

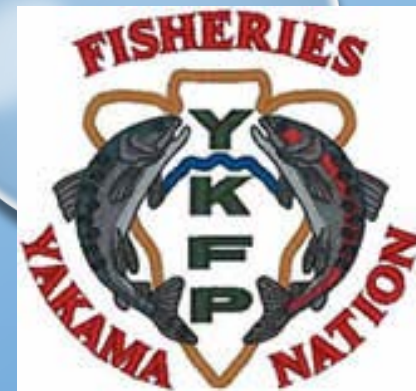
MOVEMENT PATTERNS OF ARTIFICIALLY RECONDITIONED KELT STEELHEAD FOLLOWING RELEASE

RESEARCH PARTNERSHIP BETWEEN YAKAMA NATION
AND COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

CRITFC: DOUG HATCH PRIMARY INVESTIGATOR; RYAN BRANSTETTER: PRESENTER, ANDY PIERCE

YAKAMA NATION: DAVE FAST, CHRIS FREDERIKSEN, BILL BOSCH, JOE BLODGETT

RESEARCH FUNDING PROVIDED BY: **BONNEVILLE POWER ADMINISTRATION**



ACKNOWLEDGEMENTS

- JEFF TRAMMELL (YN)
- CONAN NORTHWIND (YN)
 - TIM RESSEGUIE (YN)
 - RYAN DEKNIKKER (YN)
 - BILL BOSCH (YN)
 - BILL FIANDER (YN)
 - RENE TULE (YN)
 - BILL FLETT (YN)
 - ZACK MAYS (WDFW)
 - TODD NEWSOME (YN)
- PAUL HUFFMAN (YN)
- MICHAEL FIANDER (YN)
- PROSSER HATCHERY CREW (YN)
 - TRACY HAUSER (BPA)
 - JEREMIAH NEWELL (CRITFC)
 - BOBBY BEGAY (CRITFC)
 - DAVID GRAVES (CRITFC)
 - KYLE DITTMER (CRITFC)
 - NEIL GRAHAM (CRITFC)
 - LAURA JENKINS (UI)

RATIONALE FOR THE STUDY

- DOCUMENTING REPRODUCTIVE SUCCESS FROM ARTIFICIALLY RECONDITIONED KELT STEELHEAD IS IMPORTANT:
 - “ONE OF THE UNCERTAINTIES SURROUNDING THE SURVIVAL BENEFIT OF LONG-TERM RECONDITIONING IS THE ACTUAL SPAWNING SUCCESS OF RECONDITIONED KELTS.” *2014 FCRPS SUPPLEMENTAL BIOP*
 - THIS QUESTION HAS ALSO BEEN RAISED BY THE INDEPENDENT SCIENCE REVIEW PANEL (ISRP).
- GOOD OPPORTUNITY TO UTILIZE THE RADIO TRACKING INFRASTRUCTURE FROM THE VSP PROJECT.
- INCREASE OUR SAMPLE SIZE. DOCUMENTED PRODUCTION FROM REPEAT SPAWNERS ALREADY EXISTS.

OBJECTIVES

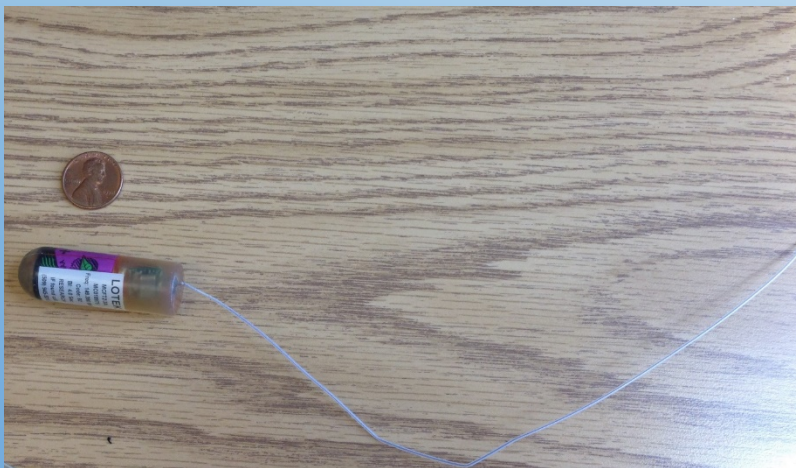
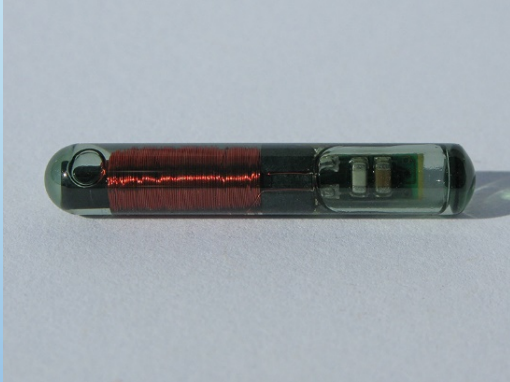
1. REAR KELTS TO MATURITY (**REPEAT SPAWNERS**) AND TAG/RELEASE
2. TRACK REPEAT SPAWNERS IN THE YAKIMA BASIN
3. DETERMINE HOMING FIDELITY AND SPAWN TIMING TO TRIBUTARY
4. FIND REPEAT SPAWNERS ON SPAWNING GROUNDS
5. DOCUMENT EVIDENCE OF SPAWNING
6. FIND KELT PROGENY

