

Proposal: Estimating Abundance of Cutthroat Trout in Puget Sound

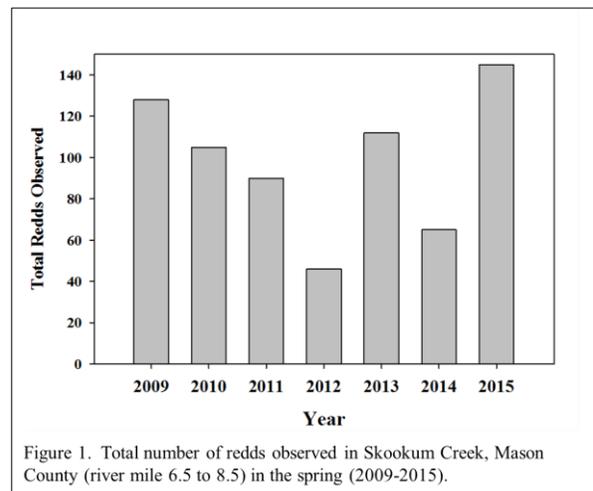
Species Background

Coastal cutthroat trout, *Oncorhynchus clarkii clarkii*, are native only in North America, from northern California to south-central Alaska, and have been described as the ancestral salmonid in the Pacific Northwest, contributing to at least eleven other cutthroat trout subspecies and more than 5 life history types (Behnke, 1979). Anadromous coastal cutthroat trout are not ESA listed and are not of commercial value therefore have received little attention from the scientific community. As a result, information regarding spawning behavior, marine migrations and population size is limited. While, no formal stock assessment methodology currently exists for anadromous coastal cutthroat trout counts at artificial barriers and anecdotal information suggests that cutthroat trout abundance has declined across their range since early 1980's (Pearcy et al. 2014). As a result, Washington Department of Fish and Wildlife (WDFW) relies on conservative angling regulations (catch and release, selective gear rules, stream closures) to maintain/increase populations size while providing fishing opportunity. Recent work by WDFW staff and volunteers has improved understanding of spawn timing, redd identification and marine distribution of coastal cutthroat trout in Puget sound.

Specific results from recent work will provide the foundation for the proposed project and are summarized:

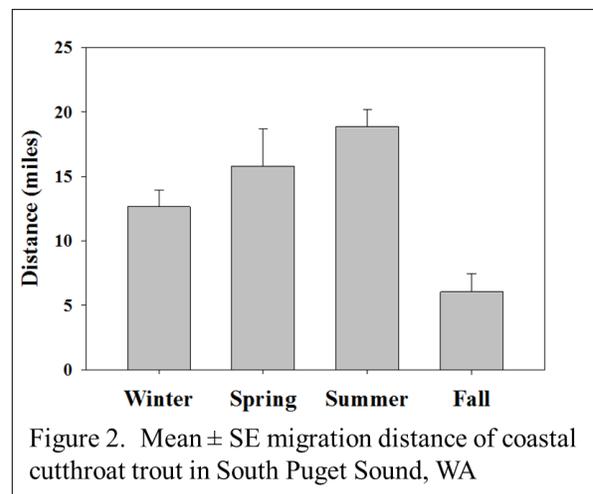
Spawning

Anadromous cutthroat in south Puget Sound exhibit a protracted spawn timing (~6 months) relative to other salmonids revealed from weekly redd surveys in Skookum Creek (Losee et al. 2016). It appears that the majority of variability in spawn timing of cutthroat trout can be explained through local patterns in stream flow. **Cutthroat trout in Skookum creek exhibit a high degree of interannual variability in redd abundance (Figure 1) however a relationship between redds and number of fish has not been identified for this species.**



Marine Movements

Recent genetic and scale analysis of cutthroat in Puget Sound revealed that cutthroat typically enter the marine environment at age 2 and do not undergo long distance marine migrations relative to other salmonids but rather remain near their natal estuaries. Overall, cutthroat migrated the longest distances (mean=18.5 miles) during summer months (Figure 2). **In addition, 75% of all cutthroat captured throughout south Puget sound (Figure 3, Losee et. al in prep.) originated from Skookum Creek.**



High Site Fidelity

Monthly tagging and recapture of coastal cutthroat

trout at a single location in Eld Inlet illustrated that coastal cutthroat trout exhibit high site fidelity in the marine environment (Losee *et. al*, 2016). In addition, beach seining has proved to be a reliable method to capture, tag, and collect biological data (scales, tissue etc.) from a large proportion of Skookum Creek spawners with little to no harm to the fish. For instance, numerous fish have now been marked and recaptured more than five times in a six month period.

Study Objective

An understanding of the timing, location, and abundance of spawning fish is essential to fish management. Without this knowledge, biologists may be unable to define annual abundance, evaluate management plans and ensure long term stability of a population.

Currently stock assessment of coastal cutthroat is limited to counts of adults at artificial barriers. While valuable, upstream traps are often unreliable due to financial constraints and trapping bias associated with small size and variability in run timing of cutthroat trout. In the absence of artificial barriers, redd counts have been used to estimate population size of all species of anadromous salmonids with the exception of coastal cutthroat trout.

