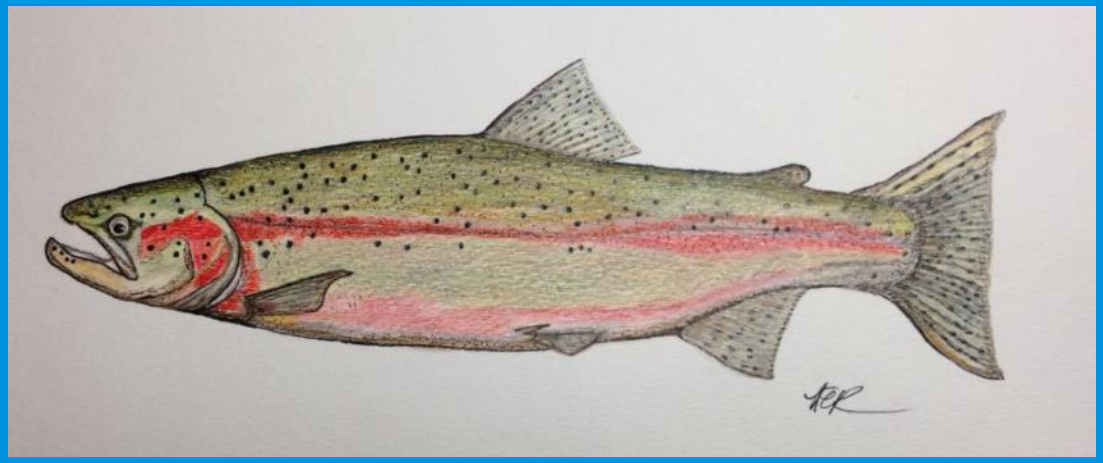
Patterns of Iteroparity in Snake River Steelhead Trout



Tim Copeland, Carlos Camacho, Brett Bowersox, Mike Ackerman, & Kristin Wright

Oncorhynchus mykiss in Idaho

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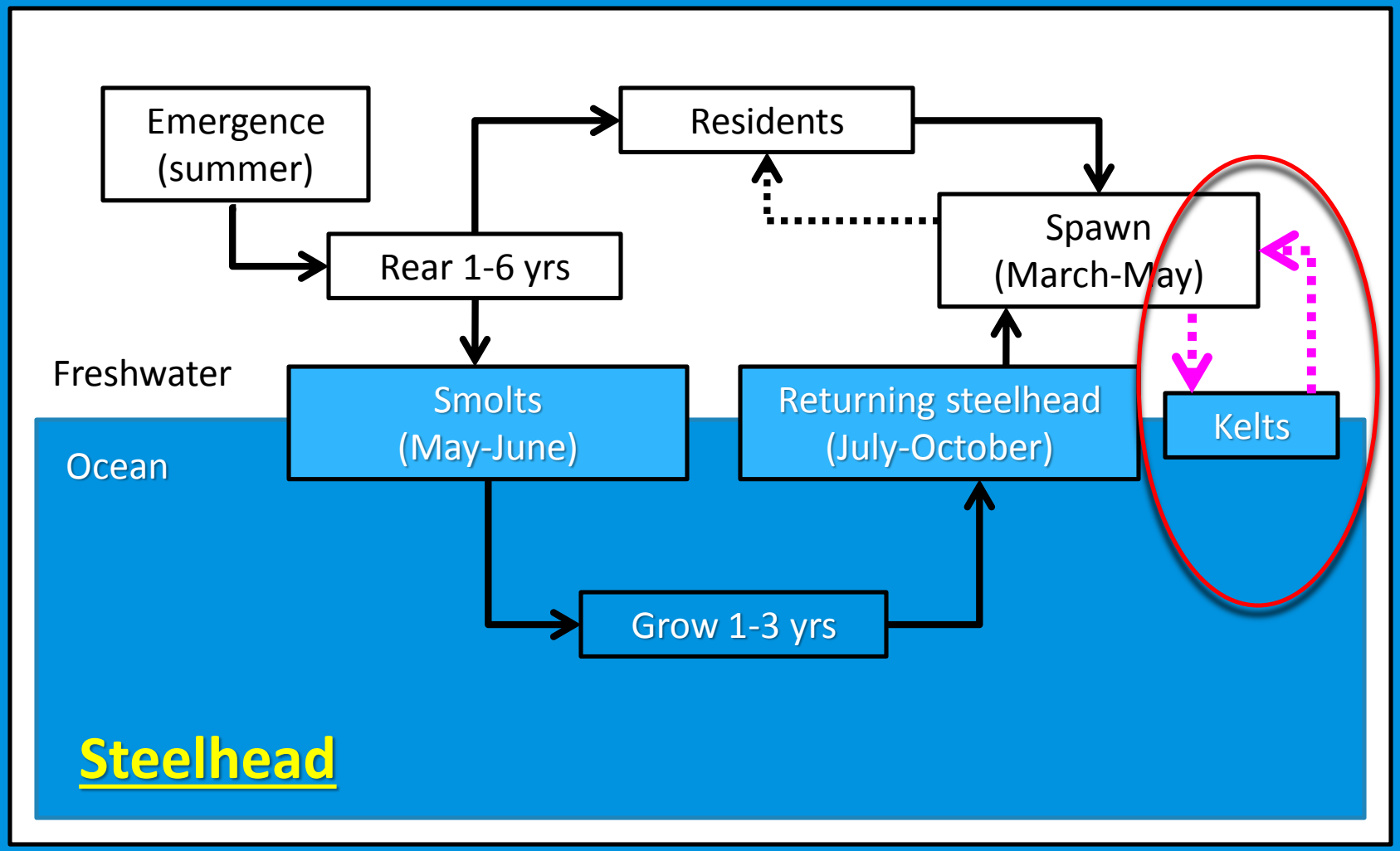


Repeat Spawning

- Iteroparity in steelhead & Atlantic salmon
  - Higher fitness on second spawn
  - Promotes population resilience & genetic diversity
  - High incidence closer to the ocean
- Snake River 2004-2010 ~0.5%
- Management for iteroparity
  - Hydro-dam operations
    (Extensive)
  - Collect & re-condition
    (Intensive)

Repeat Spawner?

Goal & Objectives

- Information to evaluate wild steelhead mgt

✓ Estimate 2010-2017 iteroparity rates

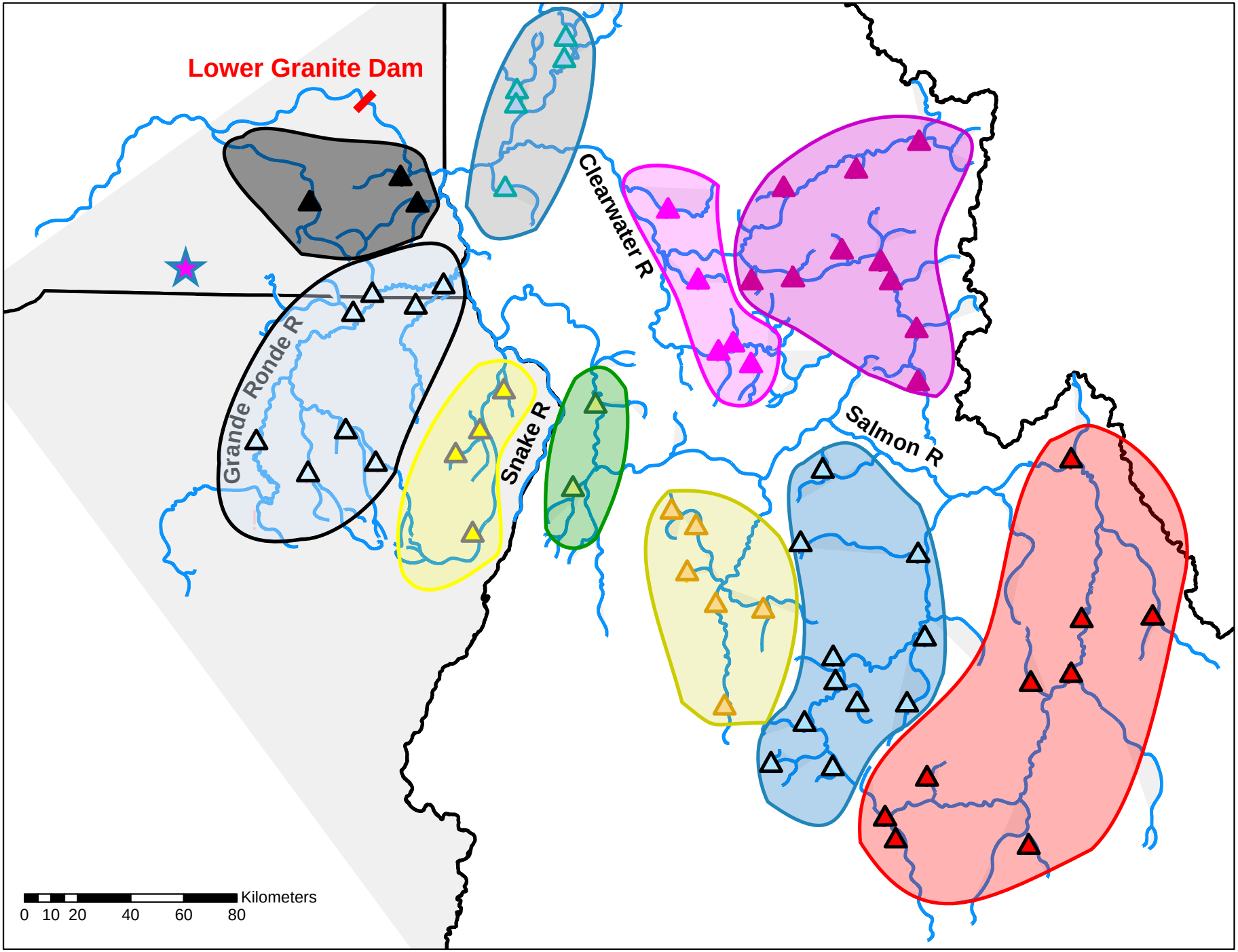
✓ Describe characteristics (age, sex, skipping)