METHODS: KELT COLLECTION AND ARTIFICIAL RECONDITIONING

- Captured at Chandler Juvenile Bypass in the spring of 2013 (end of March- early June).
- All kelts pit-tagged, administered prophylactic treatments: oxytetracycline, emamectin benzoate, and formalin¹.
- Provided a diet of krill with top coated or uncoated pellets¹.
- ¹ Described in detail in: Hatch DR, Fast DE, Bosch WJ, Branstetter R, Blodgett JW, Whiteacre JM & Pierce AL 2013 Survival and traits of reconditioned kelt steelhead (*Oncorhynchus mykiss*) in the Yakima River, Washington. *North American Journal of Aquaculture* **33** 615–625.

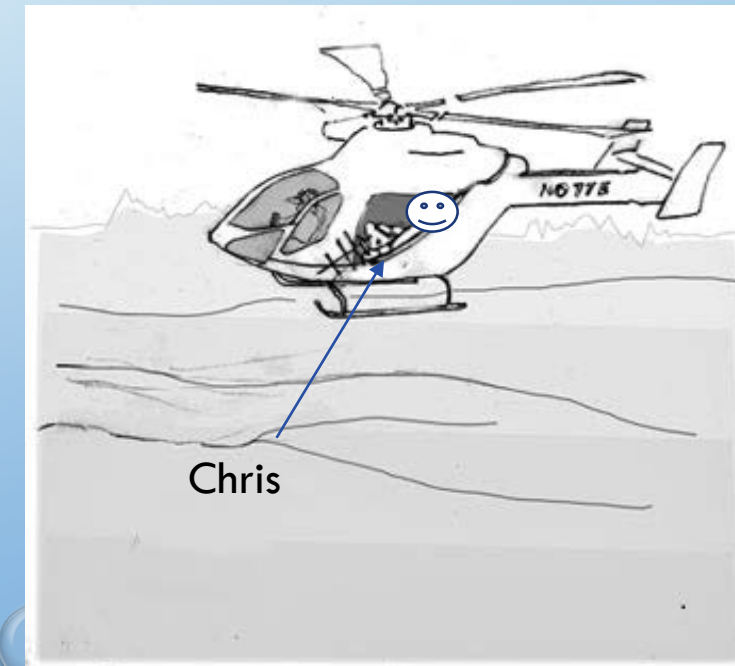
TRACKING EQUIPMENT

- All fish checked for PIT-tag/or re PIT-tagged.
- Lotek Transmitters: Model: MCFT2-3A, Dimensions: 16 dia x 46 length (mm), water weight 6.7g, Burst Interval: 4 seconds, Tag Life: 1112 days (est)
- Radio tags were gastrically inserted (All by Chris Fredericksen)

