PIT-Tags: Look How Far We Have Come

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Outline

- RFID Technology Overview
- RFID History in Columbia River Basin
- Monitoring Systems
  - Power Supply
  - Data Collection & Transmission
  - Antenna Arrays
RFID Technology

TAG RESPONSE

MAGNETIC FIELD TRANSMISSION

READER

ANTENNA
RFID Technology

Magnetic Lines of Flux
RFID History – 400kHz vs. ISO*

• **400kHz**
  - Introduced in 1983
  - Expensive to maintain
  - Short read range
  - Not good for adult platform (antenna size)
  - Non–standard tag

• **ISO (134.2kHz)**
  - State of the art
  - Lower maintenance cost
  - Extended read range
  - Standard tag (multiple sources)

*From Pacific States Marine Fisheries Commission
ISO PIT Tag System Transition Status June 28, 2000
Hand Held Readers

- **400 kHz**
  Read range – 1 to 4 in.
- **125 kHz**
  Read Range – 2 to 6 in.
- **ISO 134.2 ISO**
  Read Range 3 to 18 in.
Stationary Monitors

- 400 kHz
  Antenna range – 12 in.
- 125 kHz
  Antenna range – 24 in.
- 134.2 kHz ISO
  Currently using 20 x 4 ft pass-through and 20 ft long pass-by antennas
  Full flow antenna at Bonneville Dam reads in 16 x 16 ft antenna at 40 fps
PIT-Tag Monitoring System

- Power Supply
- Data Collection & Transmission
- Antenna Arrays
Power Supply

➢ AC
➢ Battery Switcher
➢ Batteries
➢ Solar
➢ Thermoelectric Generator

Battery Switcher

AC
Data Collection & Transmission

➢ Fiber Optic
➢ Ethernet
➢ Cell Phone
➢ Land Line
➢ Satellite
Biomark Antenna Systems

➢ Biomark RM310
➢ Biomark IS1001 standalone
➢ Biomark IS1001–MTS
Description

• Machined cavity for RM310
• 40” Diameter
• ML401 Data Logger
• Submersible battery housing (3–5 d runtime)
• Colorado River
Biomark IS1001–MTS

Description
• IS1001–Master Controller
• IS1001 Reader
Biomark IS1001 Enclosures

• IS1001 Metal Enclosure
• IS1001 Submersible Enclosure
Biomark IS1001–Standalone

• Multiple Configurations
• 12 and 24V DC Models
Biomark IS1001-MTS

- Multiple Configurations
- 12 and 24V DC Models
IS1001 Standalone – Cord Antenna

Description
• 12-IS1001 w/LED
• 50’ length
• Auto-tuning
Fish Ladder – Lamprey Passage

Description

• Thin Wall Construction
• Custom Lead in/out ramps
• Attached to weir face
Fish Ladder – Lamprey Passage

Description

• Thin Wall Construction

• Attached to weir face
Fish Ladder– Sweden

Description

• 16 – FS2020/Antennas
• Thin Wall Construction
• Attached to weir face
• Monitor from US
Fish Ladder – US Army Corps of Engineers

Description

• 3 x 8 ft

• Internal Ferrite tiles

• External shield

• 2” cross-section
Description

• New bypass channel
• Expanding system this year
Fish Ladder – White River, WA

Description
• Synchronized IS1001
IS1001–MTS Floating System

Description
• 8–10’ Float
• 8–IS1001
• Quick deploy & removal
Description

• 3–10’ BIO LITE antennas

• IS1001–MTS
IS1001–MTS – Large River

Description
• 5–20’ BIO STOUT
• IS1001–MTS
• 5–IS1001 in SUBs
• Cell Phone
• Solar Power
IS1001–MTS – Very Large River

Description
• 12–20 ft BIO STOUT
• 2 Arrays
• Water Depth 3–15 ft
• 3–wk install effort
Description
• 12–20 ft antennas
• 2 Arrays
• Water Depth 3–15 ft
• 3–wk install effort
Spillway Monitoring – USACE

Description

• B2CC Entrance

• 4–20’ Hydrofoils
Spillway Monitoring – USACE

Description

• Install up to 18 hydrofoils to monitor spillway passage
• Adaptable to surface passage routes
Summary

• RFID introduced into Basin in 1980s
• Transition from 400, to 125, to 134.2kHz
• Read range extended from inches to feet
• Larger and different antenna configuration
• Increased flexibility of small and large scale applications