

San Joaquin River Chinook Salmon Trap and Haul



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Adult Chinook Salmon Trap & Haul



Adult Chinook Salmon Trapping




Adult Chinook Salmon Trapping Locations

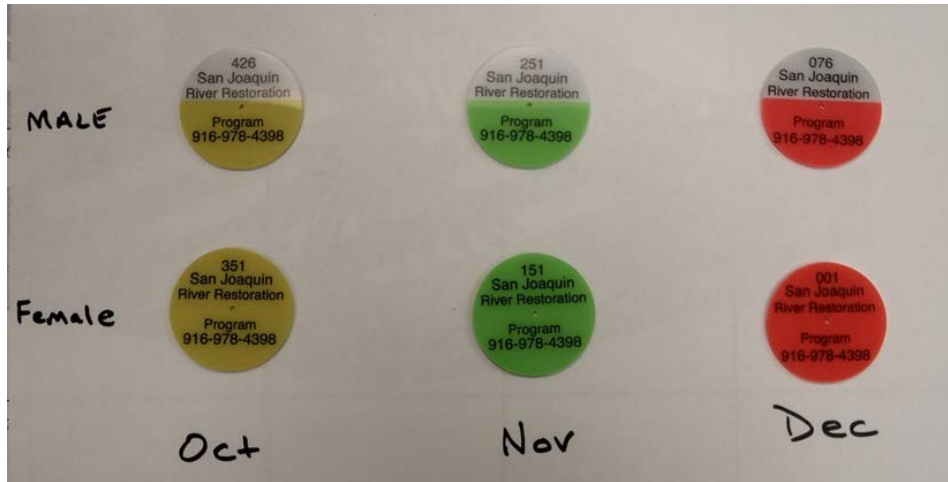
Fyke Trap Locations

-  **Upstream of Hills Ferry Barrier**
-  **1/2 mile upstream of Hills Ferry Barrier**
-  **Mud Slough (North Grasslands State Wildlife Area)**
-  **Salt Slough at Wolfsen Road**
-  **San Joaquin River (confluence with Bear Creek)**

Dip Netting Locations

-  **California Department of Fish and Wildlife captured salmon in irrigation canals near Los Banos, CA:
Delta, Midway, Hereford, Deepwell, and Britto Roads, and Cozzi Ave.**

Adult Chinook Tagging



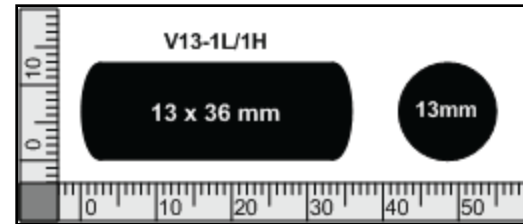
Peterson disc tags used for identification of salmon by gender and month of capture