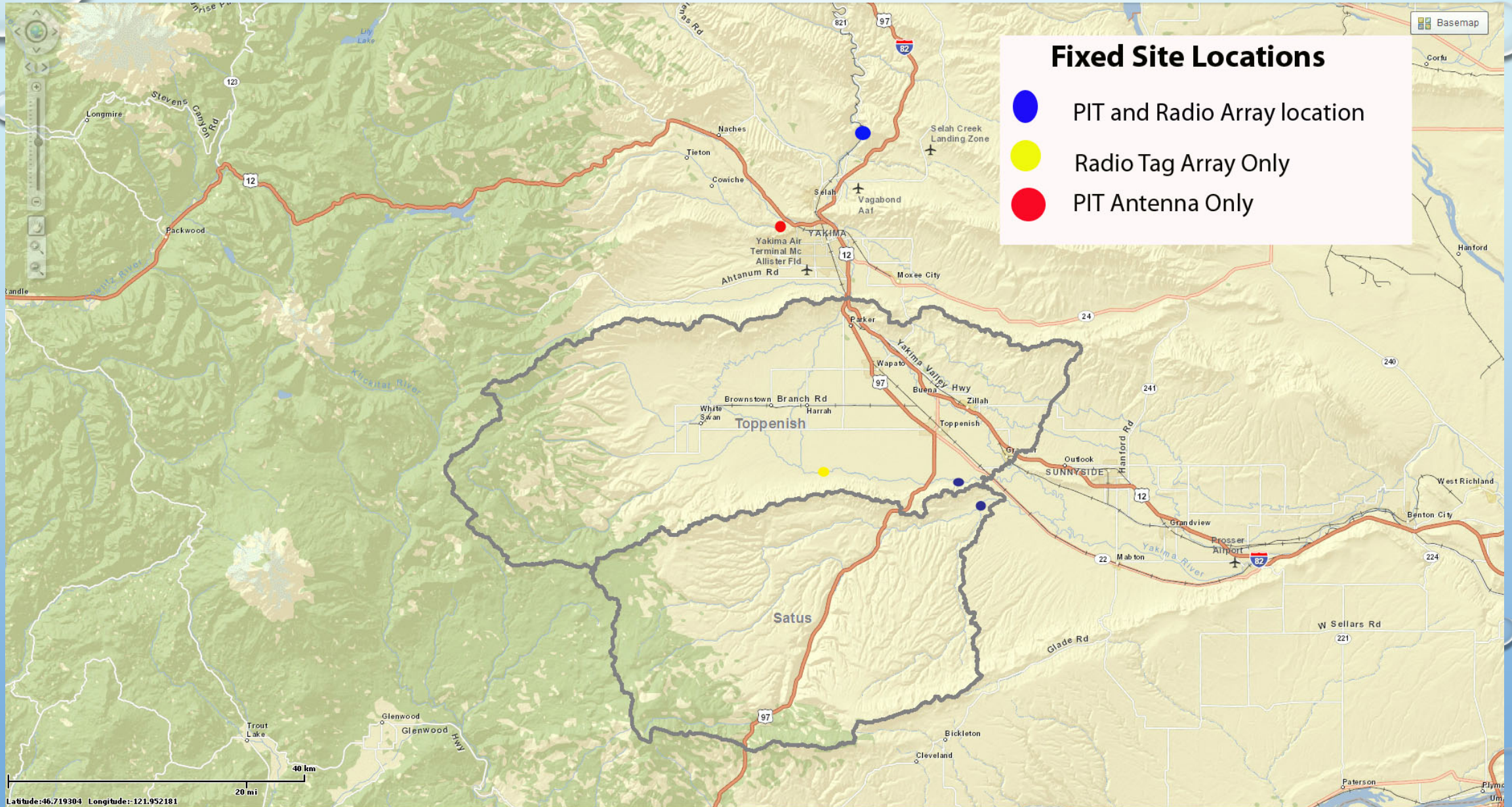


TRACKING EQUIPMENT CONT.

- Multi-directional yagi antenna mounted on back of truck.
- Small hand held directional antenna used for close proximity and hard to access sites.
- Helicopter outfitted with antenna and receiver
- Lots of coordination between YN and CRITFC staff.



