

Survival and Traits of Reconditioned Kelt Steelhead *Oncorhynchus mykiss* in the Yakima River, Washington

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Outline

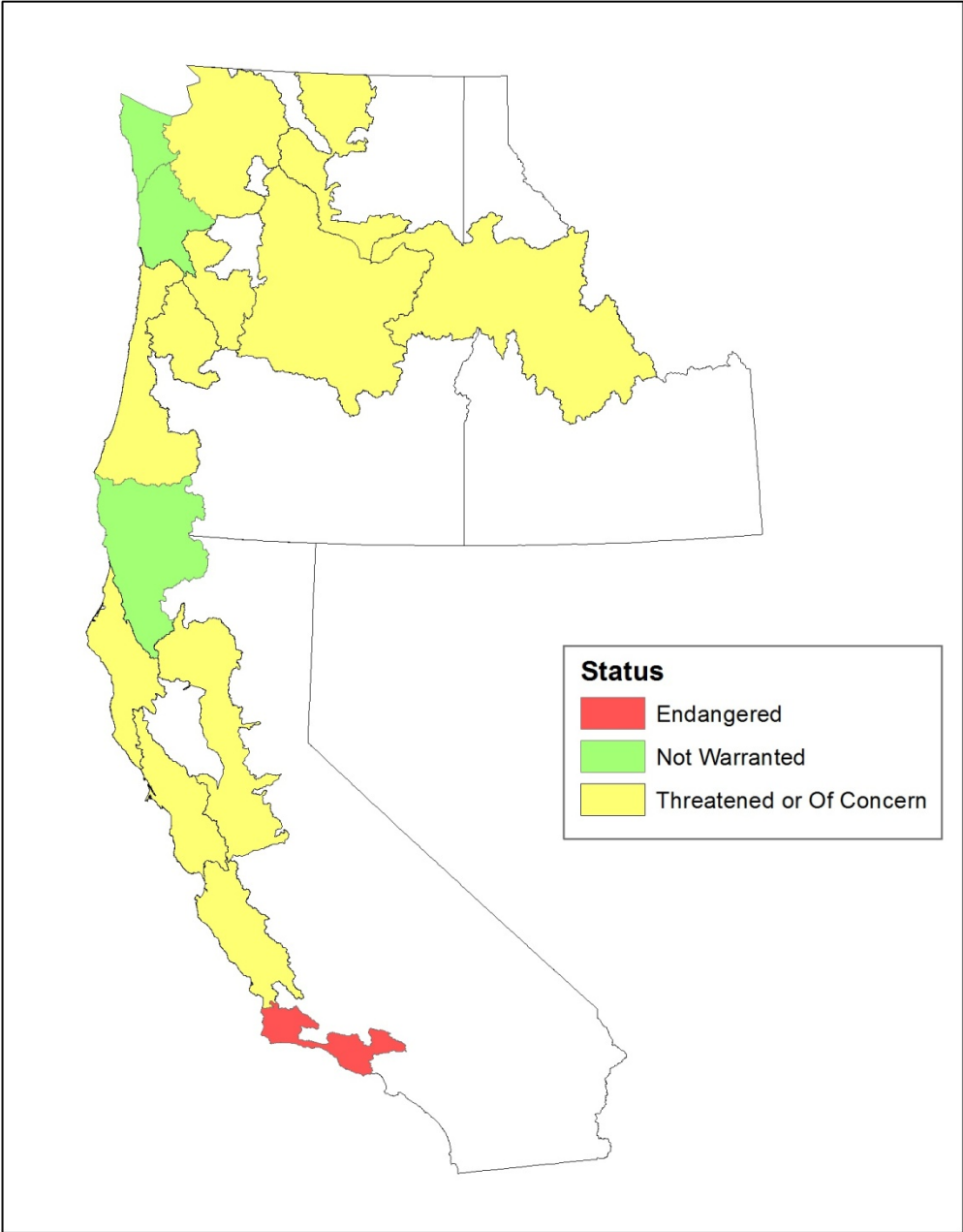
- The Problem: Dramatic decline of steelhead in the Columbia River Basin
- Taking advantage of steelhead iteroparity
- Describe the reconditioning process
- Provide data on survival and traits of reconditioned steelhead
- Recommendations



