

# WHY DO SALMON STRAY? TRADEOFFS BETWEEN HABITAT AND HOMING

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# What we know about homing

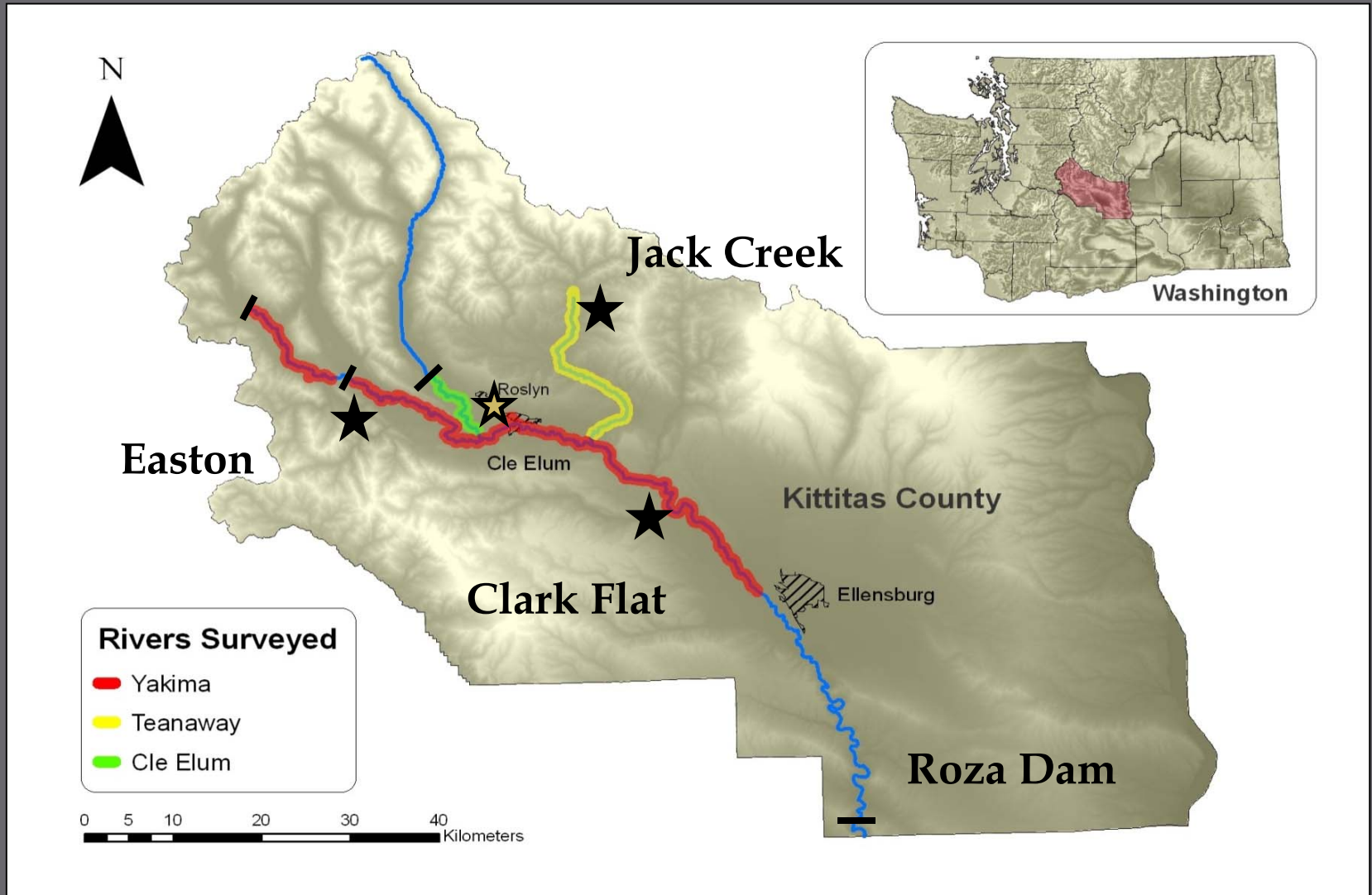
- ▣ Capable of precise navigation at multiple spatial scales
  - Open ocean to freshwater
  - Within freshwater system
  - Site of incubation
- ▣ Homing confers an evolutionary advantage, just as migration does
  - Allows for local adaptation
  - Improves likelihood of successful reproduction
  - Evident in many species – mountain whitefish, northern pikeminnow, largescale suckers

# Why do salmon stray?

- ▣ Evolutionary mechanism to avoid disturbance
  - Mt. St. Helens
  - Flooding
- ▣ Colonize newly accessible habitats
  - Glacier Bay, AK
  - Upper Cedar River, WA
- ▣ Find better spawning habitat?