STATIONARY RADIO AND PIT TAG ARRAY LOCATIONS



ASSUMPTIONS AND LIMITATIONS OF RADIO TAG DATA

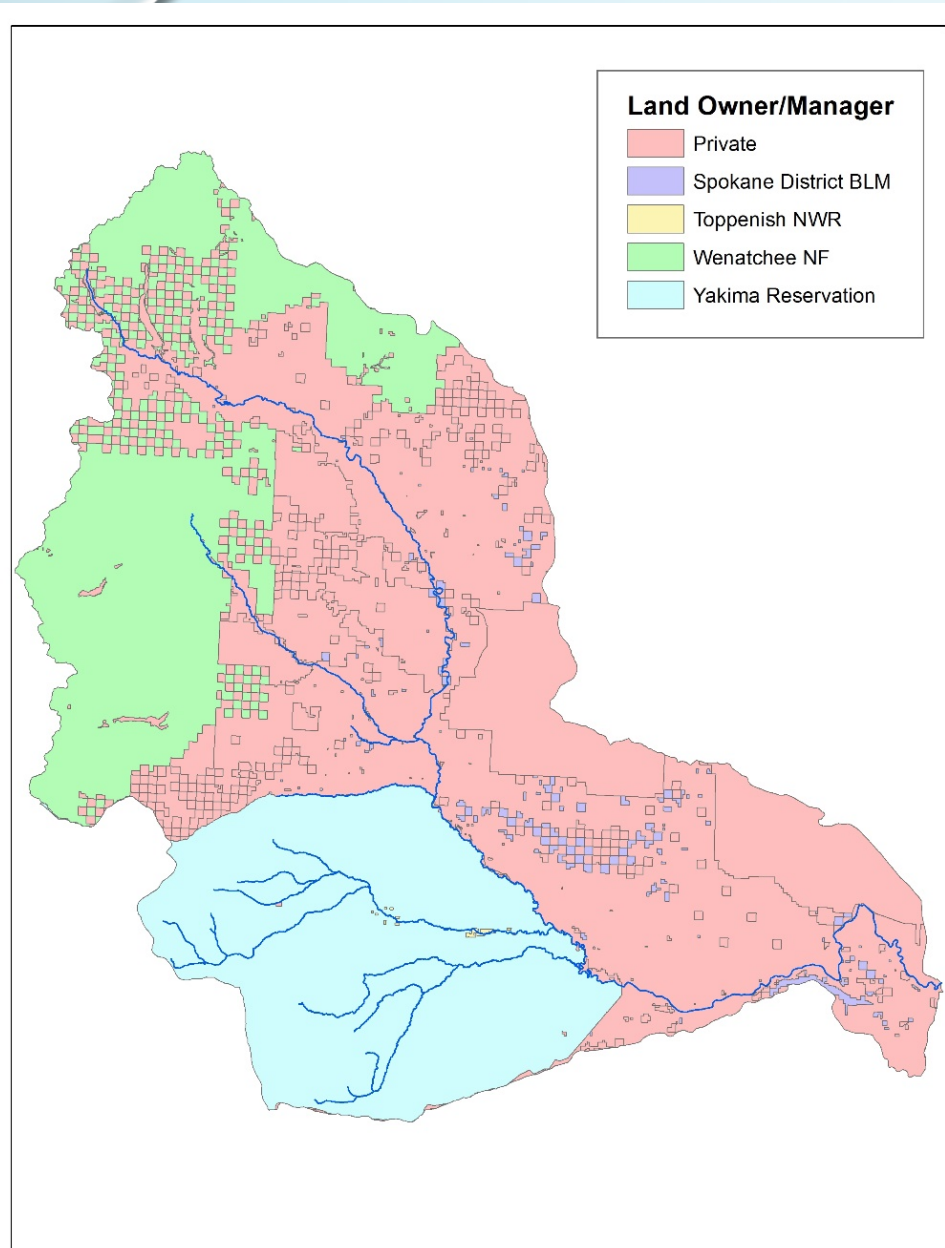
- Data is only as good as time spent tracking.
- Mortality: tag ceases to move after about a 2-week time period or longer with no subsequent PIT-tag detections.
- Spit tag: based on subsequent pit-tag detection or lack of carcass when radio tag is retrieved.
- Radio tag placement is not immediately detrimental to fish behavior or increases mortality.