The Problem

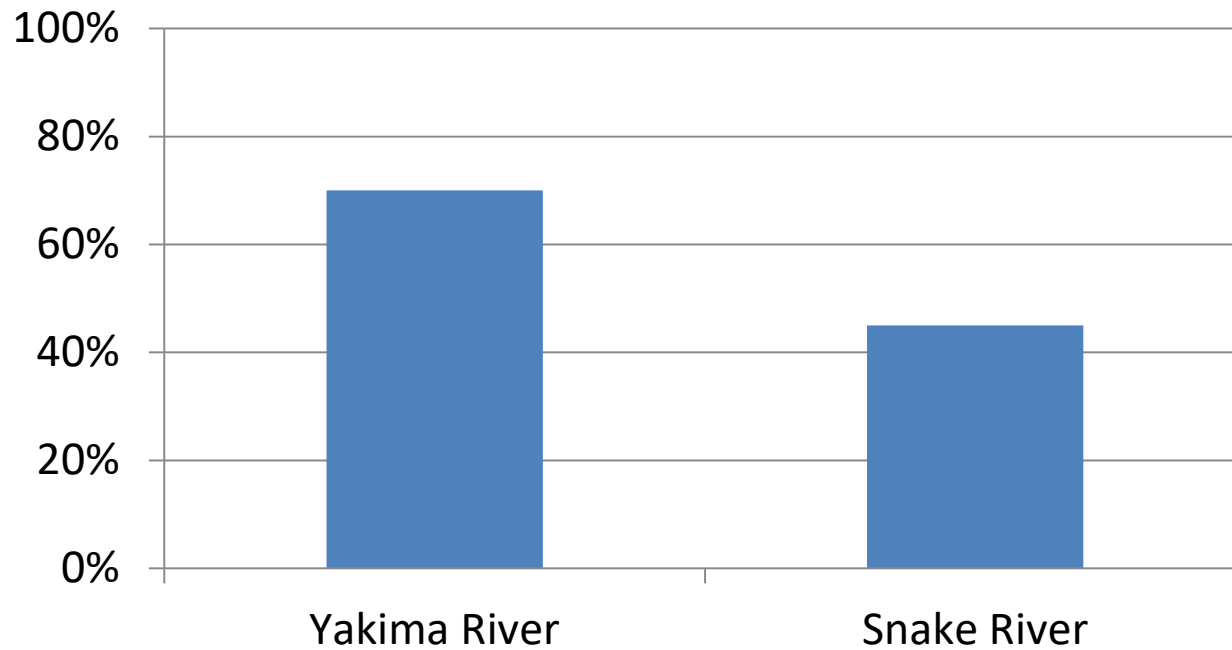


Steelhead ESUs



Taking advantage of steelhead iteroparity

Percentage of the upstream run seen as kelts

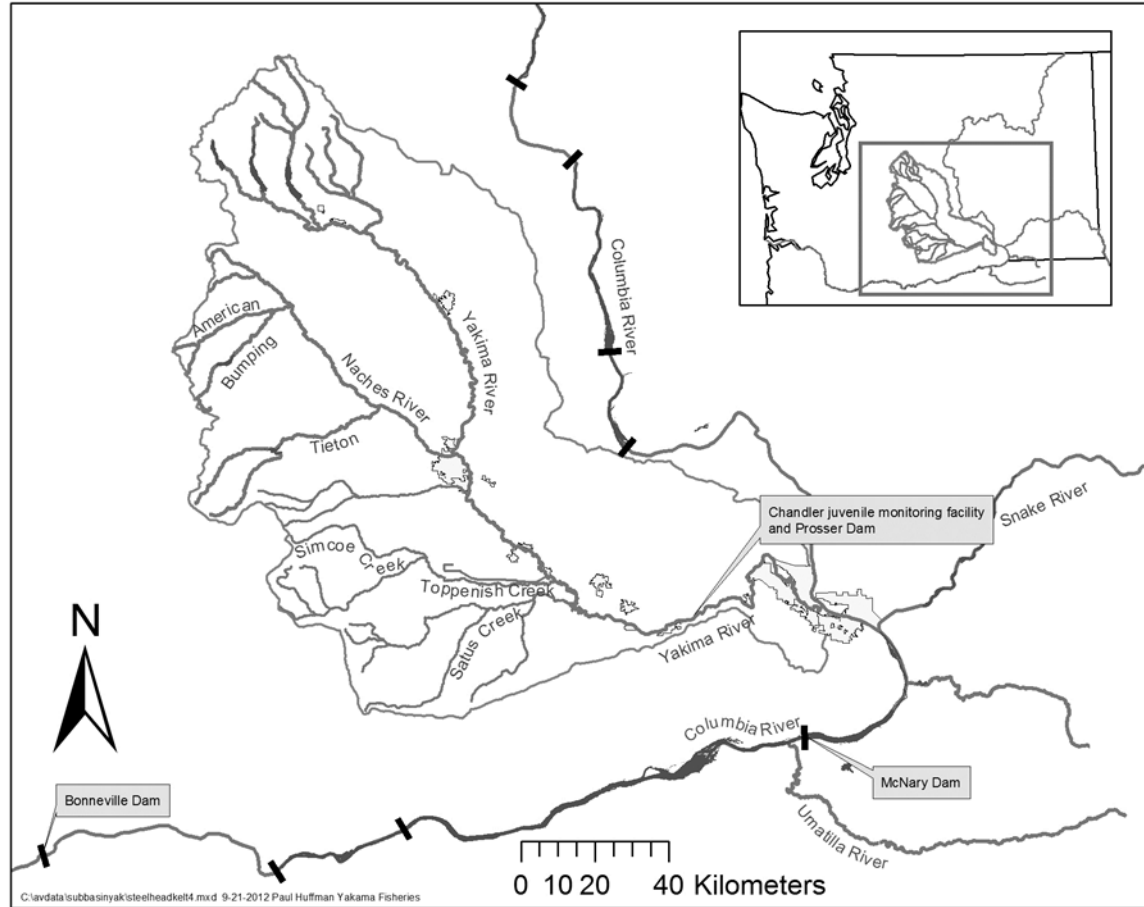


Taking advantage of steelhead iteroparity

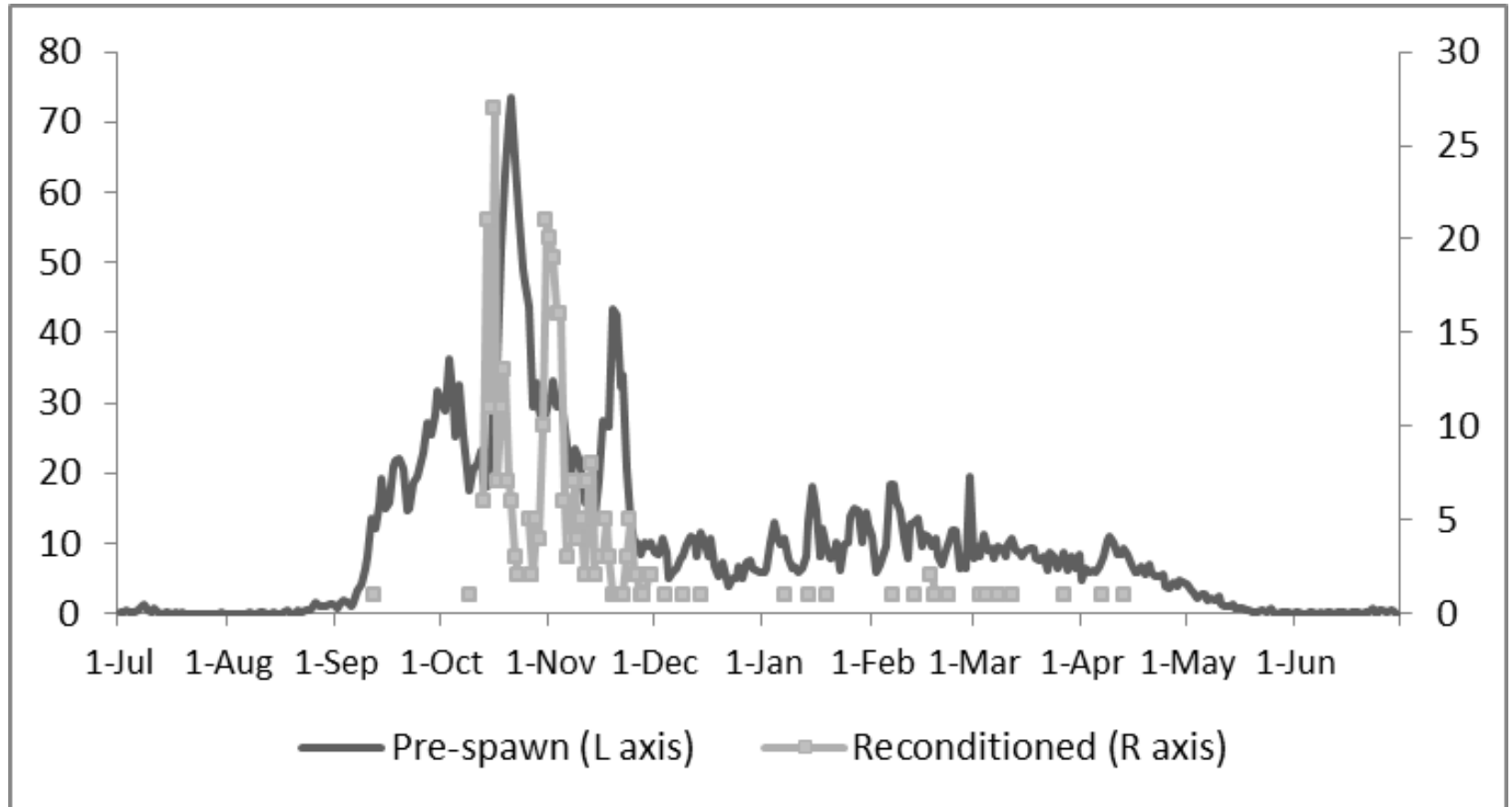
- Although most steelhead try to return to the ocean after spawning. Repeat spawner rates of inland populations are low.
- Burgner et al. 1992 reported 7.2% kelts in the high seas population.
- Repeat spawners comprise $< 3\%$ of the Yakima River run.
- Repeat spawners comprise $\sim 1\%$ in the Snake River.



Taking advantage of steelhead iteroparity



Survival and traits



When did they cross Prosser Dam?



