# Alternative smolt rearing enables use of local natural-origin steelhead broodstock.

NOAA FISHERIES
Northwest Fisheries Science Center

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2016 Pacific Coast Steelhead Management Meeting
Asilomar Conference Grounds, Pacific Grove, California, March 8-10, 2016

# Grande Coulee Dam

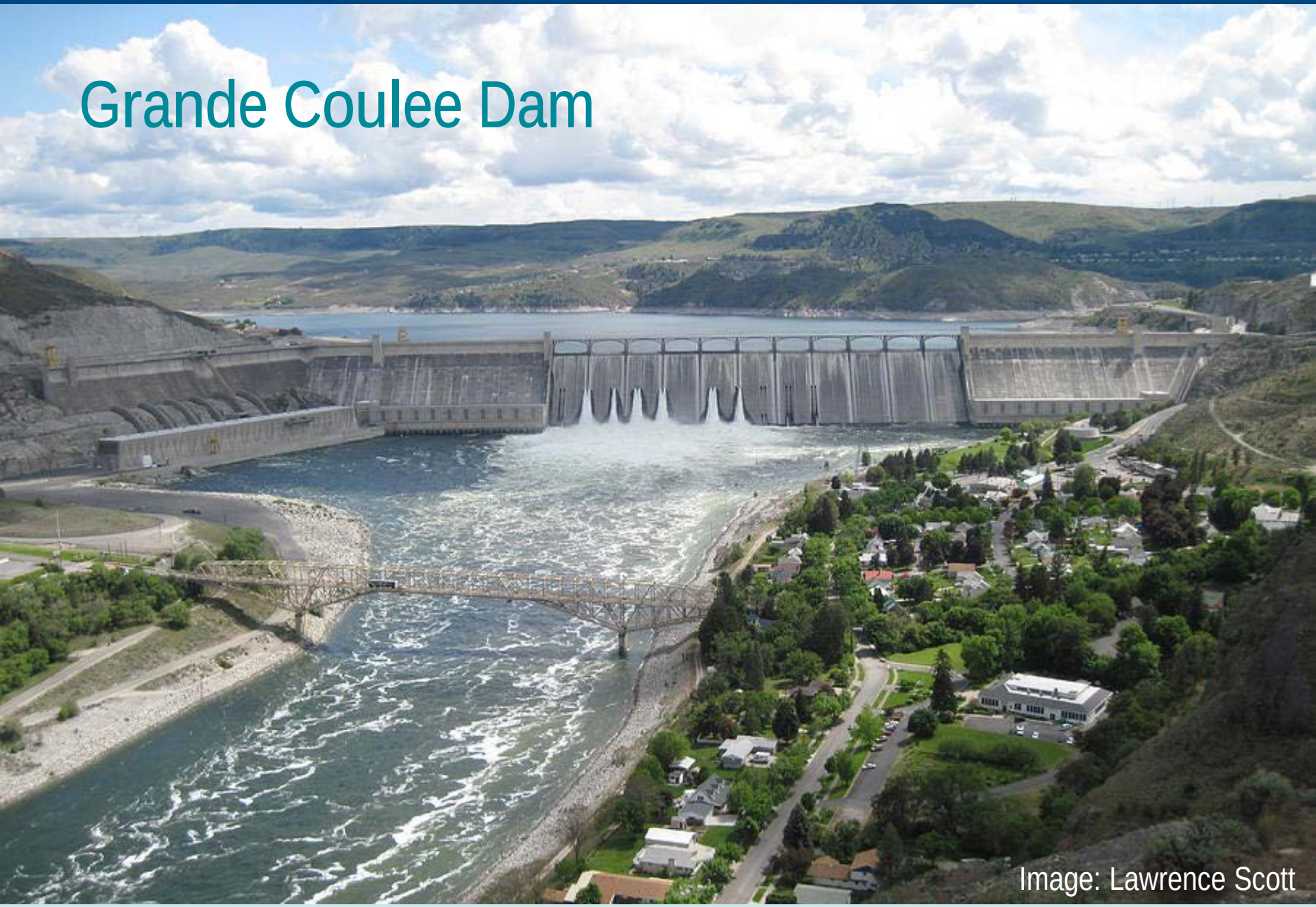
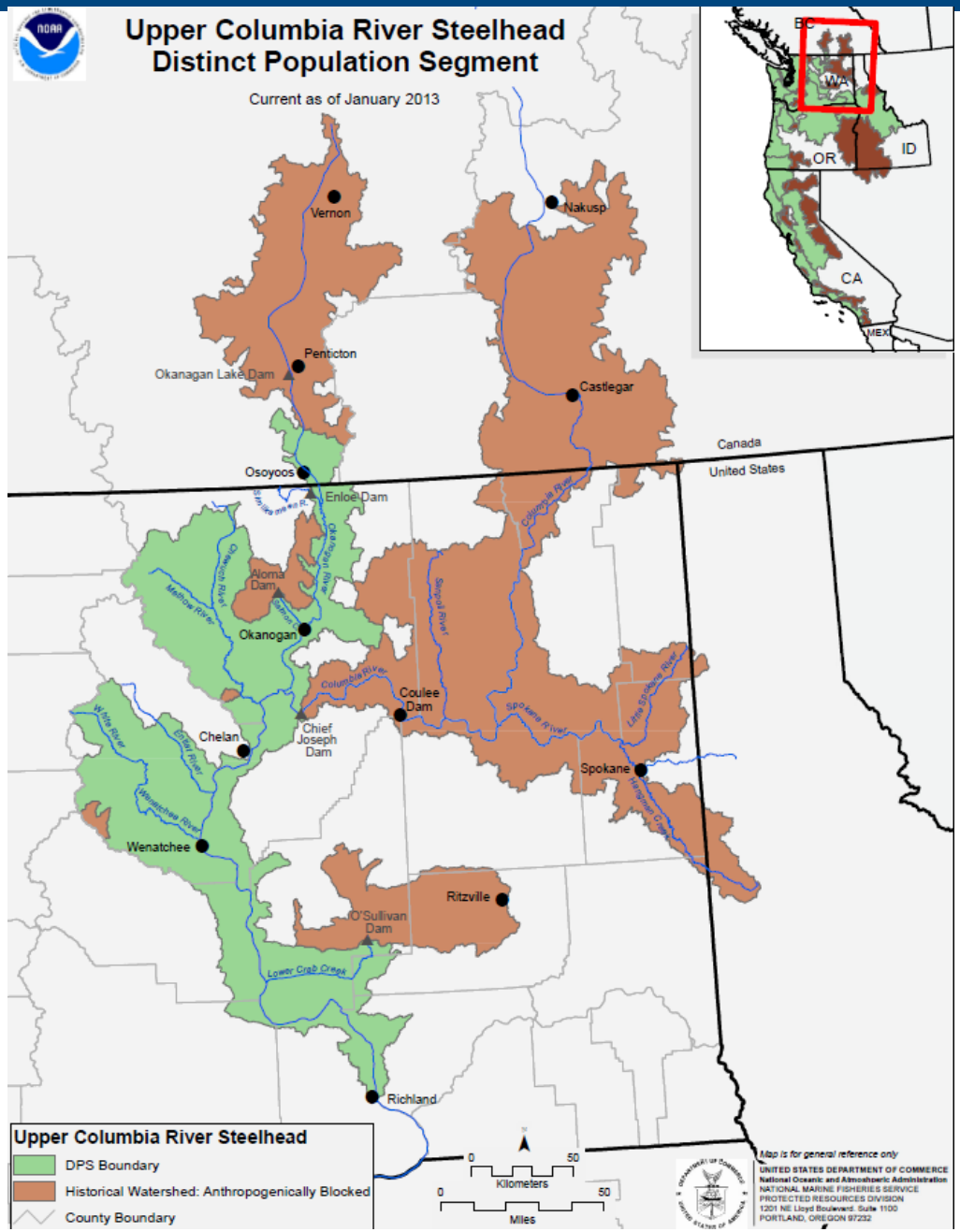


