

Behavior and survival of hatchery Spring Chinook in the Hood River

2024 AFEP ANNUAL REVIEW

3 DECEMBER 2024

HANS BERGE, JOHN LYSSENKO, AND RYAN FLAHERTY

Goals



- Determine outmigrant behavior and survival in the Hood River and delta
- Original interest in natural and hatchery origin (steelhead and Chinook)
- Permitting only allowed hatchery Chinook
- Investigate potential use and entrainment in Nichols Boat Basin
- Use of acoustic telemetry

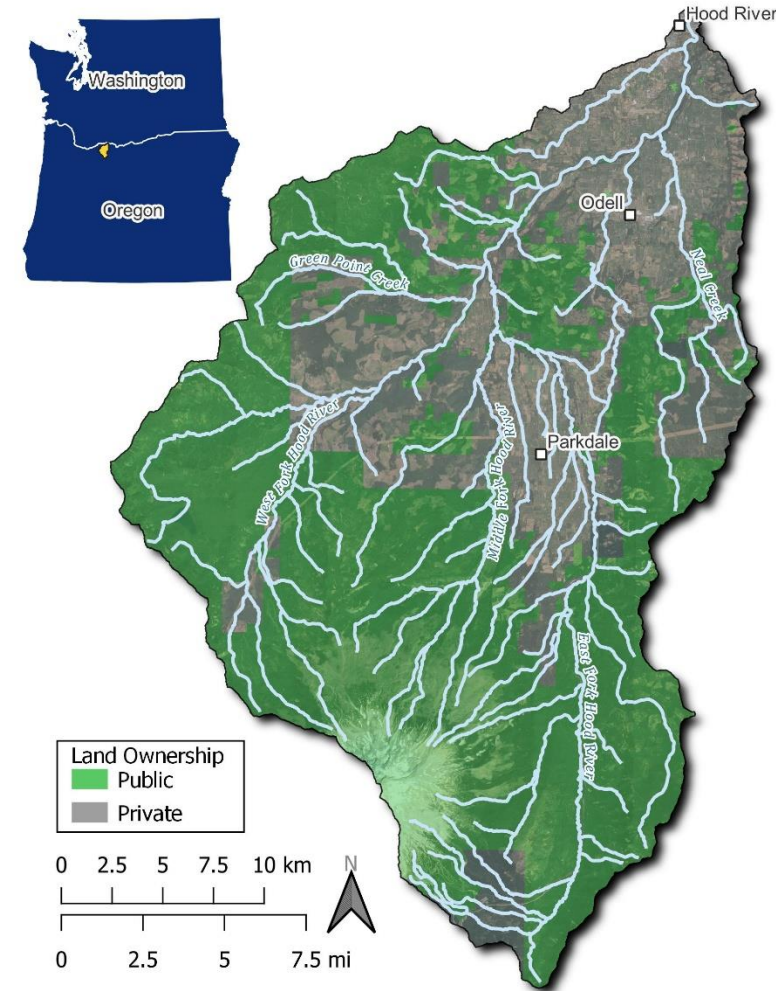


Nichols Boat Basin

Study Area



- 878 km² originating from east slope of Cascades
- Rivers flow from Mt. Hood (3,437 m) to the Columbia River at rkm 271 (22 m)
- Most of watershed is public land
- Middle and West Forks are glacial
- Study started at Moving Falls fish facility on West Fork and ended in Columbia River
- Fish from Round Butte and Parkdale Hatcheries
- Study from 13 April 2024 – 17 May 2024