Survival and traits

At Collection

- Pre-spawner abundance
- Kelt abundance
- Proportion of run seen as kelts
- Fork length
- Weight
- Fulton's K
- Condition (Good-1, Fair-2, Poor-3)
- Color (Bright-1, Intermediate-2, Dark-3)
- Flow (Monthly, Spring, SH run)
- PIT tag

At Release

- Kelt abundance
- Kelt survival (N_1/N_0)
- Fork length and Δ FL
- Weight and Δ WT
- Fulton's K and Δ K
- Fat meter
- Plasma (vitellogenin and estradiol)



Survival and traits

Pre-spawner and Kelt Metrics

Years 2000/01 – 2010/11	Pre-spawn Steelhead At Prosser Dam		Kelt Steelhead at Collection, Chandler Juvenile Monitoring Facility (CJMF)							
	Abundance	Median date of passage	Abundance	Median date of collection	Proportion of Pre- spawn run	Fork length (cm)	Weight (kg)	Condition	Color	Percent female
Minimum	1,537	18-Oct	520	13-Apr	0.16	60.3	1.67	1.548	1.500	89.7
Maximum	6,796	26-Dec	1,659	30-Apr	0.37	68.0	2.43	1.672	1.786	97.2
Average	3,577	9-Nov	885	24-Apr	0.27	63.7	1.97	1.615	1.620	92.9



Survival and traits

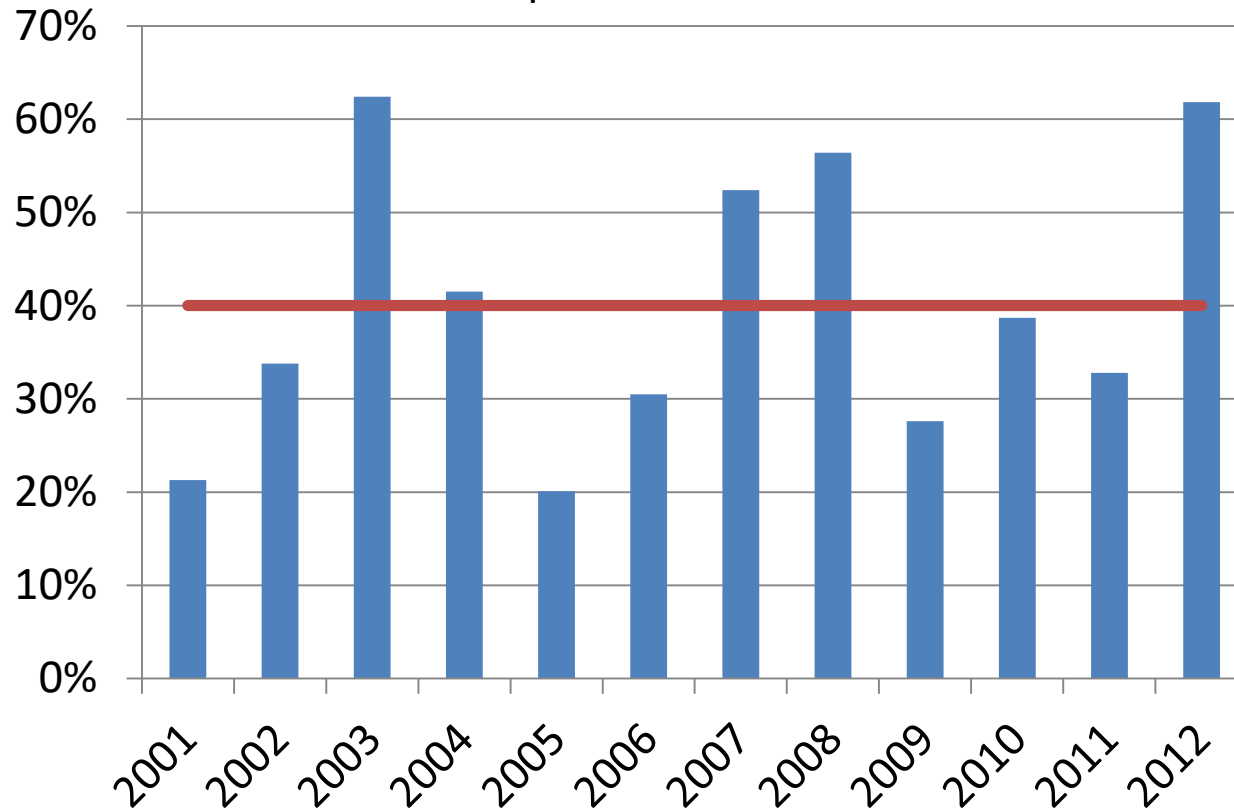
Kelt Metrics

Years 2001 - 2011	Number Reconditioned	Number Released	Survival (%)	Mean Fork Length (cm)			Mean Weight (kg)			Mean Fulton's K		Means At Collection	
				Collect	Release	Change	Collect	Release	Change	Collect	Release	Condition	Color
Minimum	279	85	20.1	59.29	60.45	-0.46	1.59	2.00	0.30	0.027	0.033	1.548	1.500
Maximum	1100	426	62.4	67.35	68.03	2.65	2.08	3.22	1.22	0.035	0.048	1.672	1.786
Average	545	208	40.0	63.05	63.35	0.61	1.92	2.41	0.50	0.030	0.037	1.615	1.620



Survival and traits

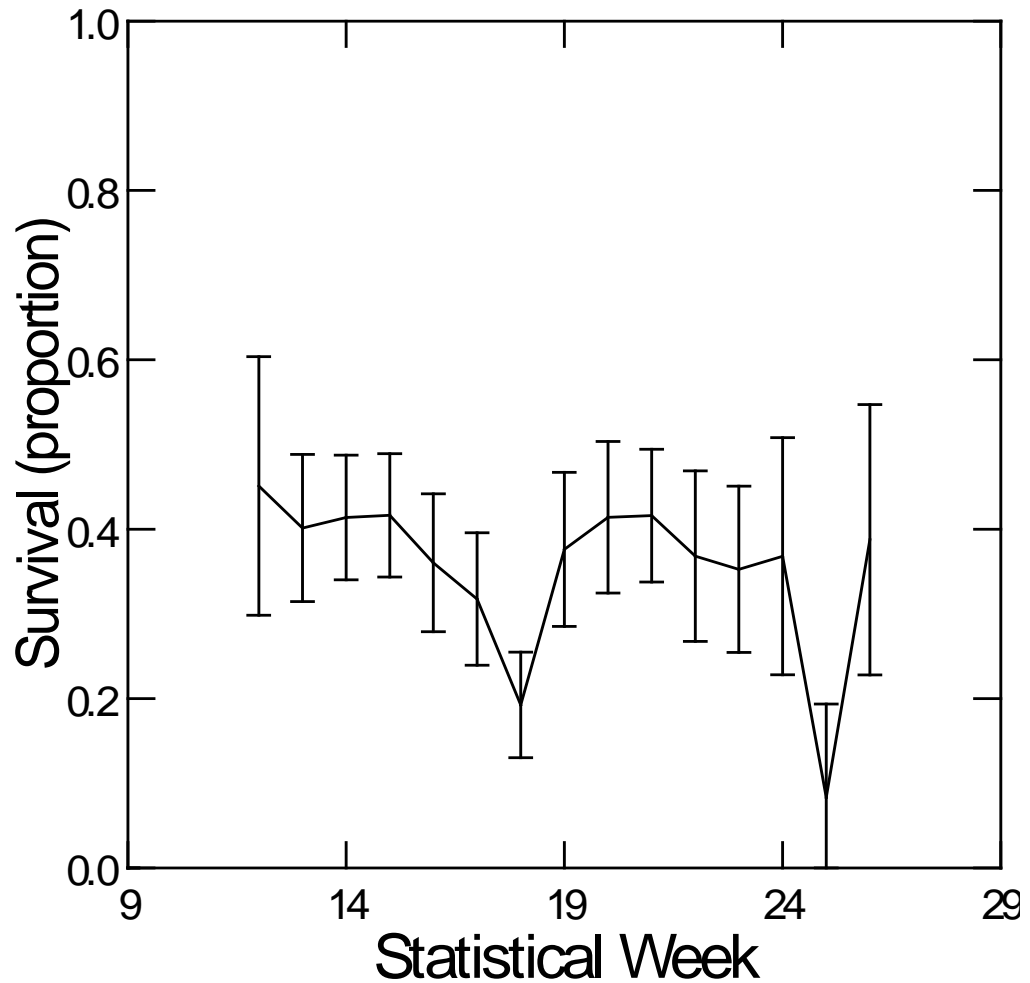
Survival of kelt steelhead in long-term reconditioning
Fish collected April-June and released in October