Image: Lawrence Scott

# Columbia River

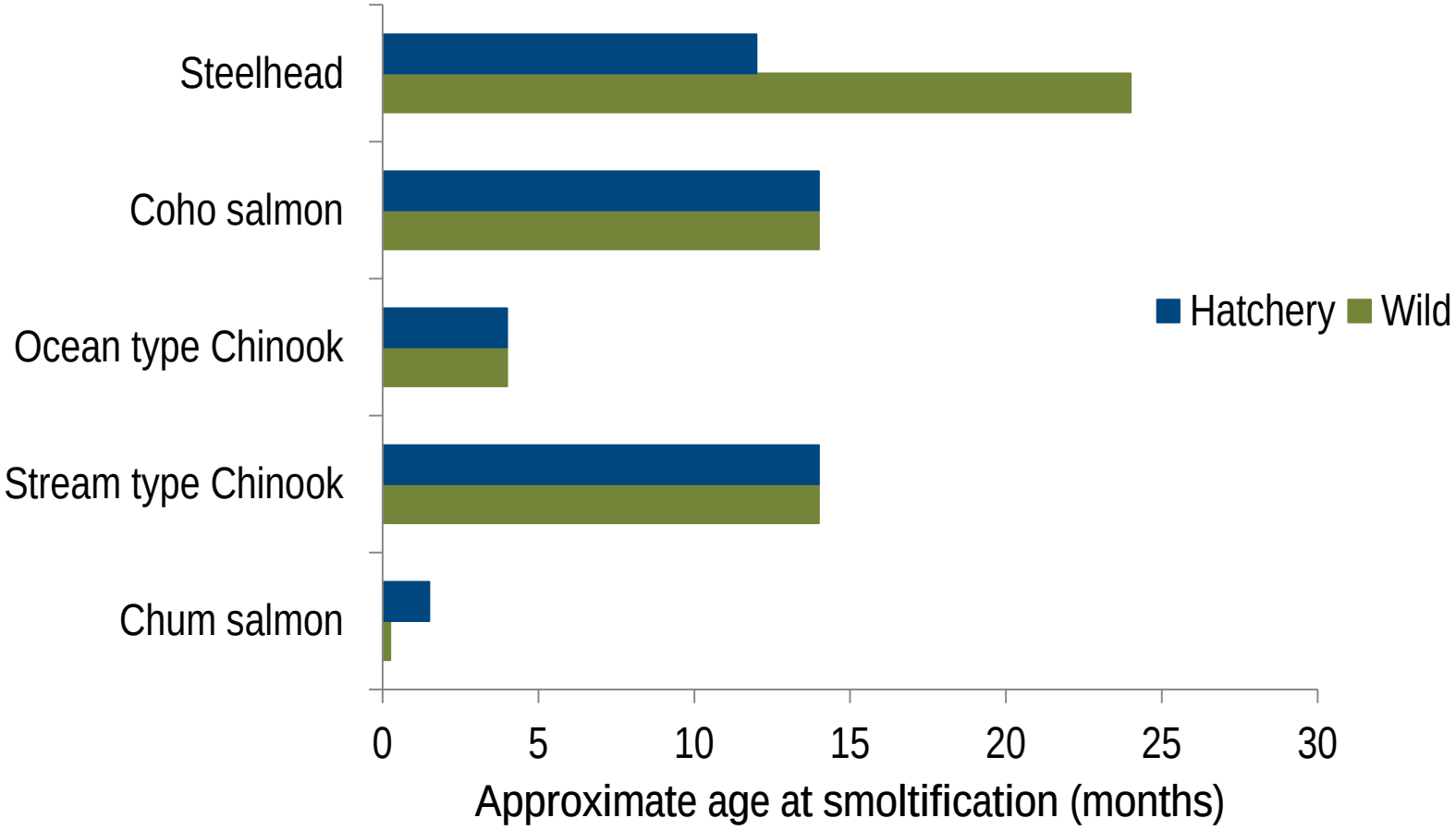

Cara Campbell, U.S. Geological Survey

# Upper Columbia River Steelhead DPS

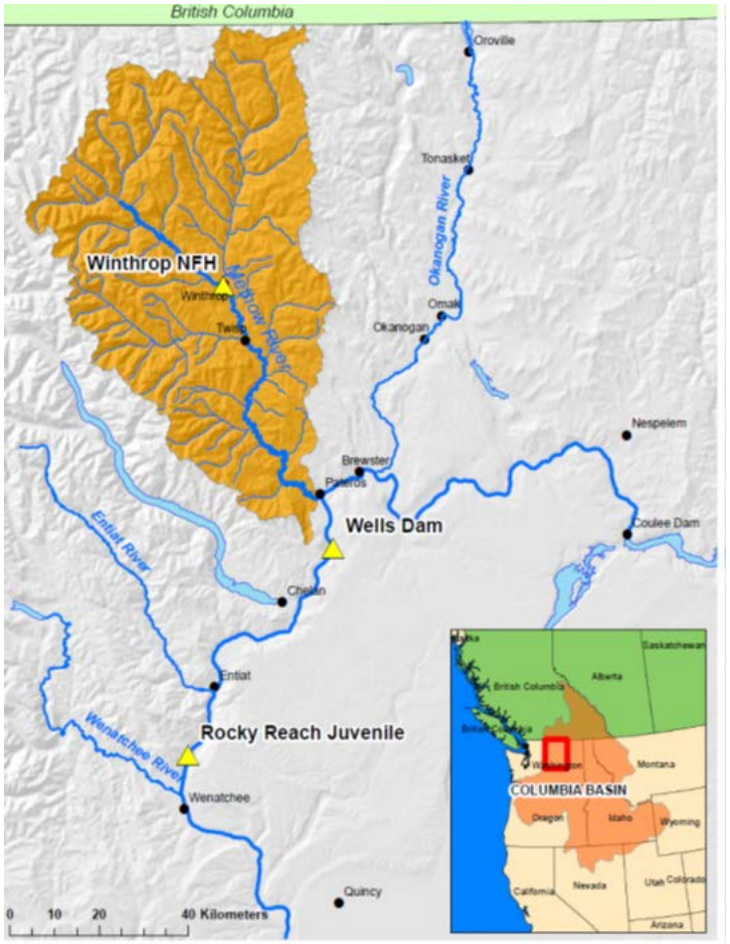



3. Wells Dam & Hatchery
Wells Overlook
Douglas County
Hwy 97
Wells Hatchery
Chelan County
Carpenter Island Boat Launch
Image: Douglas County PUD

