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Advances in Fisheries Management with Acoustic Imaging

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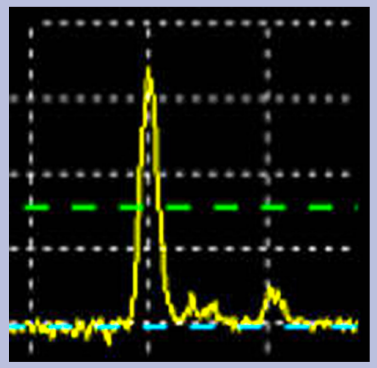
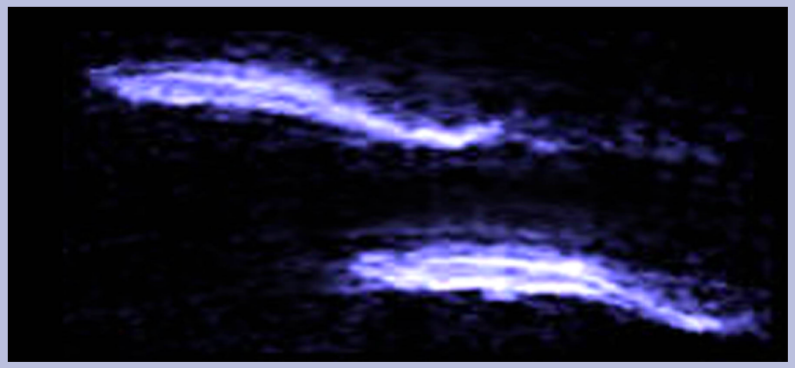
Evolution of Estimating Fish Passage with Acoustics in Riverine Environments





Bendix (old - 1960s+) • Split Beam (newer 1990s+) • **DIDSON** (newest 2000+)

- **EASY TO USE** – Not much more complex than the average video camera (perhaps far less).
- **GOOD DETECTION** – Detection capabilities are far superior to single/split-beam sonar technologies – more forgiving of suboptimal bottom topographies.
- **CLEAR DIRECTION OF TRAVEL** - No ambiguity regarding milling fish & downstream debris.
- **SHORTER PROJECT DEVELOPMENT TIME** – Site selection, training & system operation are easier than split-beam (and thus economical).
- **HIGH LEVEL OF DEFENSIBILITY / CREDIBILITY** – DIDSON output is more intuitive and understandable by biologists, managers and the public.

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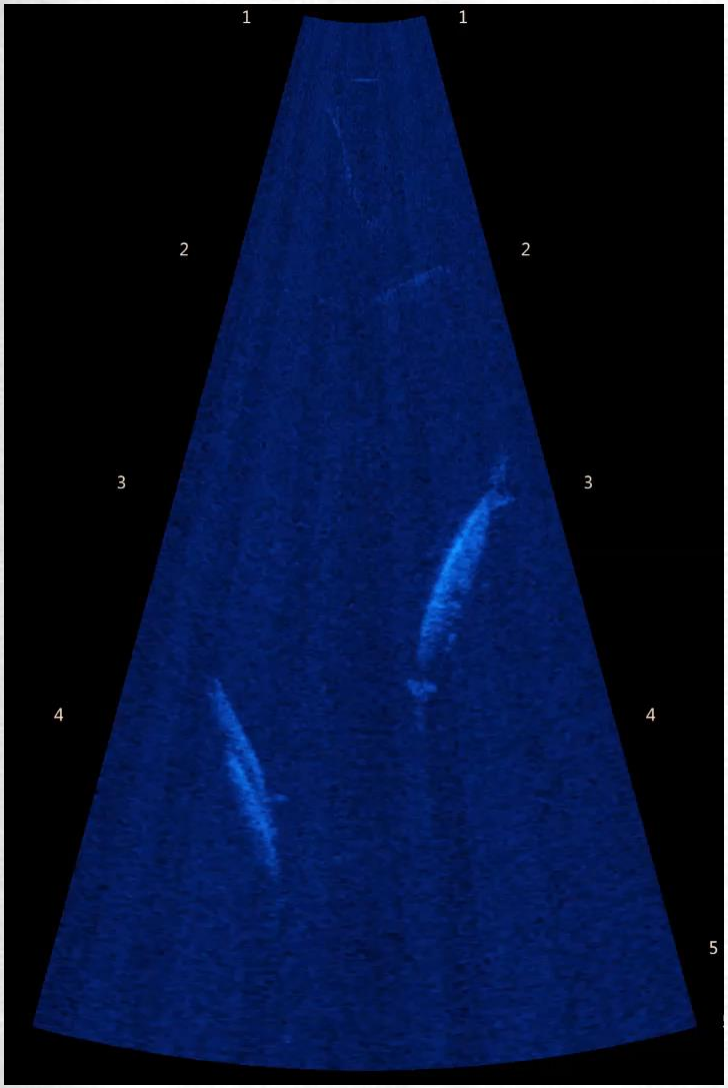