✓ Estimate survival from first to next spawn

  – Test for biological influences (stock, timing, etc)

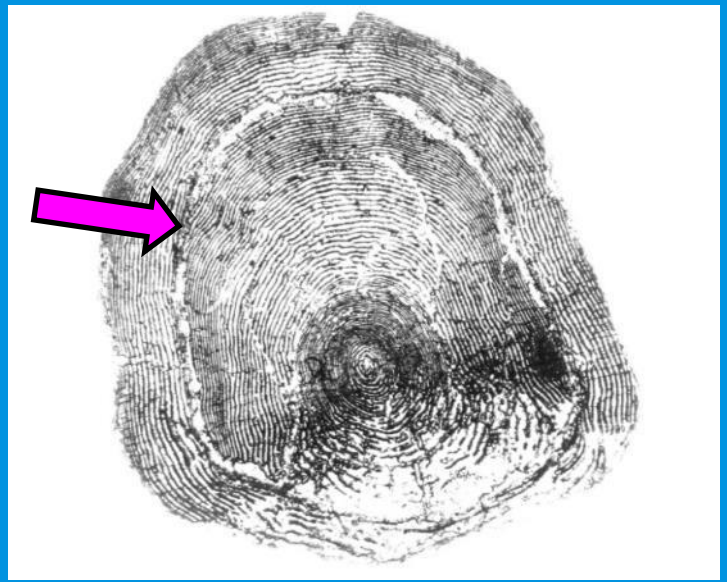
Lower Granite Dam

- Biological sampling- scales, genetics
- PIT tagging- survival to post-spawn & repeat
  - Separation by code to boost biological sample

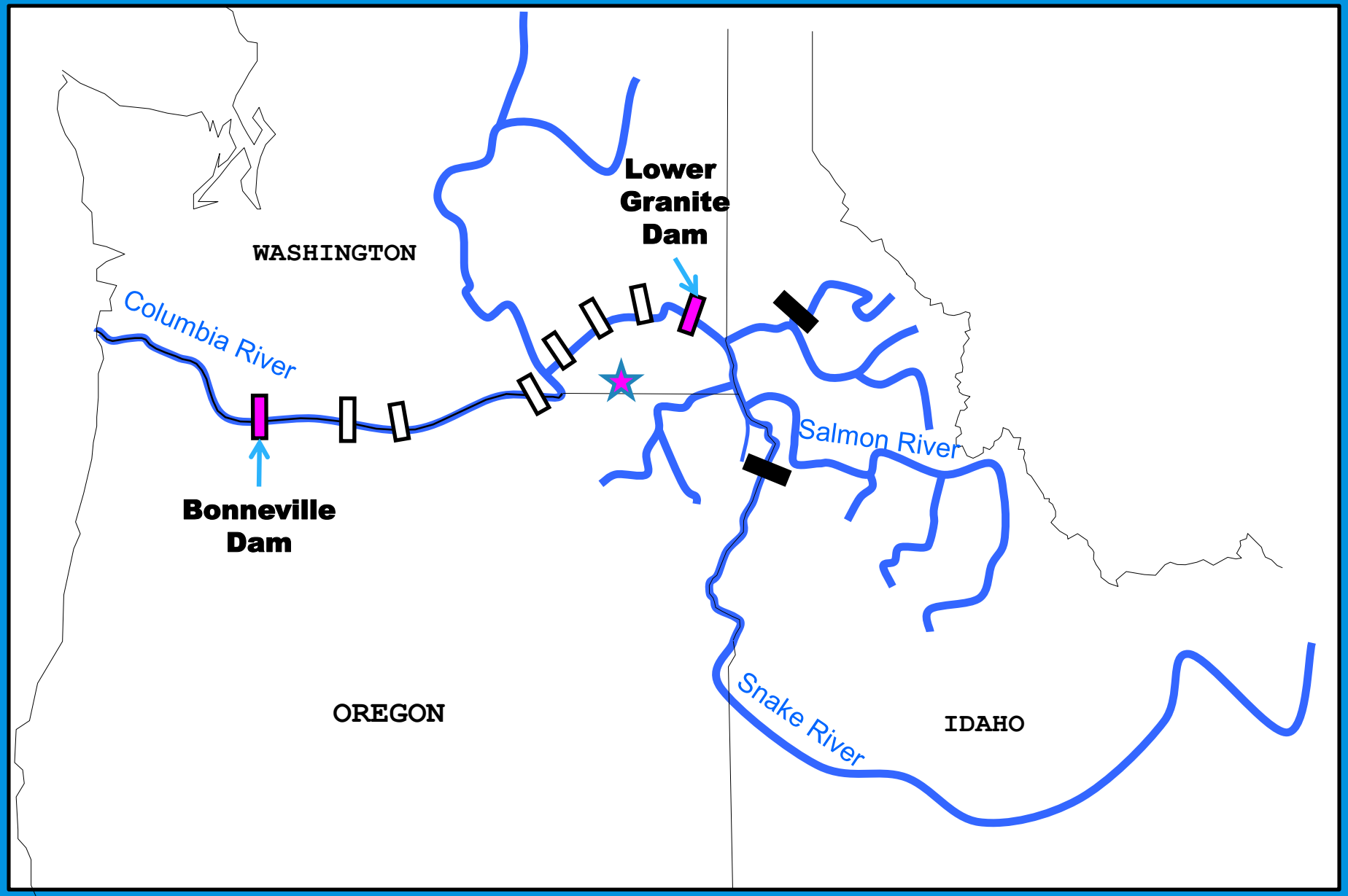

Lower Granite Dam
Clearwater R
Grande Ronde R
Snake R
Salmon R
Kilometers
0 10 20 40 60 80

