

Movement and Home Range Study of Select Native Fishes in the Chehalis River Basin

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How does restoration impact native freshwater fishes?

- ASRP includes all aquatic species and habitats
- Actions are largely aimed to improve and protect salmon and steelhead habitat
- Relationships between restoration actions and changes to distribution of other native freshwater fishes are poorly understood
- Data gap: Will restoration also have a positive influence on native freshwater fishes?



Speckled dace



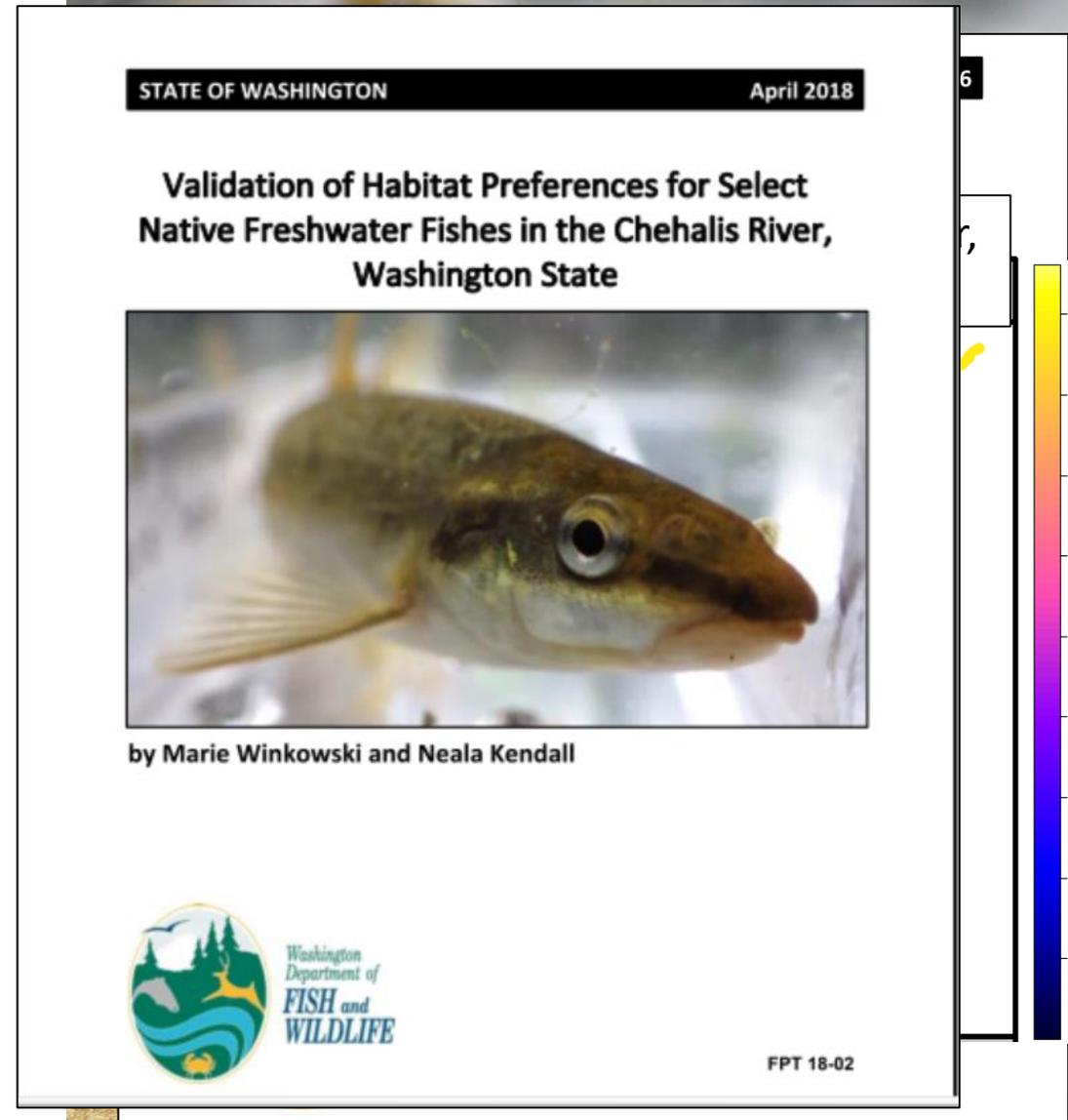
Reticulate sculpin



Pacific lamprey

Native freshwater fish research

- Species distribution/occupancy
 - Instream Fish Study (Winkowski et al 2016)
 - Develop multispecies occupancy model (Broms et al. 2016)
- Habitat preferences
 - Winkowski and Kendall 2018
- Movement patterns
 - Report available: Winkowski, M., Kendall, N., and E. Cropper (2019) Movement and Home Range Study of Select Native Fishes in the Chehalis River, Washington State. Washington Dept. Fish and Wildlife.