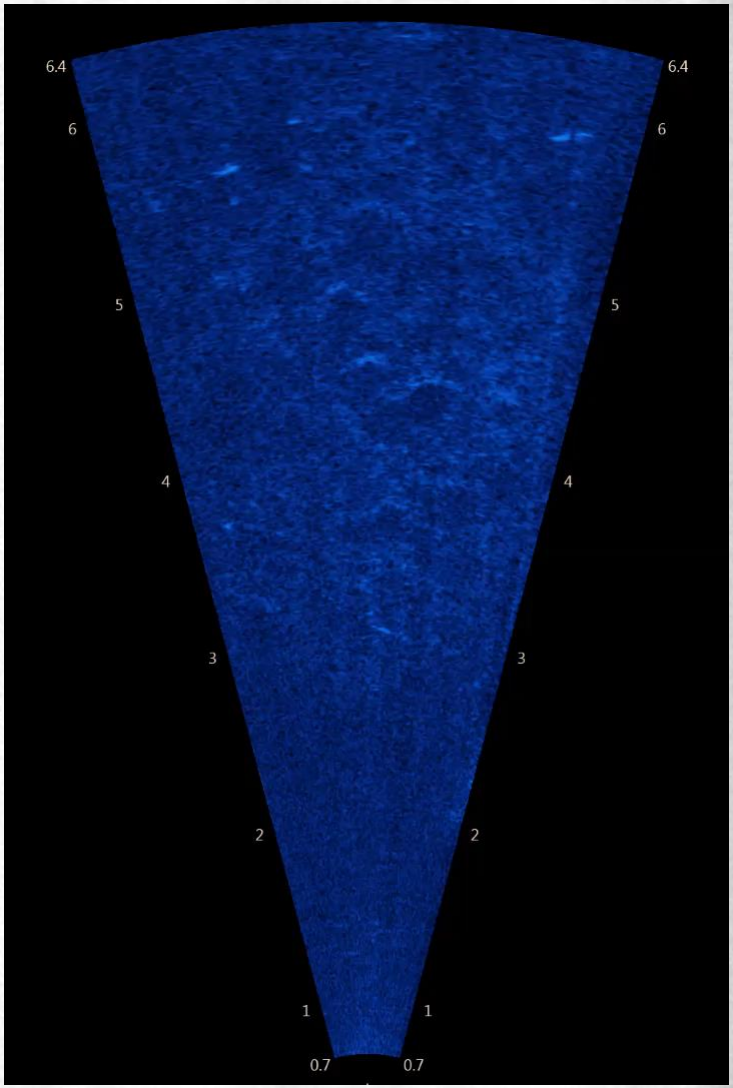

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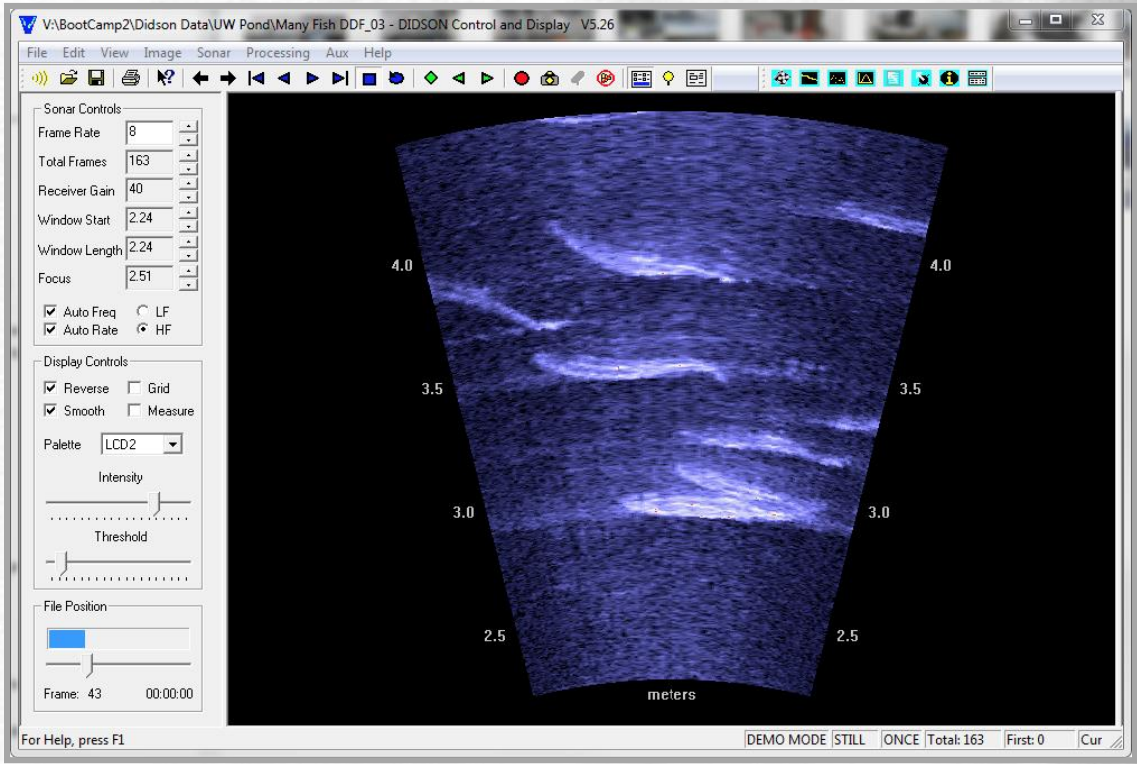
DIDSON – Dual Frequency Identification



- Range to 80m
- Identify Fish
- Accessory Lenses
- X2 Rotator for Aim
- Wide FOV
- Intuitive

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ARIS Improvements Over DIDSON

- ARIS is ~40% smaller than DIDSON (ARIS 3000)
- ARIS uses less power than DIDSON
- ARIS has better resolution than DIDSON (128 beams)
- ARIS has independent control over the acoustic image start and end ranges and all sampling parameters
- ARIS measures depth, water temp, heading, pitch, roll
- ARIS can communicate over much longer cables at full bandwidth >300m for ARIS vs. 60m for DIDSON
- ARIScope can open multiple files for playback
  - Has flexible recording modes
  - Automatic logging for remote troubleshooting
- ARISFish is totally new for image post-processing