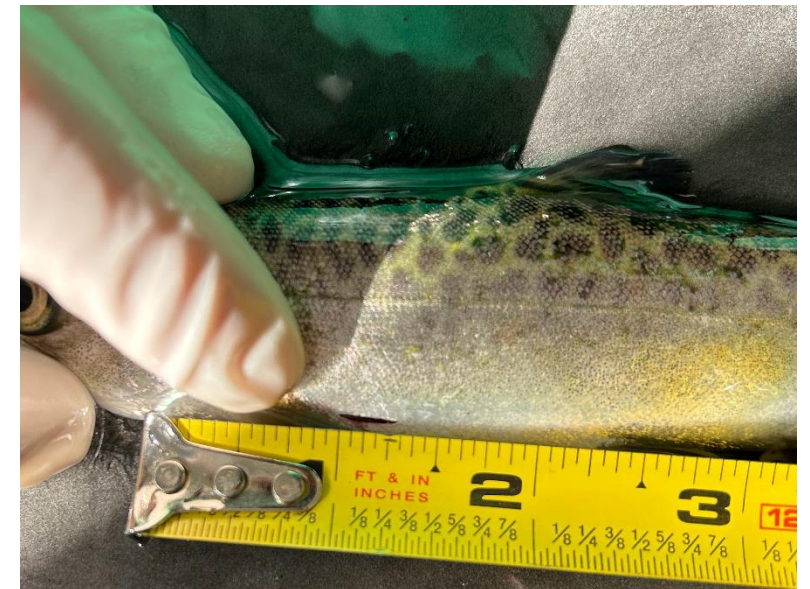


Tagging



				Length (mm)			Weight (g)		
Stock	Release Group	N	Release Time	min	mean	max	min	mean	max
PARKDALE	DAY	81	4/18/2024 9:12	124	154.8	196	27	44.4	95
PARKDALE	NIGHT	60	4/19/2024 20:28	131	148	190	25.3	38.5	73.4
ROUND BUTTE	DAY	120	4/18/2024 9:12	141	180.8	220	34.1	65.8	113.1

- Acoustic tags: 13 mm x 7 mm and weight of .715 g in air, with PRI of 2 s
- Implanted using a suture-less technique (Voorhees and Barnes 2020)
- Burden less than 3%
- 261 tagged hatchery Chinook
- 201 released during the day (120 Round Butte and 81 Parkdale) and 60 released at night (Parkdale)
- Fish held 3 days prior to release, no tags expelled