Movement and home range study – Objectives

1. Describe movements and home ranges of mountain whitefish
2. Describe movements of Pacific lamprey
3. Identify and describe relationships between flow, temperature and fish movements



Mountain whitefish

- Relatively long-lived salmonid (15 years)
- Entire freshwater life history
- Potential indicator species of ecosystem health
 - Long-lived, broad distribution, foraging site fidelity (McPhail and Troffe 1998)
- Complex movement patterns
 - Migrations to spawning, over-wintering, and summer-foraging (McPhail and Troffe 1998; Baxter 2002; Boyer et al. 2017)
- Sportfish
- Fall-winter spawner (Sept-Dec)



Pacific lamprey

- Culturally and historically significant species
- Populations are declining throughout their range (Close et al. 2002, Paragamian 2002)
- Species of Greatest Conservation Need in State Wildlife Action Plan (SWAP)
- Unique life history
 - Filter feed as larvae burrowed in substrate for 4-7 years
 - Metamorphose to juveniles and migrate to ocean
 - Parasitic adults spend 1-2 years in the ocean before returning to freshwater to hold and spawn in spring and summer following year



Mountain whitefish tagging

- Radio telemetry
- Captured over 2 seasons using electrofishing, snorkeling with modified hook and line



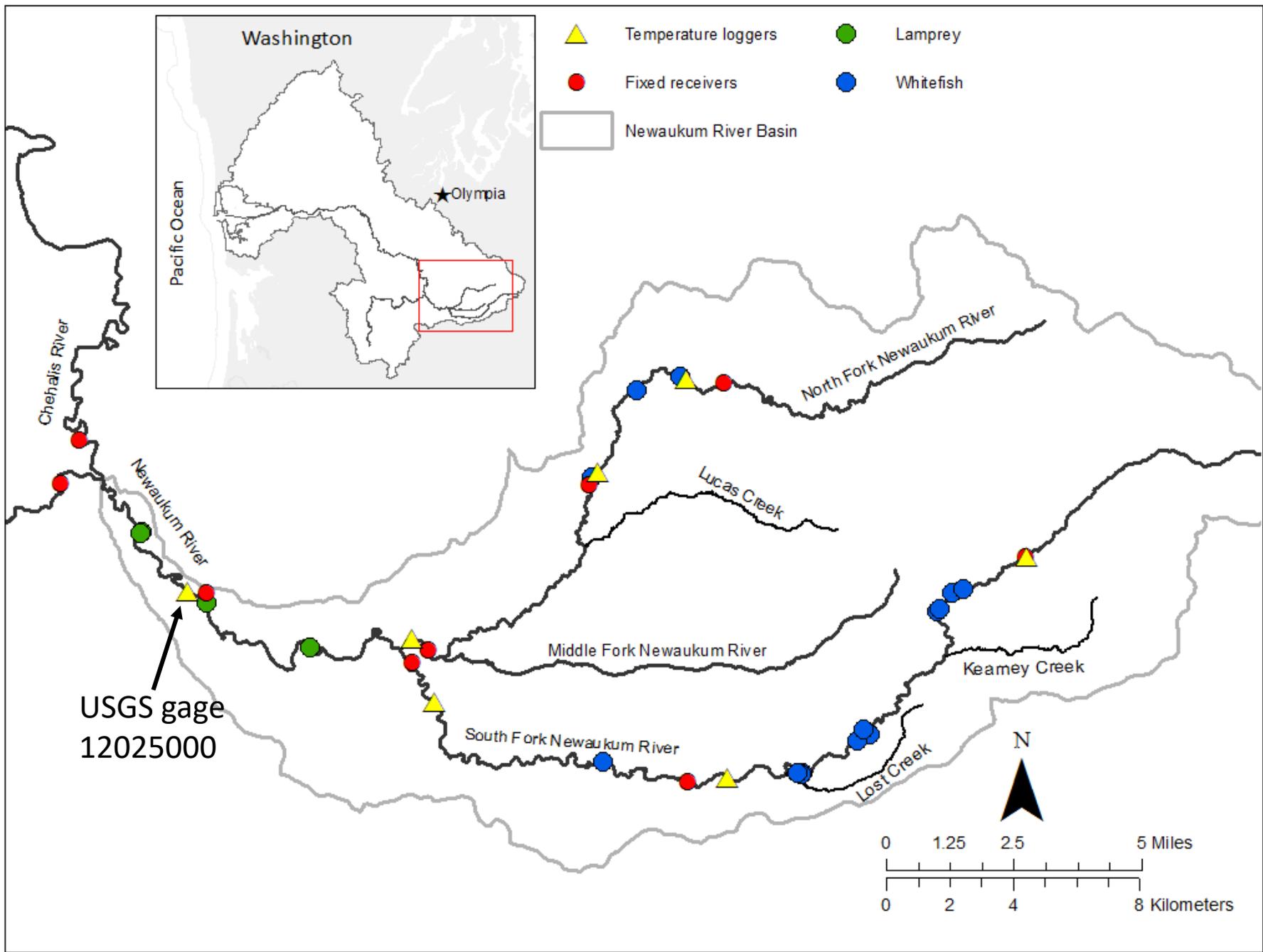
Pacific lamprey tagging

- Radio telemetry
- Captured over 1 season using tube traps



Methods



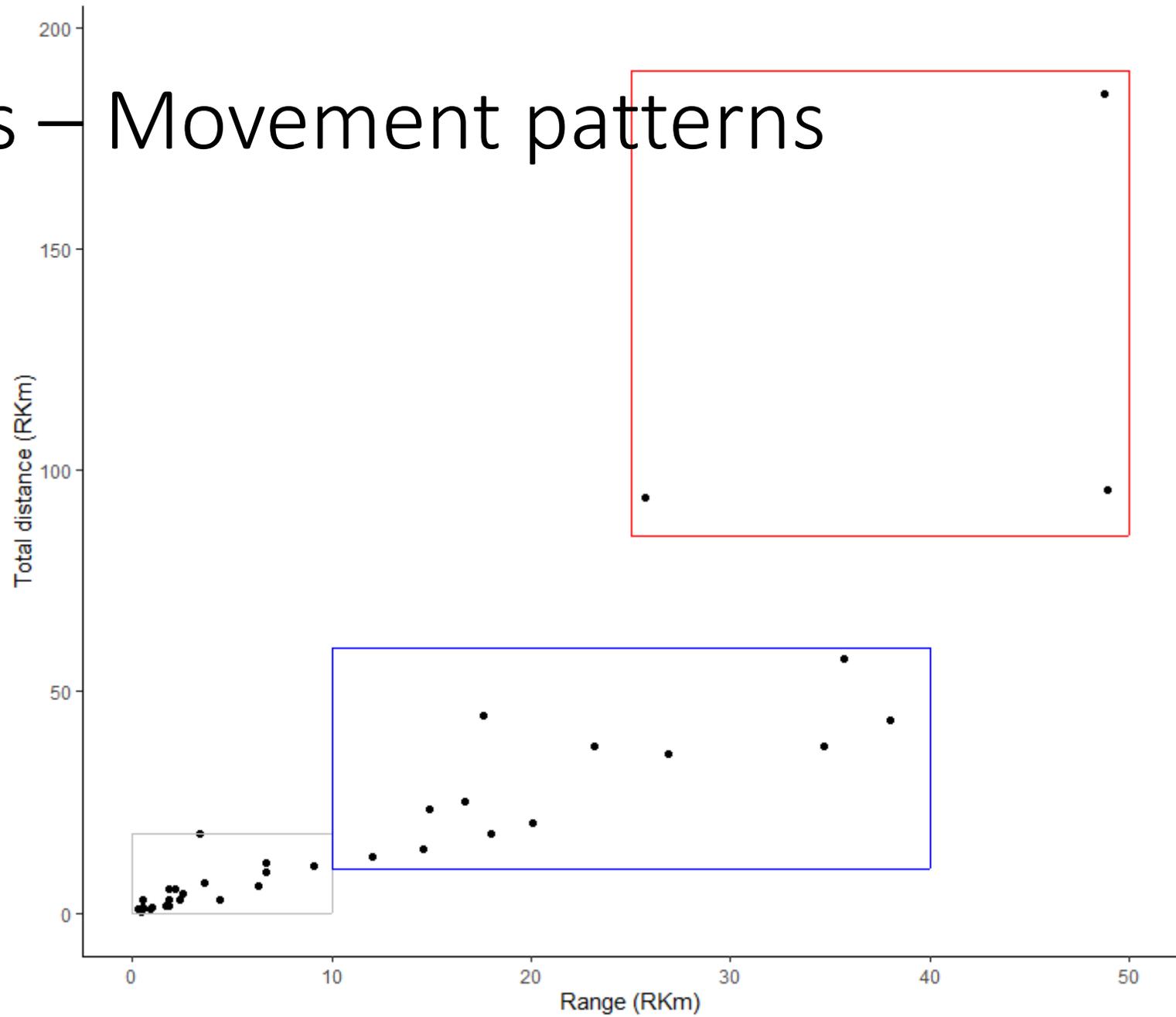


Results – Mountain whitefish

- Tagged 37 mountain whitefish
- Total distance traveled was 0.4 to 185 Rkm
- Range was 0.3 to 49 Rkm
- Diversity of movement patterns