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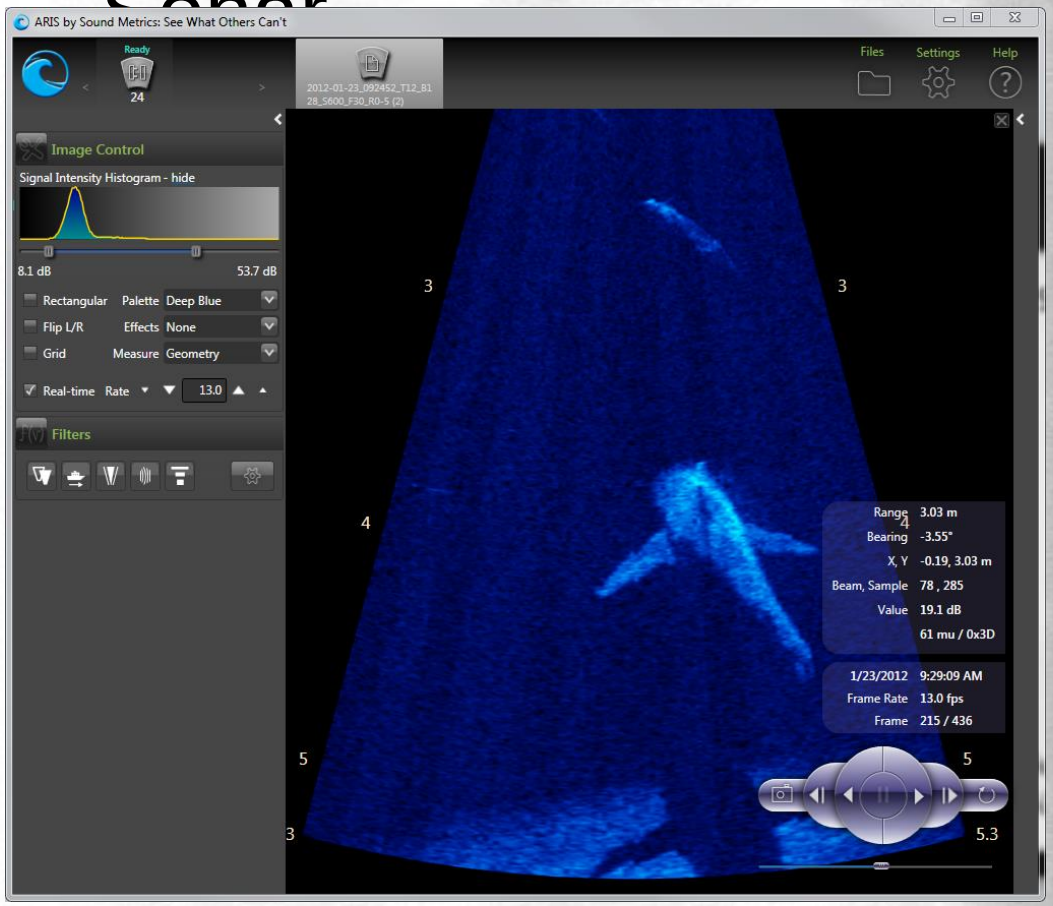
ARIS– Adaptive Resolution Identification Sonar



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Proven Technology Deployed Worldwide

- Monitoring Threatened/Endangered Species
- Managing Sustainable Fisheries
- Habitat Studies
- Research Fish Behavior
- Observe Trawl Activity
- Multiple Uses to Leverage Investment
  - Structural Inspection
  - Monitor Erosion
  - Recover Evidence, Drowning Victims
- Many Peer-Reviewed Articles in Scientific Journals
- Technology Listed in Multiple NMFS Biological Opinions
- EPA Approved for Monitoring Endangered Species