Data Analyses

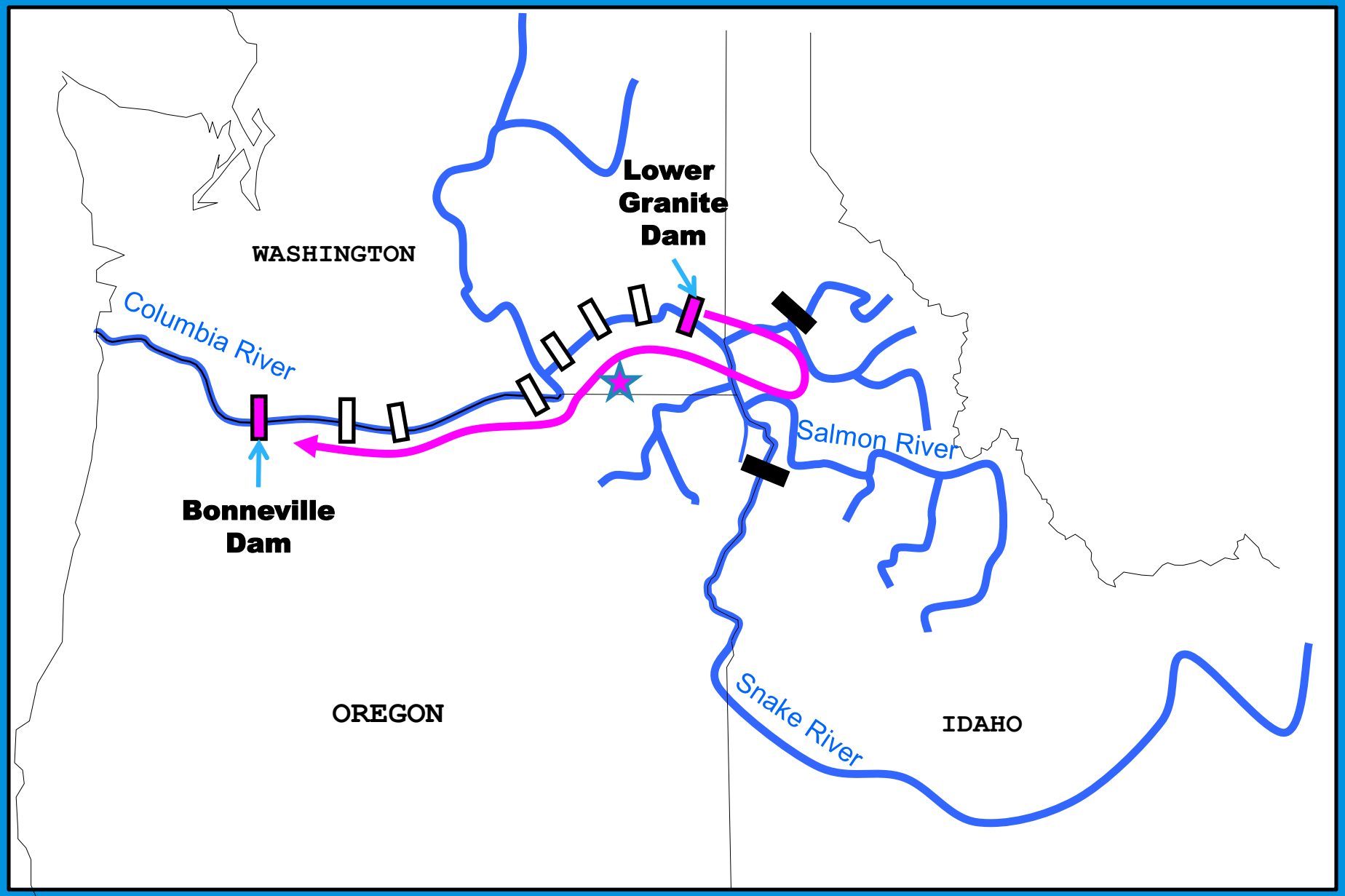
- Abundance by spawn years 2010-2017
- Summarize life history characteristics
  - Growth in length between spawns
- Estimate survival from first to next spawn
  - Important factors 2010-15 (length, sex, etc)