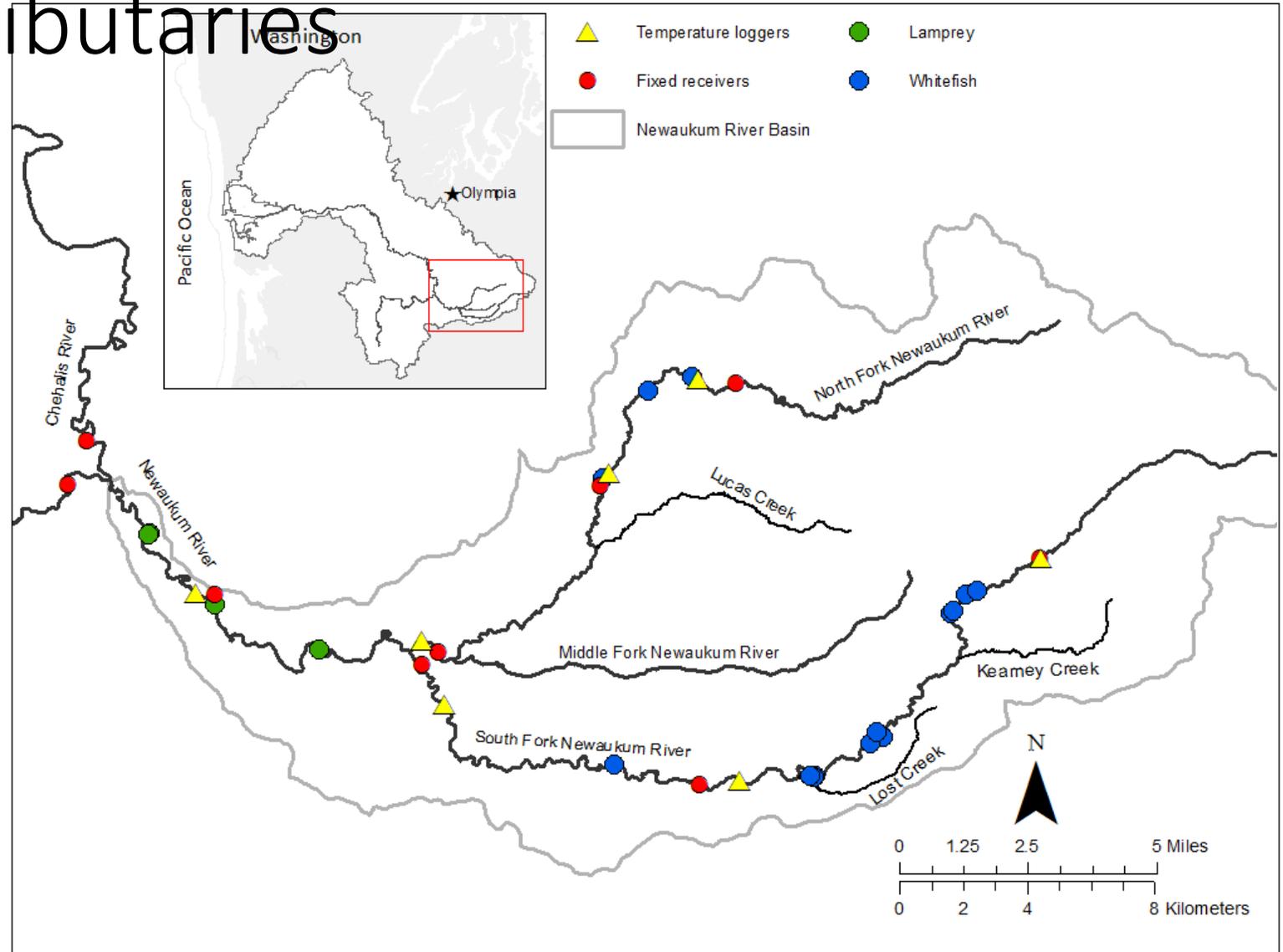


Results – Movement patterns

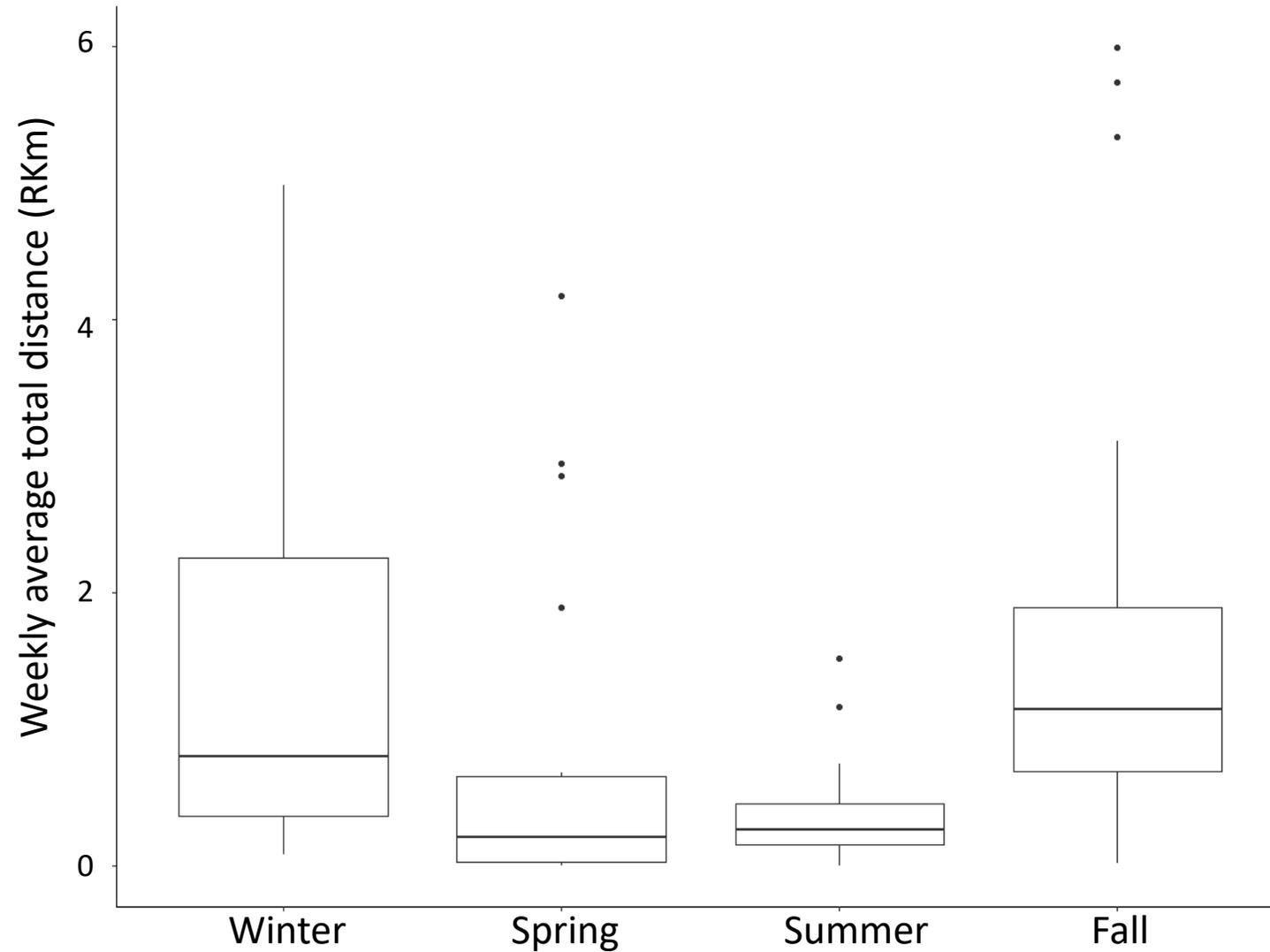


Results – Mountain whitefish moved between forks and into tributaries

- Fourteen fish moved between tributaries, forks
