Broad and Fine scale patterns of sea run cutthroat in marine waters

Background

Patterns of movement for cutthroat as they transition from periods of residency at nearshore beaches to spawning activity in freshwater is also poorly understood. Results from acoustic tracking in Hood Canal suggests migration patterns are restricted to their natal fjord (Moore et al. 2010). However, genetic stock assignment for Cutthroat Trout in South Puget Sound revealed migrations outside of their natal fjords (Losee et al. 2017). These conflicting results and an absence of information for areas outside Puget Sound leaves numerous unanswered questions that are important for management of this native salmonid.

Results from recent research in South Puget Sound suggests that coastal cutthroat trout exhibit high site fidelity in the marine water, remaining at individual nearshore locations across various life stages (Losee et al. 2018). This past work has helped to identify marine habitats important to cutthroat trout and raises questions about the long-term persistence of cutthroat populations that rely on popular fishing beaches. Enhanced fine scale tracking at sites of high recapture rates will clarify the behavior of cutthroat trout at these beaches.

Study Goals

The aim of this study is to 1) describe temporal patterns of inter-habitat (freshwater, estuarine, nearshore) movements 2) and the role physical variables (temperature, salinity, tide) and barriers (e.g. dams, culverts etc.) play in determining movement patterns and 3) describe the fine scale movement of cutthroat trout in the nearshore marine environments of Washington State with a focus on popular fishing beaches.

Study Area and Fish Collection

We will capture and acoustically tag ~180 adult cutthroat trout across Washington State. Specifically, fish will be captured and tagged in South Puget Sound (N=60), the Strait of Juan de Fuca (N=60) and Willapa Bay (N=60). Additionally, we will tag ~20 cutthroat of unknown life history (anadromous vs. resident) in Willapa Bay streams. Acoustic receivers will be deployed across the study area in conjunction with currently operating receivers (Figure 1).

In addition to fish movements, each receiver will also be collecting temperature data of the surrounding environment where they reside. Tracking results will be compared with temperature data throughout the study area to better understand the role temperature plays in predicting cutthroat movements and habitat use.

Draft Methods

Fish will be caught using beach seine and hook and line. Cutthroat greater than 250mm fork length will be tagged (Vemco V9-6L acoustic tags) in the field. Specifically, they will be anesthetized with MS-222 (0.07 g/L) with baking soda buffer and supported upside down by a

closed cell foam block during surgery, during which they will be given anesthetic by gravity feed over the gills (0.02g/L). After an incision is made in the abdomen forward of the pelvic girdle muscle, a tag will be inserted, antibiotic injected (25 mg/kg oxytetracycline), and the incision sutured with 2-3 stitches (4-0 RB-1 Taper antibacterial Ethicon Vicryl Plus violet braided). The wound will be dabbed with antibacterial ointment (Bacitracin), weight and length will be recorded and fin clip and scale samples collected. Following tagging, fish will be held at capture location with aerated water until swimming upright and responsive. All tags and surgery tools will be disinfected with Nolvasan (chlorhexidine diacetate) and rinsed in saline solution before use and between fish.

Pictures of equipment used in acoustic telemetry study; v9 transmitter, v16 transmitter, VRT2x acoustic receiver and example of on-site surgery station.

2023 Timeline

	2023							
	Jan	Feb	Mar	Apr	May	June	July	Aug
Strait J.F. deploy receivers and tag								
South Sound deploy and tag								
Willapa Bay deploy and tag								

Conclude study August of 2024

Budget:
-180 tags x $350=$63,000
-52 receivers x $2,800=$145,600
-Anchors, buoys, temperature loggers, suture material-$5,000
-150 scales analyzed x $2=300
-150 tissue analyzed for sex determination x $30=$4,500

Total Project Cost =218,100

Previously Purchased

24 receivers=

-8 receivers purchased by University of Washington=$17,480

-8 Receivers purchased by Coastal Cutthroat Coalition=$17,480

-8 Receivers provided by Umea Telemetry Group, Swedish University of Agricultural Sciences= $17,480