Salmon displaying Peterson disc tag



Adult Chinook Acoustic Transmitters

Esophageal Insertion of Acoustic Transmitter

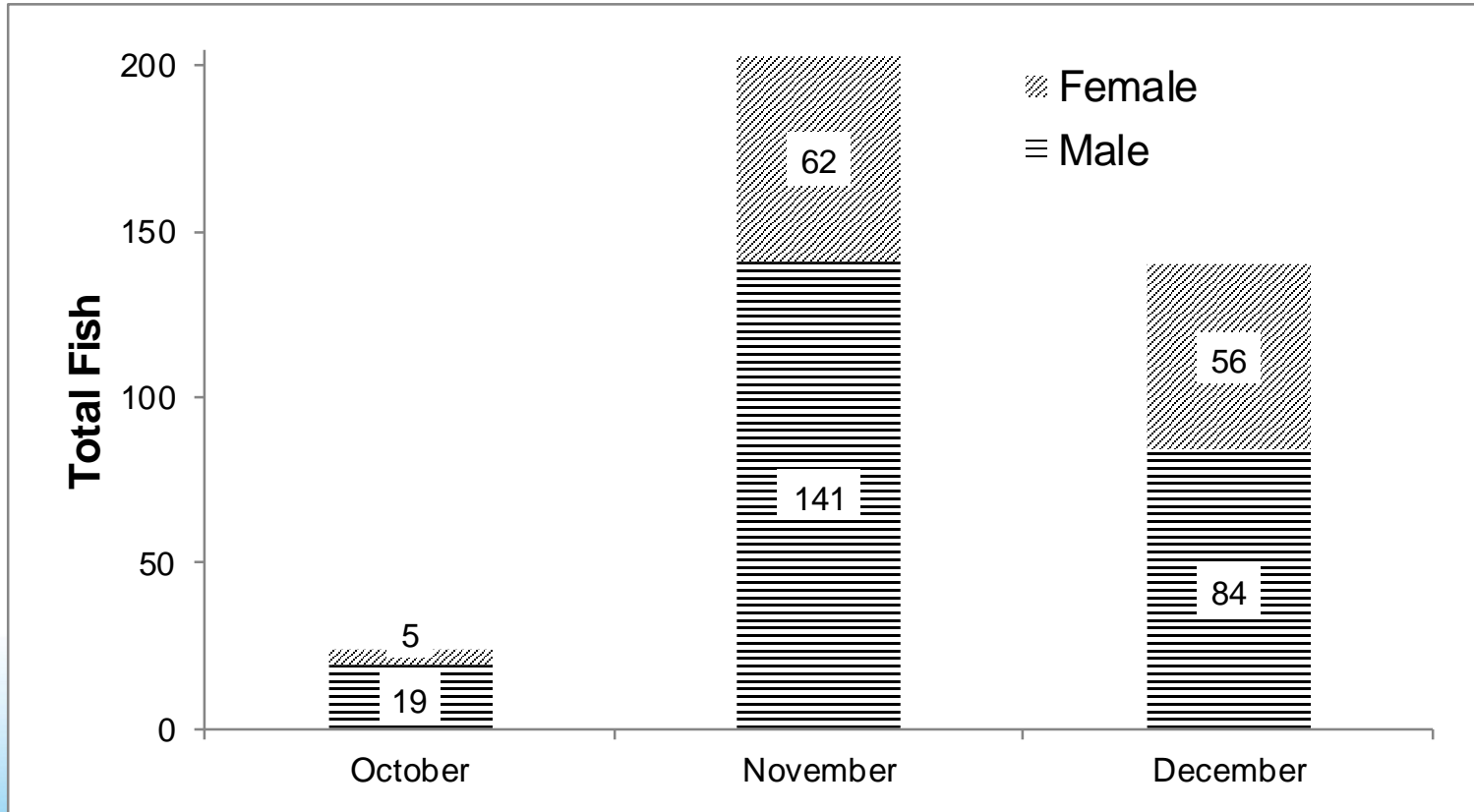



V13 Transmitter



Acoustic transmitter inserted via a modified bovine piller with glycerin lubrication