- Two fish moved outside study area
- Five fish were detected in smaller tributaries in winter



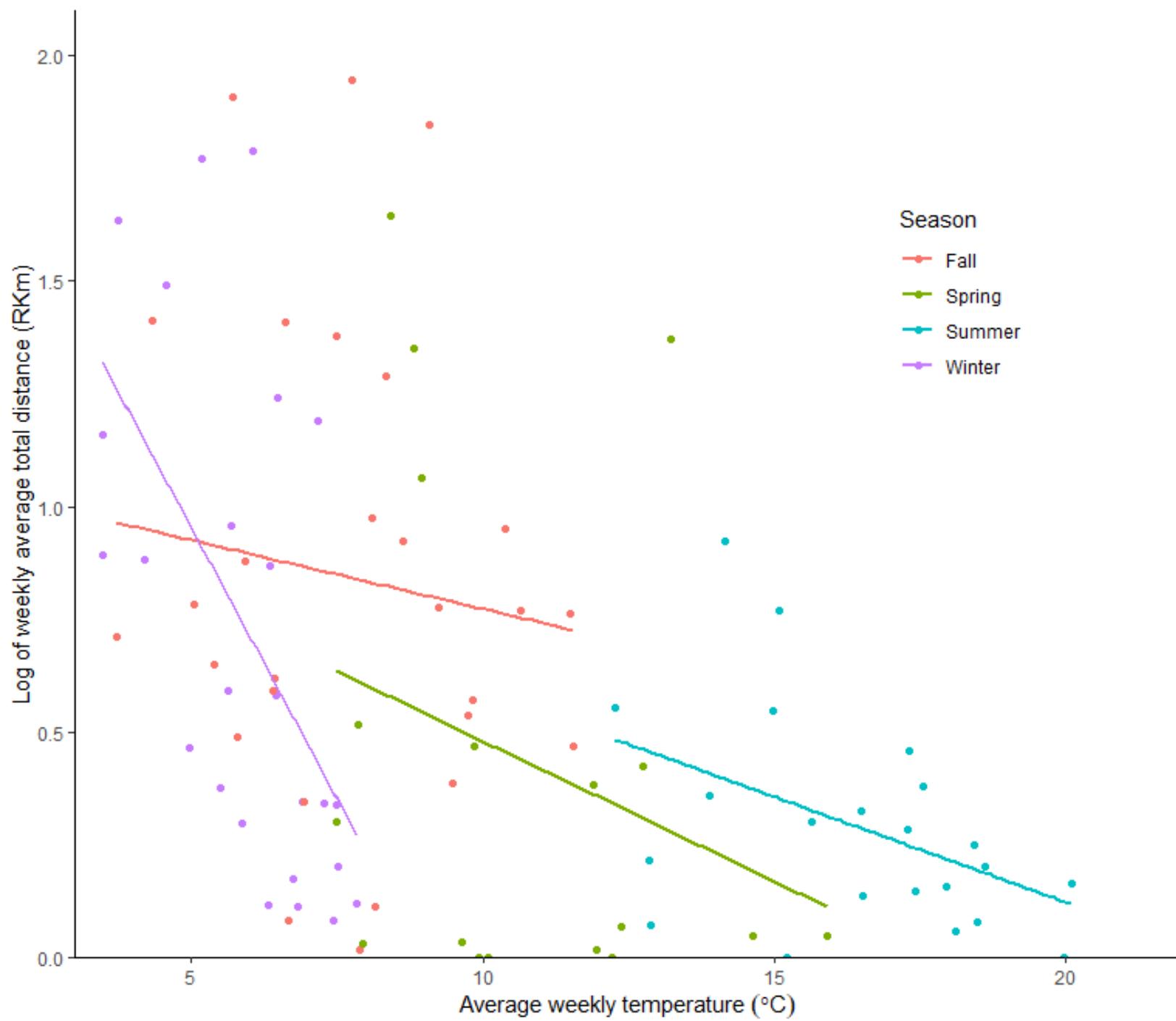
Results – Movements of mountain whitefish differs among seasons