# Hatchery supplementation



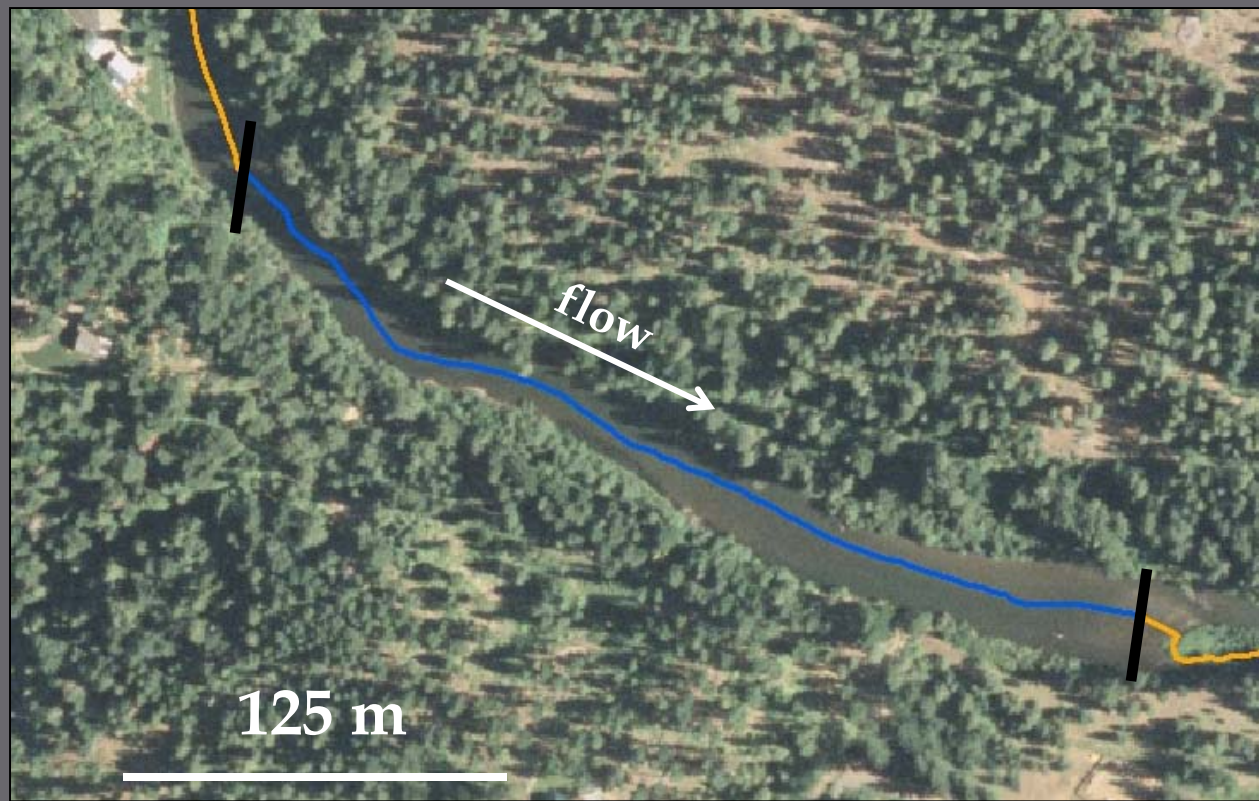
# Why does this matter?

- ▣ Hatcheries are controversial and expensive
  - Each adult fish costs \$14 - \$530 (WA Ecology 2002)
  - Create jobs and fishing opportunity
  - Genetic and ecological risks to wild fish
  - Integrated practices rely on habitat, which may be fully utilized by wild fish



## Extensive survey September 2007

- ▣ Channel type (1,2,3)
- ▣ Unit type (PO,GP,GR, RI)
- ▣ Channel width
- ▣ Depth
- ▣ Substrate
- ▣ Cover
- ▣ Wood
- ▣ Fish abundance



## Survey summary

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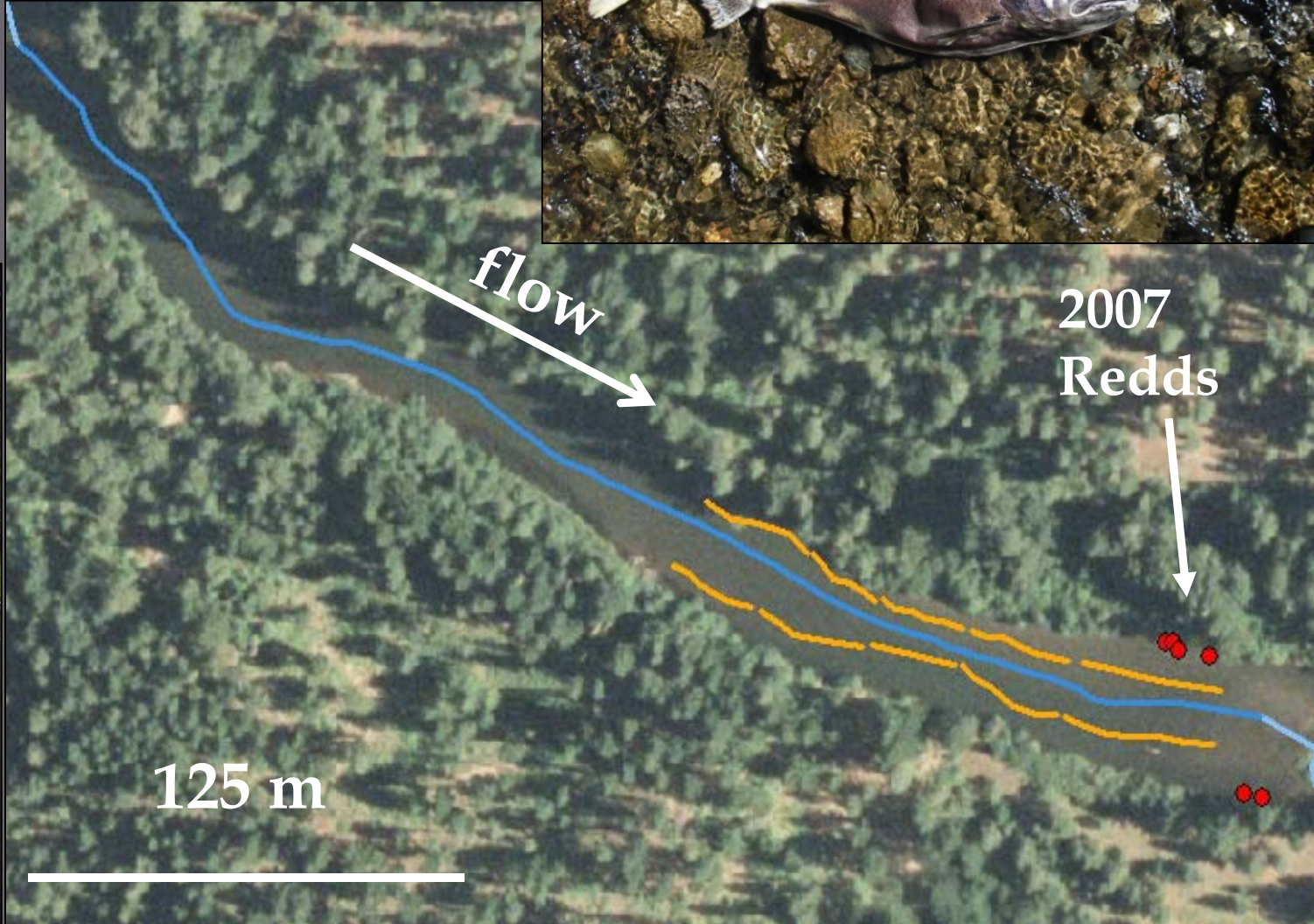
140 km mainstem