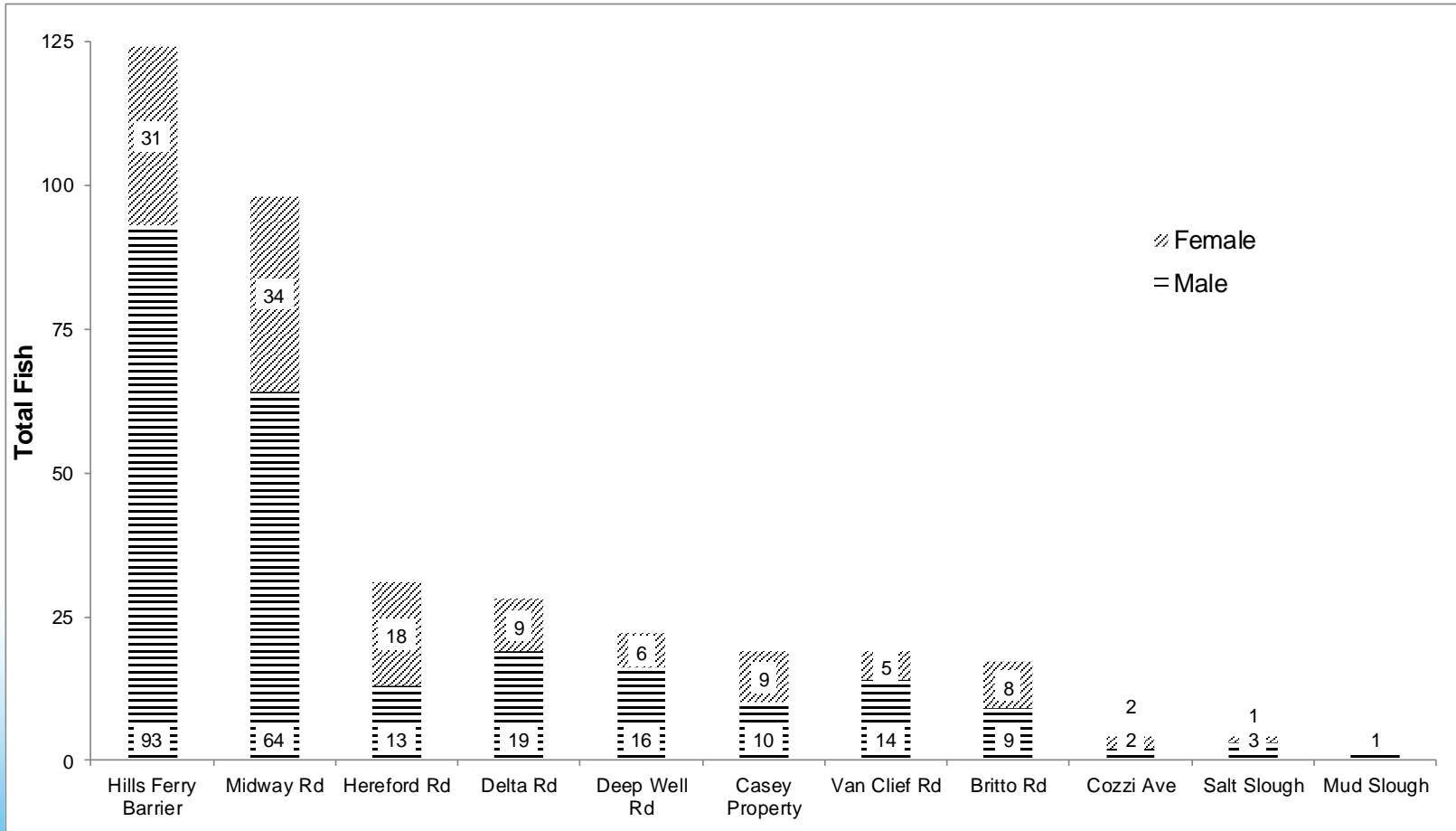
Adult Chinook Salmon Captured





 367 Chinook salmon were captured, tagged, and released between October 1 and December 15, 2013

 123 (33.5%) were female and 244 (66.5%) were male

Adult Chinook Salmon Captured



-  Majority of fish were captured at the fyke net above Hills Ferry Barrier (33.8%) and with dip nets at the irrigation canal located near Midway Rd. (26.7%).
-  Remaining 39.5% of fish were caught among the other 9 locations.

Acoustic Telemetry



Manual tracking of an acoustically-tagged Chinook salmon using a VR100 receiver with a VH110 ultrasonic directional hydrophone.