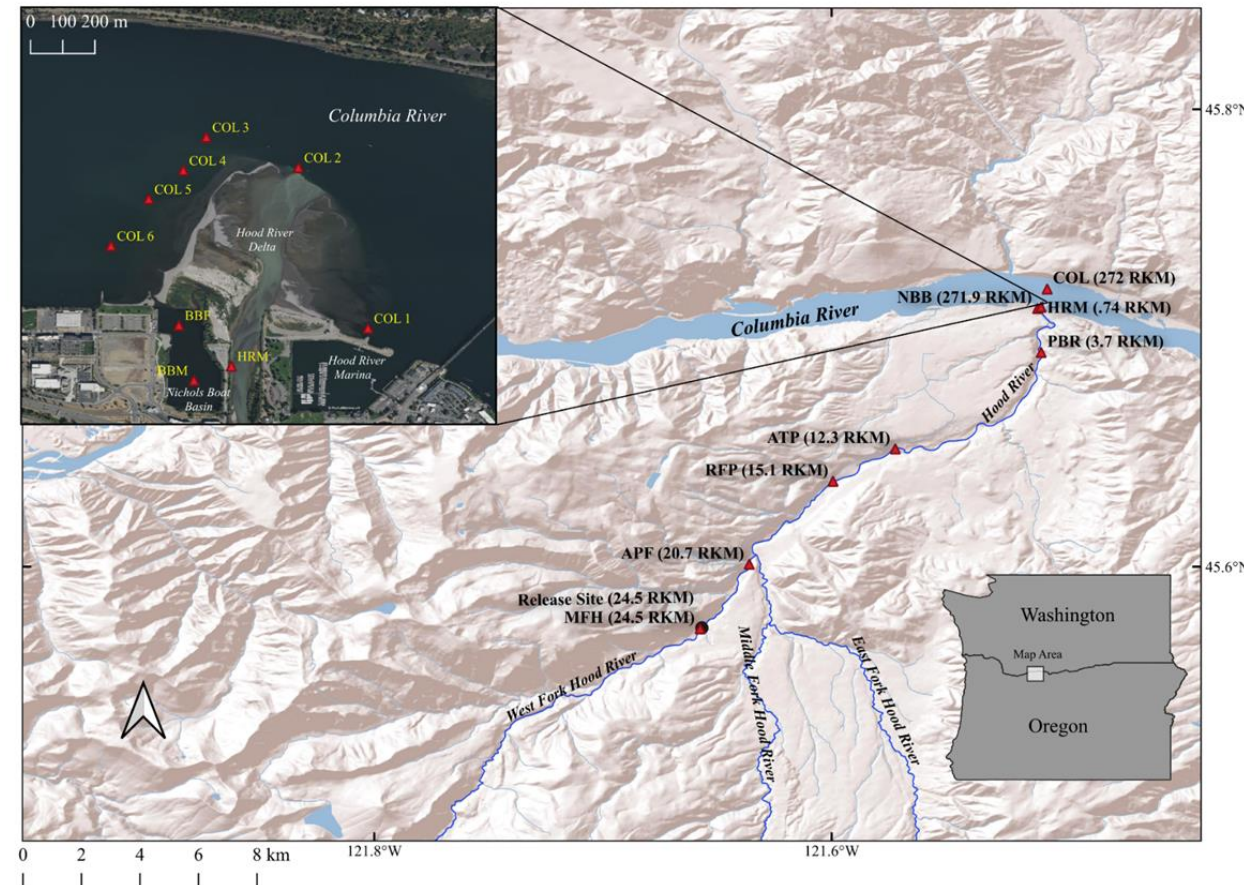
Hydrophone Deployment



- 19 autonomous receivers at 13 locations
- Punchbowl Falls (rkm 20.7) to mouth
- 6 in Columbia River, 2 in Nichols Boat Basin
- Tag life study (30 tags) with an additional hydrophone at Moving Falls facility



Horizontal deployment of a hydrophone in Hood River



Hydrophone locations used in this study

Data Analysis



- Analyzed using Minimum Mode Processor with filters for detections
- Used MARK with RMARK
- Cormack-Jolly-Seber single release-recapture model
- Reach specific estimates