20 km side channel

# Carcass and redd surveys (2002 - 2008)

Surveys conducted by Yakama  
Nation and NOAA Fisheries

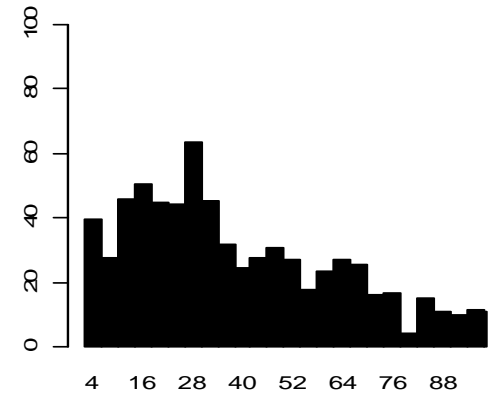
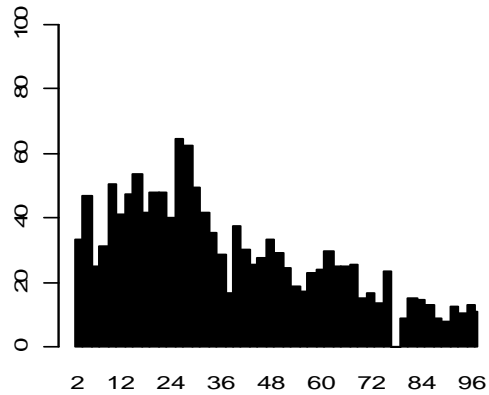
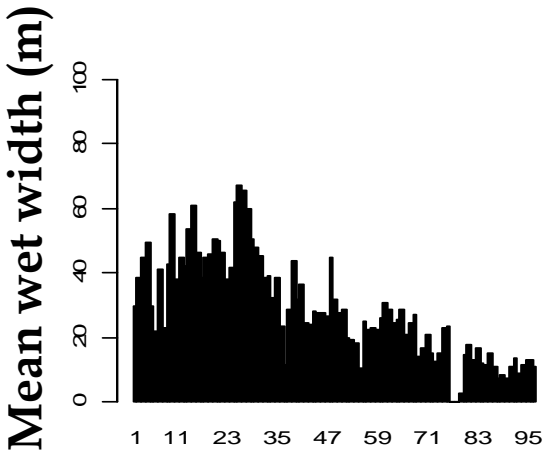
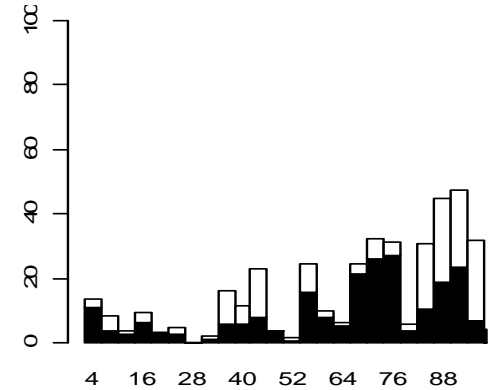
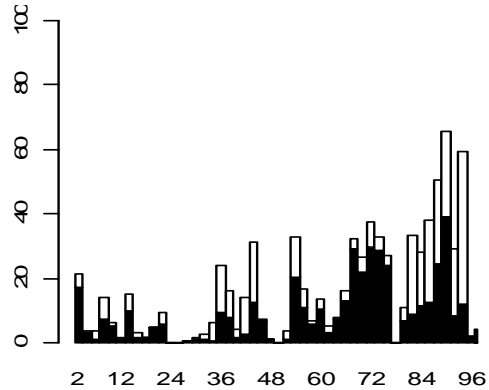
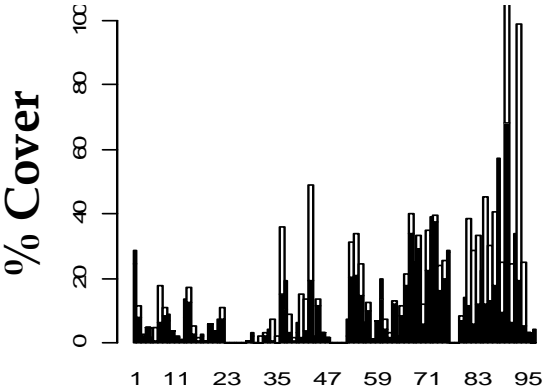
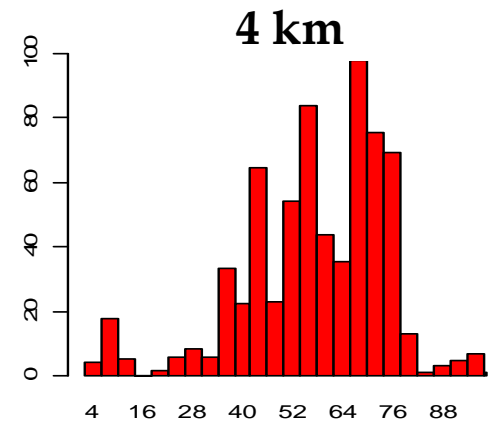
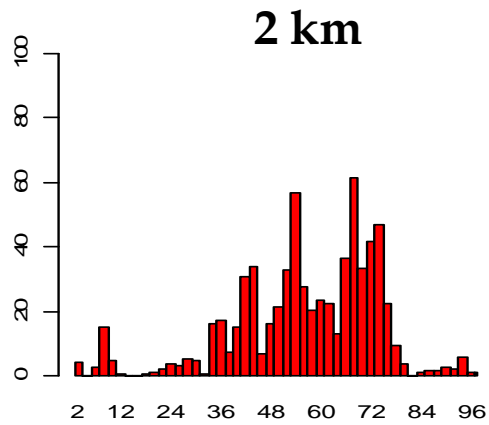
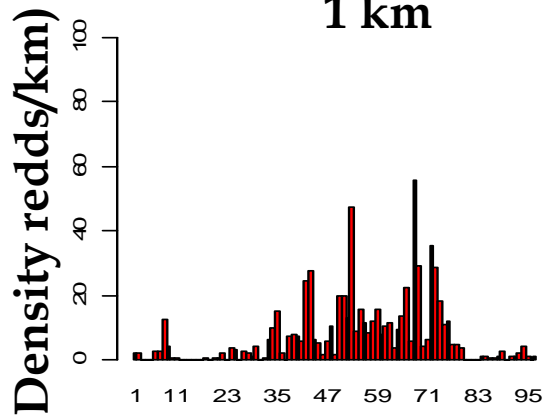
- GPS location
- Origin (CWT)
- Gender
- Age class
- Length