Survival and traits

Survival as a function of collection week

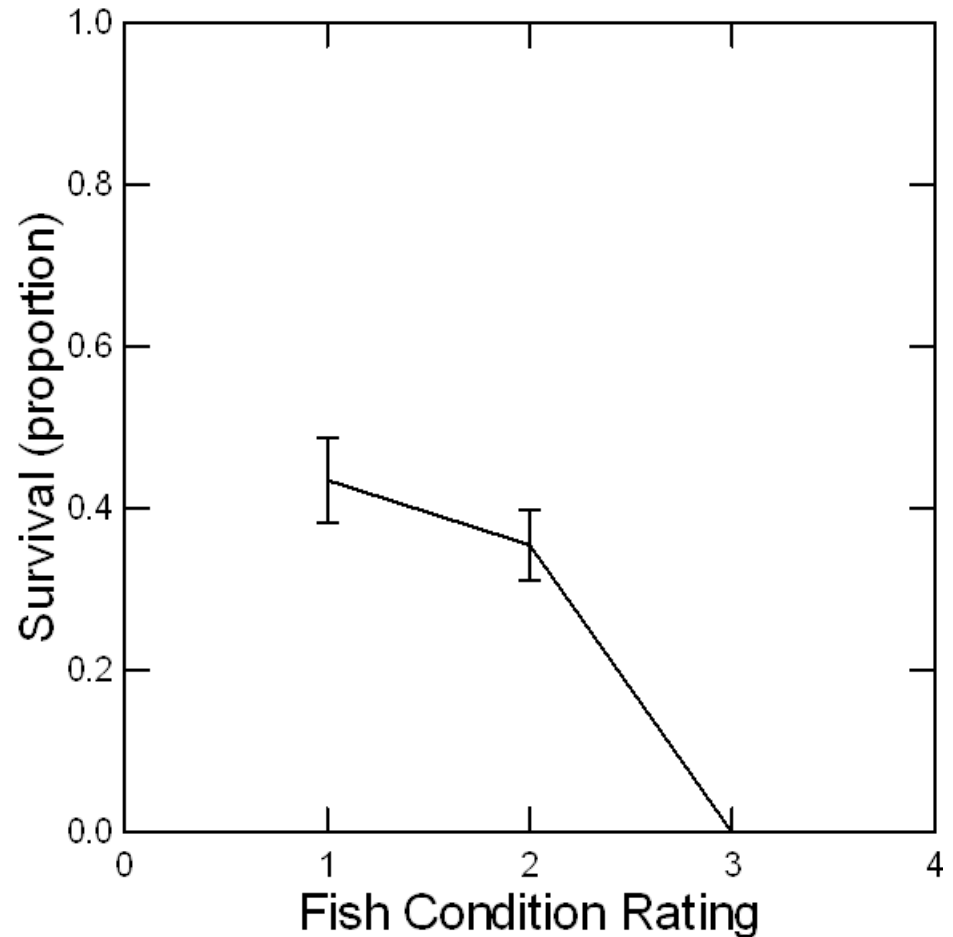
- Slight advantage toward fish collected early
- No explanation for the dip at WK 18



Survival and traits

Survival and fish condition

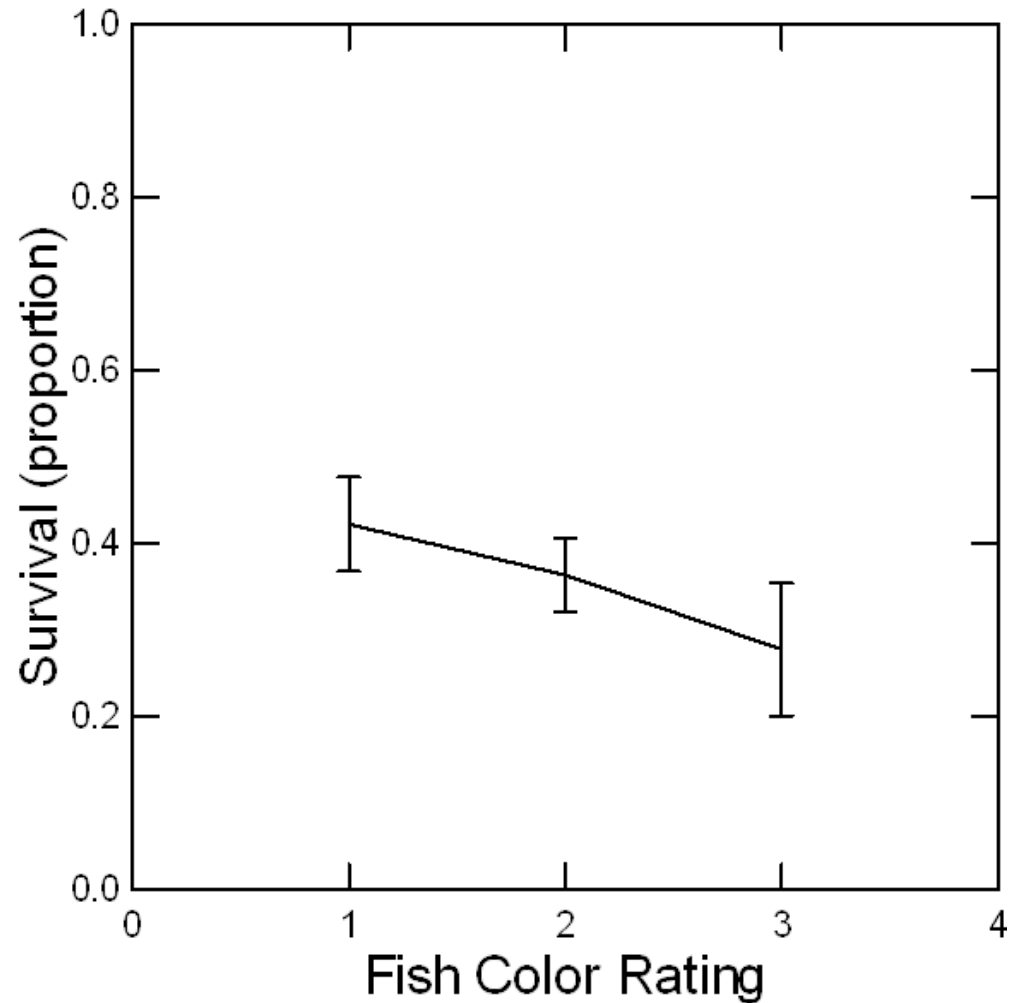
- Fish are rated as Good-1; Fair-2; and Poor-3.
- Good and Fair fish have survivals that are not significantly different.
- Poor fish = dead