# Hatchery and wild age at smoltification/release

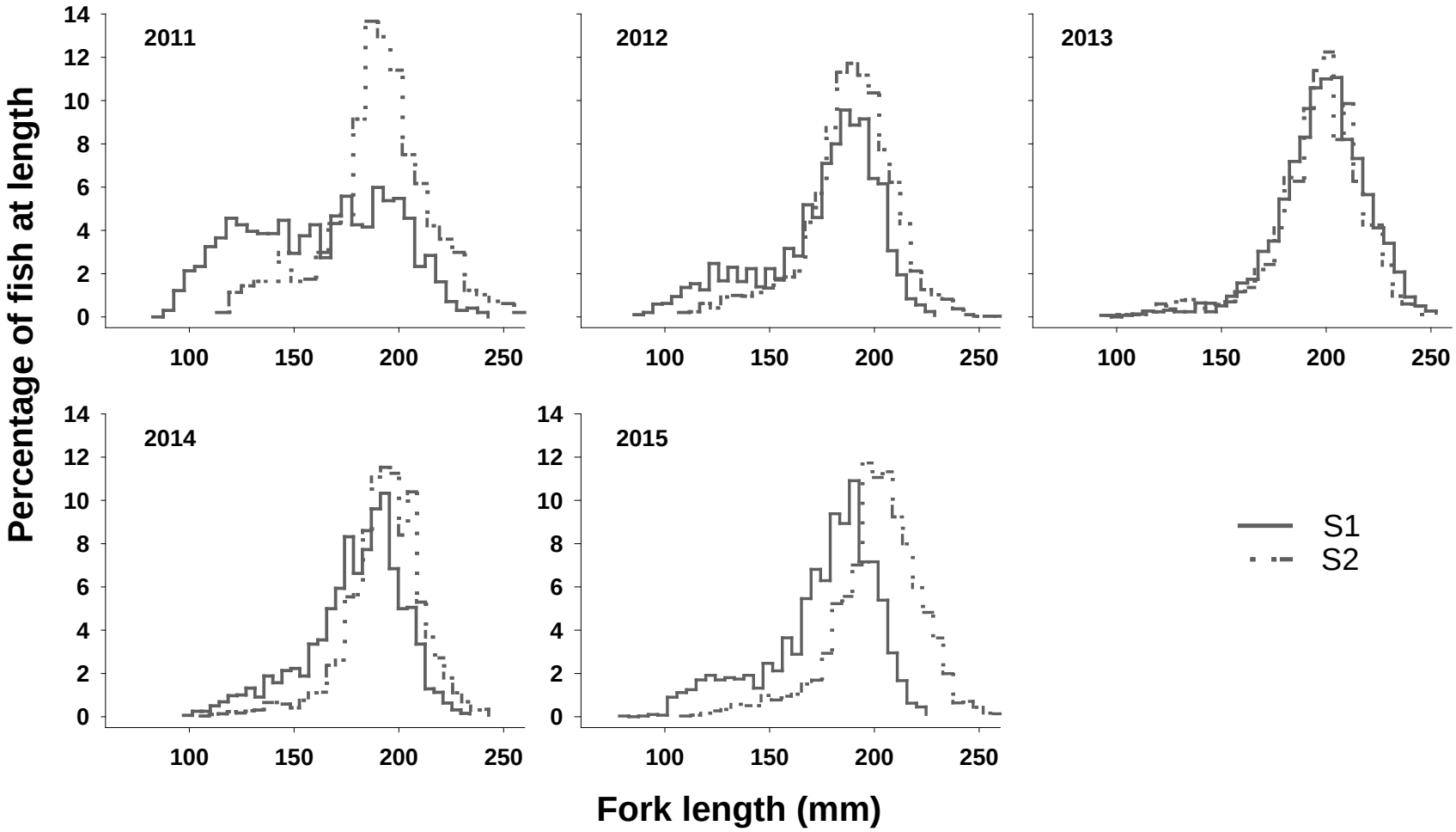


# Winthrop National Fish Hatchery



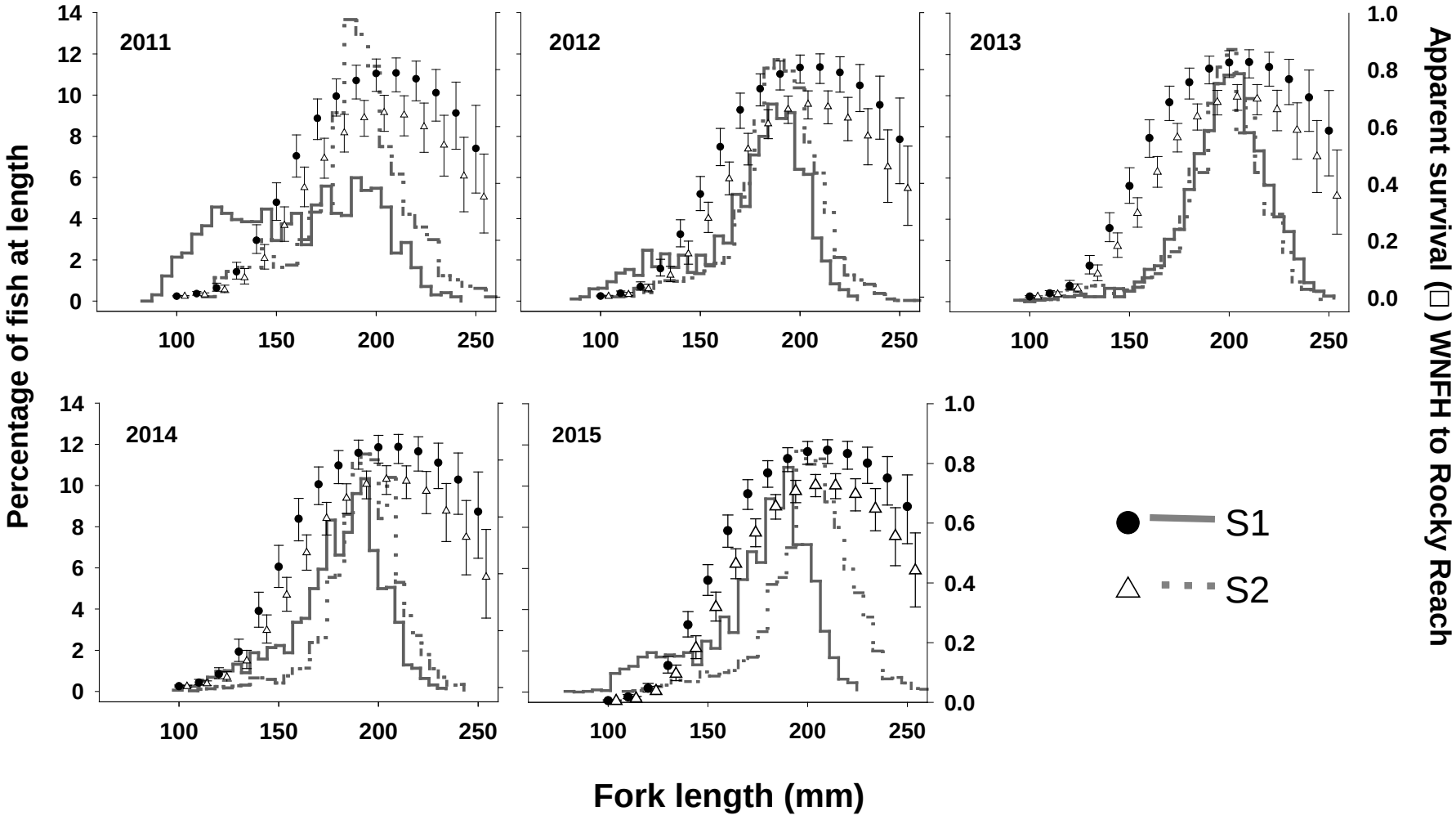