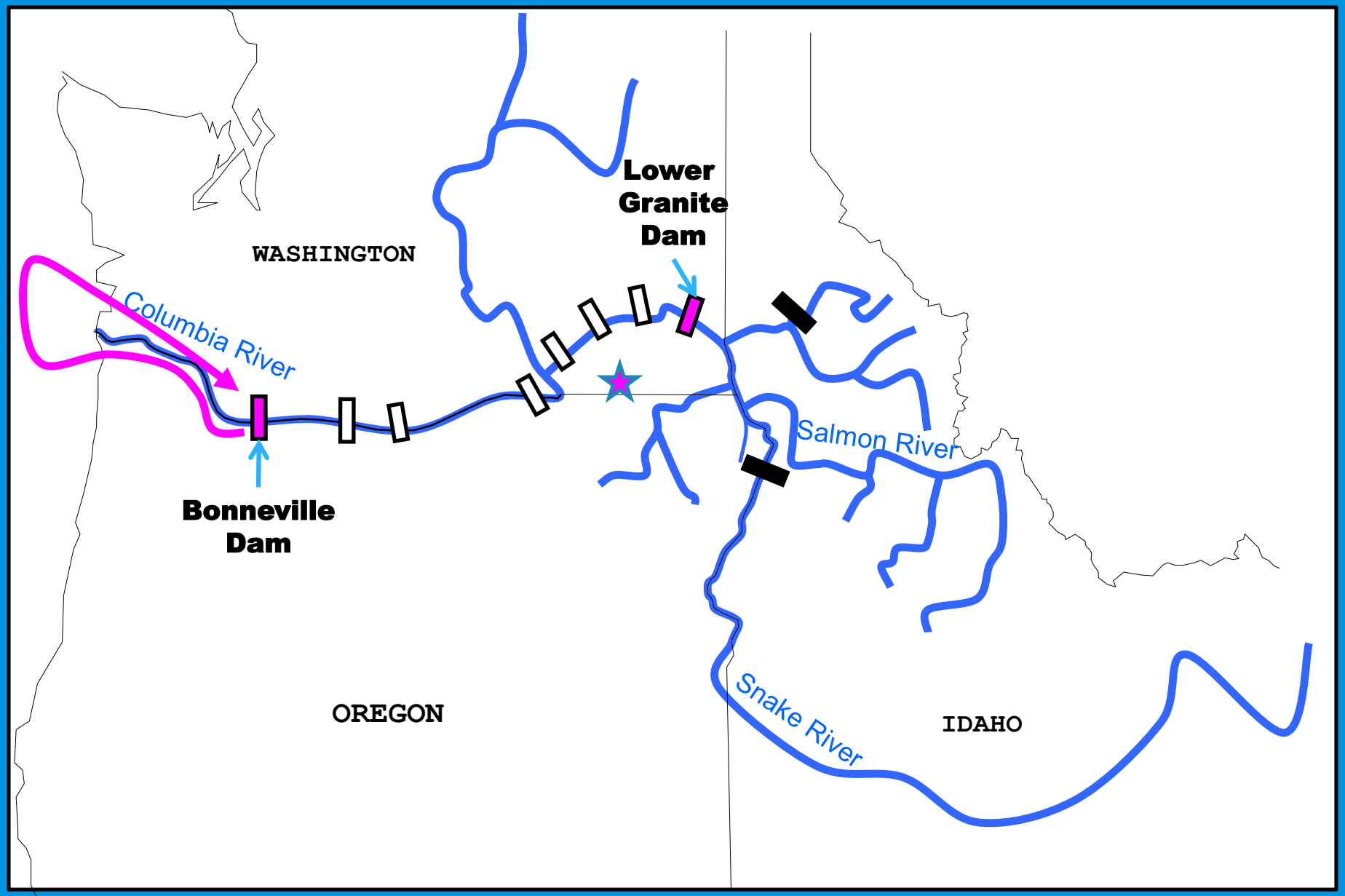
Road to Repeat



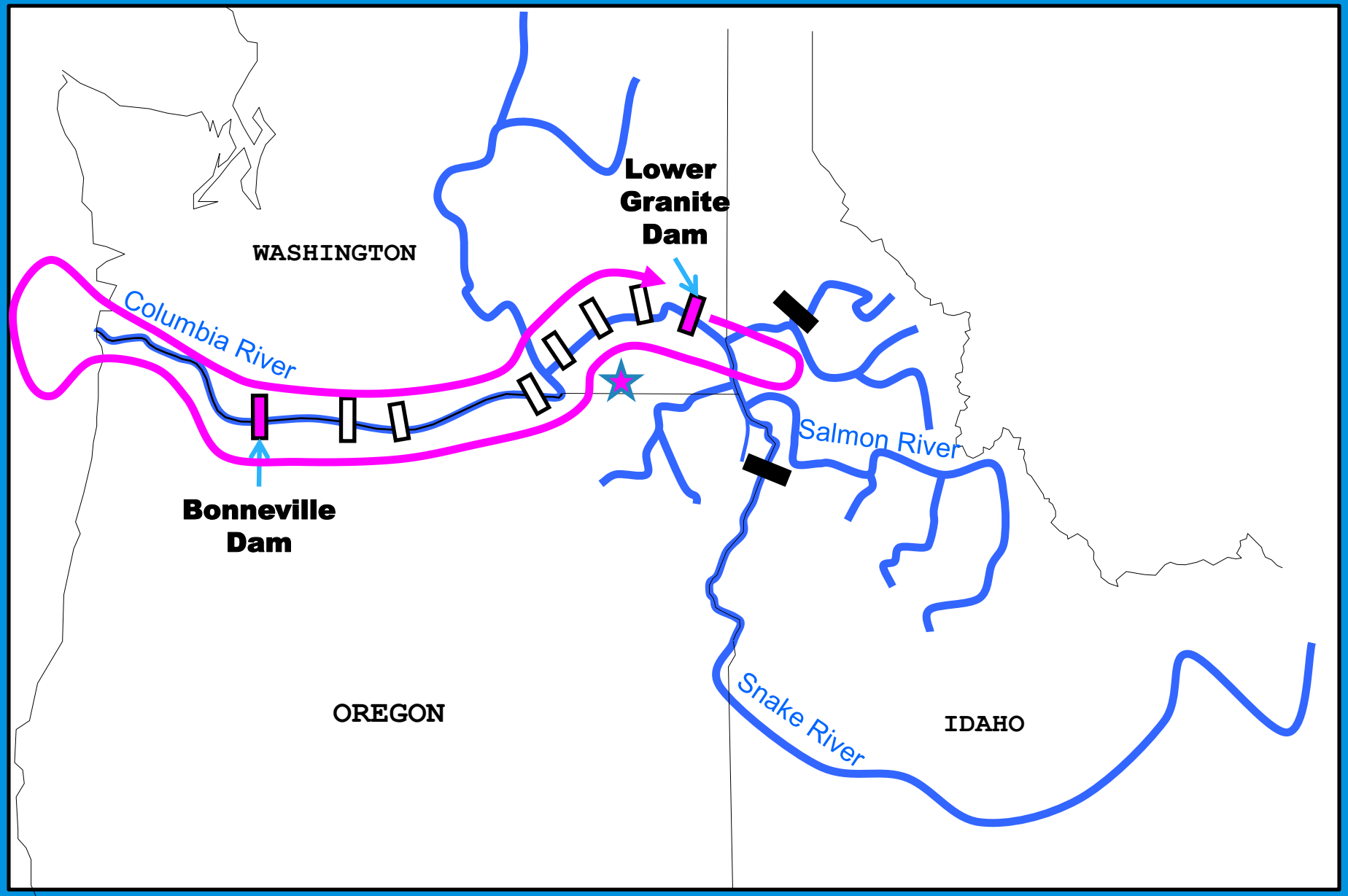
Road to Repeat



Road to Repeat

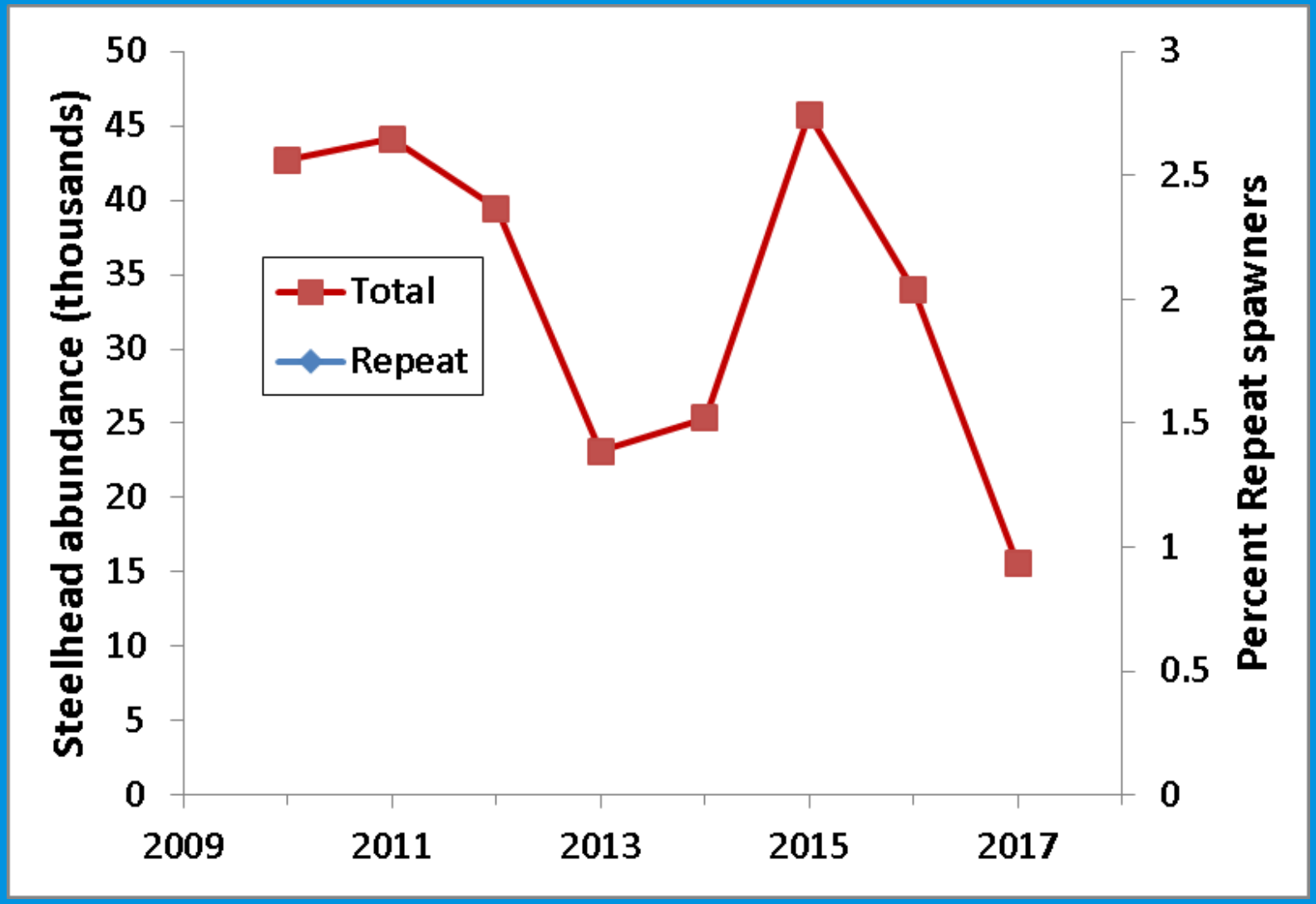


Road to Repeat