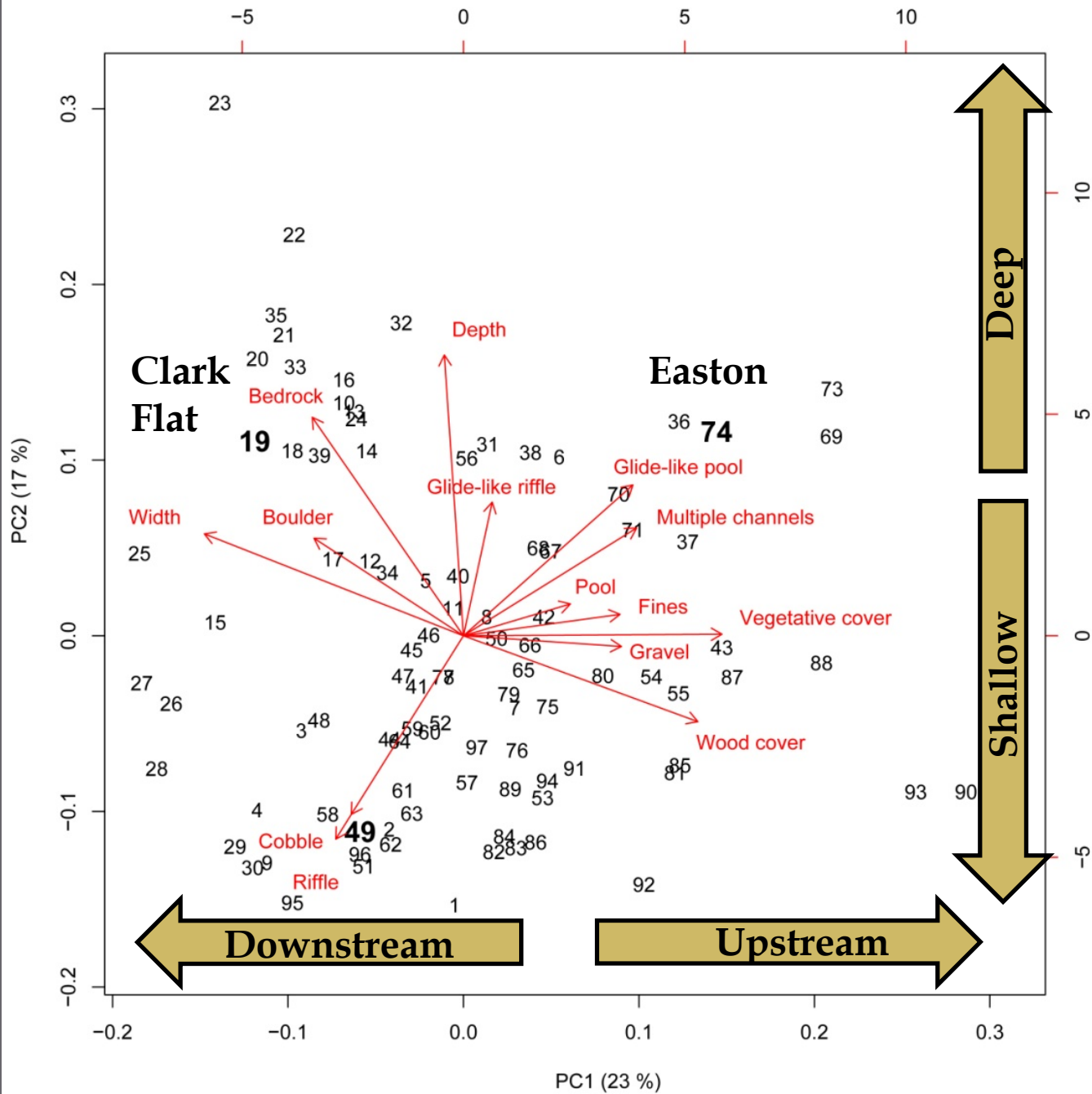
# Research Questions

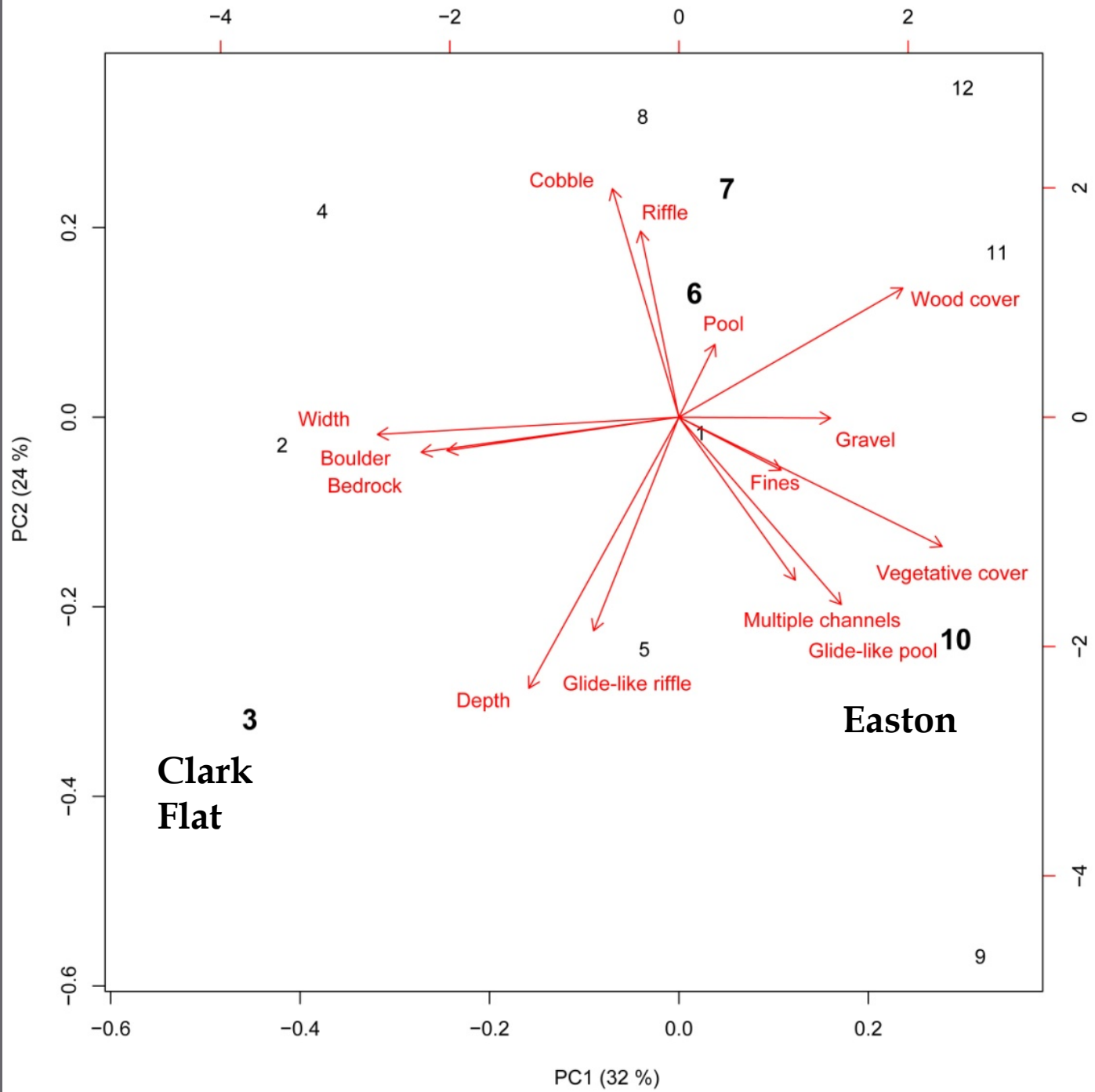
- ▣ How does available habitat compare near hatchery facilities on the Yakima River?
- ▣ If a fish strays from its acclimation area, is it due to habitat differences?