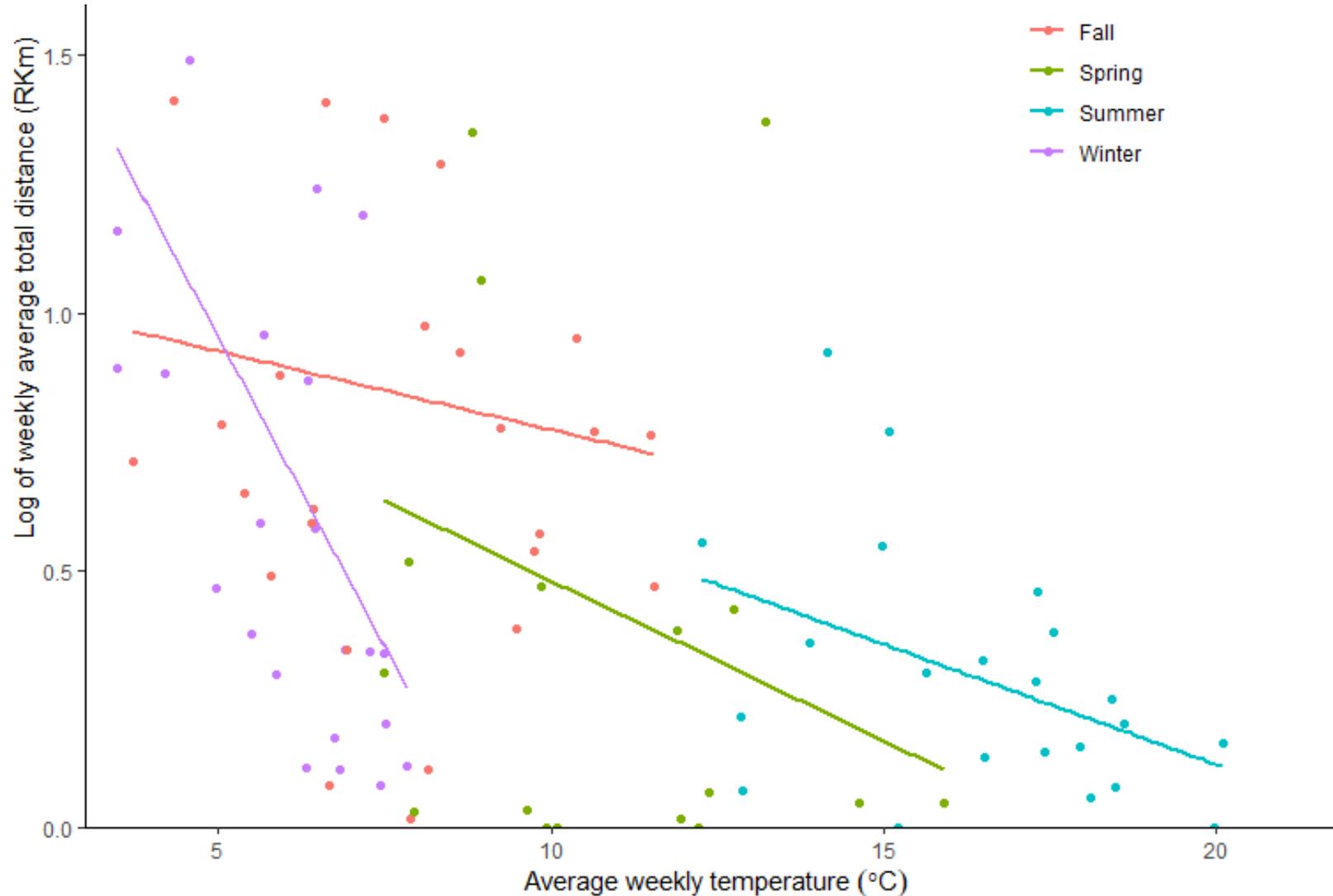
Results – Mountain whitefish

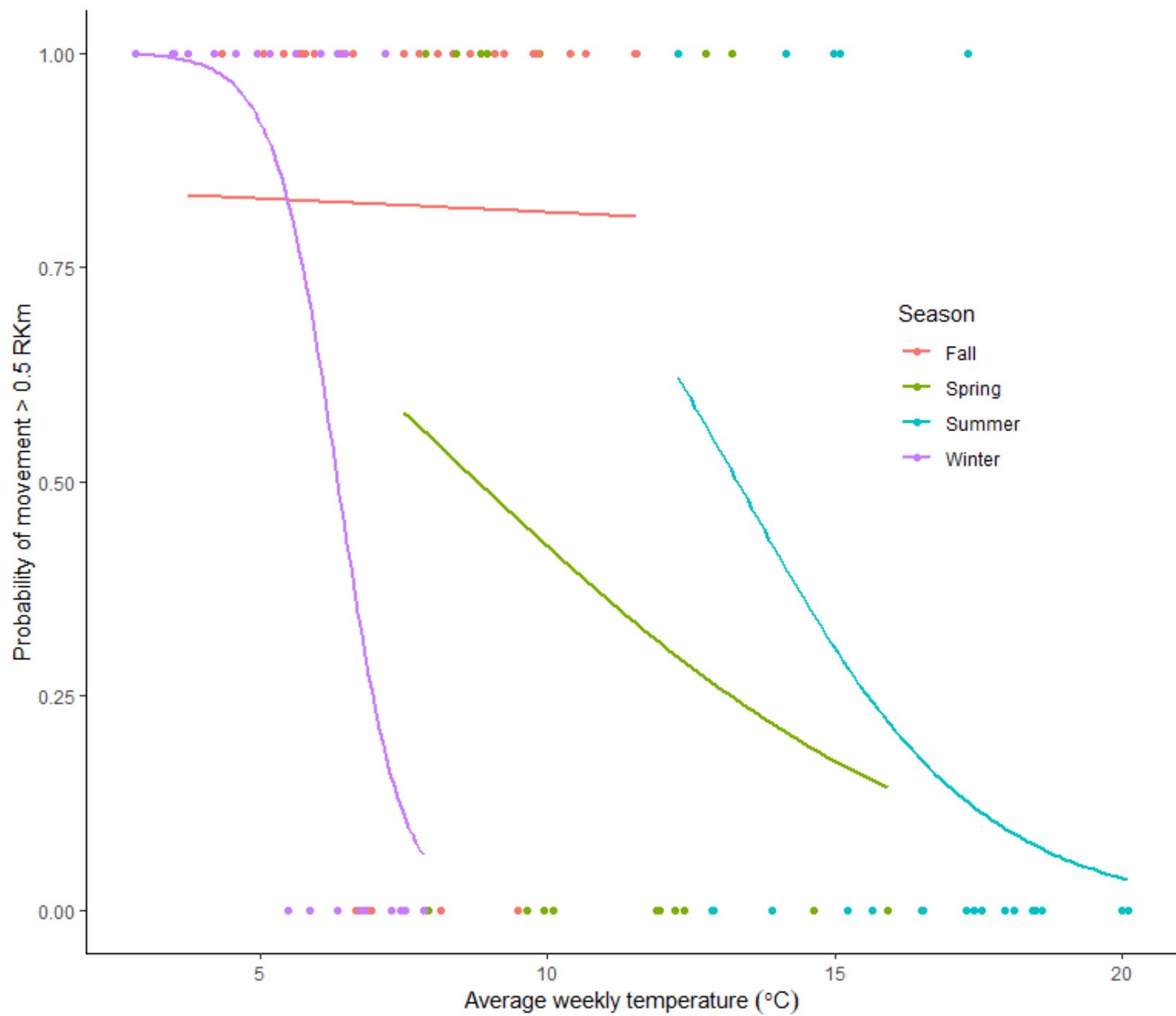
- We analyzed movements relationship with flow and temperature using linear and logistic regressions
- Temperature was only significant relationship