VR2W Single Channel Receiver
(Photo courtesy of Vemco)

Telemetry Locations



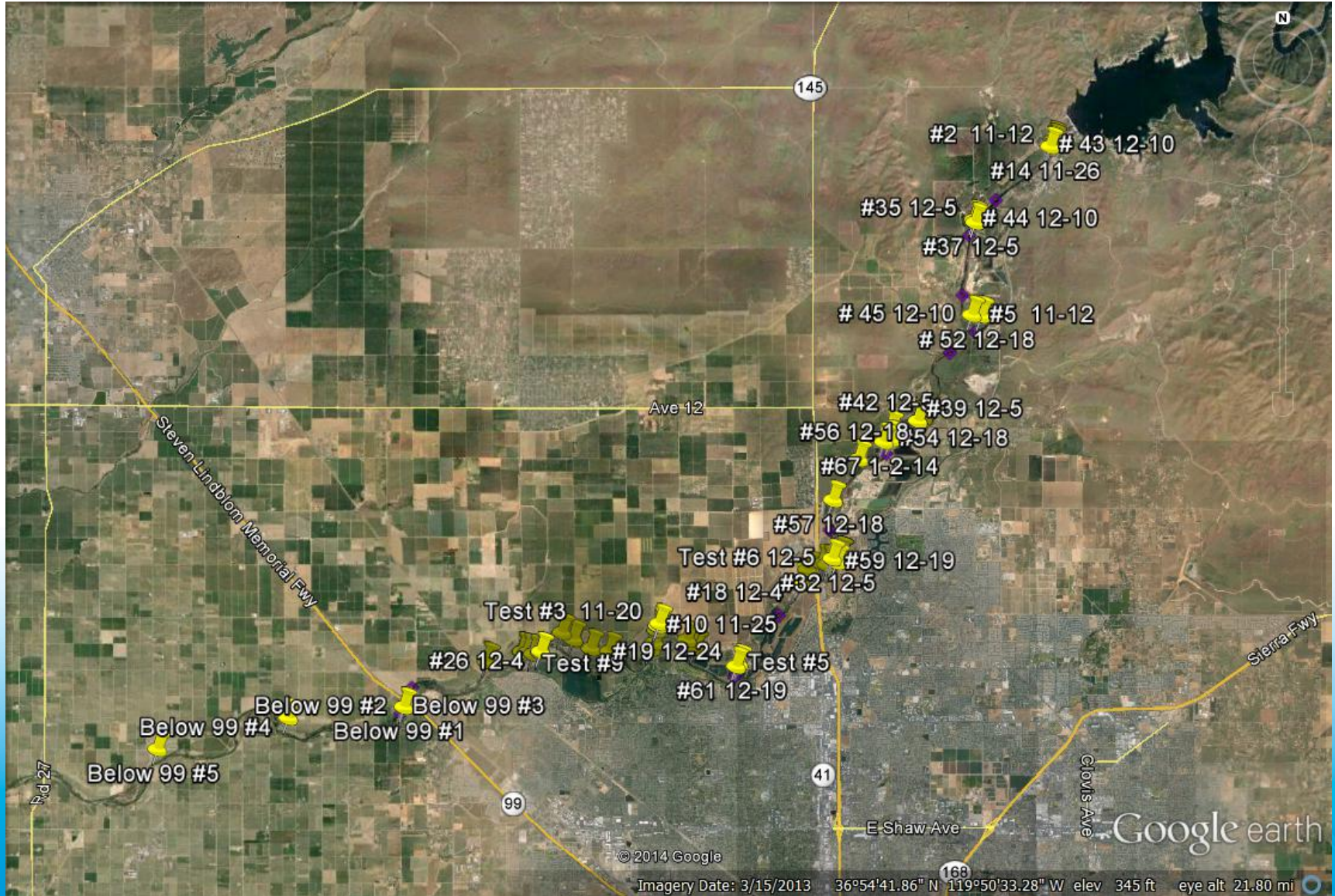
Chinook Salmon Redd Monitoring



➤ 67 redds upstream of Hwy 99