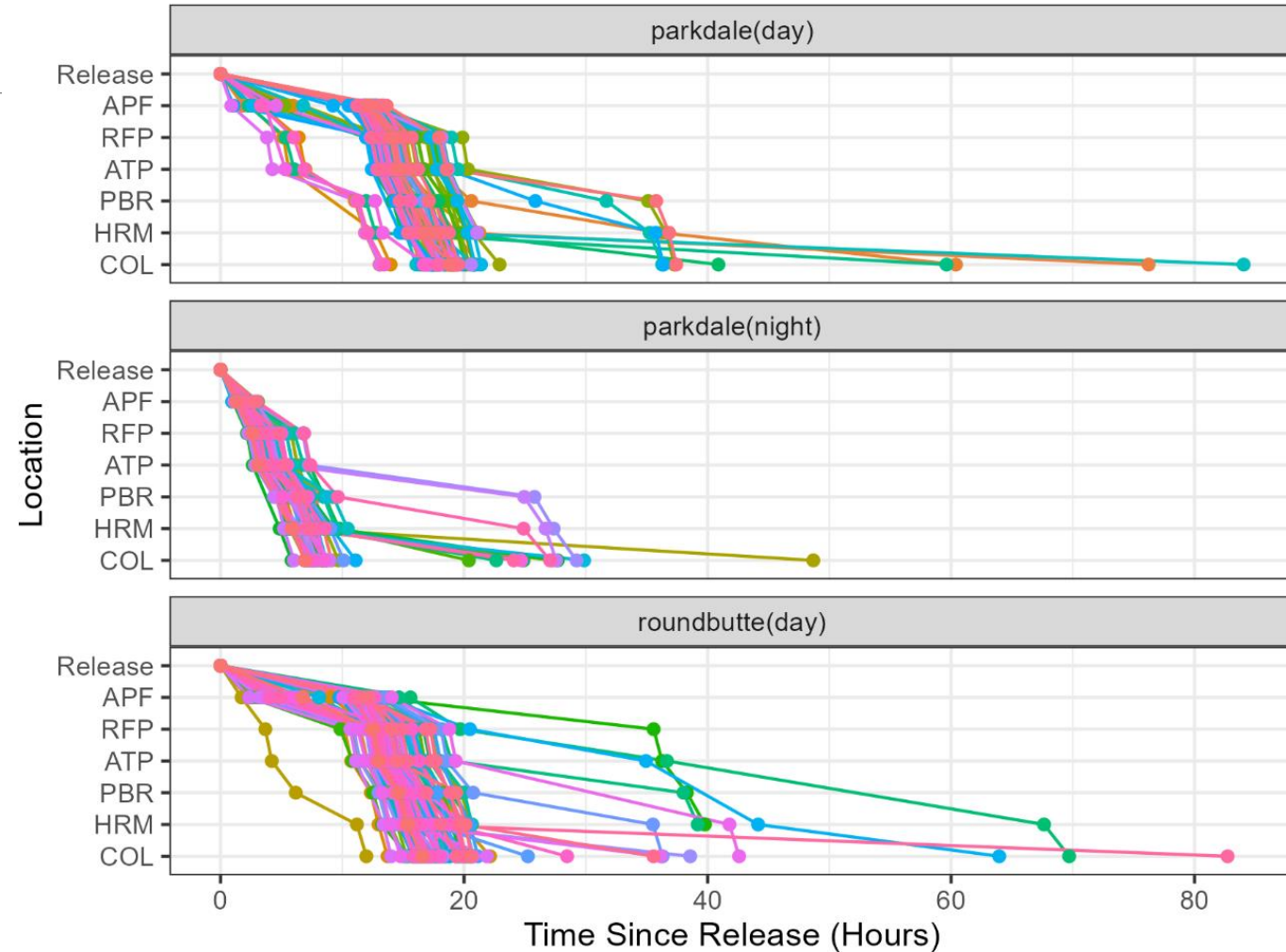


Two hydrophones set parallel

Results: Travel time to Columbia River



- Most out of river within 24 hours
- Night release traveled faster than Day
- Night release: mean travel time 7.9 hrs
- Day release: mean travel time 17.22 hrs
- All fish gone after 34 days
- Tag life study: 83.9 to 102.4 day life span, average of 90.2 days



Results: Behavior in Nichols Boat Basin and delta



- No tagged fish entered the Nichols Boat Basin
- Most fish left the delta and Columbia River array within several hours
- 6.5% stayed longer than 24 hours
- One fish went upstream in Columbia River



Hood River Delta, April 2024

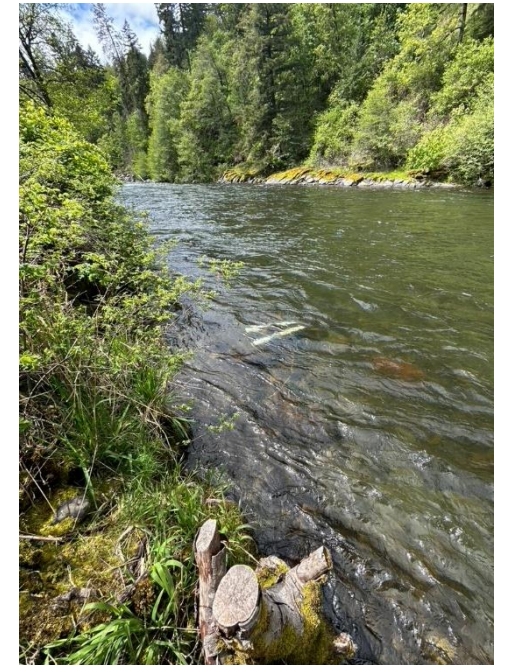
Results: Fish Survival



- Cumulative survival estimate for both groups was 91% (261 total tags)
- Day survival rate was 96%
- Night Release survival rate was 98%

Reach	Survival	95% CI
Release to APF	0.966	(0.943-0.985)
APF to RFP	0.996	(0.988-1.000)
RFP to ATP	1.000	(1.000-1.000)
ATP to PBR	0.991	(0.975-1.000)
PBR to HRM	0.993	(0.978-1.000)
HRM to COL	0.965	(0.912-1.000)
Cumulative	0.913	(0.857-0.959)