# Pre-release sampling of PIT-tagged steelhead

# S1 and S2 size distributions by release year

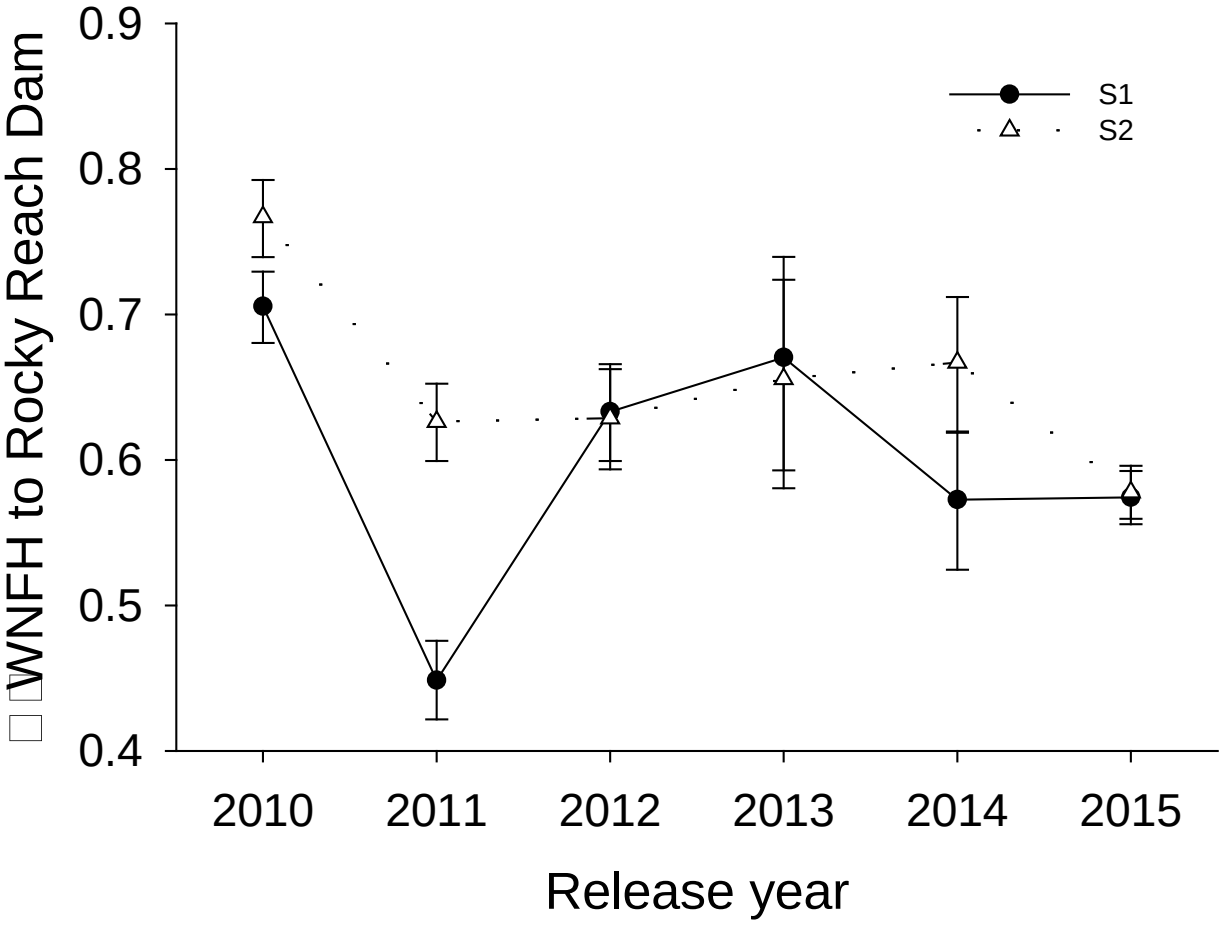