RELEASE

- All repeat spawners had pit tags at time of release
- All radio tagged repeat spawners were female
- Radio tagged repeat spawners were chosen out of pool of 136 likely mature fish.
- Radio tagged repeat spawners all in good condition.
- 70 radio tagged repeat spawners released
- 154 additional repeat spawners were released (PIT only).
- 18 borderline mature fish released (PIT only).
- Total of N=224 potential repeat spawners released to the Yakima River, below Prosser Dam on 10/13/13



DIFFICULTIES ENCOUNTERED

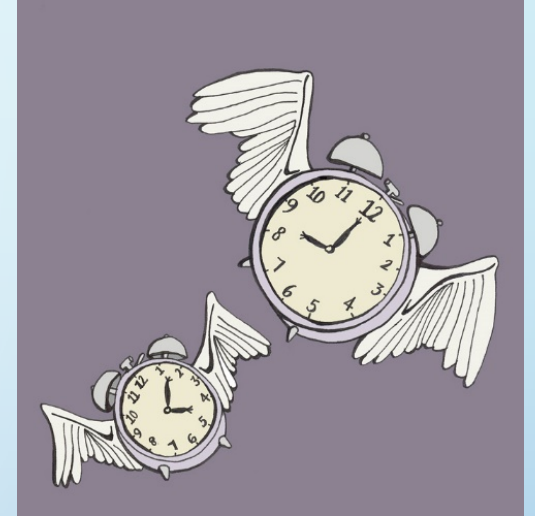


- Private lands/no access
- Thick riparian vegetation near spawning areas
- Spit Tags (7 known tags spit). 5 of them which crossed Prosser Dam.
- High water during migration and spawning

