

Steelhead Spawning Patterns in the Klickitat River Subbasin - Hatchery/Wild, Summer/Winter, and Genetic Stock Interactions

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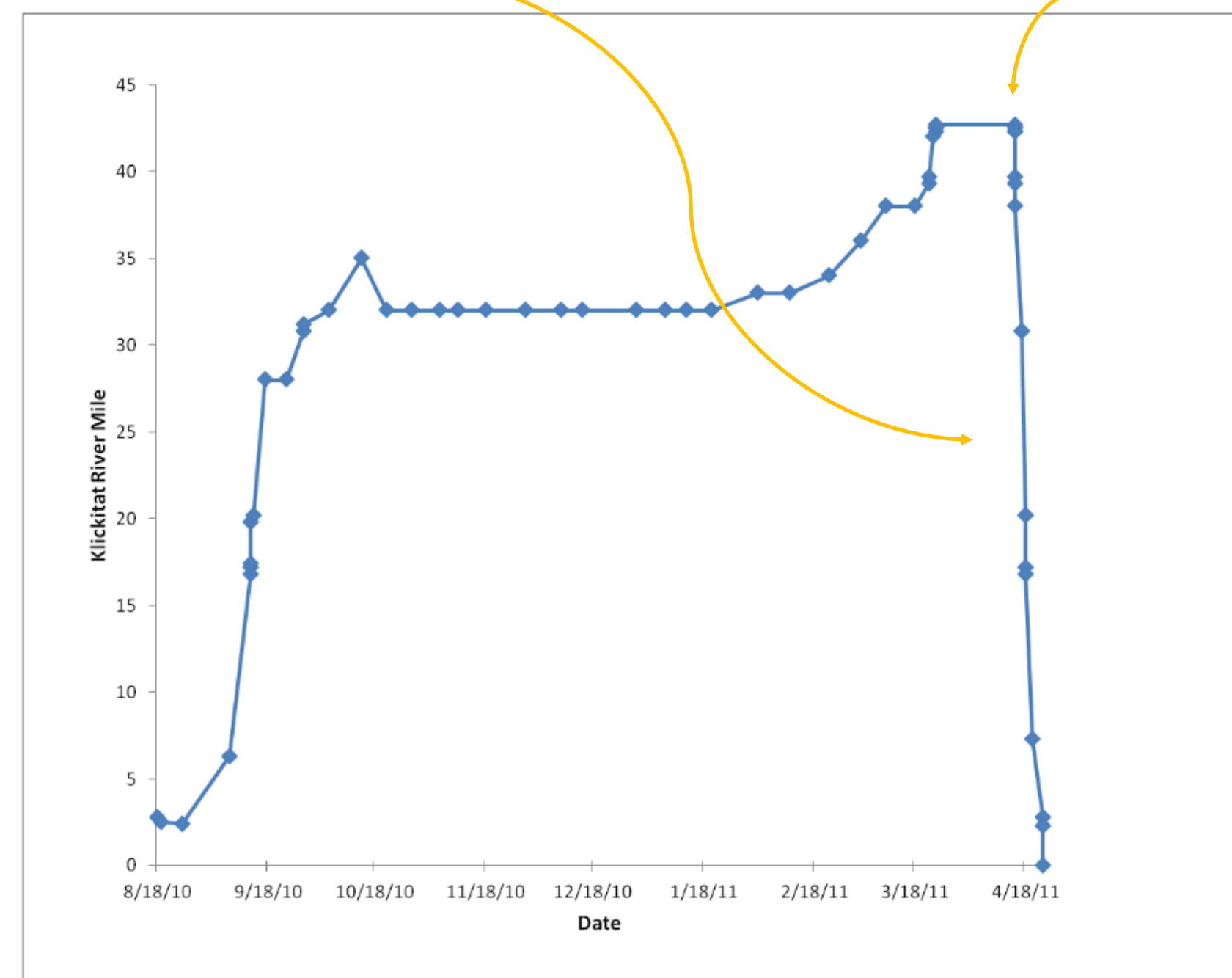