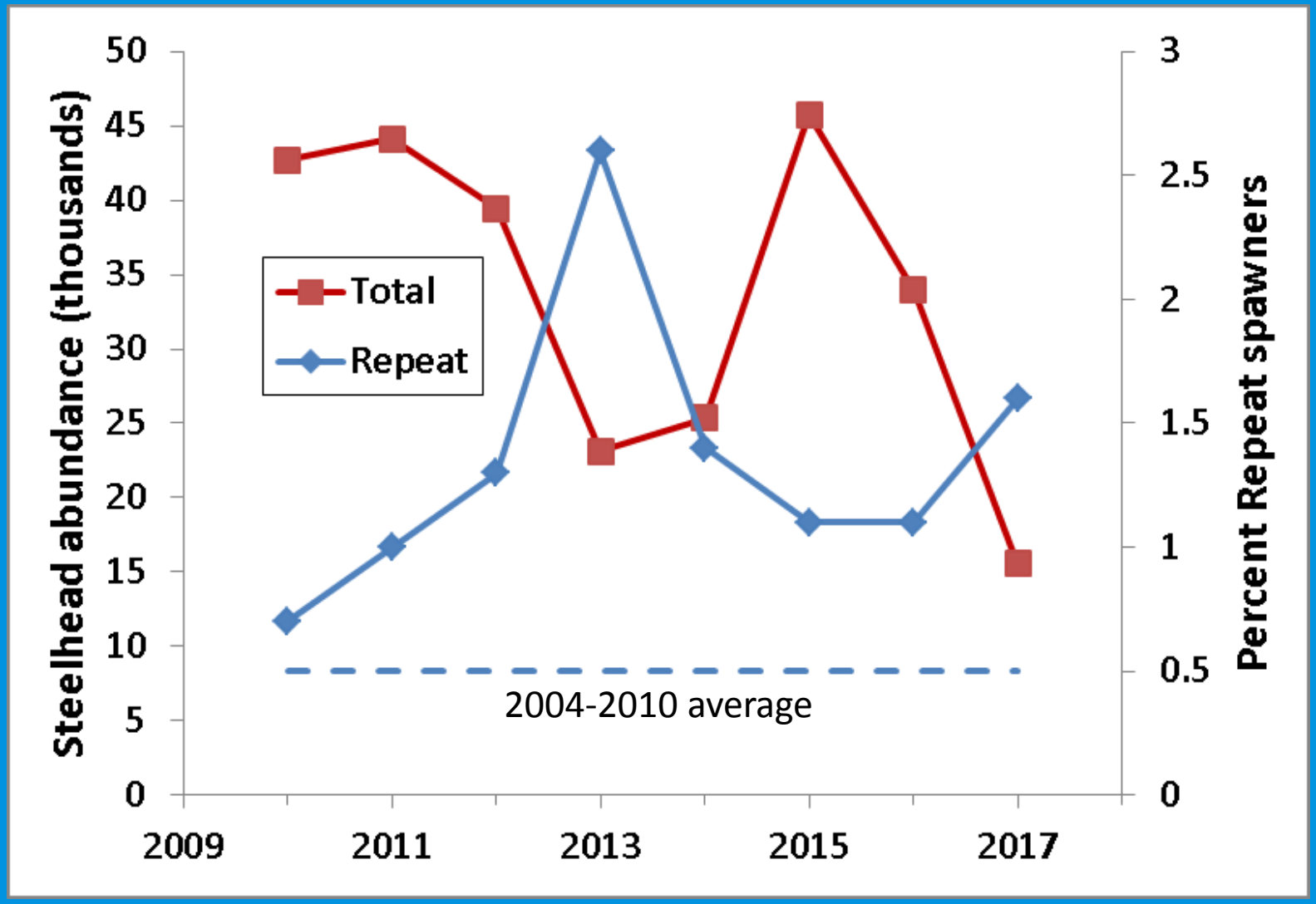


Results

Repeat Spawner Abundance

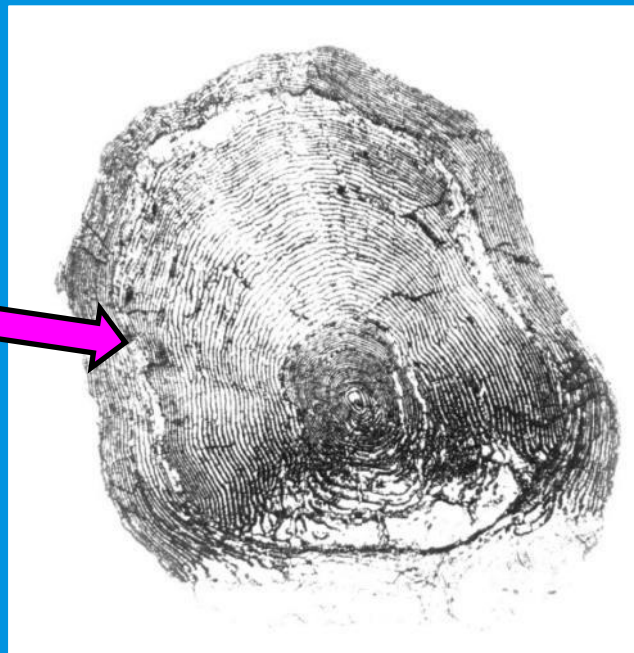


Repeat Spawner Abundance

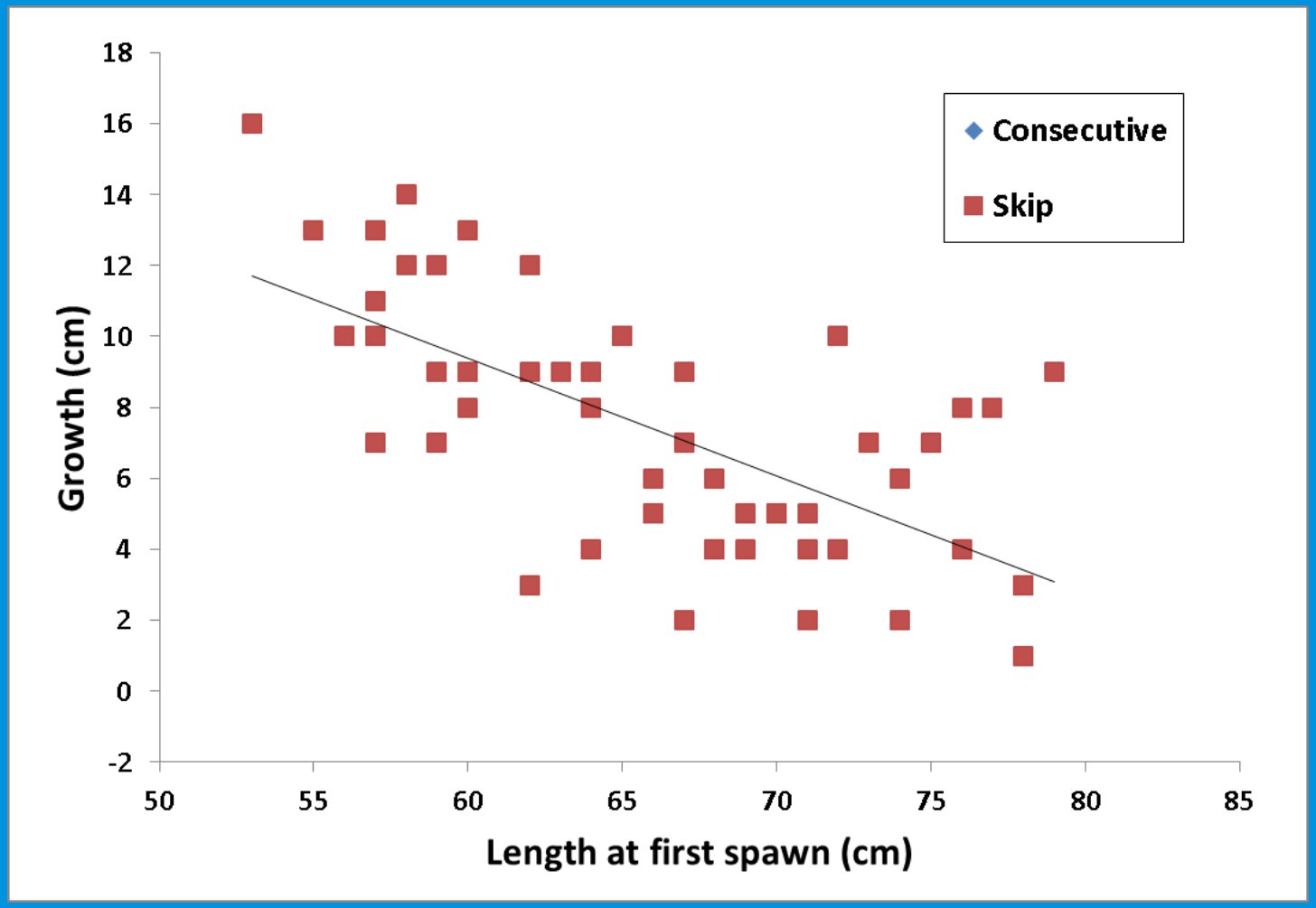


Repeat Spawner Characteristics