➤ 5 redds downstream of Hwy 99

Chinook Salmon Redd Monitoring

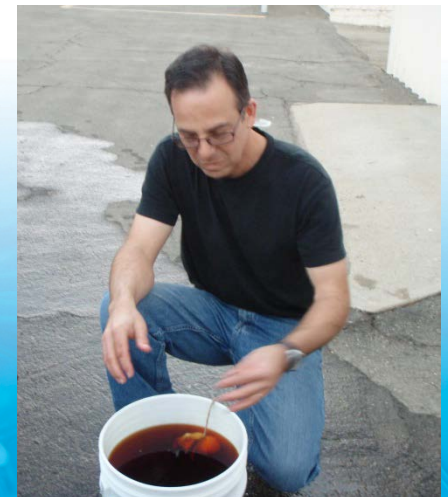


Streamside Spawning

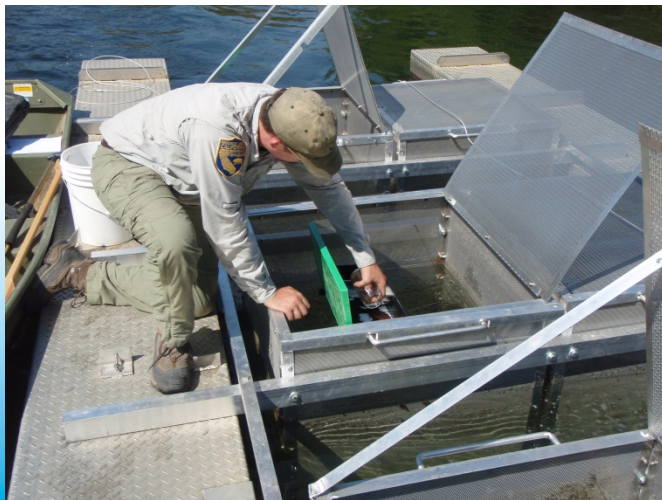
12 Spawns:

11 females from Trap & Haul

1 male & conservation facility female



Juvenile Chinook Cage Rearing



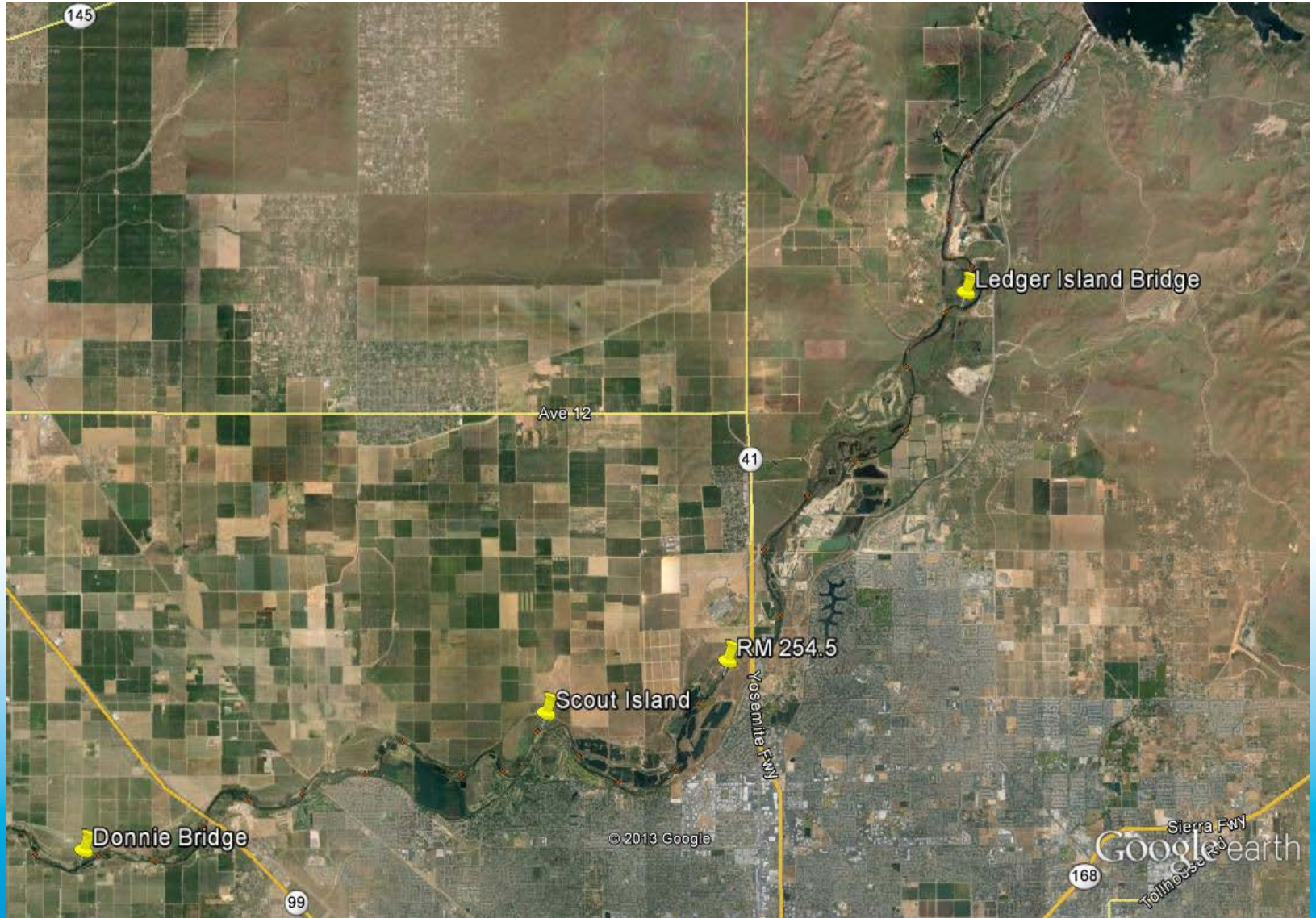
Juvenile Chinook Salmon Trap & Haul



Juvenile Chinook Salmon Trapping



Juvenile Salmon Trap & Haul Locations



Juvenile Salmon Collection



Rotary Screw Trap at Ledger Island

Juvenile Salmon Collection



Fish Collection Weir near Highway 41

Juvenile Salmon Collection



Fish Collection Weir at Scout Island

Juvenile Salmon Collection



Weir Collection Box



Juvenile Salmon Collection



Nets and Collection Boxes at Donnie Bridge

Chinook Salmon Capture Data

1511 Juvenile Chinook caught in Reach 1

1169 Juvenile Chinook transported

1132 Juvenile Chinook released in Reach 5

as of 4/16/14



Difference in values:

- Fish captured dead
- Fish impinged or killed from high debris loads
- Transport deaths
- Net Pen deaths
- Sacrificed for Genetic & Stomach content analyses

Juvenile Salmon Release



Release Site near San Joaquin River with Merced River



1132 fish released x Estimated Survival (0.1 – 2%) = 1.1 – 22.6 adults





Juvenile Salmon PIT Tag Monitoring





PIT Tag Monitoring

Purpose and Need:

-  To monitor Chinook salmon movement throughout their life history in the Restoration Area and to determine survival
 - Juvenile — emigration, movement, and entrainment
 - Adult — escapement, entrainment, and straying
-  Determine the use of Passive Integrated Transponder (PIT) tag technology in the Restoration Area as a low cost-life long monitoring technique.



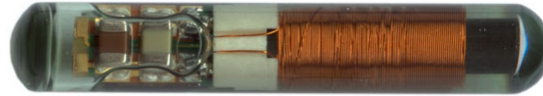
PIT Tag Monitoring

Study Plan:

Phase I — Assessment of PIT tag technology & site-specific limitations

Phase II — Construction of arrays, fish tagging, and monitoring under different flows, river conditions, and passage corridors

What are PIT Tags?