Survival and traits

Survival and fish color

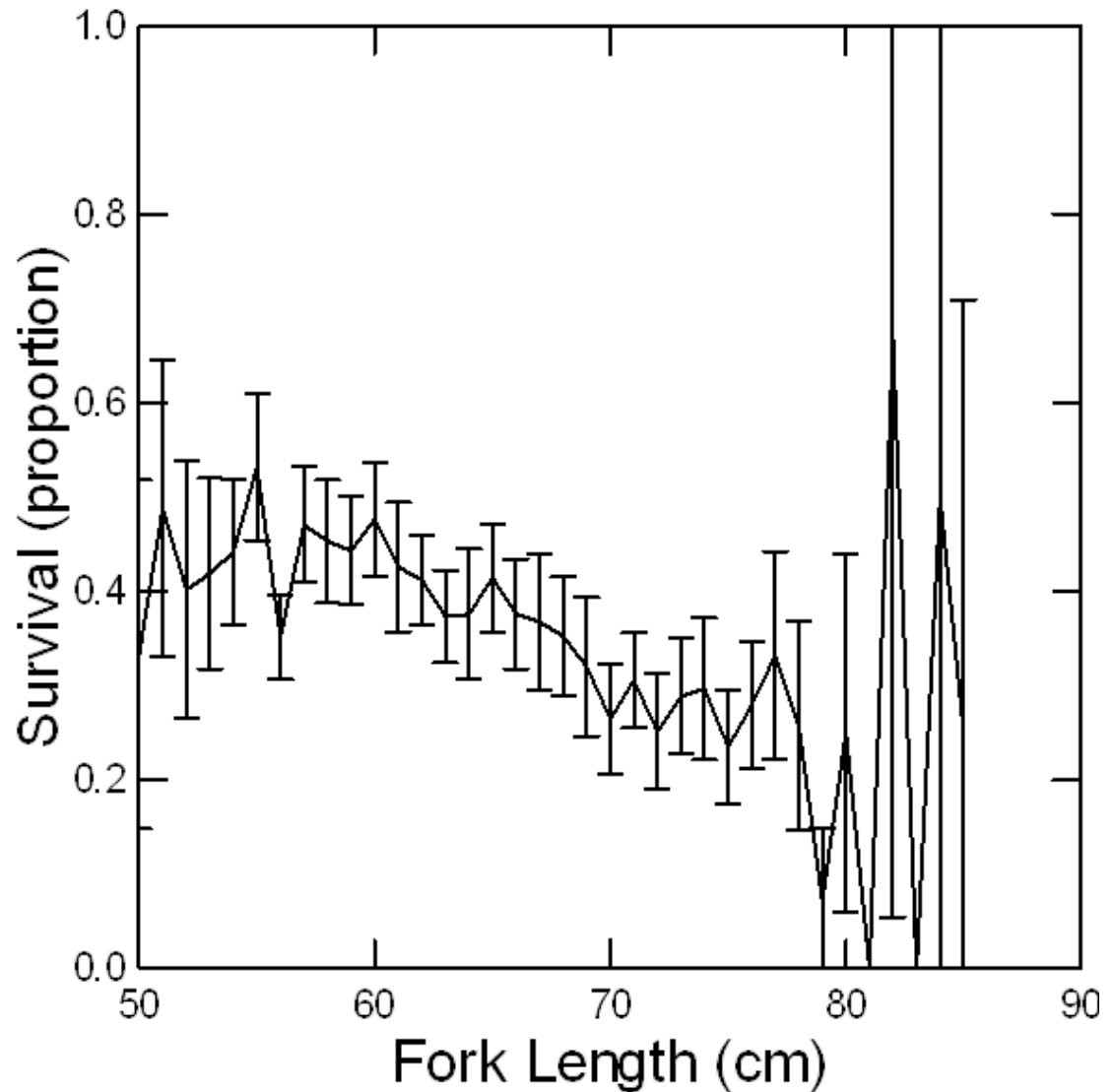
- Fish are rated as Bright-1; Medium-2; and Dark-3.
- Survivals are not significantly different among fish color ratings.