# Apparent survival and fork length

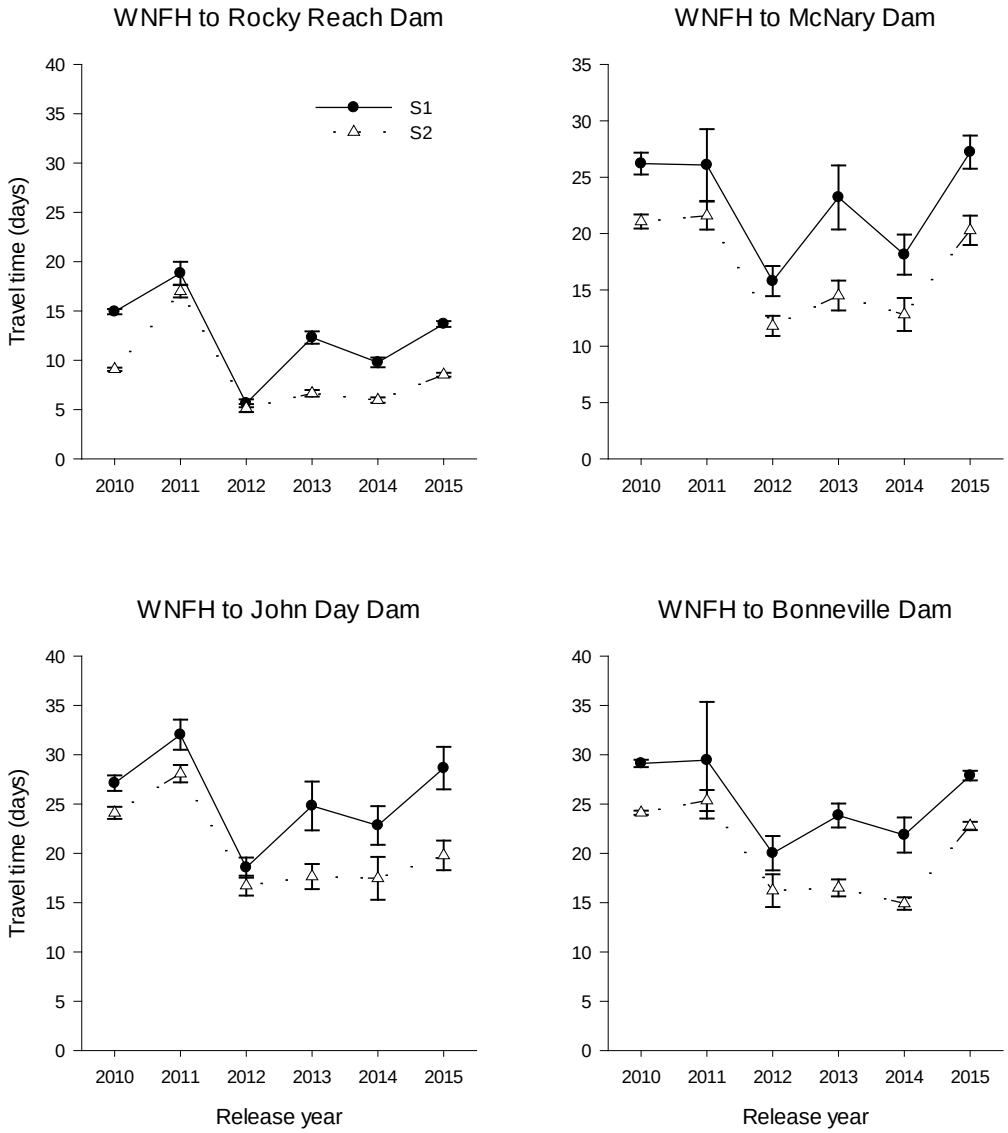
$\Phi$(rear + year + length + length$^2$) p(rear + year + length)



