APPLICATIONS OF A FLOATING PIT TAG ANTENNA SYSTEM IN DESERT RIVERSCAPES

Stephani Clark Barkalow[1], Martinique Chavez[1, 2], Adam Barkalow[3], Phaedra Budy[2, 4], Peter Mackinnon[2], and Mark Mckinstry[5]

[1]American Southwest Ichthyological Researchers, Albuquerque, New Mexico;
[2]Department of Watershed Sciences, Utah State University, Logan, Utah, USA;
[3]New Mexico Department of Game and Fish, Fisheries Management Division, Santa Fe New Mexico
[4]U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Utah State University, Logan, Utah, USA;
[5]U.S. Bureau of Reclamation

PTAGIS
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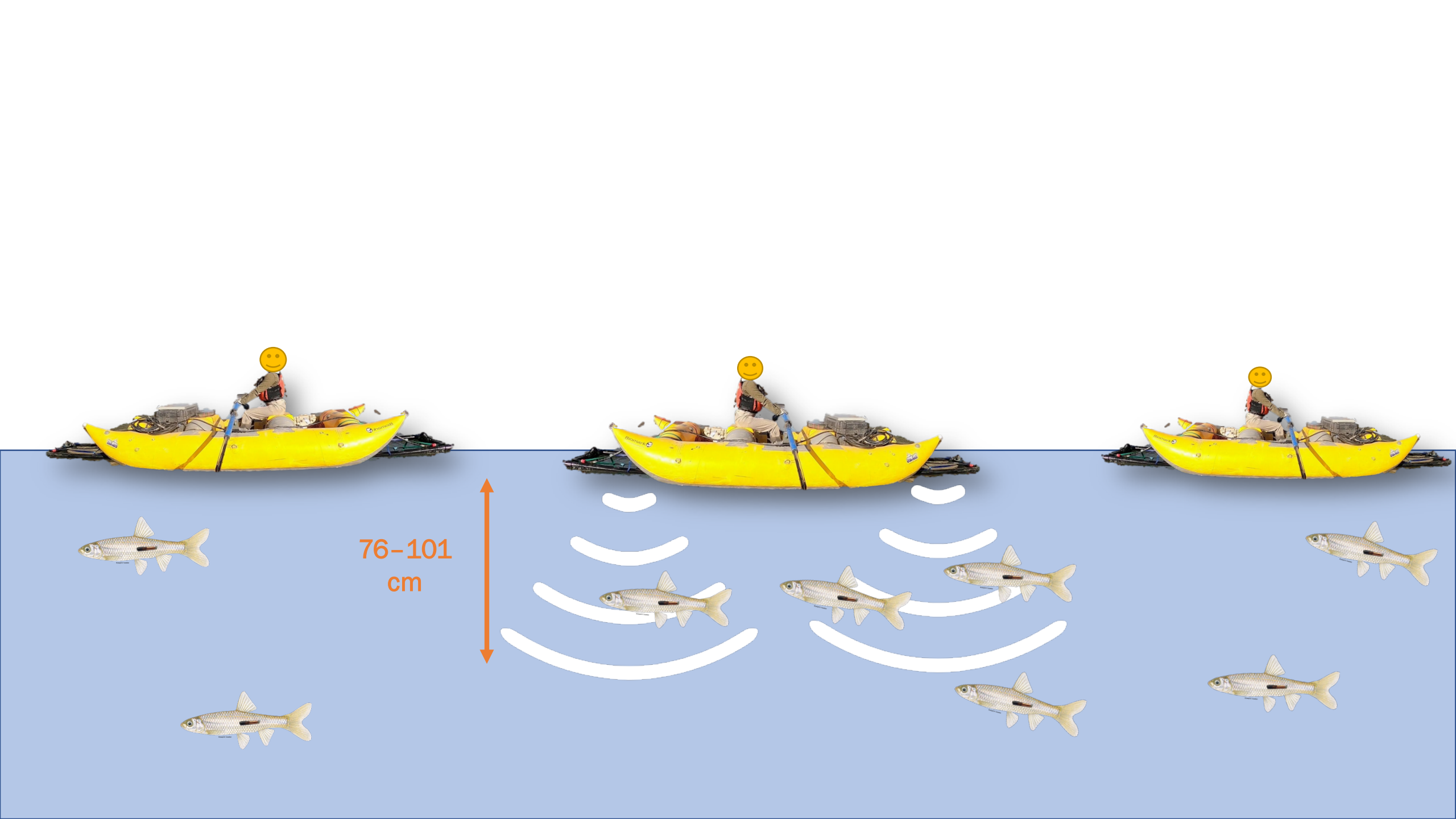
Passive Integrated Transponder Portable Antenna SystemS (PITPASS)

