

Acoustic Tag Usage Discussion

Brad Eppard of USACE (see PowerPoint for more details)

1. Acoustic technology is being used by the USACE on the Willamette and Columbia rivers to address performance standard testing requirements from 2008 and 2010 Biological Opinions as well as gather behavioral information to support identification and evaluation of fish passage technologies, operations and techniques. The technology allows them to understand Fish Passage Efficiency, Spill Passage Efficiency, route-specific survival and dam passage survival.
2. In the Columbia and Snake rivers, the USACE is using the Juvenile Salmon Acoustic Telemetry System (JSATS) tagging technology.
3. There are currently 65,000 unique JSATS tag codes in the system. A basin-wide JSATS user group meets monthly to manage the risk of studies overlapping and/or interfering with each other.
4. Cost for tags is currently around \$200 per tag. There is a goal to get tag price down to around \$100.
5. Receiver costs depend on technology. Autonomous receivers are around \$8,000 to \$9,000 and cables receivers are about \$19,000. The receivers have a lifespan of several years. Hydrophones can be damaged but are easy and inexpensive to replace.
6. Typical studies cost about \$6.5M to assess survival of three species across three dams. The studies follow a standard protocol. Full program cost for Lower Columbia survival studies is about \$13M per year. Willamette Basin acoustic program cost is about \$2M to \$3M per year. Jim Ruff reviewed available information to confirm the annual cost estimate is about \$3.9 million total at two dams in the Willamette Basin (see USGS discussion below).
7. In response to a question of whether or not there is competition between tagging technologies (i.e., a measurement may be attained by either acoustic or PIT), Brad Eppard clarified that all fish are “dual-tagged” with acoustic and PIT tags. The PIT detections provide backup measurements to confirm passage in instances where acoustic tags fail to be detected.
 - a. PIT tag data is provided to PTAGIS for regional use.
 - b. PIT tagged fish can be detected upon their return as adults.
 - c. Acoustic telemetry data is not openly shared with others. USACE has a contract with the University of Washington to develop an archived database to store/manage all the JSATS information. Because of the complexity in interpreting acoustic tag data, USACE does not favor open access.
8. Tag loss was evaluated in 2007 and 2008 and did not indicate any significant loss of acoustic tags.
9. Confidence interval for the USACE survival studies is 95% +/- 2 to 3%.

10. It is possible to remotely activate the JSATS tags, but that functionality is not actively being used or explored by USACE.

John Beeman (USGS)

1. Noted that while PIT and Acoustic Tags can be used for similar measurements (e.g., dam passage survival), they each have different benefits and limitations that keep one tagging technology from being a wholesale replacement for another.
2. For example, radio telemetry was used to study passage through Cougar Dam.
3. USGS has used acoustic telemetry to manually follow white sturgeon and other resident fish.
4. Planning of studies follows a top down approach from management questions to study design and then applicable tagging technology selection.
5. Lower frequency (69khz - Vemco tags) are used worldwide to study aquatic animals especially in salt water. These are larger tags with a different encoding scheme.
6. American Fisheries Society is coming out with a new book on telemetry systems called "Telemetry Techniques: A User Guide for Fisheries Research."
7. Measure 2-D and 3-D fish positions and behavior starting in early to mid 2000s (using the HTI system) to determine where passage location may be most suitable.
8. In response to the NMFS 2008 BiOp for the Willamette River, USGS is evaluating downstream passage options at Cougar and Detroit projects using HTI tags.
9. At Cougar in 2011, USGS tagged 1000 juvenile Chinook, with 100 native fish captured from the reservoir and the remainder tagged at the hatchery.
10. At the Detroit project, USGS will expand its efforts in 2012 with a similar acoustic telemetry fish passage study using 1200 tagged fish.
11. The HTI acoustic tag has a 3-month tag life.
12. USGS will be obtaining 3-D fish behavior and positioning information in the near-dam forebay of each dam.
13. Costs are similar to JSATS tagging studies; HTI tag cost is about \$300 apiece.

Russell Langshaw (Grant County PUD)

1. In addition to dam passage survival measurements for salmonids, Grant County uses acoustic tags to study adult white sturgeon movement, adult fall Chinook spawning, and predator movements (walleye, bass, and pikeminnow).
2. Using acoustic tags for evaluating juvenile passage allows the use of run-of-river fish (which are preferred to hatchery fish) due to small population requirement to get a high level of precision in the study.
3. Using acoustic tags has facilitated an understanding of variability in passage performance based on operational conditions and variability across projects.
4. Survival requirements are driven by license settlement agreement – BiOp 2008.

5. Hatchery requirements are driven by license requirement – Priest Rapids Coordinating Committee defines M&E objectives.

Steve Hemstrom (Chelan County PUD)

1. Chelan County PUD's drivers are its HCPs, which are 50-year agreements.
2. Chelan PUD has conducted 34 separate survival studies across various fish species at both projects in the last 9 years.
3. Chelan PUD has exclusively used HTI tags because it was the only acoustic technology available at the time
4. Criteria for selecting acoustic technology include:
 - can we use it now?
 - will we continue to use it?
 - will it improve?
5. We use run-of-river fish rather than hatchery fish in our studies.
6. Cost – eliminating bias in study costs money.
7. We try to get a 2.5% standard error.
8. Acoustic tag studies are able to measure smolt travel time, route-specific passage, and route-specific survival rates.
9. Chelan PUD does not dual tag – because greater size/mass of a double tag. Plus double tagging could impact fish behavior and increase predation.
10. Between 4000-4500 juvenile fish are tagged/year per species.
11. Chelan PUD also conducts an acoustic tag life study using 100 juvenile fish each year to determine the effective life of the tag.