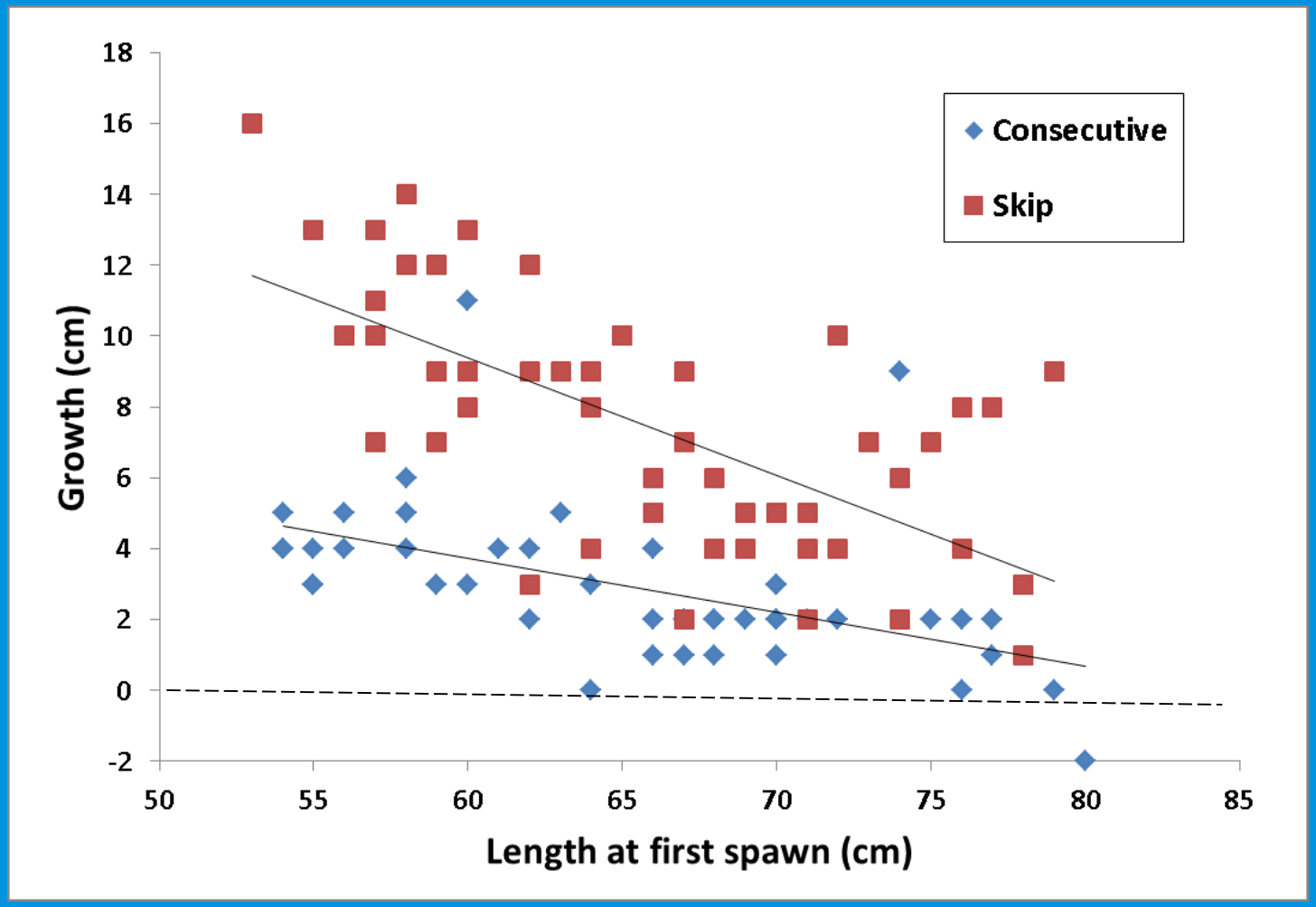
- From all stocks (n=308)
- 90% female
- 52% first spawned after 1 yr in ocean
- 58% skipped a year between spawns
- A few on third migration (n=3)