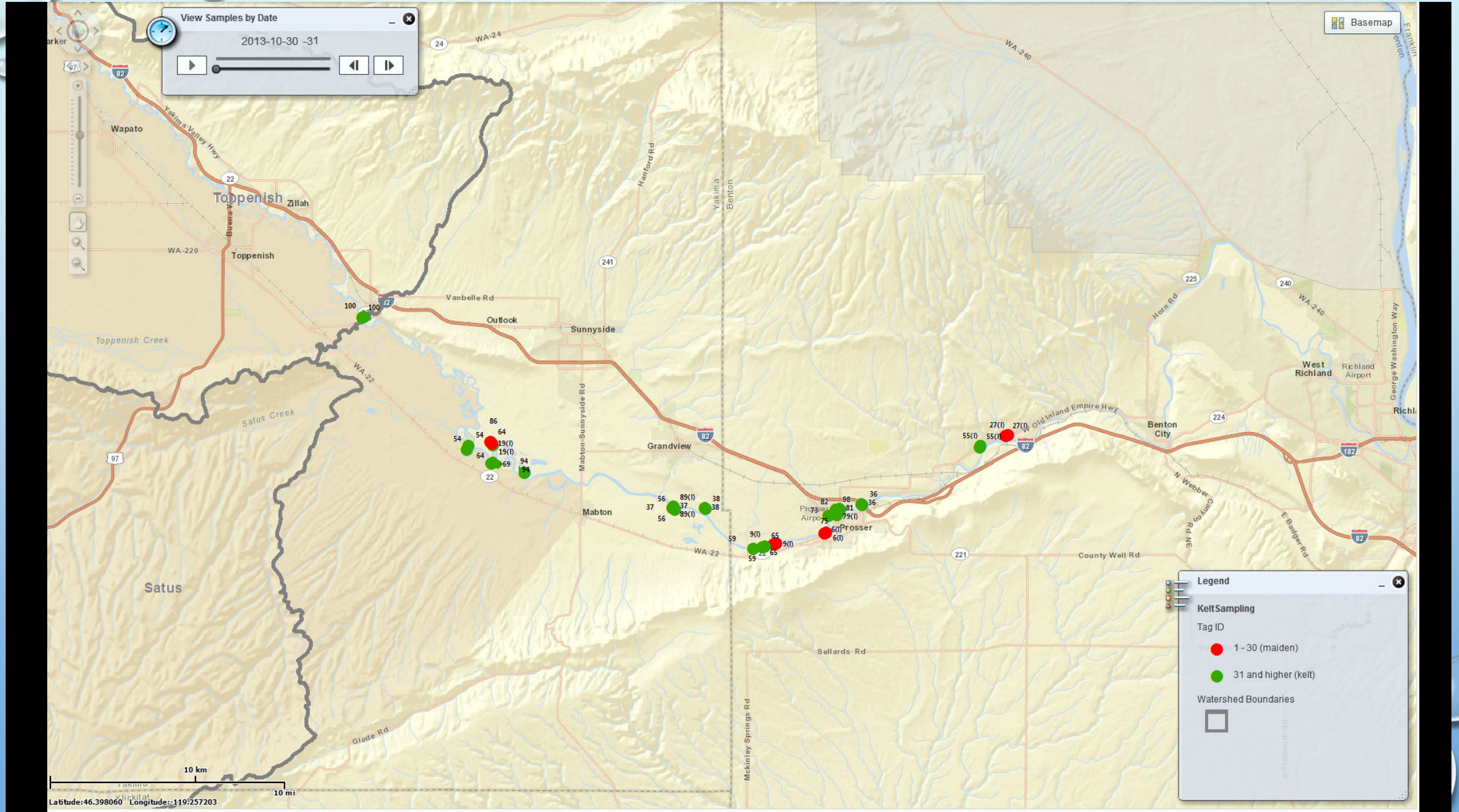


DIFFICULTIES ENCOUNTERED CONT

- Depredation
- Remote locations
- Carcass recovery
- Small spawning window



MOVEMENT PATTERNS AND TIMING



MIGRATION BEHAVIOR

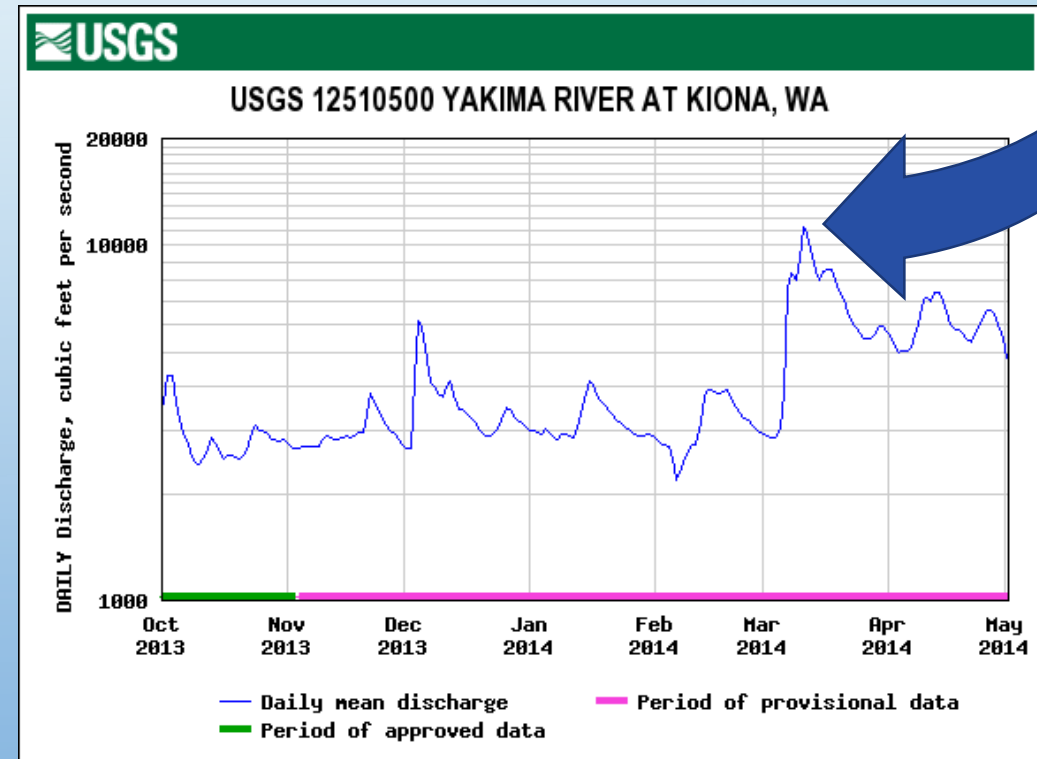
- A total of 40 (57%) radio-tagged repeat spawners crossed Prosser Dam.
- An additional 65 (42%) PIT-tag only repeat spawners crossed Prosser.

Three Migration Types

1. Cross Prosser Dam in the fall and migrate in winter to spawning tributary.
2. Cross Prosser Dam in the fall and hold at Satus Bar for winter and move to spawning tributary in spring.
3. Cross Prosser Dam in the spring and migrate immediately to spawning tributary.

MIGRATION BEHAVIOR CONT.

- There were 46 repeat spawner returns to natal tributaries based on combined radio and pit tag data.
- Most Repeat Spawners moved into spawning tributaries during the freshet.
- Repeat Spawners took on average 1-3 weeks to migrate to spawning areas.
- Repeat Spawners appeared to spawn in 2-5 days. (based on outmigration).