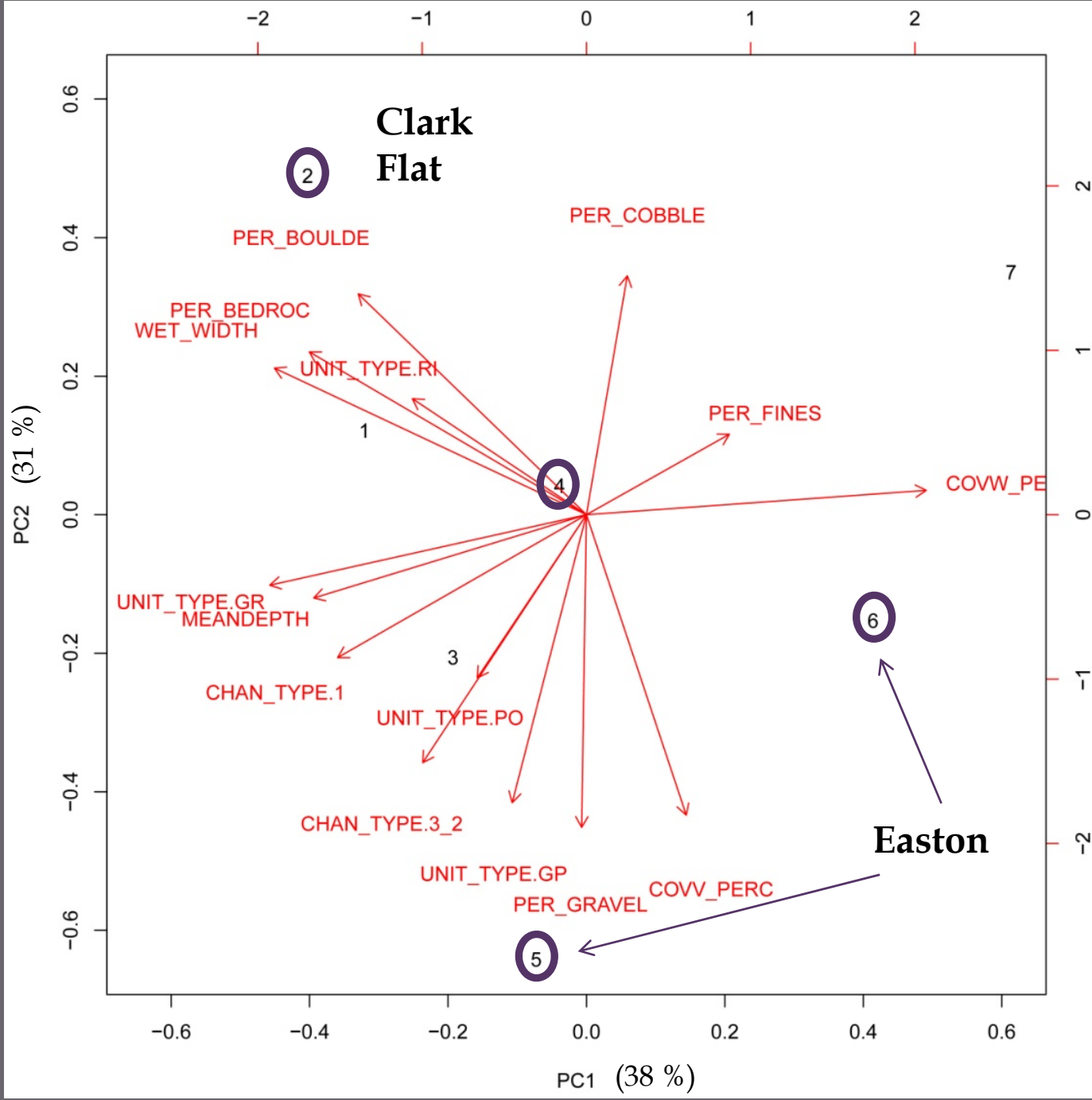


Distance upstream (km)