Total need=$165,960

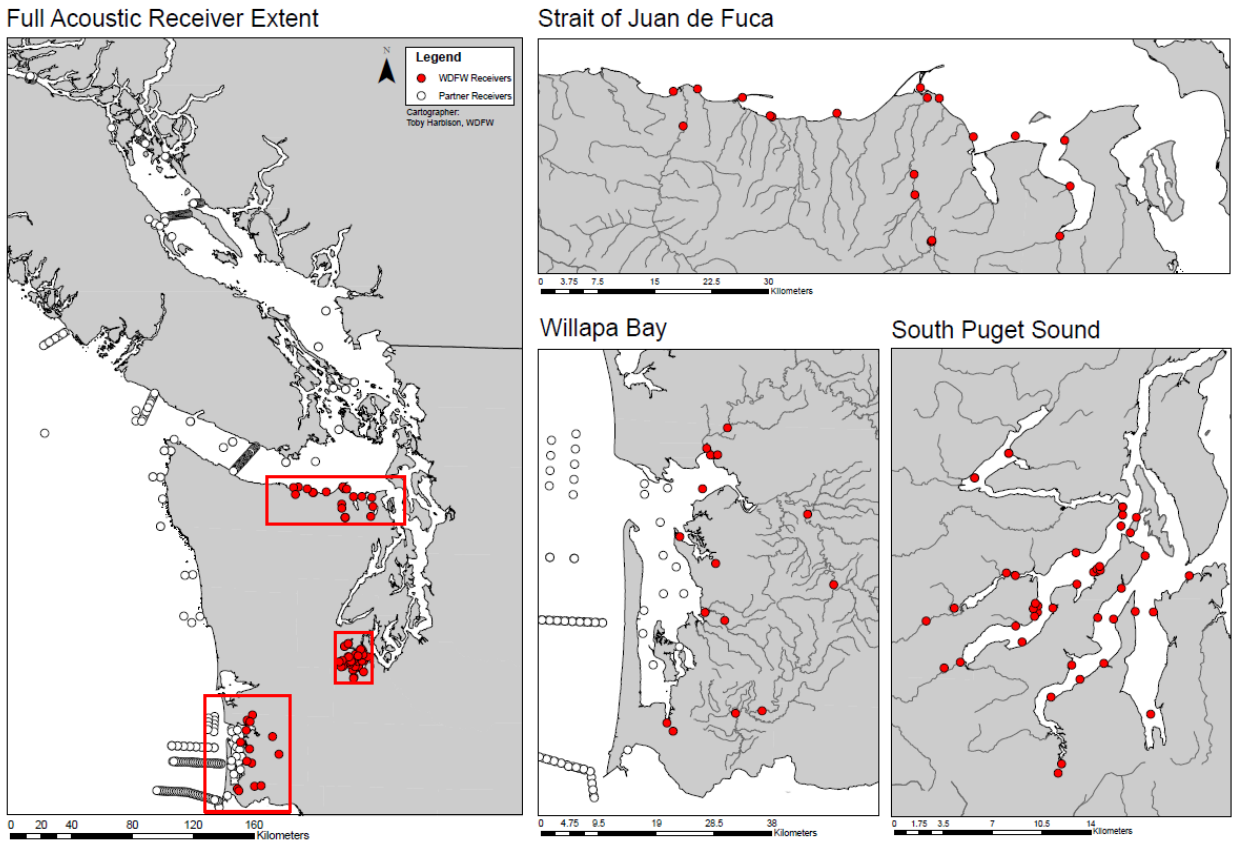

Figure 1. Current receiver locations (open circles) and proposed receiver locations (red circles) used for cutthroat tracking study in Western Washington.

Losee, J. P., A. M. Claiborne, P. D. Dionne, H. S. Faulkner, and T. R. Seamons. 2018. Size, age, growth and site fidelity of anadromous cutthroat trout *Oncorhynchus clarkii clarkii* in the Salish Sea. Journal of Fish Biology **93**:978-987.

Losee, J. P., T. R. Seamons, and J. Jauquet. 2017. Migration Patterns of anadromous Cutthroat Trout in South Puget Sound: A fisheries management perspective. Fisheries Research **187**:218-225.

Moore, M. E., F. A. Goetz, D. M. Van doornik, E. P. Tezak, T. P. Quinn, J. J. Reyes-Tomassini, and B. S. Berejikian. 2010. Early marine migration patterns of wild coastal cutthroat trout (*Oncorhynchus clarkii clarkii*), steelhead trout (*Oncorhynchus mykiss*), and their hybrids. PLoS ONE **5**:e12881.