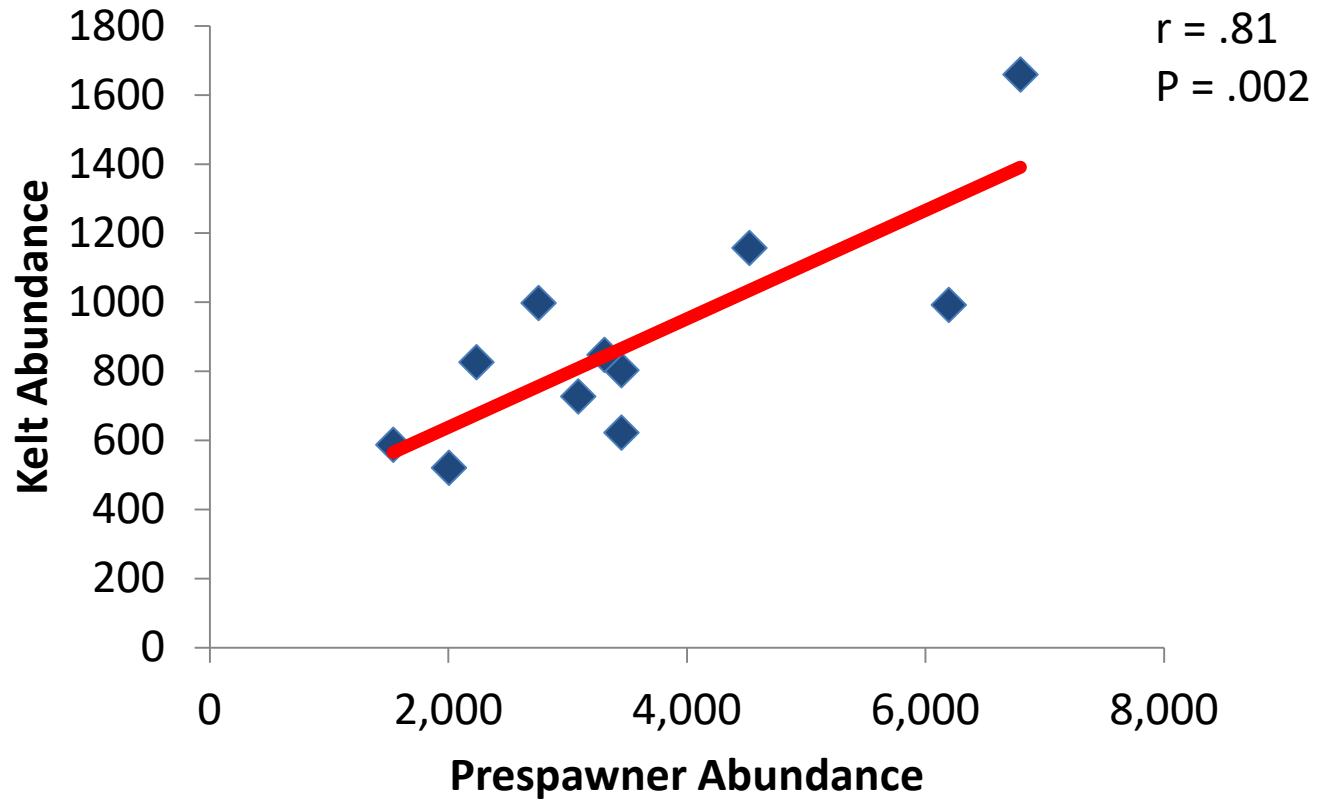
Survival and traits

Survival and fish fork length

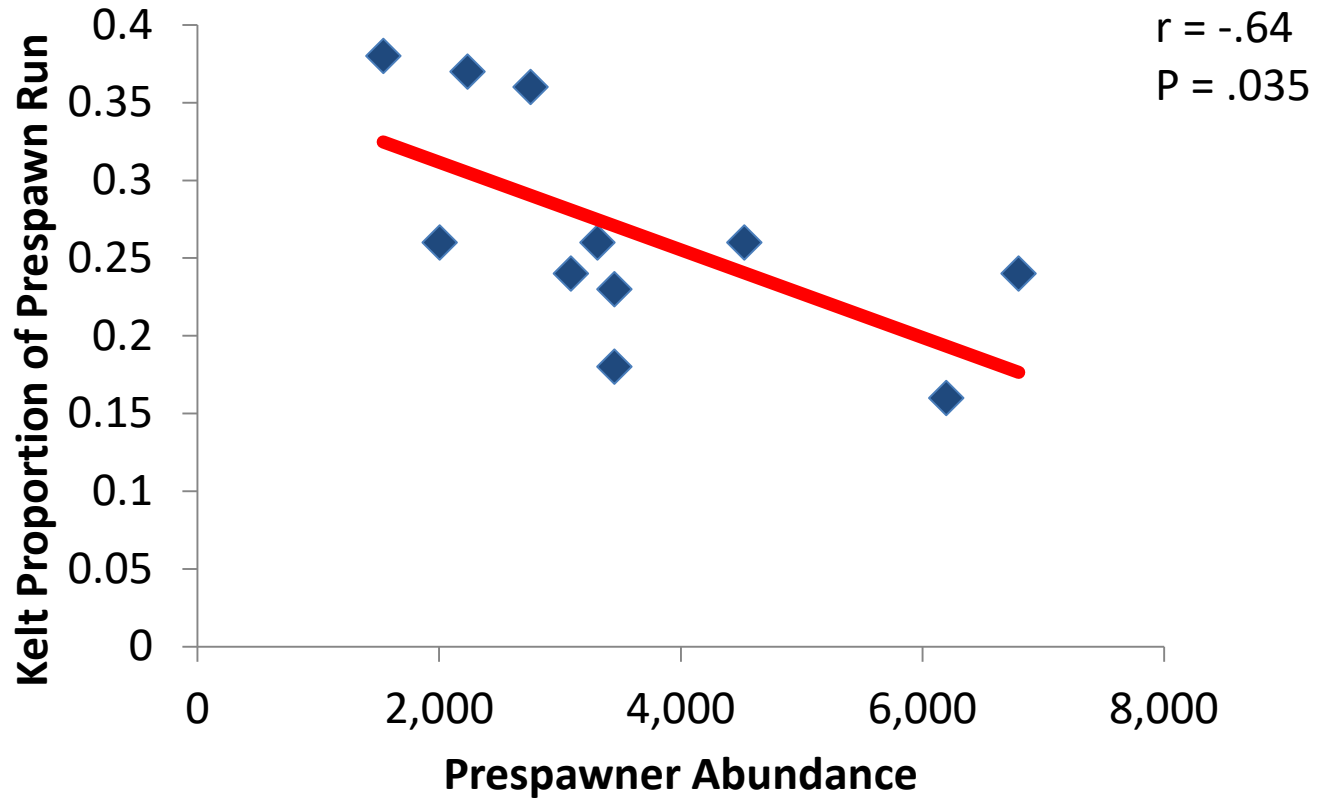
- There is a slight decrease in survival with increasing length.