Recent research by WDFW has utilized redd counts to describe the spawn timing of CCT, however without an understanding of the number of fish associated with the construction of an individual redd these counts do not offer an estimate of annual abundance.

Specifically, this project will:

1. Produce the first redd-to-fish conversion for anadromous coastal cutthroat trout (i.e. the number of cutthroat involved in the construction of a redd).
2. Apply redd conversion to historic redd count data in south Puget sound.
3. Describe differential spawn timing of cutthroat trout by age, sex, size and time.
4. Concurrently train volunteers throughout Puget Sound to enumerate redds in an effort to compare variability in redds counts during and beyond the project time period and expand stock assessment efforts outside South Puget Sound

These goals will be achieved through a combination of Passive Integrated Transponder (PIT) tags, Floy Tags, snorkel surveys and redd-based spawner surveys. By capturing (beach seine) and tagging (PIT and Floy tags) cutthroat in the marine environment we can then detect fish entering the spawning grounds on Skookum Creek via PIT tag antennas. Tagged fish will then have a unique number associated with them so patterns of age, size and sex can be evaluated. During the same time period, redd surveys will provide an estimate of the number of redds built by cutthroat allowing for an estimate of adults involved in redd construction. In addition, bi-weekly snorkel surveys will allow for an estimate of mark-rate of cutthroat on the spawning grounds to improve estimate of number of fish involved in the construction of a redd.

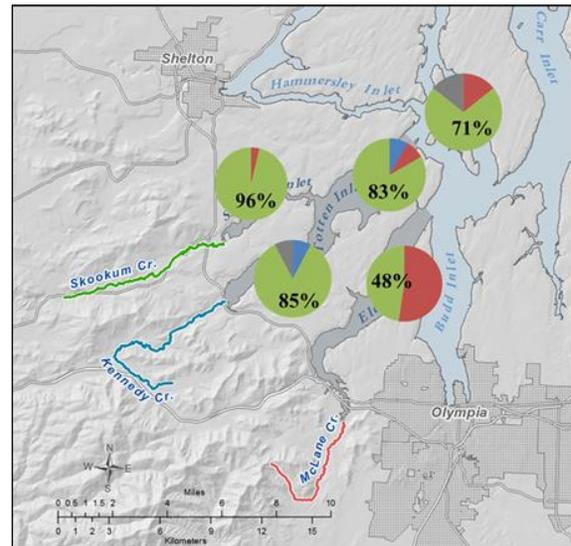


Figure 3. Stock composition of catch in South Puget Sound, Wa. Skookum Creek (green), McLane Creek (red), Kennedy creek (blue) and unknown (grey).

Project Timeline

To account for interannual variability in spawner abundance and variability in stream conditions as well as insure successful training of volunteers outside of south Puget Sound this study will be conducted over two spawning seasons (Figure 4).

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	
2016/2017	Equipment	install antennae	weekly battery change/upload											
	Field Work		bimonthly beach seining/tagging											
	Data	wkly redd surveys, volunteer training & biweekly snorkel								report writing				
2017/2018	Equipment	install antennae	weekly battery change/upload											
	Field Work		bimonthly beach seining/tagging											
	Data	wkly redd surveys, volunteer training & biweekly snorkel								report writing				

Figure 4. Timeline for estimating the abundance and spawning behavior of coastal cutthroat trout in Puget Sound.

Budget

To fund this project to completion an estimated \$96,000 is needed. This includes tagging equipment (tags, antennae etc.), 1 scientific technician (antennae maintenance, reporting, training outside South Puget Sound etc.), age analysis, fuel and other associated costs. WDFW will provide additional labor, beach seine equipment, snorkeling equipment and stream surveying equipment, which should equal or exceed \$15,000.

Project Team:

- James Losee, WDFW Project lead, 360-902-2741
- Gabe Madel, WDFW PIT Tag study design
- Phill Dionne and Hannah Faulkner, WDFW, Marine capture and tagging.
- Riley Freeman, WDFW, South Sound Stock Assessment planning
- Derek Day, Bradley Bobbit and Jason Small, Native Fish Society, PIT Tag monitoring
- William Drewry, Peninsula Outfitters, Fundraising coordinator
- TBD (contingent on reaching funding goal), Puget Sound Cutthroat Biologist and volunteer coordinator

Contributions:

To contribute to this project please make checks payable to WDFW Fiscal Services with “Cutthroat Research MI 54639” in the note. Fiscal questions contact:

Lynn Needham, fiscal services, WDFW
 600 Capitol Way N.
 360-902-2874

References

Behnke, R.J. 1979. Monograph of the native trouts of the genus *Salmo* of western North America. USDA Forest Service, Rocky Mountain Region, Denver, Colorado. 33-42.

Losee, J.P., L. Phillips, and B. Young. 2016. Spawn Timing and Redd Morphology of Anadromous Coastal Cutthroat Trout *Oncorhynchus clarkii clarkii* in a Tributary of South Puget Sound Washington. North American Journal of Fisheries Management.

Pearcy, W.T., R.D. Brodeur, and S. M. McKinnell. 2014. Anadromous coastal cutthroat trout (*Oncorhynchus clarkii clarkii*). North Pacific Anadromous Fish Commission. Report.