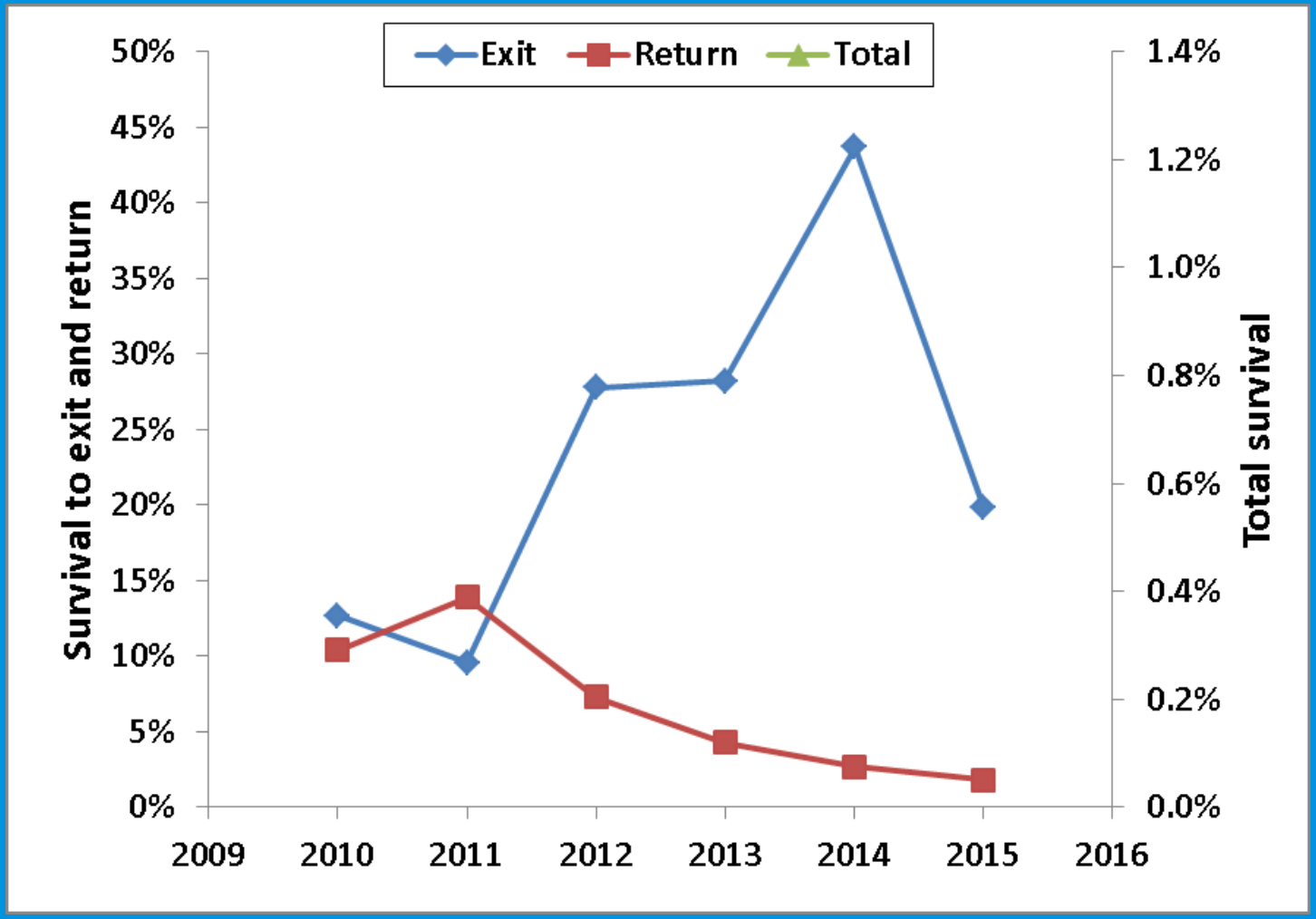
Growth between Spawns



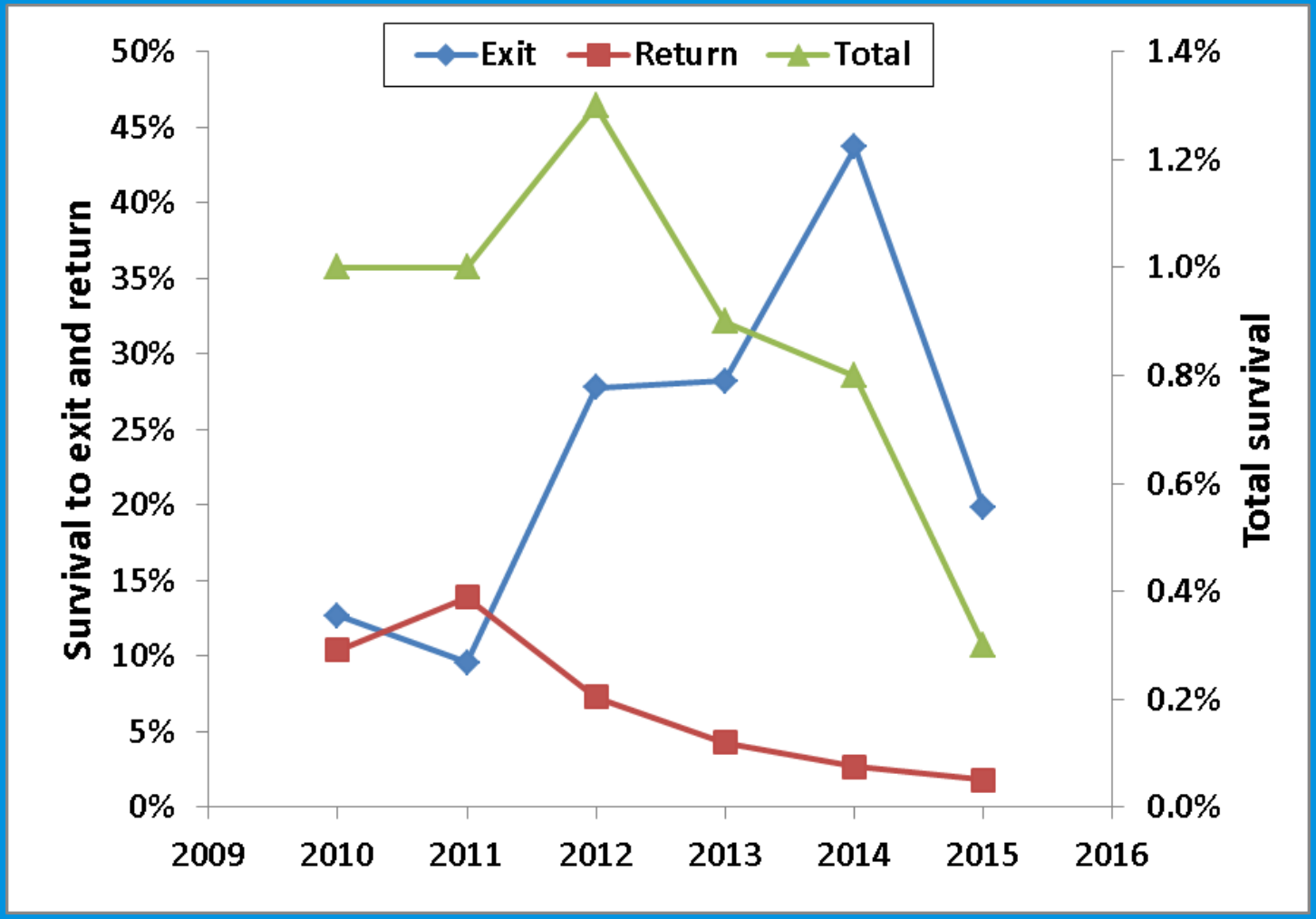
Growth between Spawns



Survival of PIT-tagged Spawners



Survival of PIT-tagged Spawners

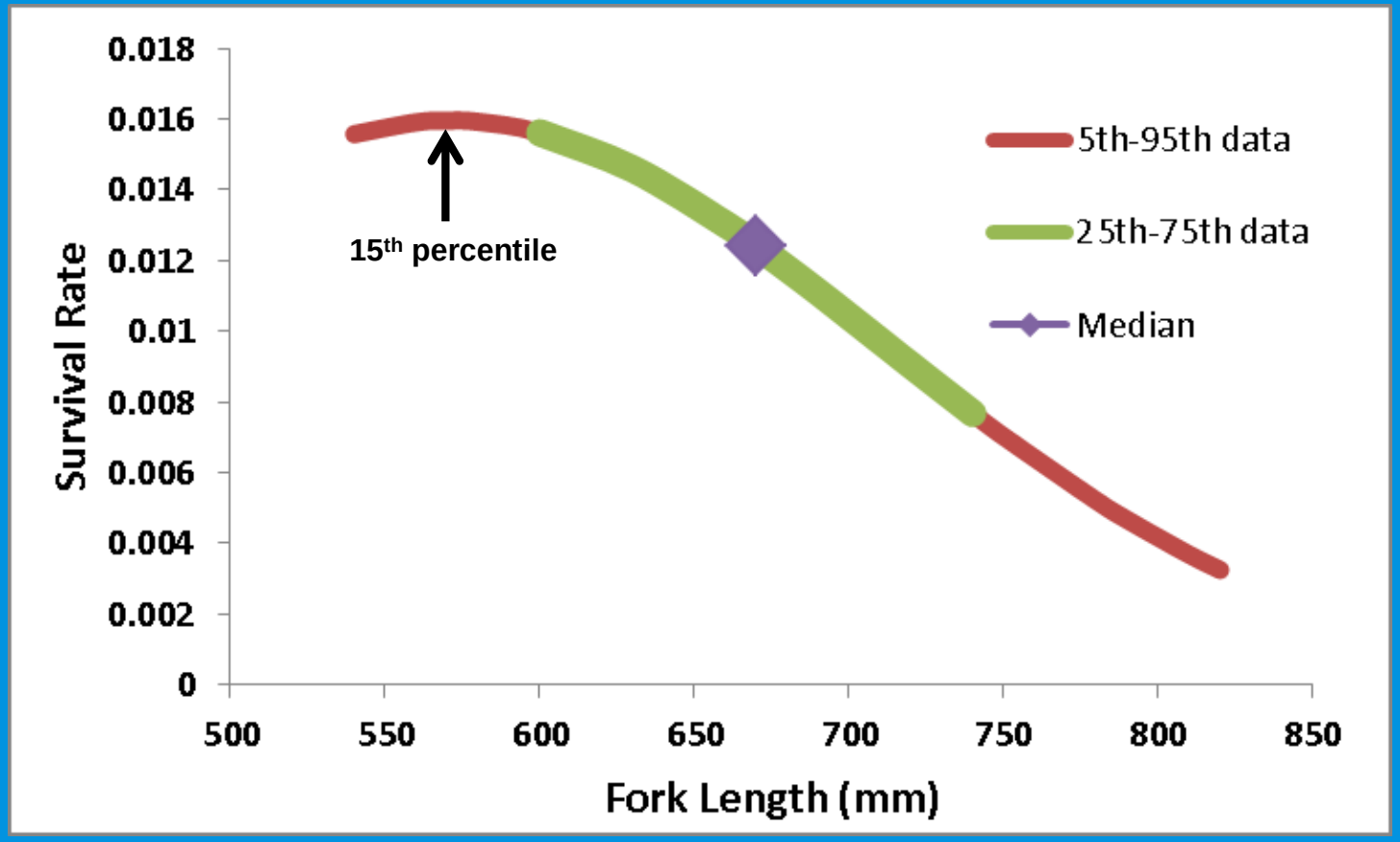


Influences on Survival to Repeat

	Spawn to Repeat	Spawn to Kelt	Kelt to Repeat
Sex	Females 3.6x better	Females 2.6x better	NS
Stock	Gr Ronde better 3.0x SF Salmon 2.4x Upper Clearwater	Gr Ronde better 1.8x SF Clearwater 1.6x Upper Clearwater	NS