OTHER MIGRATION BEHAVIOR

6 of the repeat spawners migrated downriver.

- Was it arrested egg development?

Most of the borderline fish were detected migrating downriver

1 repeat spawner entered the Walla Walla River on 4/16

- Was this fish a Walla Walla kelt that strayed into the Yakima on its way out to the ocean or was it a stray from the Yakima?

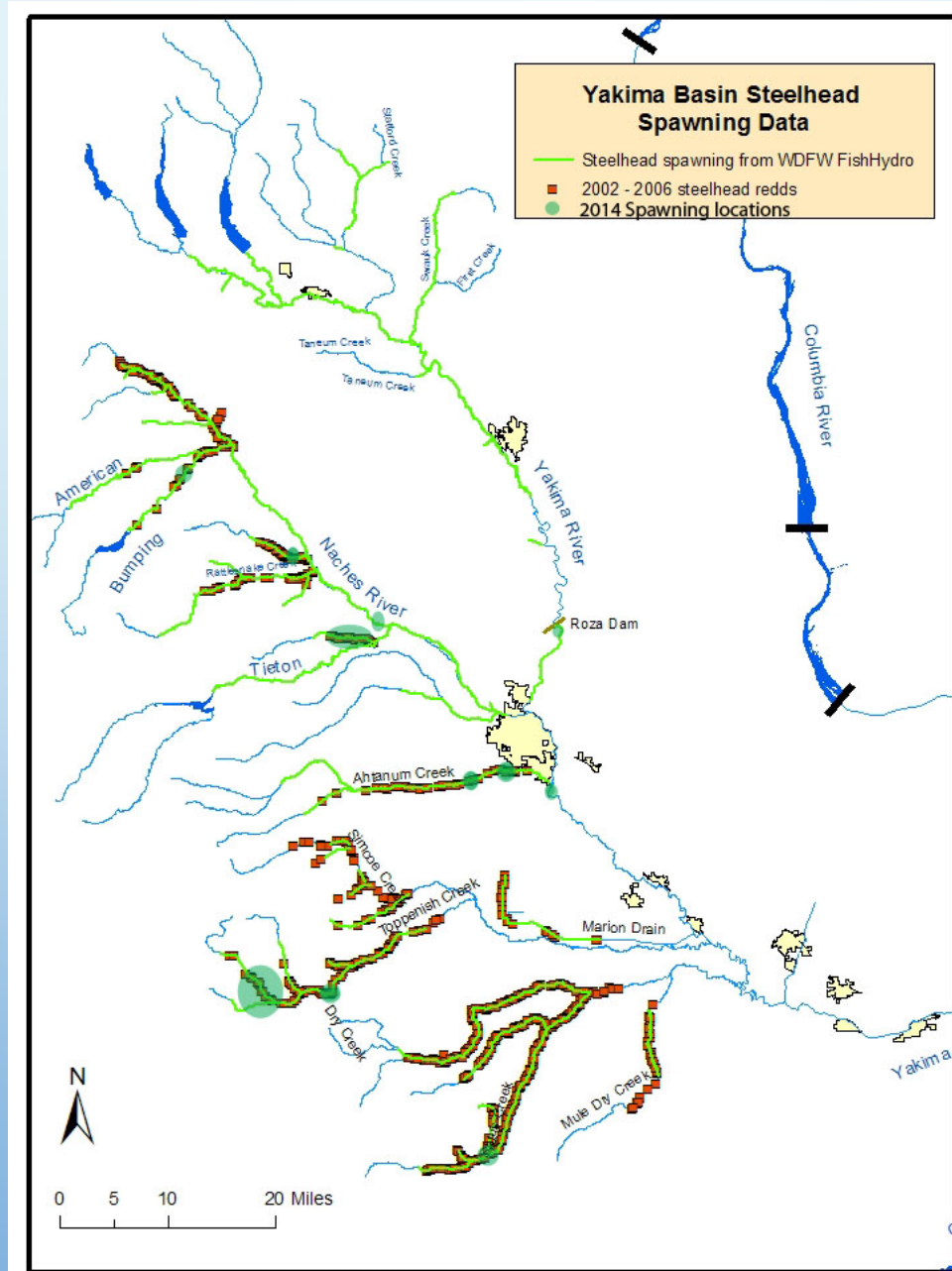
HOMING FIDELITY AND TIMING

- 22 of the repeat spawners had prior recorded tributary entry movements.
- 11 of these fish successfully returned to their previous spawning stream.
- Repeat spawners with prior spawning history returned on average within 2 weeks of the previous maiden (2013) tributary entrance date.
- Repeat spawners with prior history had a longer tributary residence in 2014 (16 and 49 days)