Passive Integrated Transponder (PIT) tag or Passive Inductive Transponder

- 🐟 “Passive”- No internal power supply
- 🐟 “Inductive”- Powered by magnetic fields
- 🐟 Magnetic field of antennae generates a few volts that powers the RFID (Radio-Frequency Identification) chip inside
- 🐟 Transmits unique identifying number for each fish
- 🐟 Smaller copper coils transfer less power = smaller the tag, more powerful the array

Tagging Juvenile Chinook

Incision



Tag Insertion





What are PIT Tag Arrays?

- PIT tag arrays are a useful tool to identify and track individuals within a large population to monitor movement, track behavior, fish distribution, seasonal migrations, individual growth, population abundance, life stage, and survival.
- PIT-tagged fish swim through or in the vicinity of an antenna where the code, date and time of passage is detected by the antenna receiver, recorded, and stored.
- Stationary antennas capable of sampling the entire width of streams, culverts, spillways, or fish ladders provide water resource managers a cost-effective way to monitor fish populations.
- Inexpensive tags with a unique identifying number.
- PIT tags are inductively charged by the reader and so do not have a battery. Tags can remain operational for decades.

Monitoring Individual Metrics

Remote PIT tag Detection:

Passively Monitor:

Dam Passage

Habitat Use

Entrainment

Determine Age

Track individual movements

Fish behavior

Life history parameters

Juvenile-to-adult survival and return to spawning areas

Recapture:

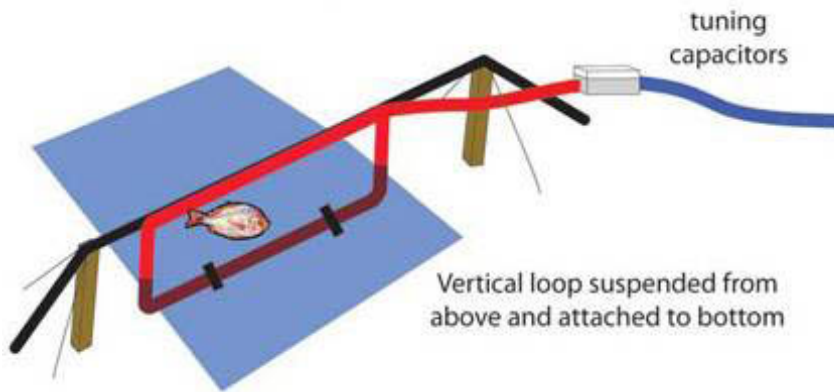
Growth

Abundance



PIT Tag Array Types

Pass-Through Rectangle

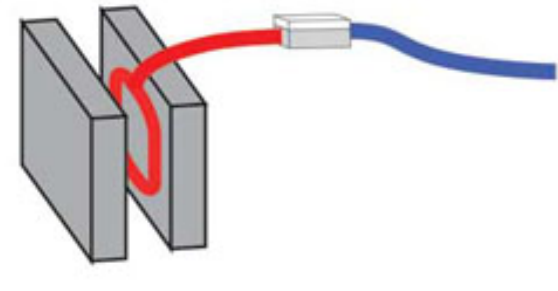


Pass-Over Loop



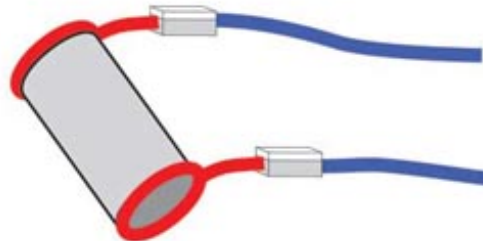
A loop laid flat on a surface has half of the read range of a vertical loop since only the field above the antenna is used.