Introduction

- Native steelhead population in Klickitat River subbasin (southern WA)
 - ESA-threatened, part of Mid Columbia DPS
- Skamania Hatchery steelhead smolt releases (90K/year)
- Radio telemetry study conducted 2009-2014
- Objectives were to determine:
 - Patterns in Hatchery and Wild spawner interactions
 - Spawning and behavior of various genetic stock groups (including out-of-subbasin strays)
 - Spawning patterns in summer- and winter-run steelhead

Methods

- Fish tagged at Lyle Falls adult trap at RM 2.4
- Tissue sample taken for genetic stock identification
- Mobile tracking (weekly) and 10 fixed detection sites
- Detection data reviewed to determine fish fates (spawned in wild, mortality or regurgitated tag, harvest)
 - 3-biologist consensus
- For wild spawners: Location and start/end dates estimated, kelting frequently observed



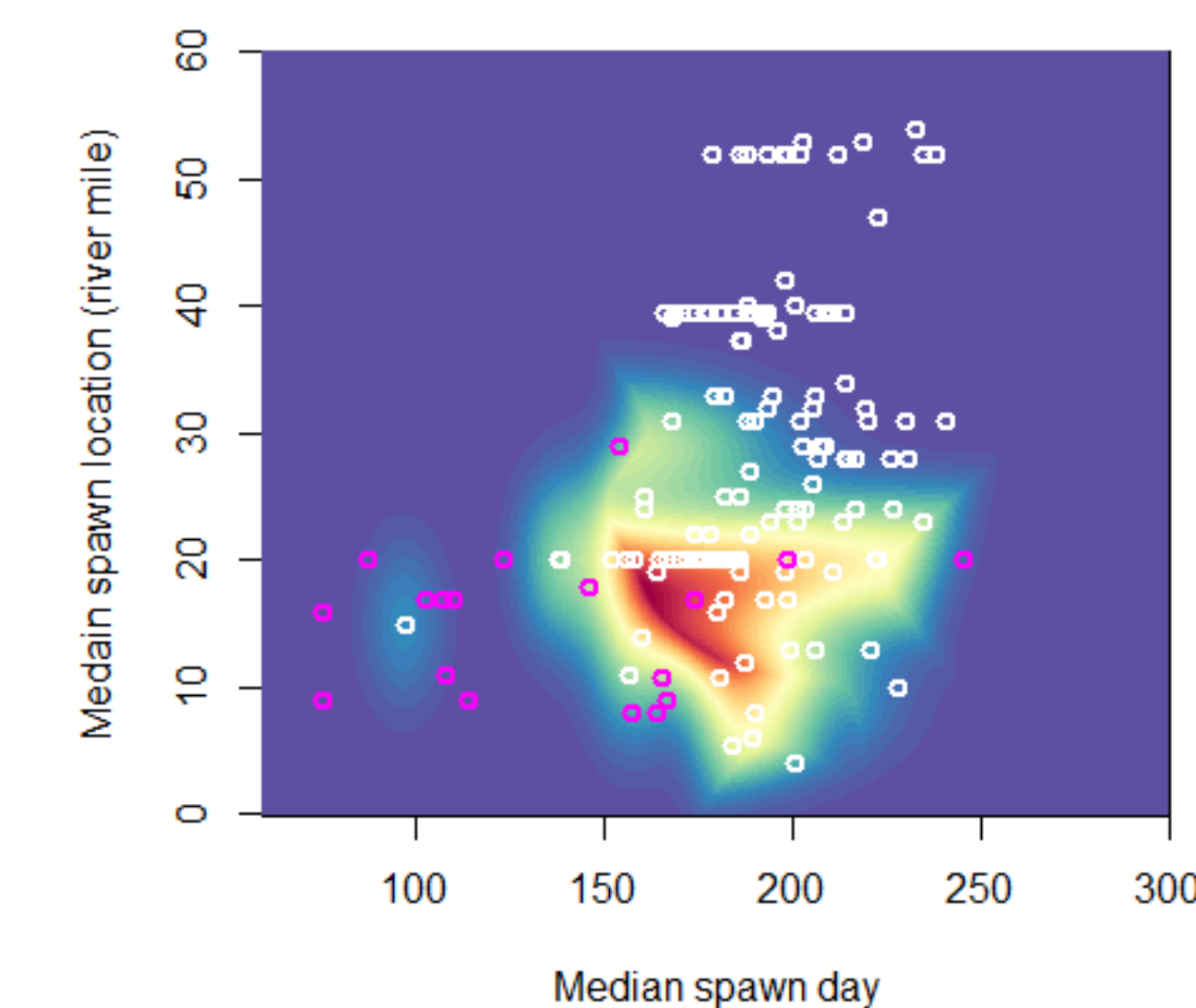
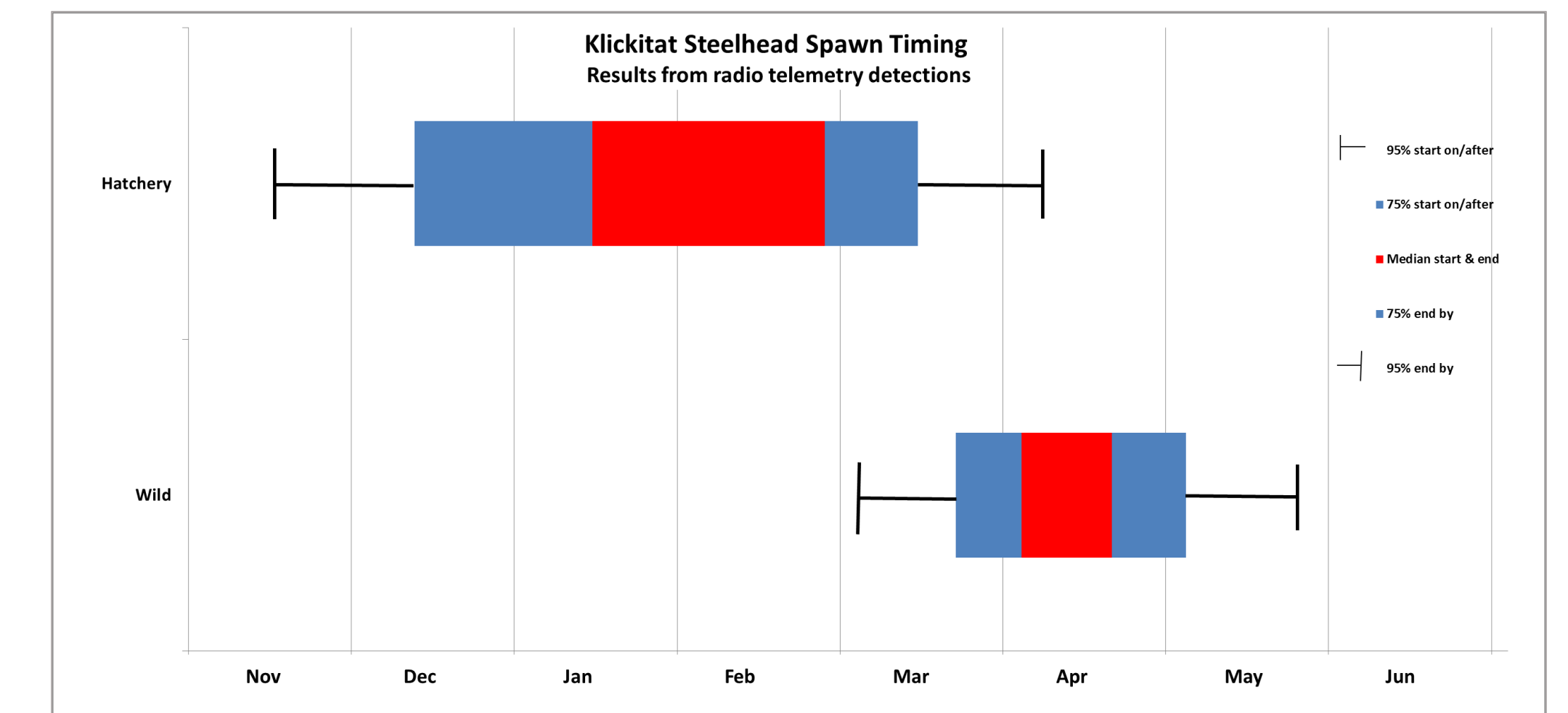
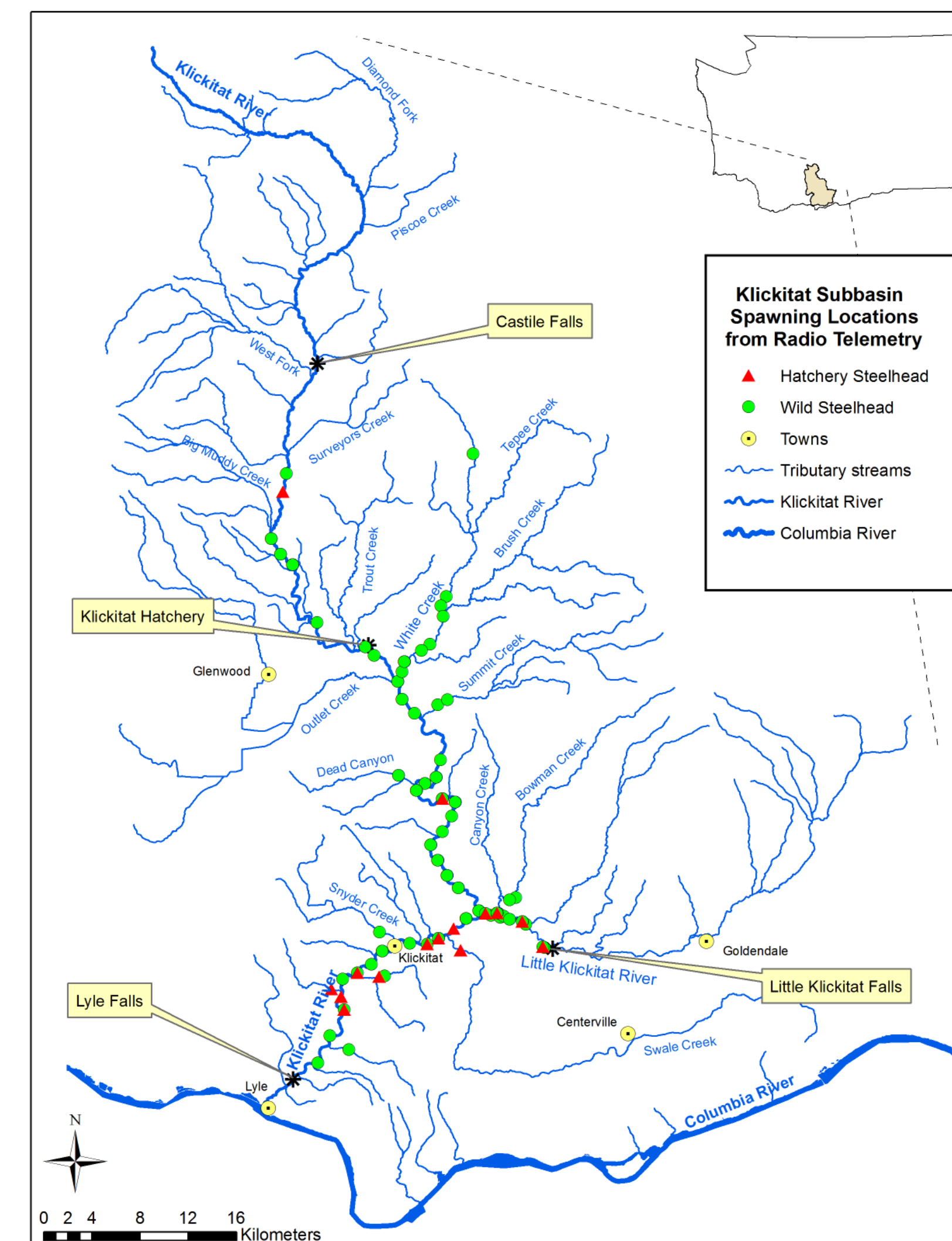
Typical detection history (location by date) for fish determined to have spawned in the wild.