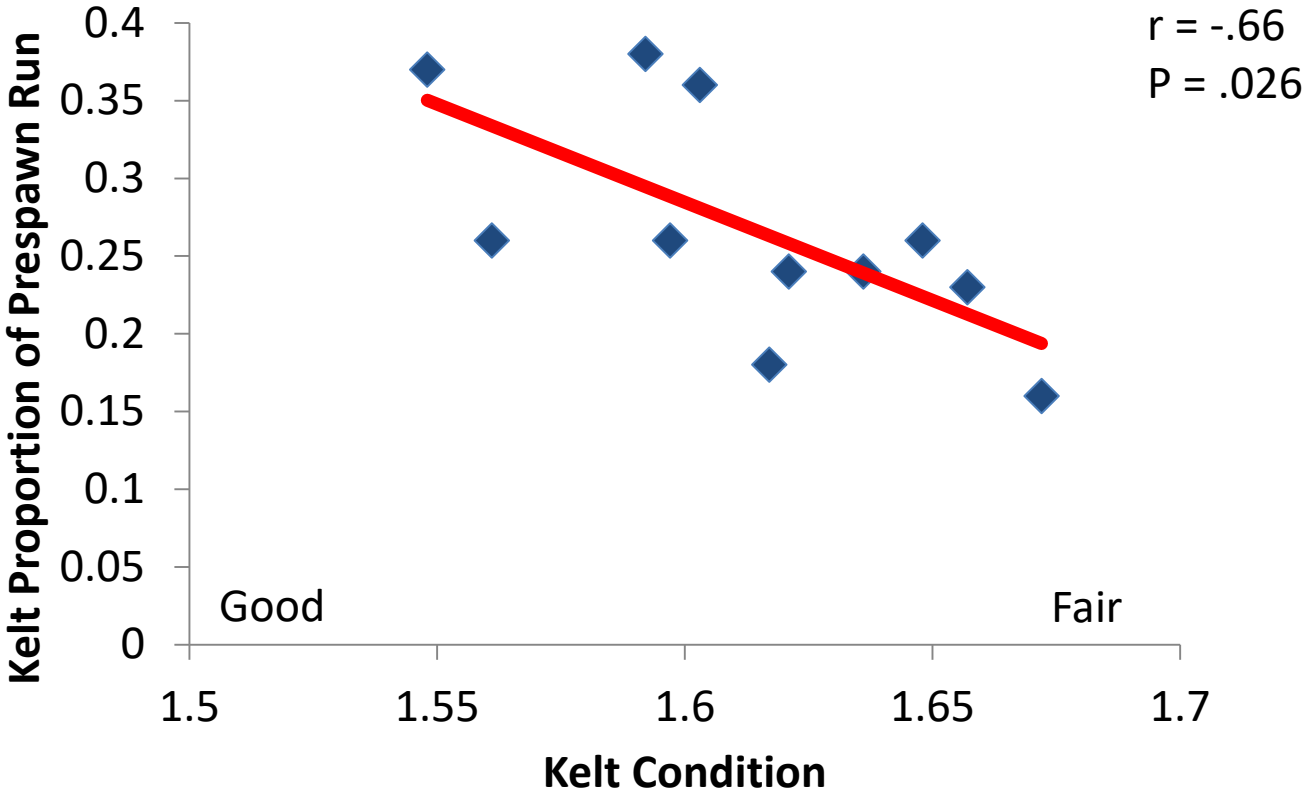
Survival and traits



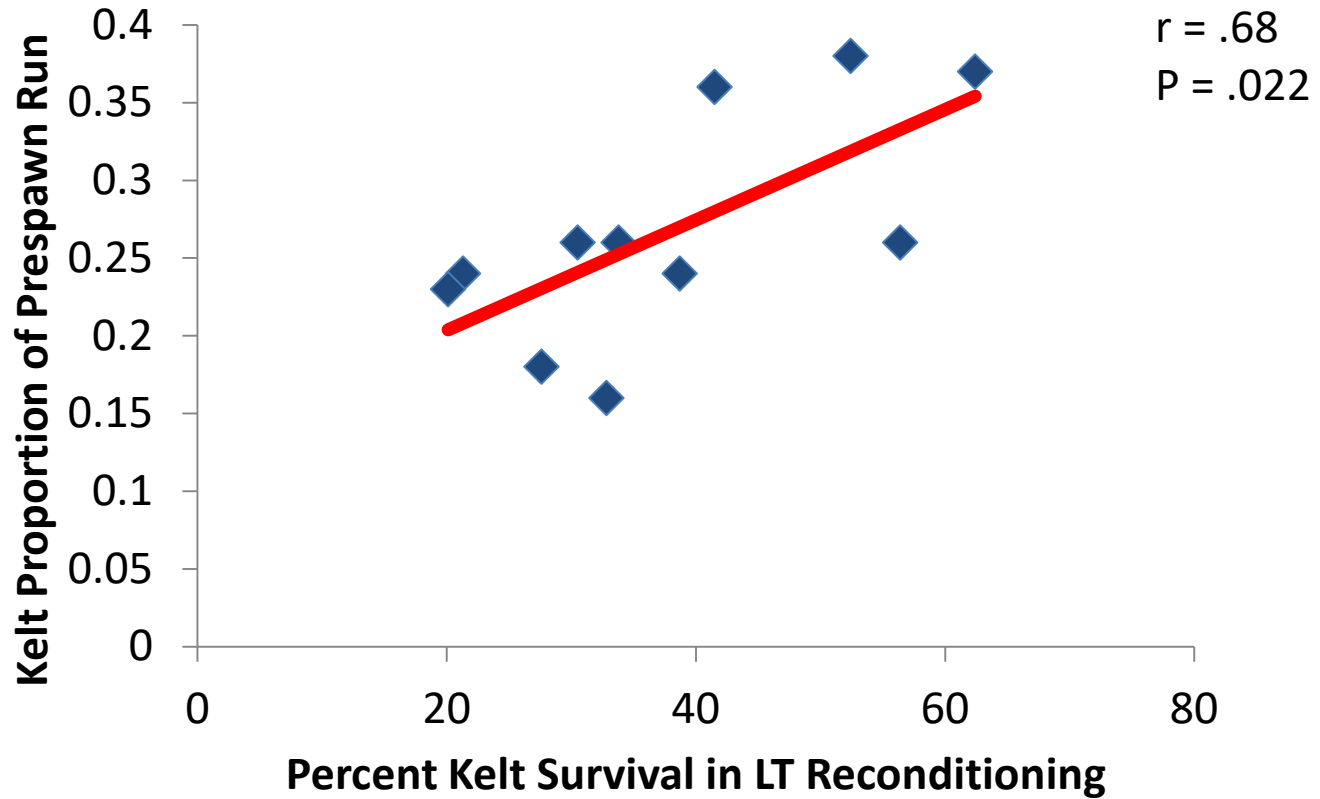
Survival and traits



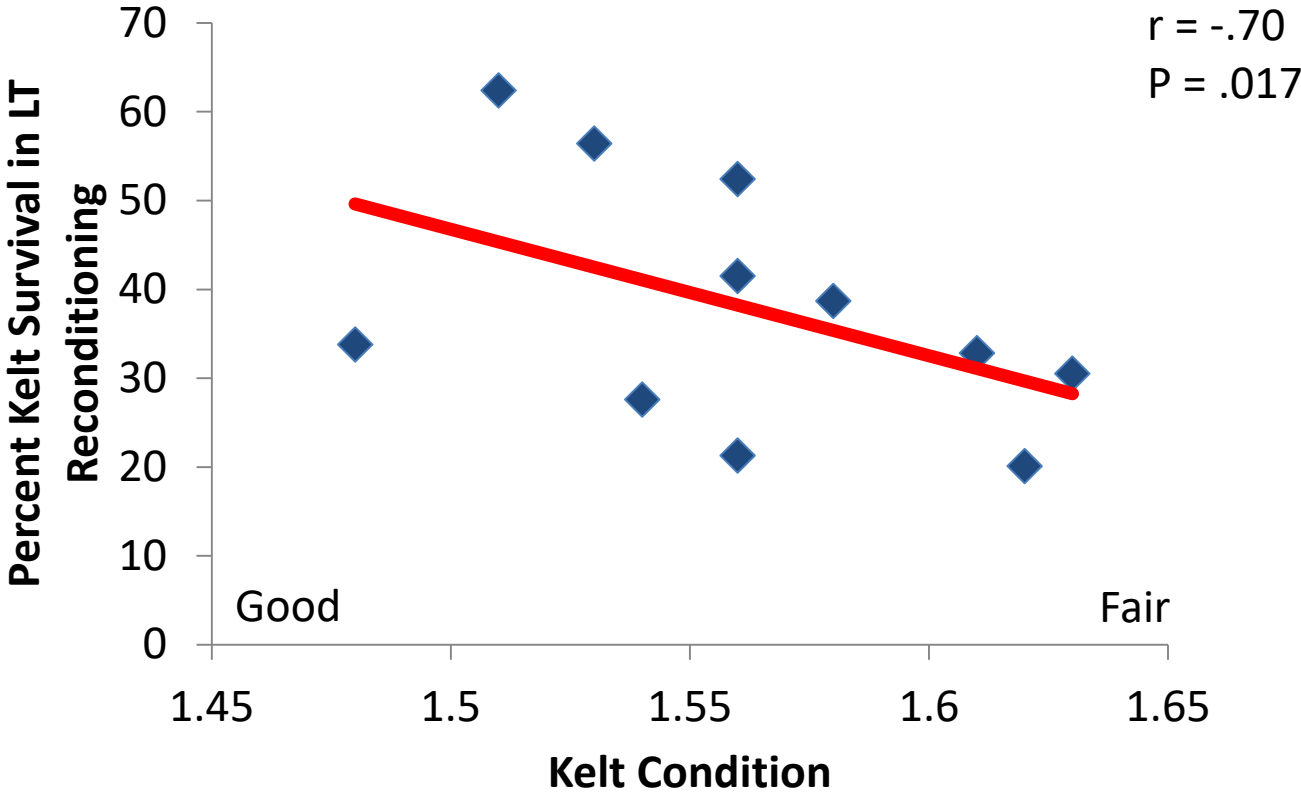
Survival and traits



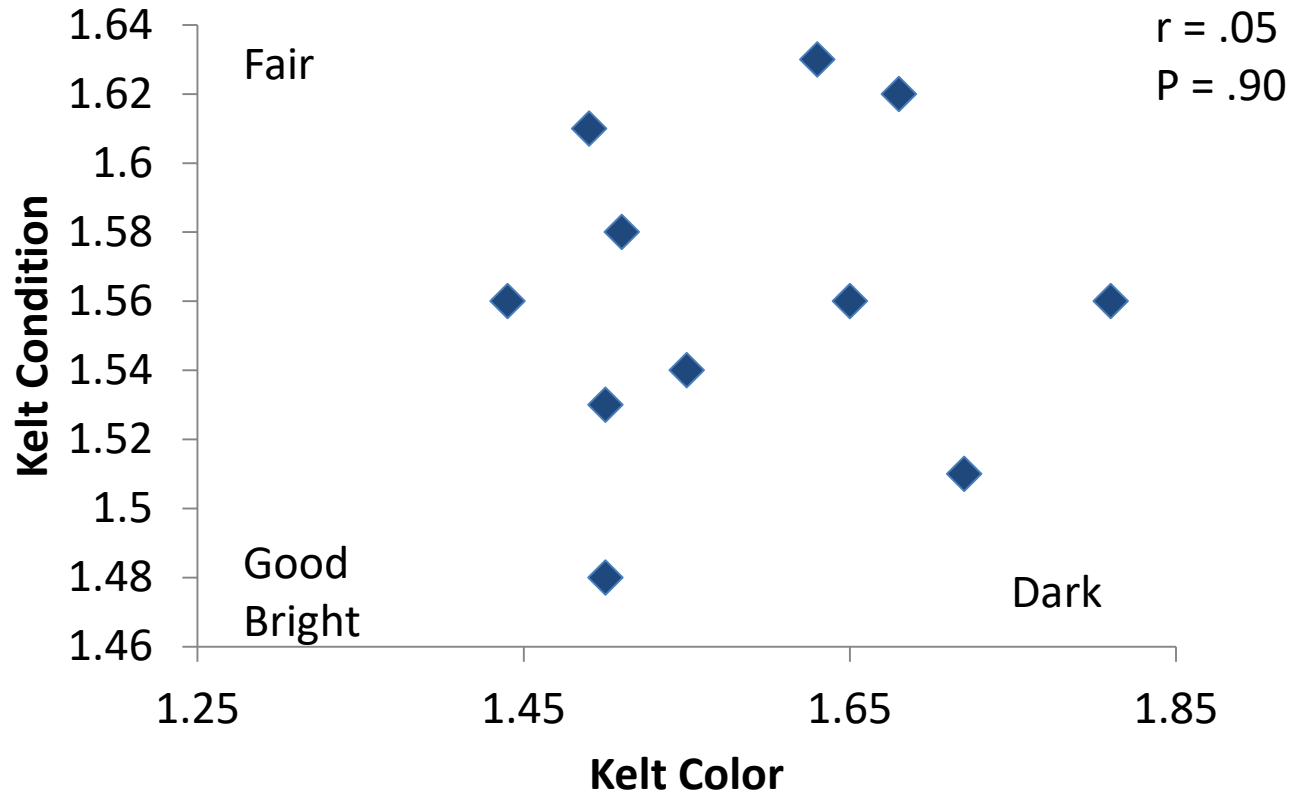
Survival and traits



Survival and traits



Survival and traits



Recommendations

- The empirical results we observed demonstrate the potential of kelt reconditioning to provide recovery benefits for imperiled wild repeat spawning populations in highly developed river systems.