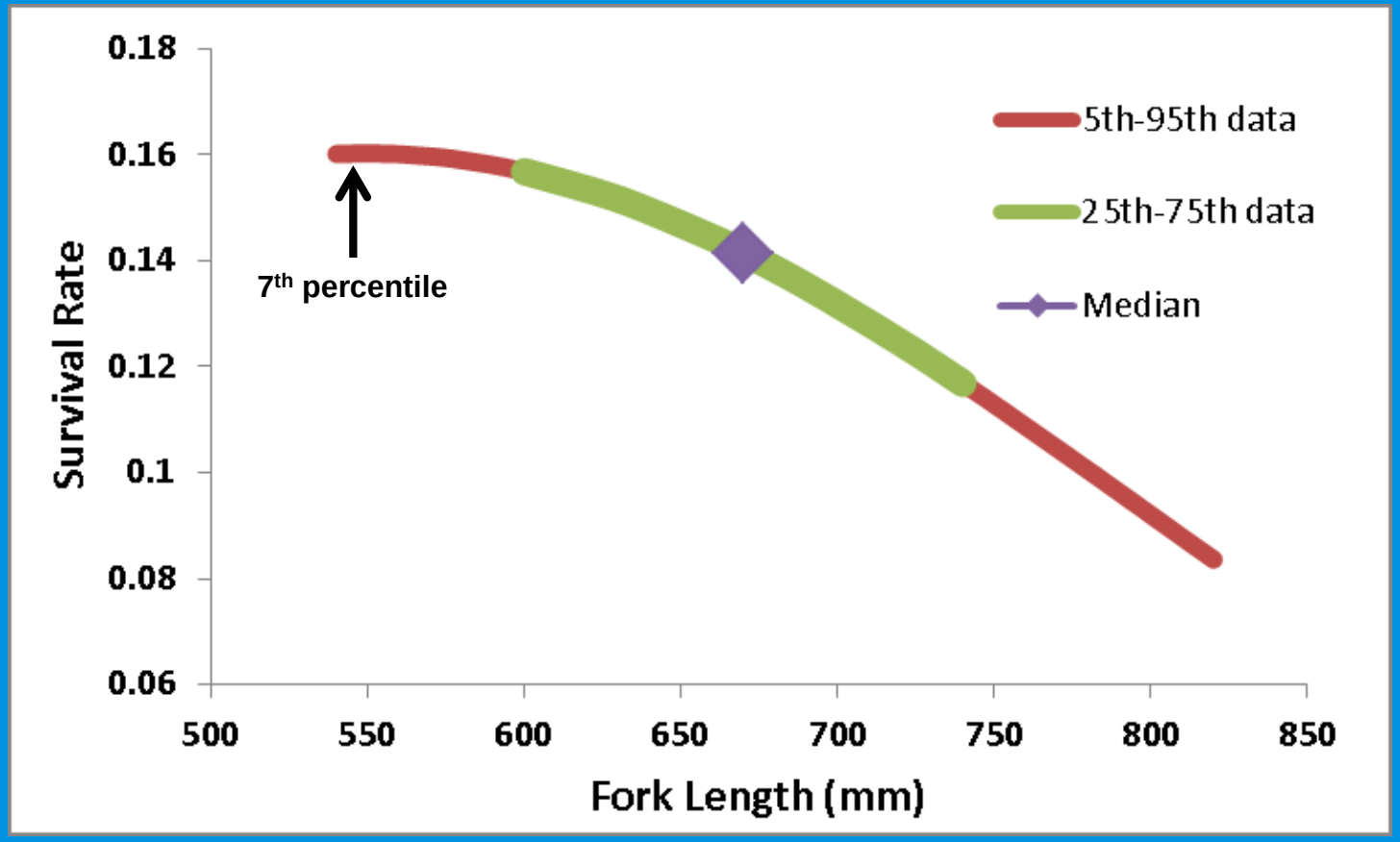
Length Effect on Survival

First to Second Spawn



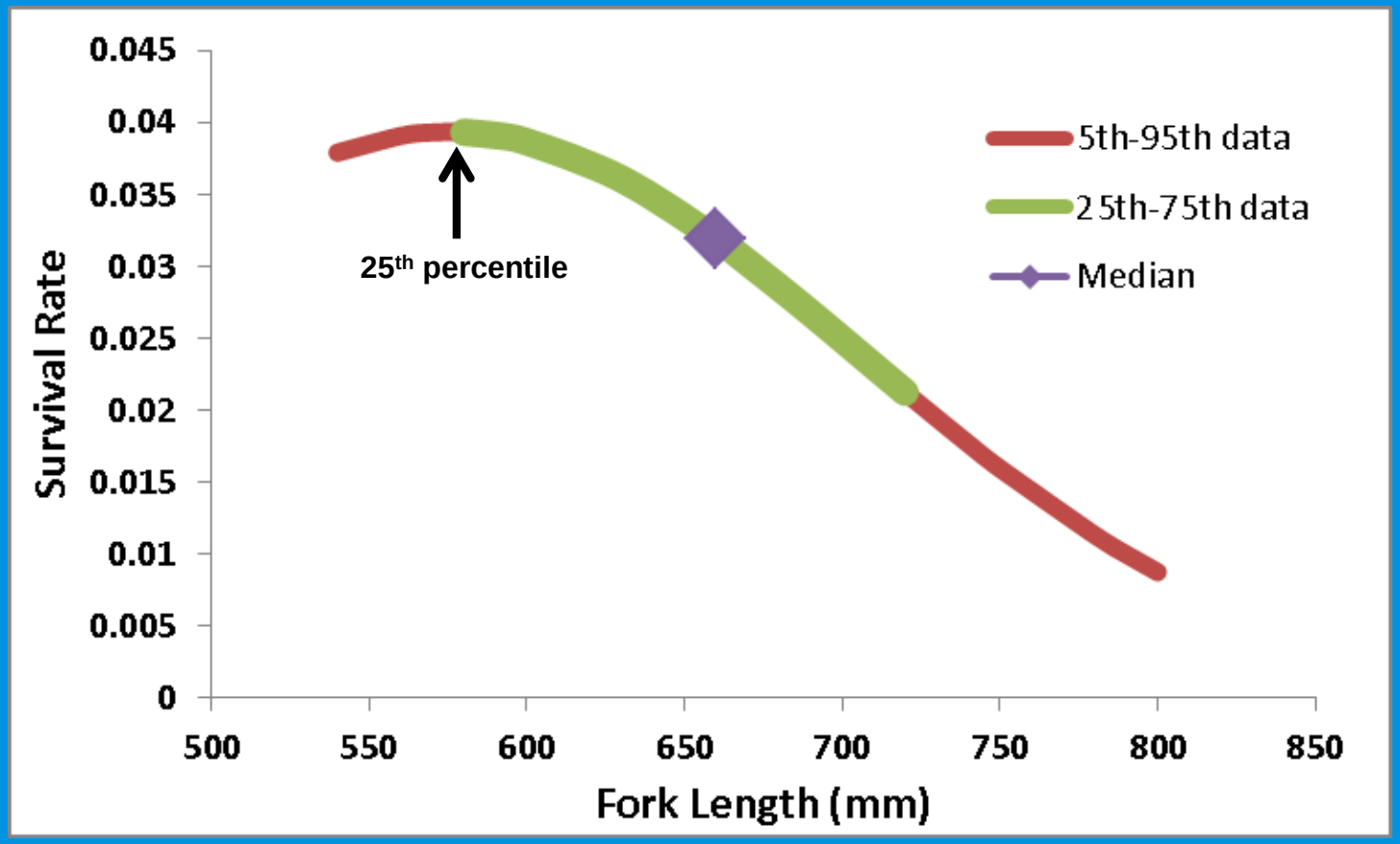
Length Effect on Survival

First Spawn to Kelt Emigration



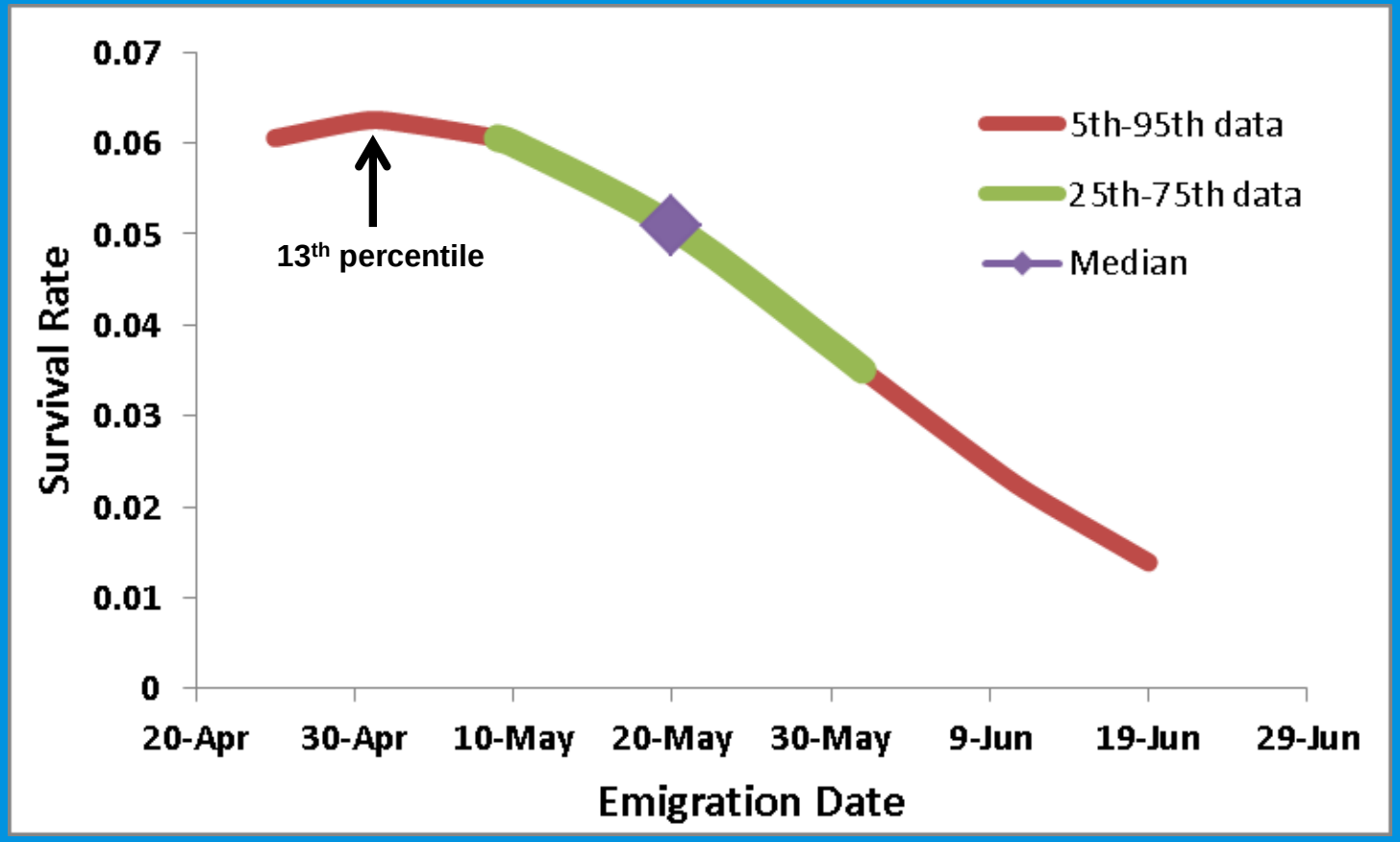
Length Effect on Survival

Kelt Emigration to Second Spawn



Emigration Date Effect on Survival

Kelt Emigration to Second Spawn



Influences on Survival to Repeat

- Size (smaller fish better)
- Sex (females better)
- Stock (older, larger stocks worse)
- From first spawn to kelt
  - Similar sex, stock effects
- From kelt to repeat
  - Length significant
  - Emigration timing

Summary & Conclusions

- Repeat spawning is at low levels (0.7%-2.6%)
  - Abundance follows larger spawning runs
  - Higher than early 2000's (~0.5%)
- Repeat spawners in all stocks
  - Small females most likely to repeat
- Post-spawn survival trends in FW & SW offset
  - Until 2015 poor ocean conditions

Management for Iteroparity

- Constrained by migratory rigor & refueling
  - Currently rare; likely never high %
- Difficulties for reconditioning
  - Most kelts trying to skip a year
  - Benefits limited for larger fish
- Hydro changes benefitted kelts
  - Poor estuary/ocean survival
- Important element of life history diversity
  - More Steelhead ⇔ More Iteroparity