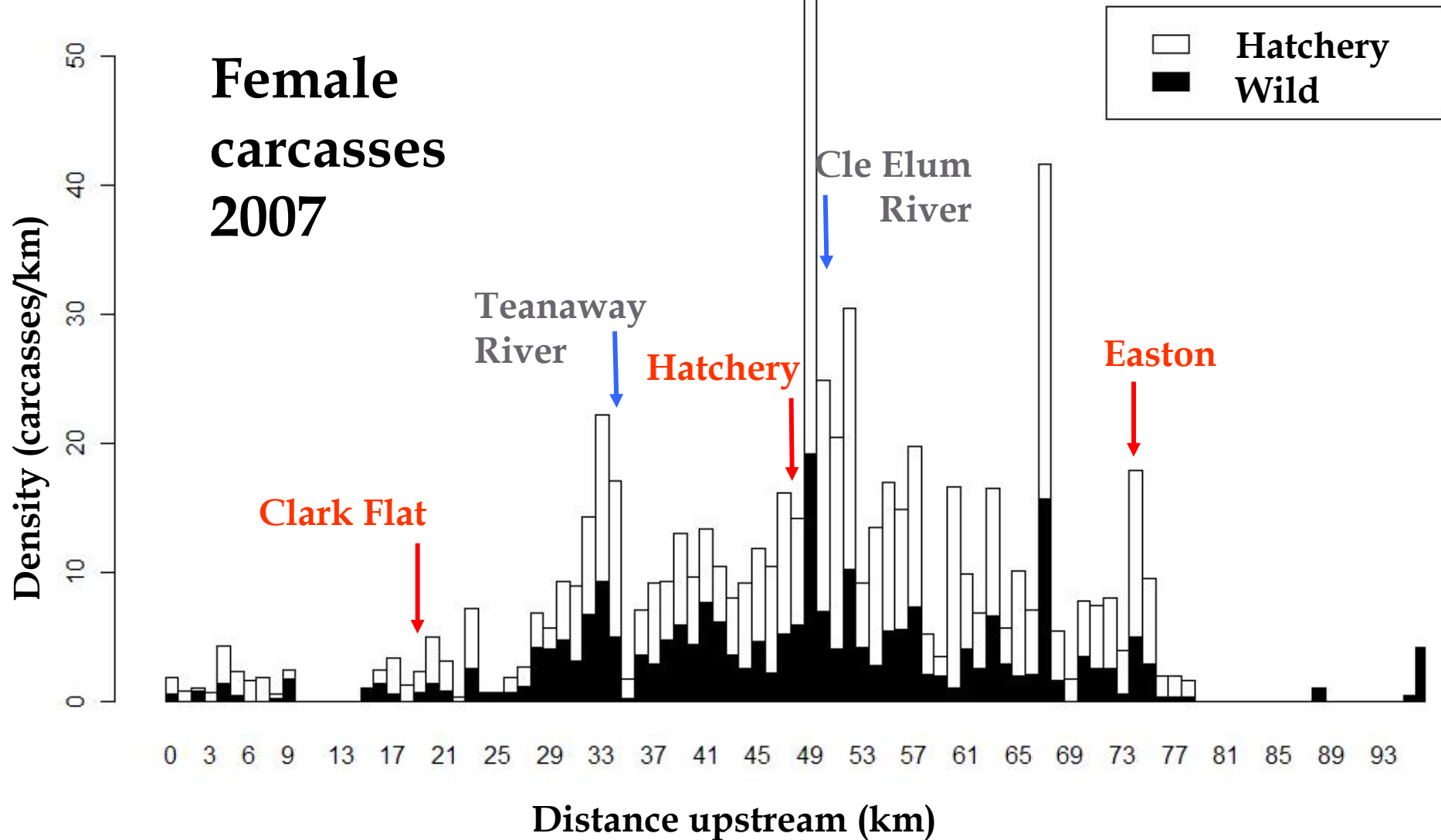


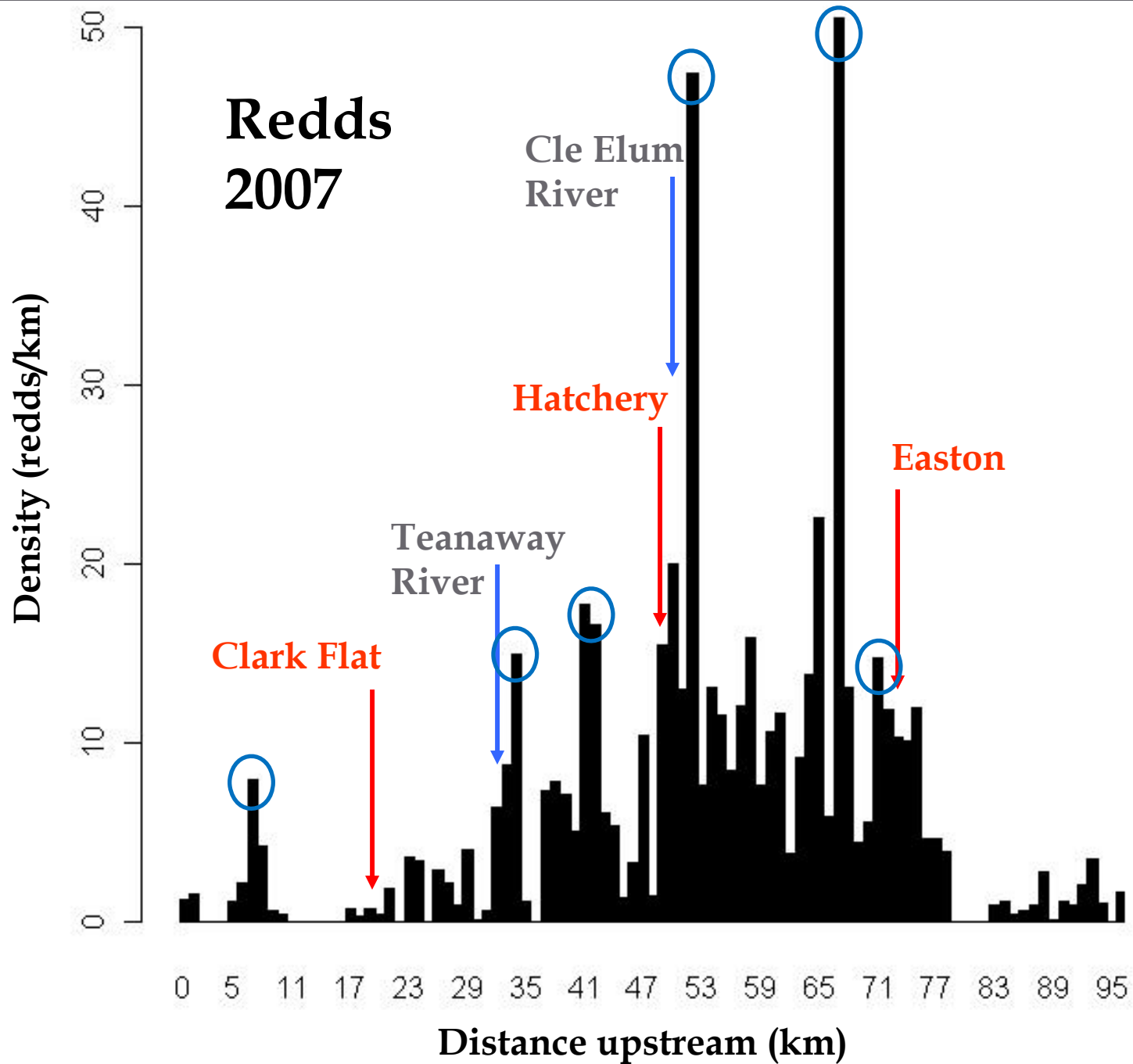
# How does habitat affect spawning site selection?

- ▣ Environmental conditions vary throughout the system, including near each hatchery facility
- ▣ Keefer et al. (2008) showed that spring Chinook wander before spawning

