized terrace along the southern shore of Hood Canal mapped by LiDAR but it has not been confirmed in the field. Further evidence of coseismic land-level change will help to establish the extent of different faults. I used the Big Beef Creek cabins as a base for examining marshes on western Kitsap Peninsula for evidence of earthquakes. One of my field sites was the tidal wetlands along Big Beef Creek.
  Rental of one cabin from June 23 to June 26, 2009 and use of wetlands

- UW SAFS - Adam Hansen (GS) / David Beauchamp (PI)
  (970) 319-1046
  Project Title: *Light and Turbidity Mediated Visual Foraging Capabilities of Piscivorous Salmonids*
  Project Description: Visual foraging models (VFM) provide a mechanistic approach for linking variability in feeding rate to changes in environmental conditions and prey availability, based on the optical conditions, visual capabilities, and behavioral responses of predatory and prey fishes in pelagic habitats. Salmon and trout rely primarily on vision to feed in openwater environments, and represent some of the most significant openwater predators in both freshwater and marine systems, with anadromous coastal cutthroat trout *Oncorhynchus clarki clarki* being of particular importance in the Puget Sound region. Using a prototype circular experimental arena (4m diameter x 1m depth) currently being constructed out at the University of Washington's Big Beef Creek Field Station, I plan to measure reaction distances to prey and capture success rates by coastal cutthroat in response to factorial combinations of ecologically relevant levels of light (0.1 – 250 Lux), turbidity (0.5 – 20 NTU), and prey fish density (0.04 – 1.27 prey·m^{-3}). In published applications of the VFM, predictions on the extent of piscivory agreed reasonably well with independent empirical estimations of consumption (e.g., bioenergetics simulations), but highlighted the sensitivity of estimating capture success, given a prey encounter. Thus, more thorough experimentation will be required to parameterize more accurate VFM's for applications to natural openwater environments. A more refined VFM framework will allow researchers, conservationists, and managers to predict how spatial and temporal variability in predation mortality can regulate populations of prey fish, like juvenile salmon, in lake, estuarine, and marine environments under different water quality conditions or in response to anthropogenic manipulations of fish populations or the environment.
  Rental of cabins and use of hatchery facilities 2009

- UW - Nolan Grose, P. Frank Stevick
  Hood Canal Geoducks

- UW SAFS - Miyako Kodama (GS) / Kerry Naish (PI) / Jeff Hard (NFSC, NOAA)
  mkodama@uw.edu
  Project title: Testing the integrated versus segregated strategies of hatchery reform: Quantifying the ability of natural-to-hatchery gene flow to resist domestication selection on life history traits and thus achieve conservation genetic objectives in hatchery-reared coho salmon.
  Description: We are using molecular-based pedigrees in coho salmon inhabiting Big Beef Creek to investigate the rate and direction of evolution in correlated traits in a wild population, and to compare this rate to a newly initiated hatchery population. Our larger goal in this research is to understand the potential to reduce domestication selection in hatcheries by using gene flow from wild to hatchery populations.

Instruction

- UW Tacoma - Julie Masura
  Geosciences Lecturer
  Interdisciplinary Arts and Sciences

- UW School of Oceanography - Miles Logsdon
  GIS Remote Sensing course

- UW Department of Biology - Evan A. Sugden
  Lecturer
  easugden@u.washington.edu
  Dr. Evan Sugden has been utilizing Big Beef Creek Field Station for more than 12 years. His Biology 455, Entomology course, consisting of typically 10-20 students plus the occasional guest scientist, have been using BBC every summer term for the past 12+ years. The classes conduct hands on field collecting and trap/extracting device analyses. He has also used BBC as a pilot trip to asses conditions before the main field work.
  Dr. Sugden has also used BBC as the field component for his Biology 180, Introductory Biology course typically consisting of 10-15 students. For the field component, the students collect invertebrates on the tidal flat and within the estuary. This component of the class is usually during the winter and spring term.
  Rental of two cabins for July 31 to August 2, 2009 and in previous years; UW class - invertebrate sampling

- Klahowya High School
  Class trip/ tour of facility

NOAA

- NOAA Fisheries - Investigators: Mary Moser, Andrew Dittman, Steve Corbett
  Northwest Fisheries Science Center
  Project title: *Migratory pheromones: potential tools to improve performance of adult lamprey passage structures at dams*

At the Big Beef Creek Field Station we conducted behavioral assays in a Y-maze using both early and spawning-phase Entosphenus migrants to determine whether lamprey movements were affected by: 1) pheromones produced by conspecific larvae, 2) pheromones produced by congeneric larvae, and/or 3) increased current velocity. Each experimental animal was tagged with a passive integrated transponder (PIT) tag and allowed to acclimate in the Y- maze. The treatment (pheromone or current) was then introduced into only one arm of the maze and lamprey movements during the following night were documented by PIT detectors located in the maze. Lamprey exhibited clear diurnal activity patterns and responded positively to both the pheromone and current velocity treatments. However, our preliminary study did not test relative attraction to competing cues or the effects of repeated exposure (i.e., acclimation). Consequently, additional experimentation is needed to fully evaluate the relative roles of these and other environmental cues.