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300+ DIDSON/ARIS Fisheries-Related Systems

- California (CDF&W, CDWR)
  - 44
- Alaska (ADF&G)
  - 40
- Canada (DFO)
  - 37
- United Kingdom (UKEA, NRW, CEFAS)
  - 25
- Native American Tribes
  - 16

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Sonar Sites

Pick a sonar site:

- Anchor River
- Aniak
- Anvik
- Chilkat
- Copper
- Crescent
- Kasilof
- Kenai (RM 19)
- Kenai (RM 14)
- Kvichak
- Nushagak
- Sheenjek
- Yentna
- Yukon (Eagle)
- Yukon (Pilot)

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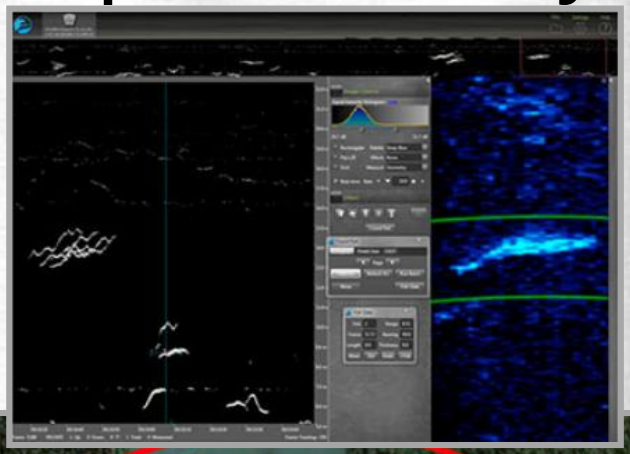
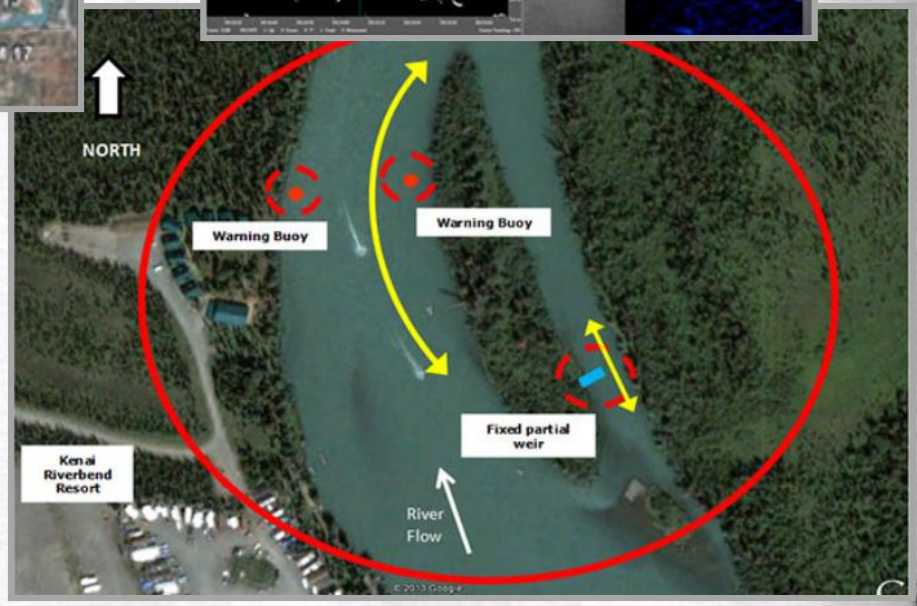
Kenai River Chinook Sport Fishery