# Apparent survival by rearing treatment



# Outmigration travel rate

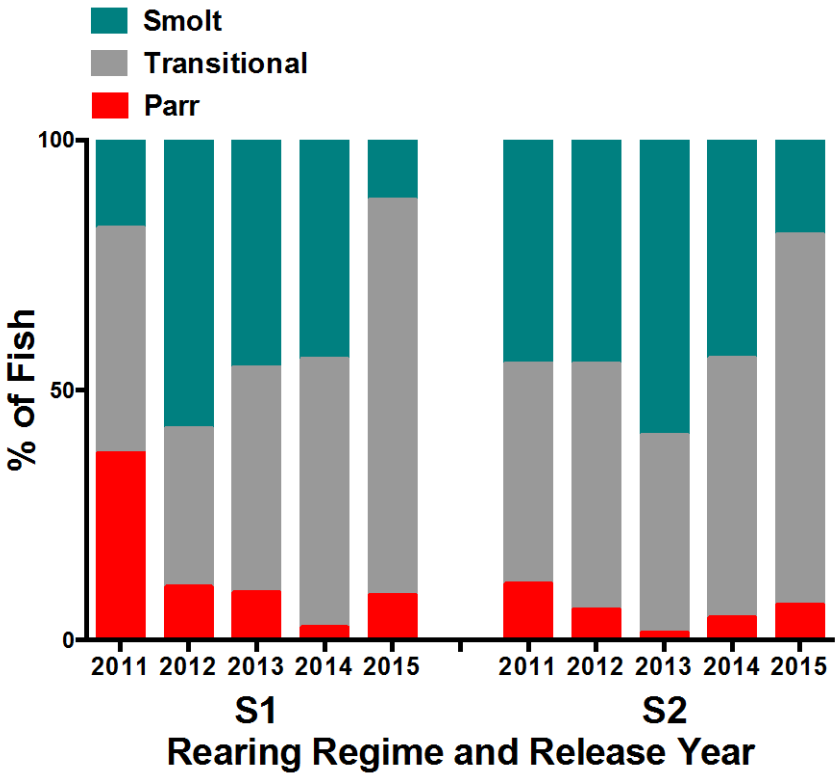


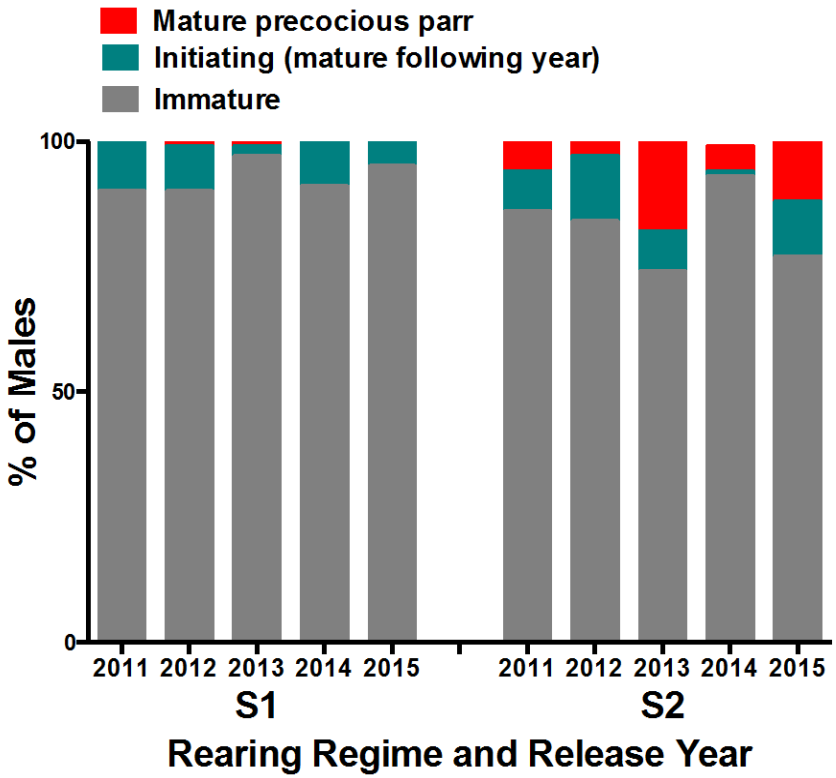
# Precocious maturation in steelhead


Image: Michael Humling

Image: Penny Swanson

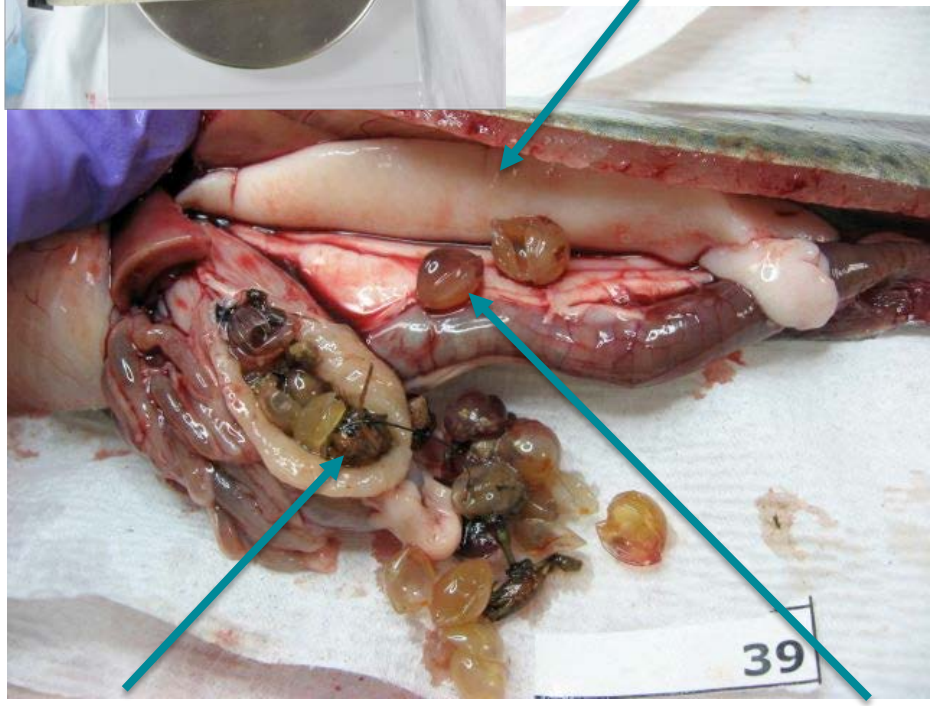
# Smoltification and Precocious Maturation