- NOAA Fisheries - Skip Tezak
  Research Fishery Biologist
  Northwest Fisheries Science Center
  Manchester Research Station
  Radio tagging of stealhead and cutthroat.

Fish and Wildlife

- WDFW - Matt Gillum
  Wild Salmon Population Monitoring, maintain on-site weir
  During upstream-migrant trapping, the weir screens the entire stream flow through vertical picket sections. During the downstream-migrant trapping season, we replace the pickets with stop-logs and screen panels. Downstream migrants are captured by three fan traps installed into the first bays on the east side of the weir house. Fish are removed, at least once daily (more frequently during peak migration and heavy debris loads), by dipnet from the live box attached to the tail of the traps. All fish captured are identified and enumerated by species and age. Coho smolts are coded-wire tagged before release. The trapping season is dependent on fish movement: smolt trapping generally begins in March, and continues through mid-June, while adult trapping begins around August (when the fall rains raise stream flows), and continues through January. (http://wdfw.wa.gov/fish/wild_salmon_monitor/hood_canal.htm)

- WDFW - Ned Pittman
  Habitat Science

Hood Canal Salmon Enhancement Group

- HCSEG - Neil W. Werner
  Executive Director
  BBC restoration project

- HCSEG - Renee Rose-Scherdnik

BBC wetland restoration project

Additional Affiliations

- Montana State University - Tomas Evans (GS) / David Varrichio (PI)
  Earth Sciences Department
  Title: Investigating the Transport and Deposition of Skeletal Elements in Fluvial Systems Through Actualistic Experimentation

  Project Summary: The fields of forensics, archaeology, and paleontology all reconstruct past events using historical information. In the case of historical data recovered from fluvial (river) environments it is necessary to determine how much time and space are represented by the bones found in these environments. In other words, how far the bones have moved since the death of an organism, and consequently how much time the material spent in a river or a flood plain. To determine the transport potential, distance, and residence time of skeletal material in rivers, bones are being seeded in Big Beef Creek and their movement down the river observed. Each experimental bone is subjected to a suit of sedimentological measurements (settling velocity, hydrodynamic area, bulk density, etc) prior to seeding, and these properties used to predict each bone's transport behavior. Observed transport behaviors will be compared to predictions to determine how well these theoretical models predict reality. The observational and sedimentological data sets collected will be used to create a new skeletal transport hypothesis if pre-existing transport equations proof unsatisfactory in describing fluvial skeletal transport.

  BBC Involvement: My research requires that I seed skeletal material in fluvial systems that are small enough that I can walk in, and I can get land owner permission to work in. BBC is a perfect location for my research since the river is small enough during the late summer that I can walk in without mortal danger and nicely there is one land owner for the entire river. Consequently BBC provides me a location for my research that is unique and easy to use.

- Battelle Marine Sciences Laboratory Sequim - Washington: J. M. Brandenberger**,** G.A. Gill**,** E.A. Crecelius and Texas A&M University Galveston, Texas: P. Louchouarn, L-G Kuo
  Study of Atmospheric Deposition of Air Toxics to the Waters of Puget Sound: Year One Data Report. August 2009. Prepared for the Department of Ecology, State of Washington; Olympia, Washington.

  The overarching question this project was designed to answer is, "What is the loading of combustion products to waters of the Puget Sound?" Addressing this question requires answering additional questions such as:
  1. What are the toxics associated with combustion processes?
  2. Does the average annual load of these toxics vary seasonally and /or spatially in Puget Sound?
  3. Do certain types of combustion processes (i.e. wood burning stoves *vs.* gasoline combustion) contribute a larger relative proportion of the total load of atmospherically derived PAHs to the waters of Puget Sound?

Seven sampling locations were selected as core sites around Puget Sound that represent a range of geographic regions, precipitation patterns, potential air pollution sources, and deposition directly on the waters of Puget Sound.

The Hood Canal site is located on a salt marsh at the University of Washington Big Beef Creek Fisheries Research Station near the community of Seabeck (Figure 6). This site was selected to represent air quality for Hood Canal and the western area of southern Puget Sound near rural forested lands. Both the Port Orchard and Hood Canal sites are in the Puget Sound convergence zone with an average annual precipitation of ~60 inches/yr (Brandenberger et. al. 2009).

- WA Department of Ecology - William J. Ehinger, Ph.D
  Freshwater Biologist
  Nonpoint Studies Unit
  BBC wetland restoration project