SPAWNING LOCATIONS

Repeat Spawner Detection to Natal Streams:

Satus: 13
 Toppenish: 13
 Ahtanum: 2
 Cowiche: 2
 Naches/Upper Yakima
 below Roza: 10
 Nile Creek: 2
 Bumping River: 1
 Upper Yakima above
 Roza: 3
 Total: 46



Possible Spawning down to proximity or redd locations:

Satus: 1
 Toppenish: 2
 Ahtanum: 2
 Cowiche: 2
 Naches: 2
 Nile Creek: 2
 Bumping River: 1
 Upper Yakima below
 Roza: 2
 Total: 14

PROSSER HATCHERY RADIO AND PIT TAG RETURNS

8 kelts returned to the Prosser facility:

- Satus Creek
- Bumping River
- Ahtanum Creek
- Cowiche Creek
- 4 x unknown locations (likely either mainstem Yakima River, below Roza Dam, or mainstem Naches River)

Current Status

- 4 kelts currently being reconditioned.
- 2 fish were released back to the Yakima River.
- 2 fish were mortalities.

OCEAN MIGRATING KELTS

- 3 kelts had subsequent downstream detections this spring (April/May) at juvenile bypass facilities at McNary and John Day dams.



McNary Dam



Lower Columbia River Estuary.

DOCUMENT SPAWNING

No direct video or photographic documentation of spawning in 2014.

“I’ve only managed to document one in the twelve years of radio tracking” Conan Northwind



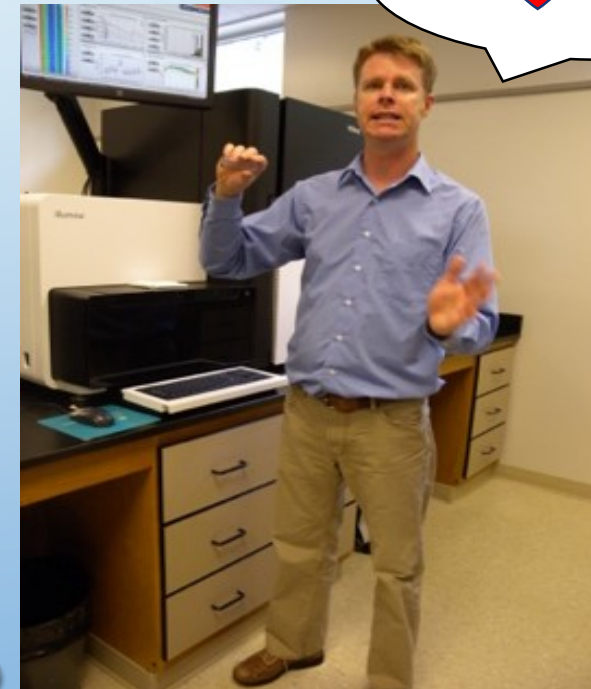
Satus RT:#83 high probability spawner, no eggs remain.



Ahtanum RT: #85, likely kelt, note retracted abdomen and caudal fin erosion.

DETERMINE KELT PROGENY

- We have to determine which spawning areas to attempt to electroshock and collect DNA for parentage.
- 9 of the 14 known spawning locations are good potential candidates to electroshock for parentage analysis. Satus (1), Toppenish (1), Ahtanum (2), Nile Creek (2), Bumping River (1), and Cowiche Creek (2).



CONCLUSIONS

- ARTIFICIALLY RECONDITIONED REPEAT SPAWNERS HAVE HIGH FIDELITY TO KNOWN MAIDEN SPAWNING TRIBUTARIES.
- ARTIFICIALLY RECONDITIONED REPEAT SPAWNER, SPAWN TIMING, IS CLOSE TO ITS MAIDEN SPAWN TIMING.
- MIGRATION PATTERNS AND PHYSICAL CUES WOULD SUGGEST SPAWNING IS OCCURRING.

QUESTIONS?

brar@critfc.org

www.critfc.org