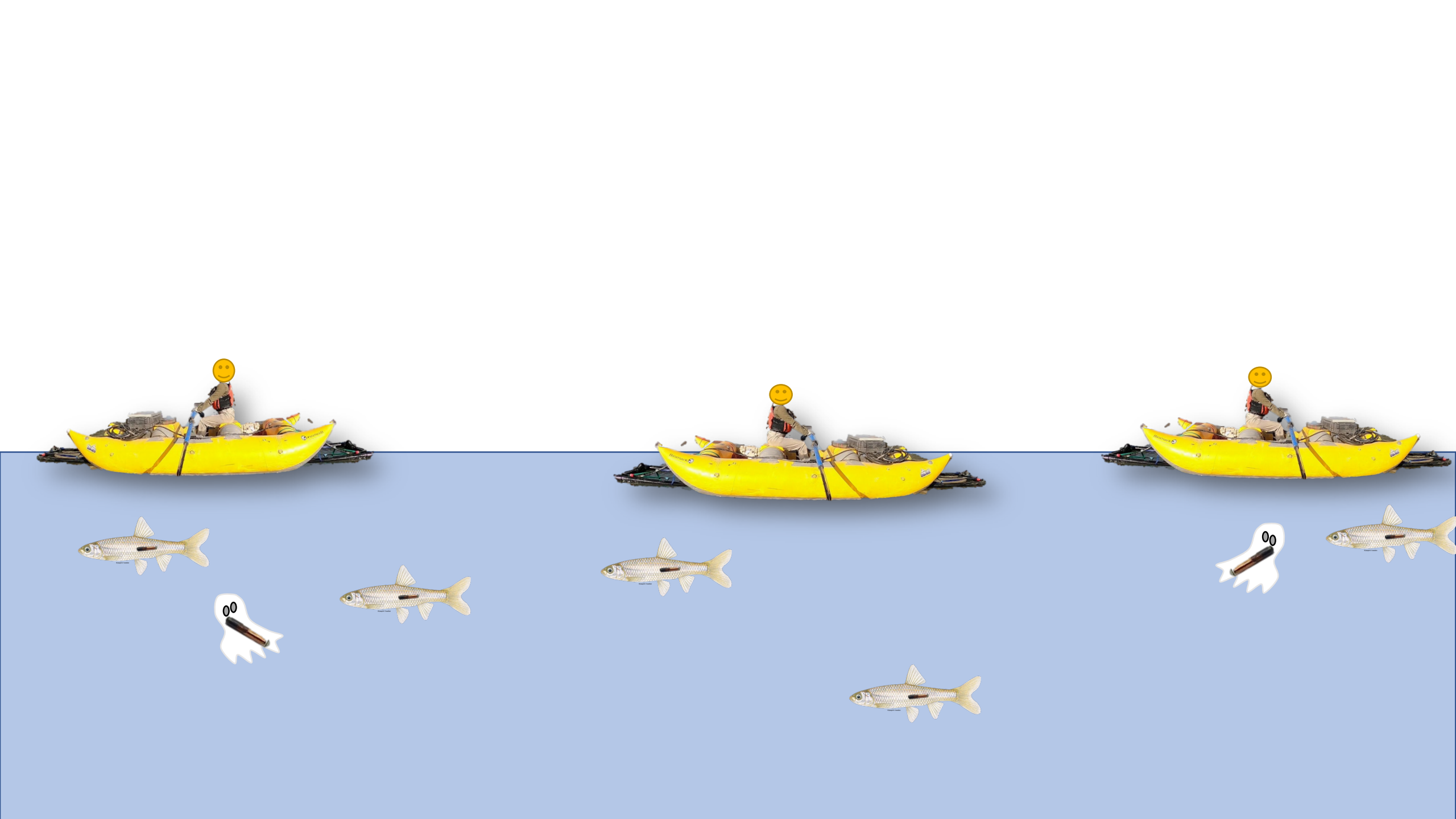
What is PITPASS?