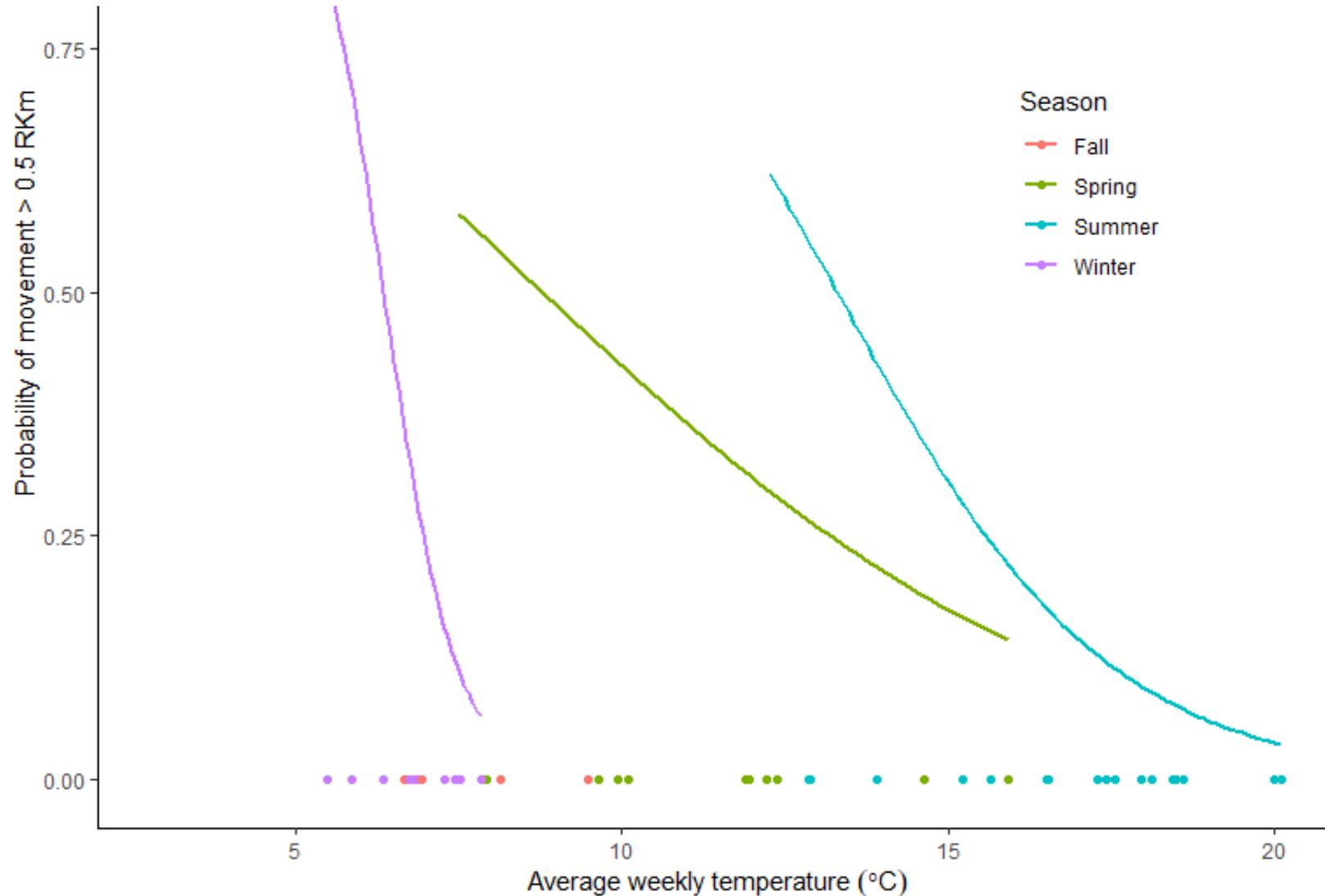


Results – Mountain whitefish undergo larger movements at colder temperatures





Results – Mountain whitefish more likely to move in fall and at colder temperatures in winter



Results – Pacific lamprey

- Tagged 12 fish
- 10 with 1+ movements detected
- TD 0.3 – 75 RKm
- Range 0.3 – 40 RKm
- Two movement patterns post-tagging:
 - Movers – proceeded upstream (n=5)
 - Holders – held near to tagging locations (n=5)
- One fish moved 35 RKm upstream then returned downstream and out of survey frame (43 days)
- One fish moved 15 RKm to Lucas Creek, trib to North Fork Newaukum River (11 days)



Discussion – Mountain whitefish

- Diversity of movement patterns
- Tributary use – post spawning refuge
- Fish move more in fall and winter, highlights importance of connectivity during those seasons
- Increased movements with decreased temperature
- More likely to move in winter when temperature $< 6.5^{\circ}\text{C}$
- Found often with spring Chinook salmon
- Restoration actions
 - Actions aimed at decreasing temperature (increase riparian buffers for stream shading, add large wood for stream habitat complexity)
 - Protect cold-water inputs (groundwater springs, seeps, areas of hyporheic flow)
 - Aligns with Spring Chinook restoration efforts

Discussion – Pacific lamprey

- Two movement patterns
- Identified diverse holding locations
- More movements in spring compared to summer and fall
- Highlights importance of connectivity during spring and to diverse holding locations



Acknowledgements

A person wearing a bright green jacket and dark pants is wading through a shallow stream in a dense forest. The water is splashing around their legs. The background is filled with lush green foliage and trees, creating a misty atmosphere.

- Field data collection
 - Stephanie Lewis, Noll Steinweg, Garrett Moulton, John Swennumsom, Keith Brady, and Kelly Perry
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Thank you