Pass-by Loop



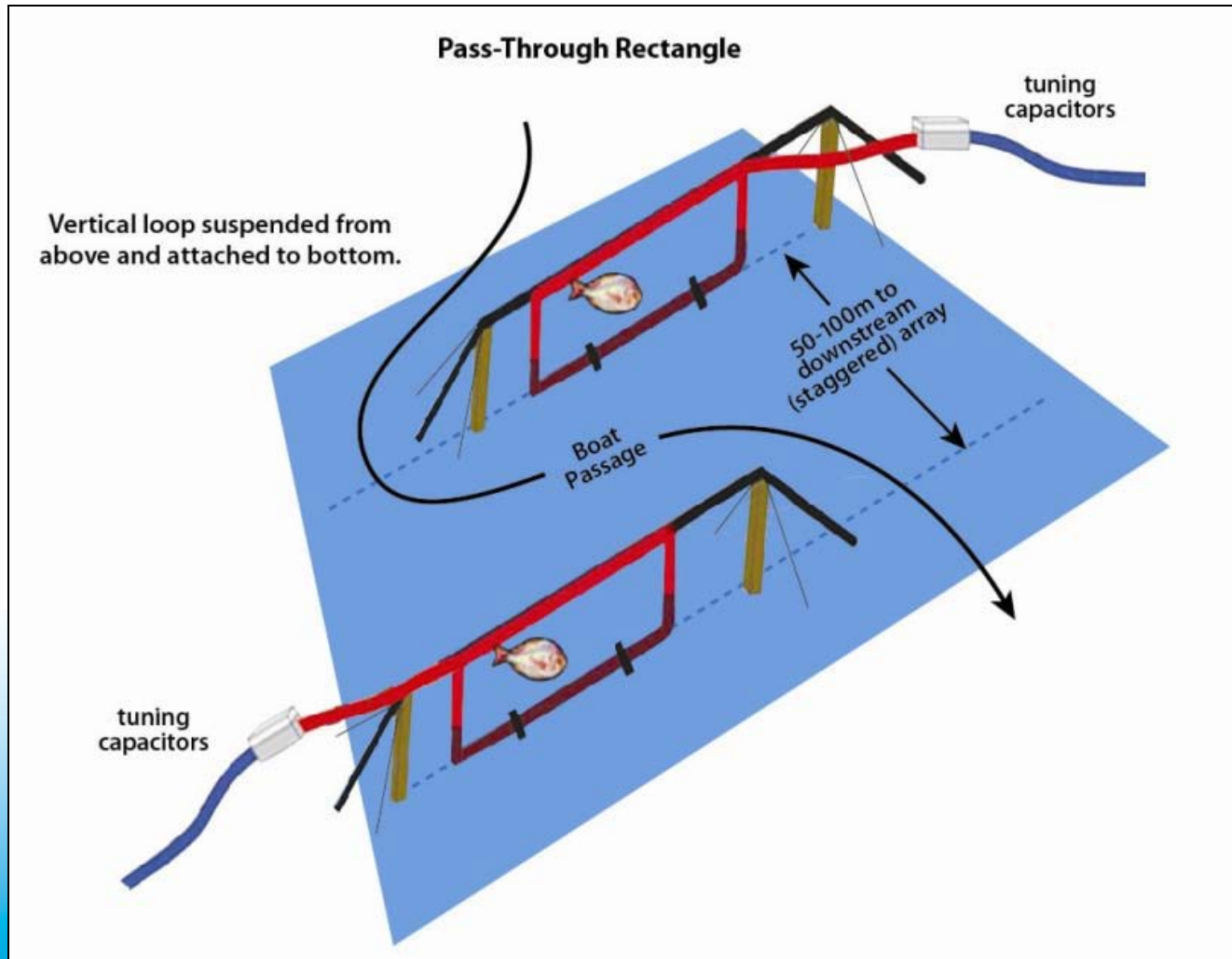
Circular Loop

Two antennas to determine speed and direction.



The largest loop diameter is twice the read distance from the wire.

PIT Tag Array Design



PIT Tag Array Types



Pass-over loop at Lost Lake



Swim-through design near Chowchilla Bifurcation

Power and Data Storage



Lockbox with receiver and batteries



Solar panels to charge batteries

Questions and Comments?



Photo courtesy of Fresno Bee