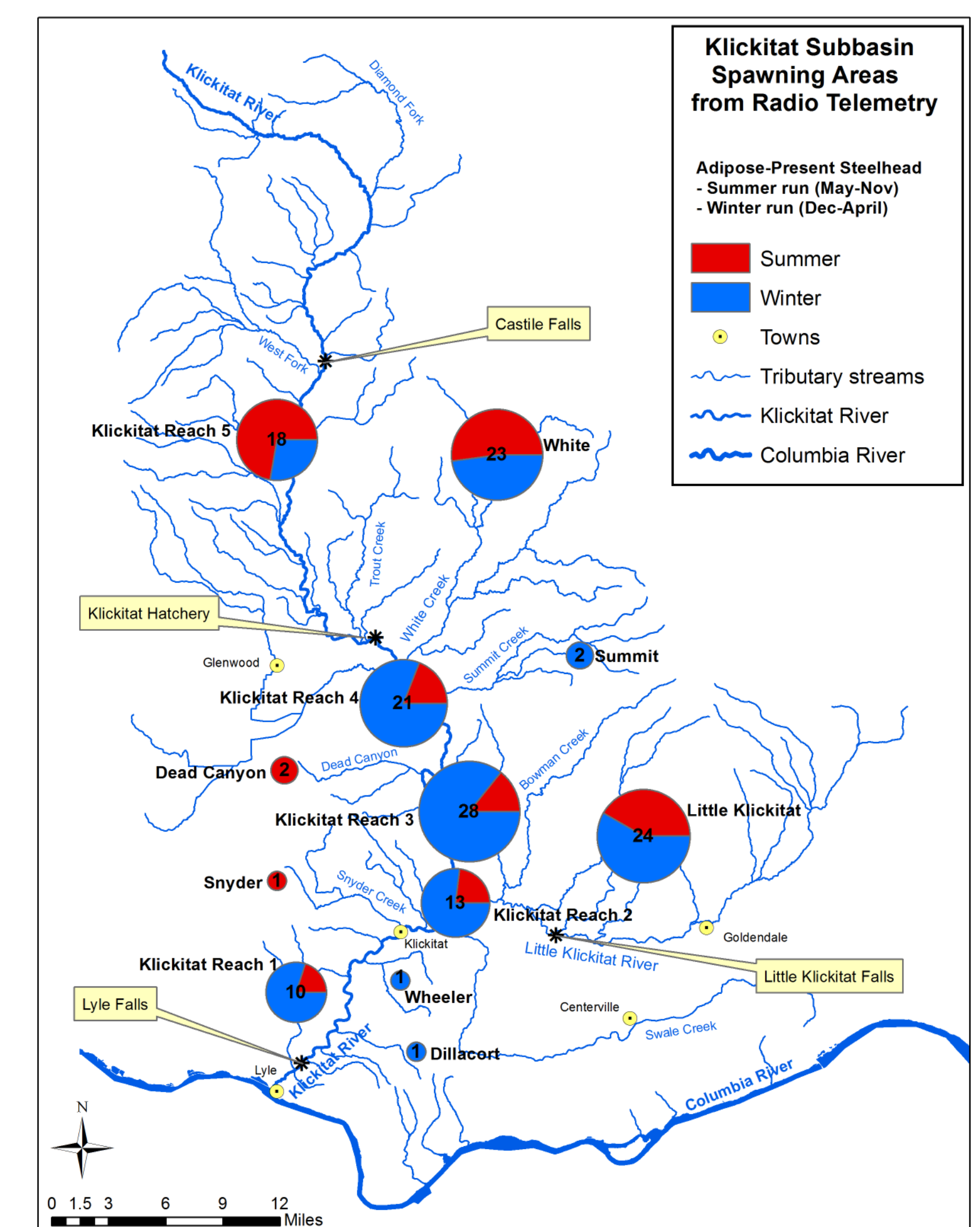
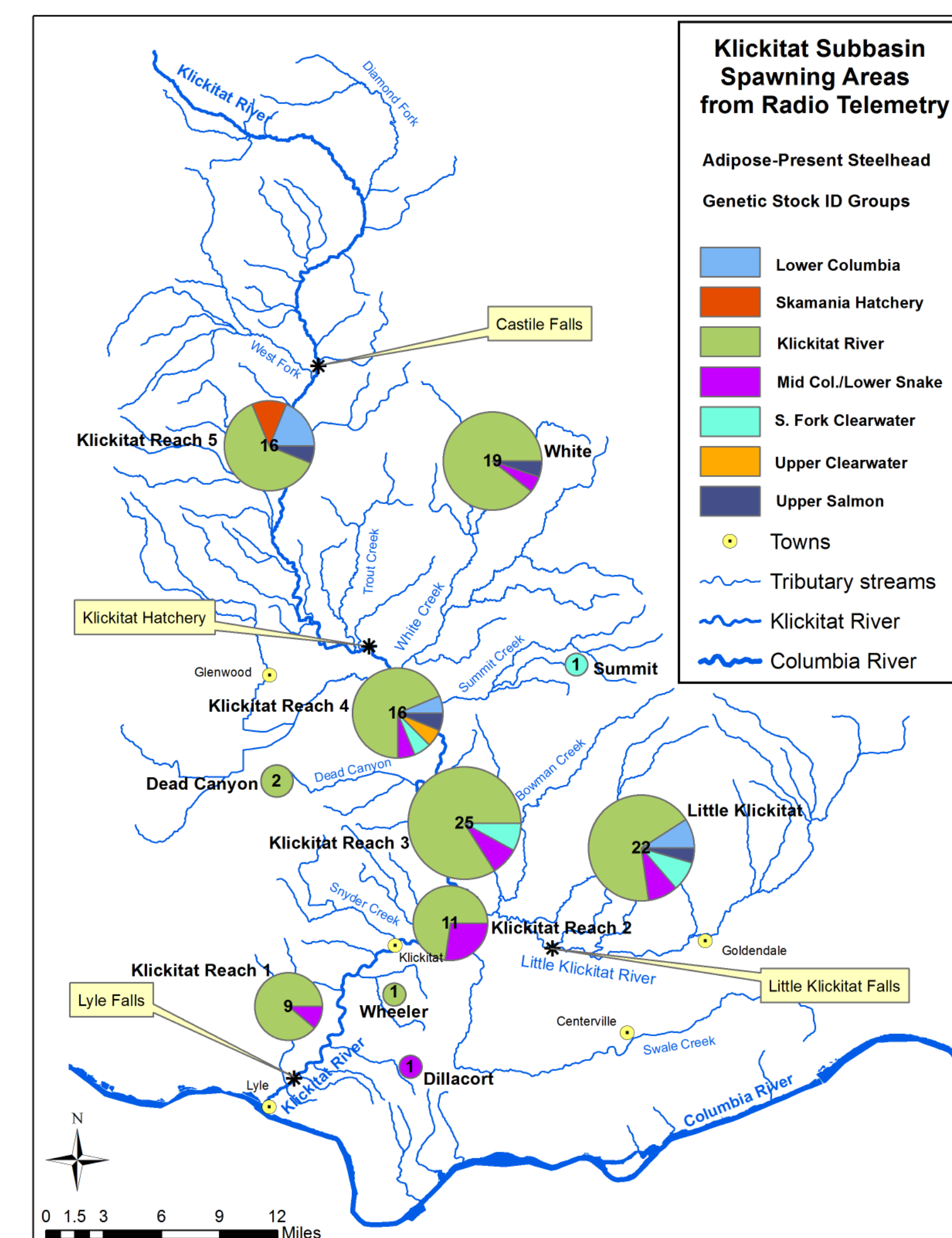
Results