- Fish condition, collection date, and pre-spawn abundance influenced reconditioning survival, suggesting that selection of fish at intake and the number of fish collected for reconditioning can be tailored to achieve program goals.



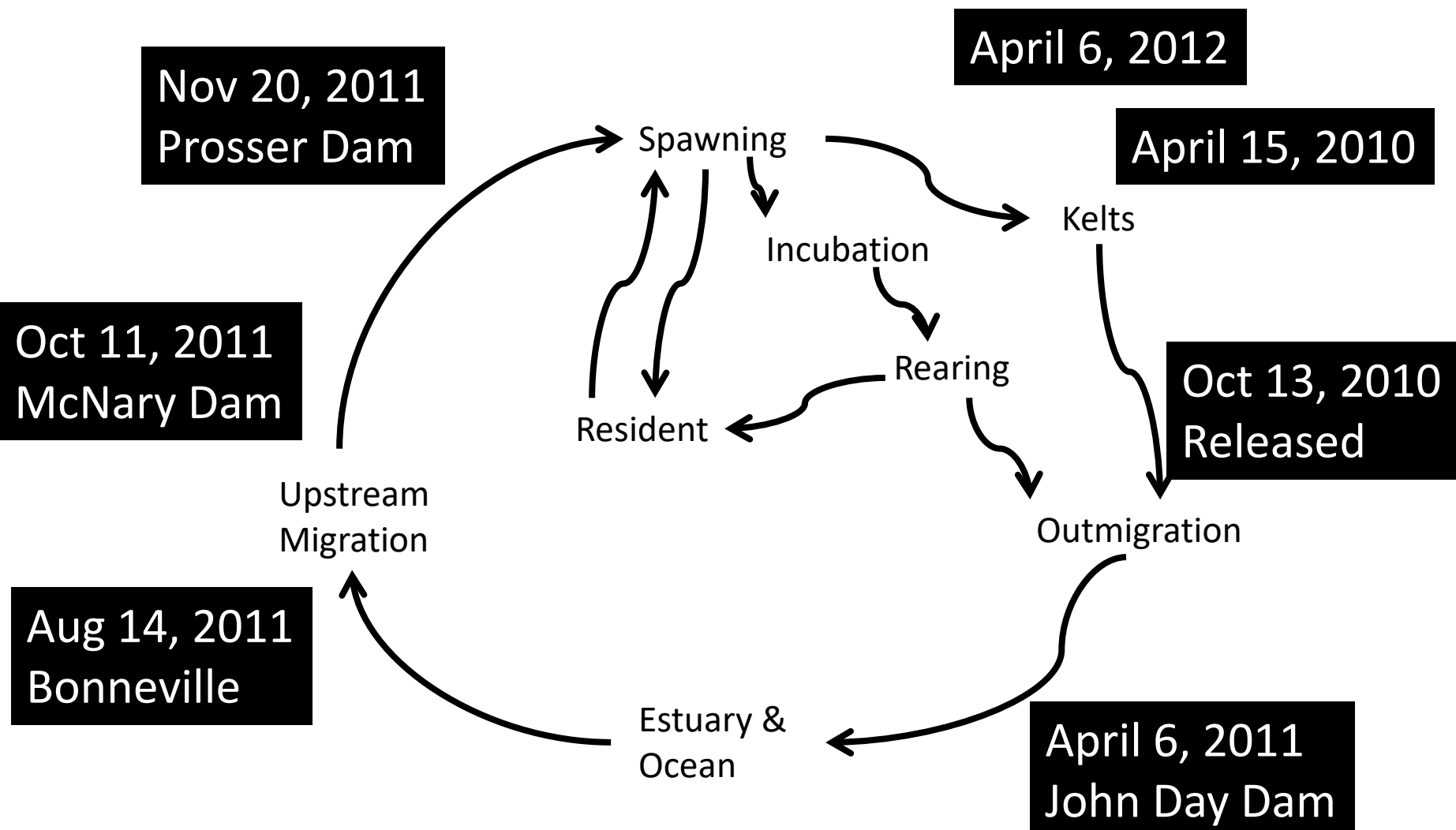
Recommendations

- Achieving reasonable survival rates by reconditioning wild kelt steelhead is a first step toward the development and implementation of this new stock recovery tool.
- Additional studies of the reproductive success of reconditioned kelts are required to quantify the benefit of the reconditioning program.



Questions





Skip spawner