# Residualism and ecological interactions

Mature testes




Yellow jackets

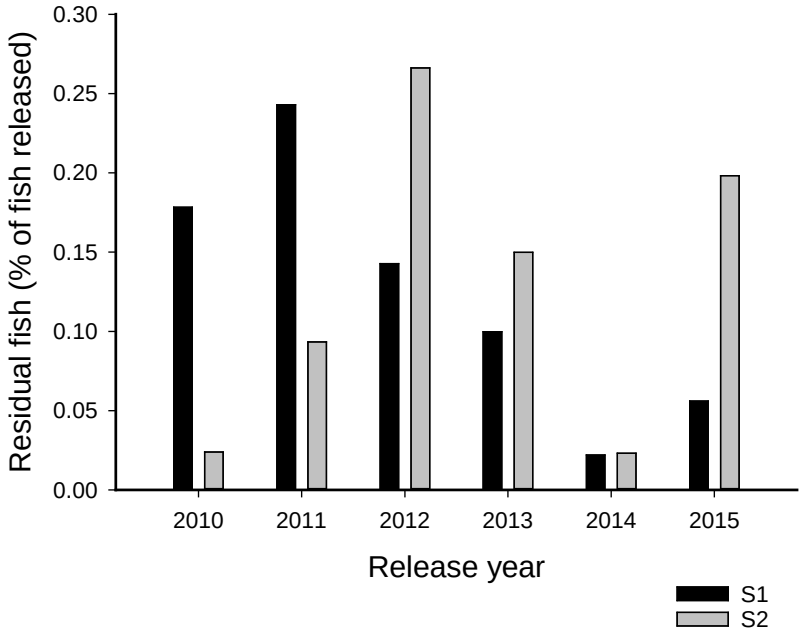
Chinook eggs

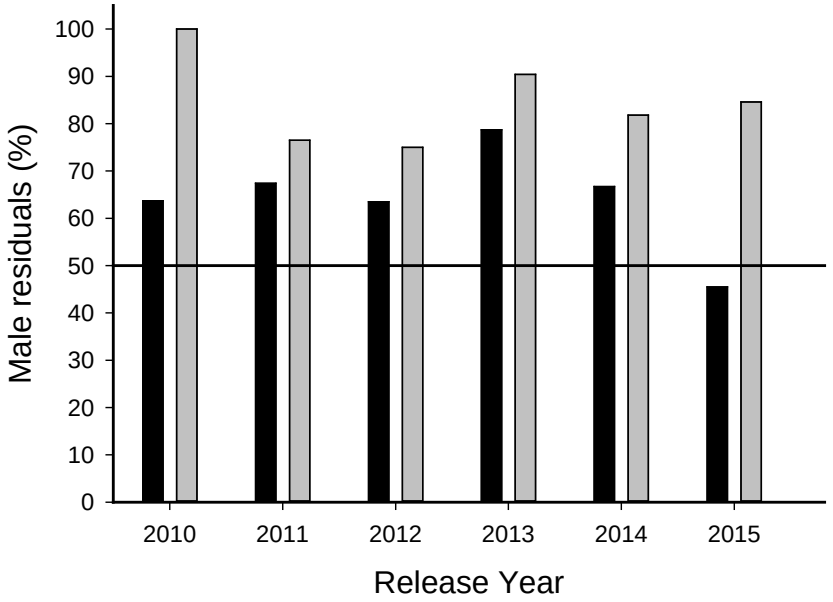
Precocious hatchery males

Anadromous female on redd

# Residual collection

# Residual index and sex ratio of residuals

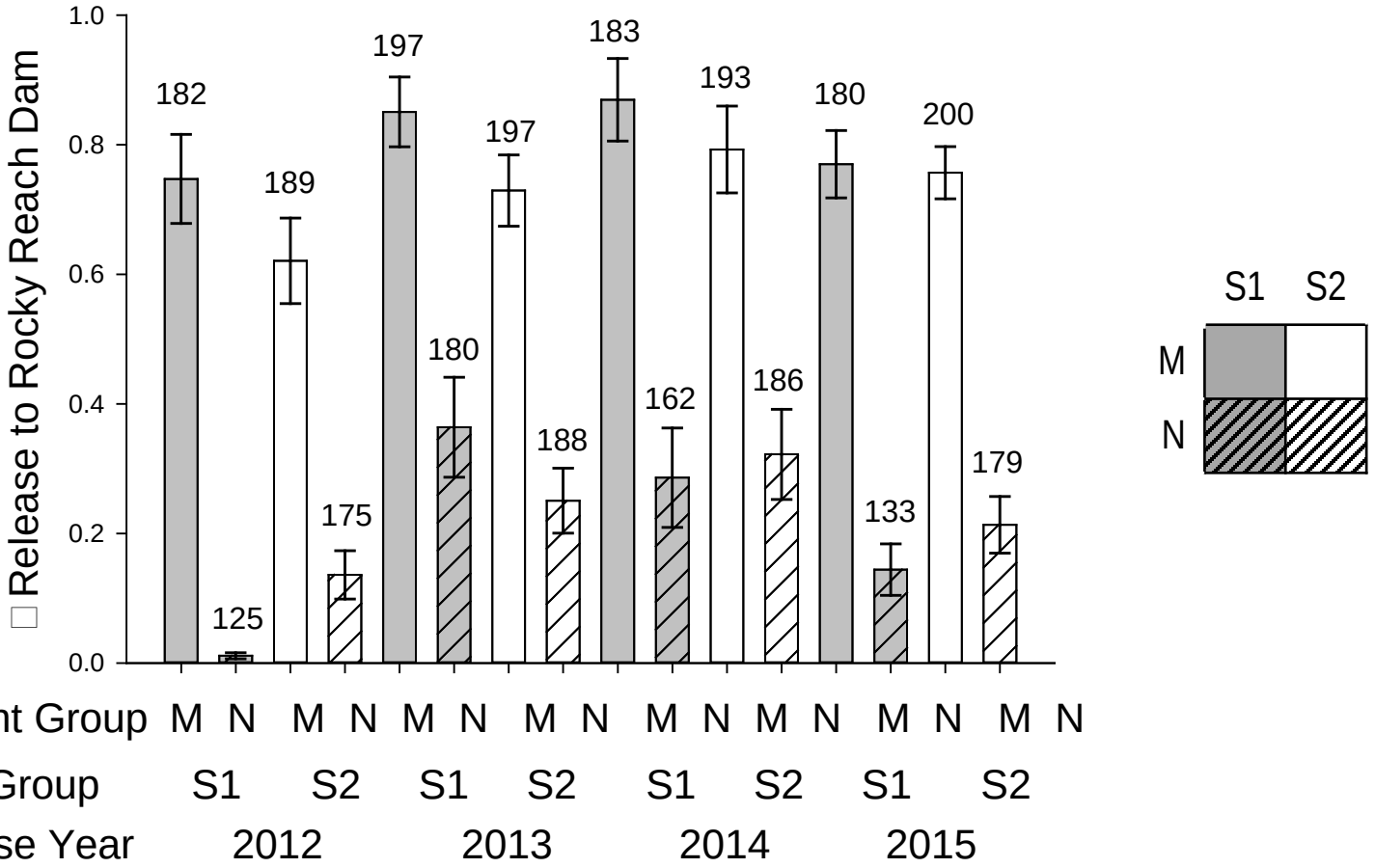


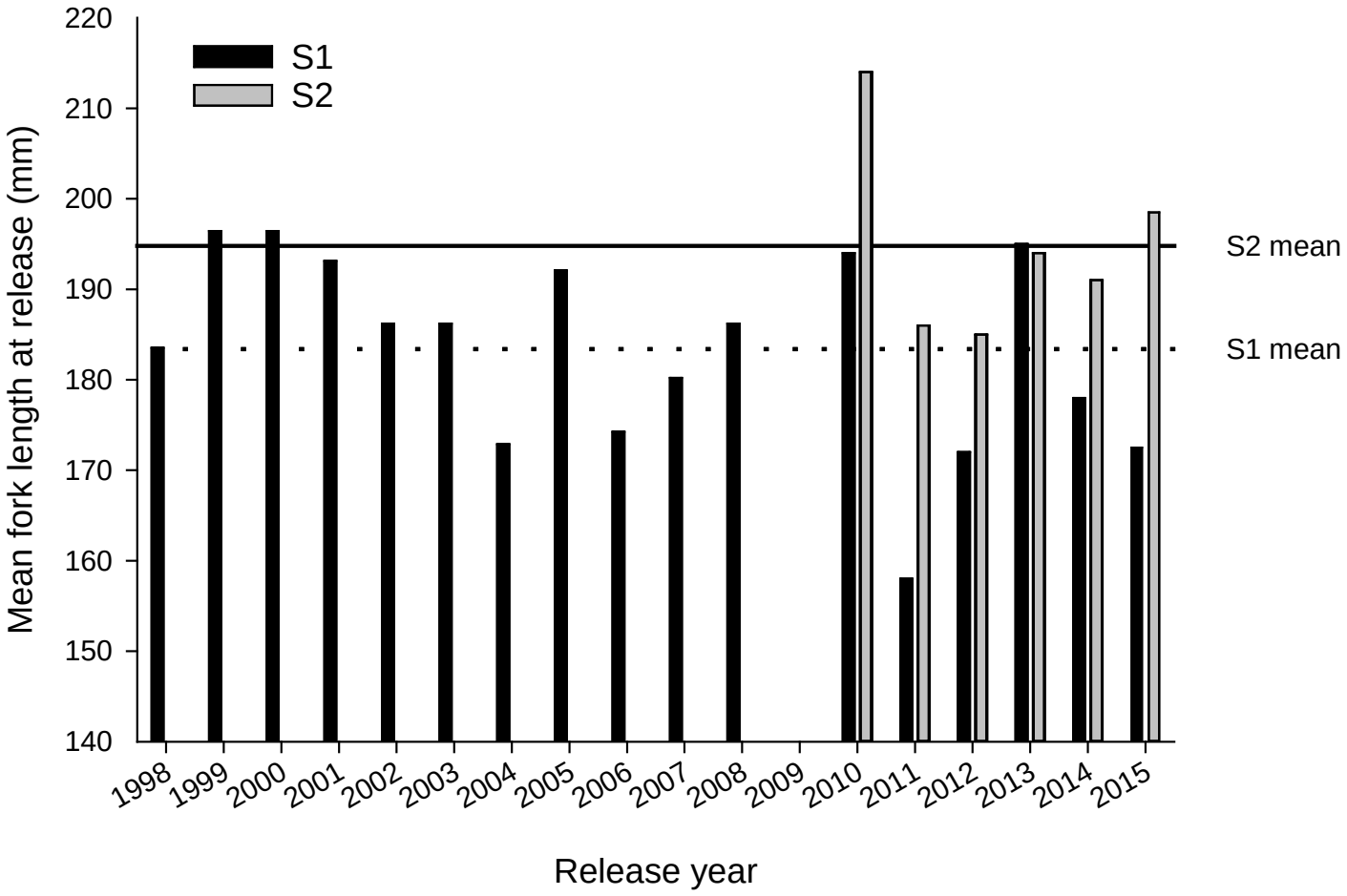
# Volitional release of steelhead

# Survival of migrants and non-migrants

$\Phi$(rear+mig+year+length+length$^2$) p(rear+year+length)



# Historic lengths at release of WNFH steelhead



# Acknowledgements

Image: Michael Humling


Collaborators

- USFWS – staff of WNFH and Mid Columbia FRO
- NOAA/NWFSC - Manchester and Montlake
- UW
- USGS
- WDFW

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# Smolt to Adult Survival Rates (SAR)

# %SAR and Saltwater Age of Adults