- 14.6% of known-fate Hatchery steelhead observed spawning in wild (20 out of 137)
- 58.2% of known-fate Wild steelhead observed spawning in wild (146 out of 251)
- Wild steelhead: 64.4% spawned in mainstem Klickitat above RM 20 or in tributaries above Little Klickitat R.
- Hatchery steelhead: 90.0% spawned in mainstem Klickitat below RM 20 or in tributaries to that reach (Little Klickitat and downstream).
- Majorities of multiple genetic stock ID reporting groups were determined to have spawned in the wild after entering Klickitat subbasin
 - Native Klickitat (59.4%), Lower Columbia (54.5%), Middle Columbia/Lower Snake (57.9%), and other Snake River (58.6%)
- Winter-run steelhead spawned at a higher rate (72.2%) than summer-run steelhead (41.8%) with overlap in timing and location (winters may use lower subbasin more)

Results (continued)



Heat density plot: 28.5% probability of overlap in time and space for wild and hatchery spawners



Conclusions

- Hatchery steelhead spawned earlier and lower in the Klickitat subbasin (and at lower rates) than wild steelhead - with some overlap in lower subbasin
 - Genetic analysis shows strong distinction between the two
- Multiple out-of-subbasin stocks enter Klickitat River and many stocks appear to spawn there
 - May have differing success rates as genetic stock distinctions remain strong
- Summer and winter steelhead show significant overlap in spawning (corroborating genetic results)

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