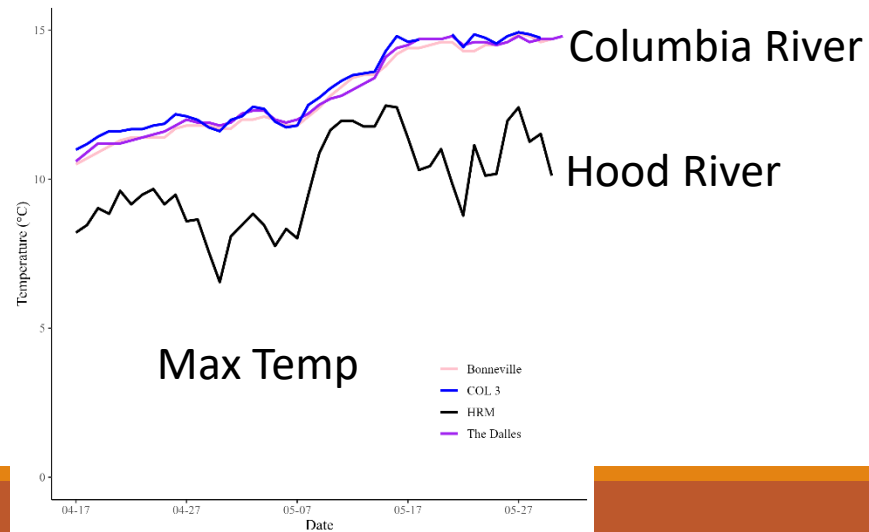
Estimated survival with 95% CI



Results: Temperature and Flow

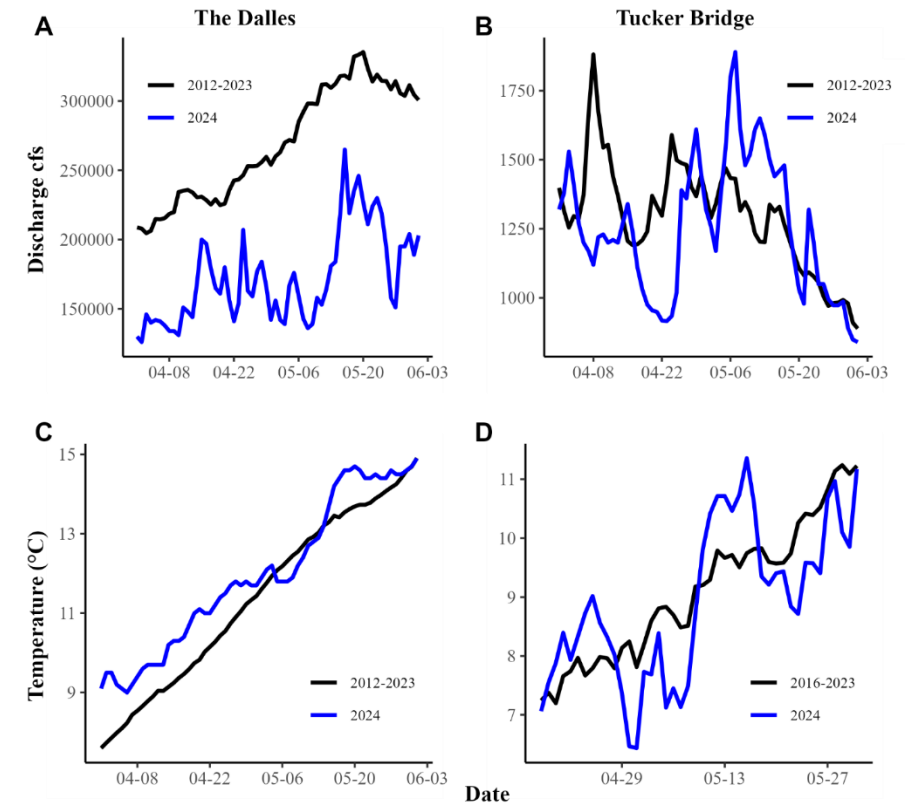


- Flows during this study were lower than 10 year average in Columbia and Hood Rivers
- Temperatures were similar
- Little difference in temperature between the Columbia and Hood River mouth.



Columbia River

Hood River

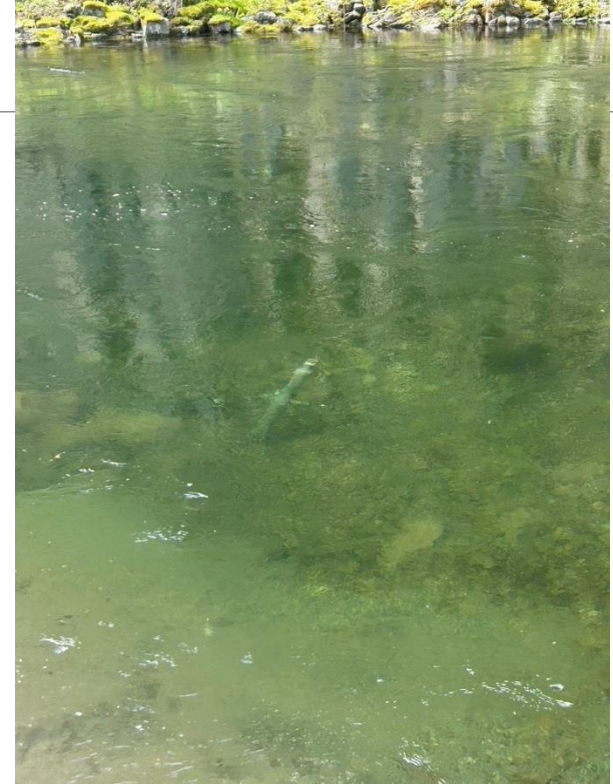


Comparisons of average daily discharge and Temperature

Conclusions



- Fish migrated quickly through the Hood River, delta, and left the vicinity in the Columbia River quickly
- Acoustic telemetry was a successful tool to evaluate movement and survival
- Suture-less tagging technique was a successful method
- Day released hatchery Chinook survival was 96%
- Night released hatchery Chinook survival was 98%, and travel time was faster
- Fish were not observed using the Nichols Boat Basin





Questions

Contact: Hans Berge (hans.berge@fishsciences.net)