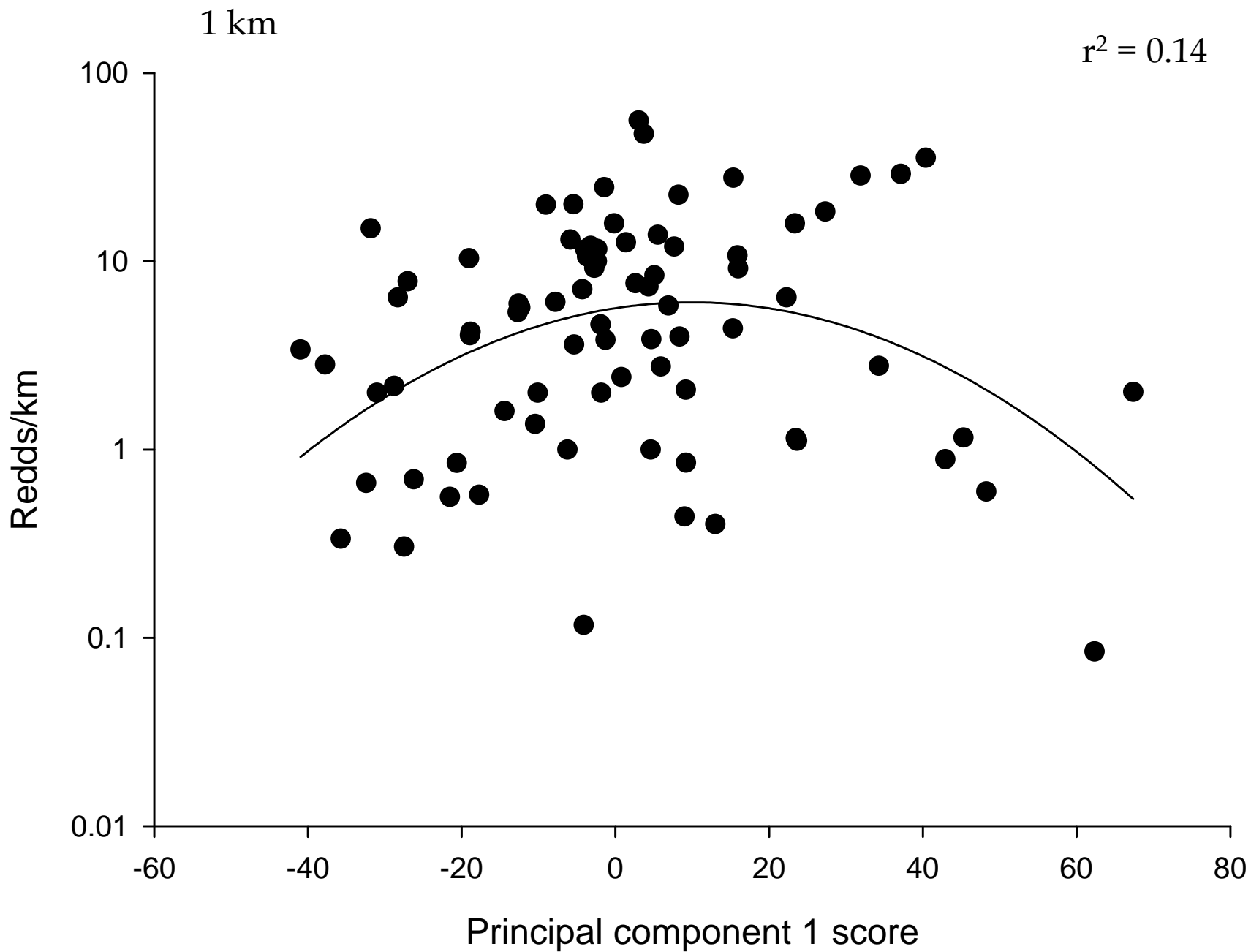


# Female carcasses 2007



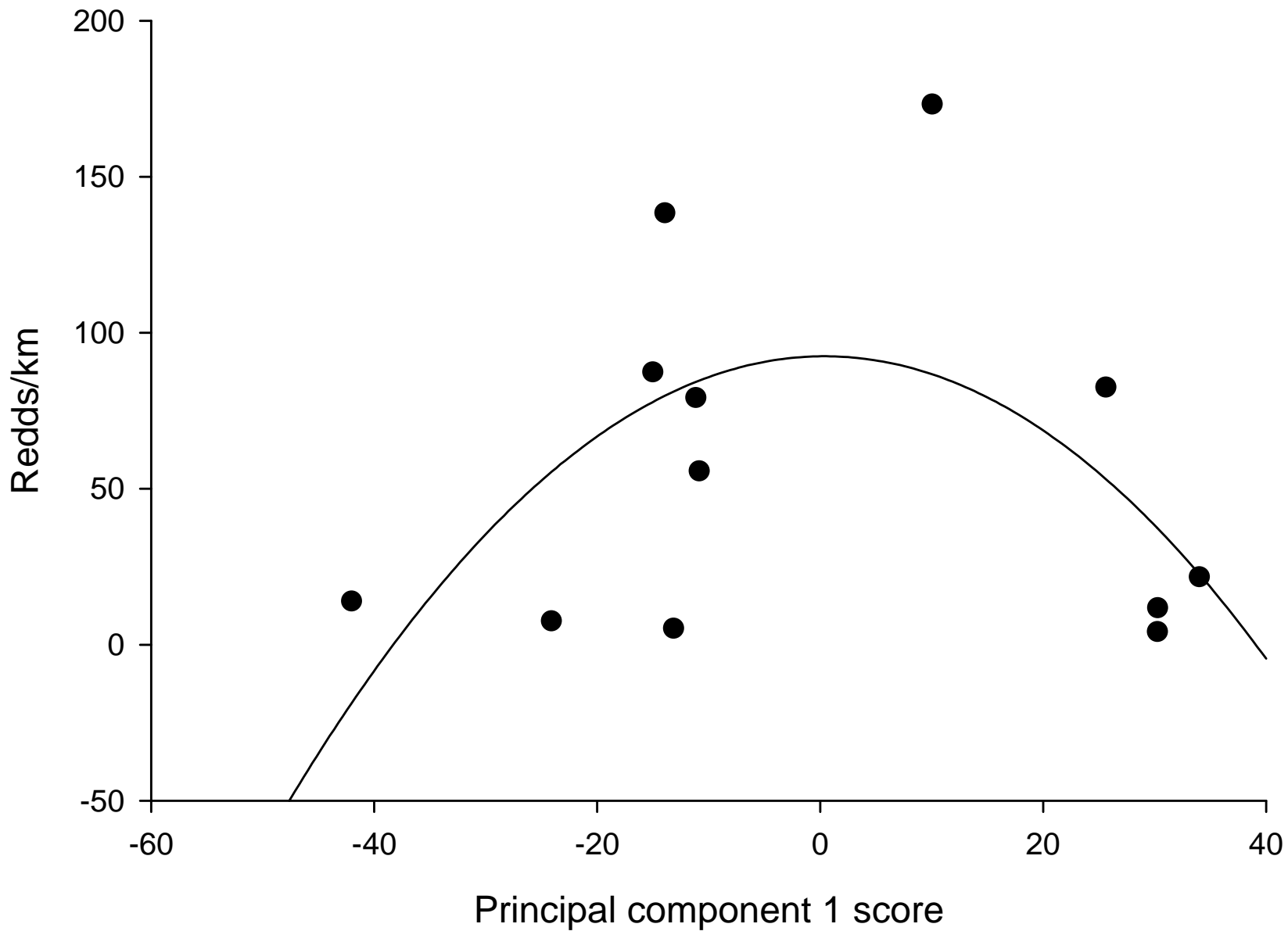






8 km

$r^2 = 0.33$



# Conclusions

- ▣ **Habitat near hatchery facilities is different across spatial scales**
- ▣ **Spawning distribution is nearly identical for wild- and hatchery-origin females**
- ▣ **Supplementation fish frequently spawn away from acclimation areas in more suitable habitat**

# Acknowledgments

- ▣ Logistics and GIS: Darran May, Hiroo Imaki, Ethan Welty, John Vaccaro, Patricia Haggerty
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