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Benefits of ARIS Technology

- Maximize Sampling Power with Minimal Impact
- Identify Fish and Direction of Fish Travel
- Image Fish in Zero Visibility Water (Dark or Turbid)
- Semi-Automated Post-Processing for Accurate Counts
- Detect Fish up to 80m (ARIS 1200)
- Defensible Counts with Human Readable Images
- Ideal for 24/7 Monitoring Over Entire Season
- No Impact on Fish Health, Behavior or Environment
- Can Operate and Record Autonomously
- Can Monitor Remote Sites via Internet to Save $$
- Successfully Applied to Great Variety of Projects

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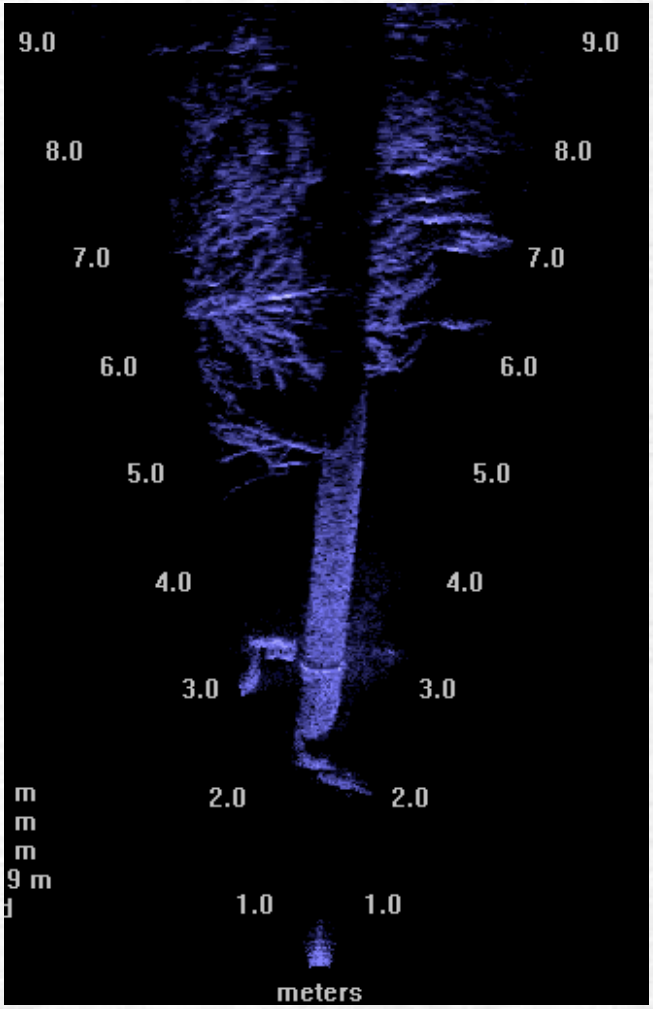
40-Year Sacramento River Mystery



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Thank you

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