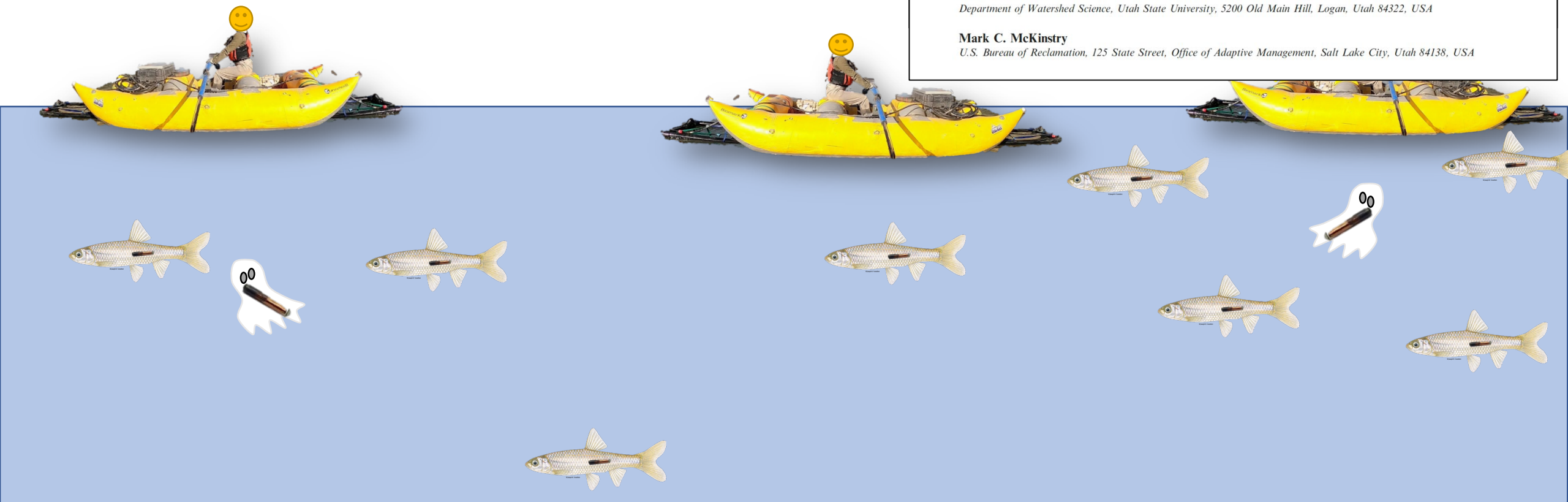
- Floating mobile PIT tag antenna
- Developed by U.S. Bureau of Reclamation and Utah State University

How does it work?

- Battery/Solar powered PIT antenna system.
- Mobile antenna detects PIT tag and simultaneously records coordinates (GPS)


76–101
cm





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MANAGEMENT BRIEF

We Ain't Afraid of No Ghosts: Tracking Habitat Interactions and Movement Dynamics of Ghost Tags under Differing Flow Conditions in a Sand-Bed River

J. Benjamin Stout*
Department of Watershed Science, Utah State University, 5200 Old Main Hill, Logan, Utah 84322, USA; and The Ecology Center, Utah State University, 5210 Old Main Hill, Logan, Utah 84322, USA

Mary M. Conner
The Ecology Center, Utah State University, 5210 Old Main Hill, Logan, Utah 84322, USA; and Department of Wildland Science, Utah State University, 5200 Old Main Hill, Logan, Utah 84322, USA

Phaedra Budy
U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Utah State University, 5205 Old Main Hill, Logan, Utah 84322, USA; Department of Watershed Science, Utah State University, 5200 Old Main Hill, Logan, Utah 84322, USA; and The Ecology Center, Utah State University, 5210 Old Main Hill, Logan, Utah 84322, USA

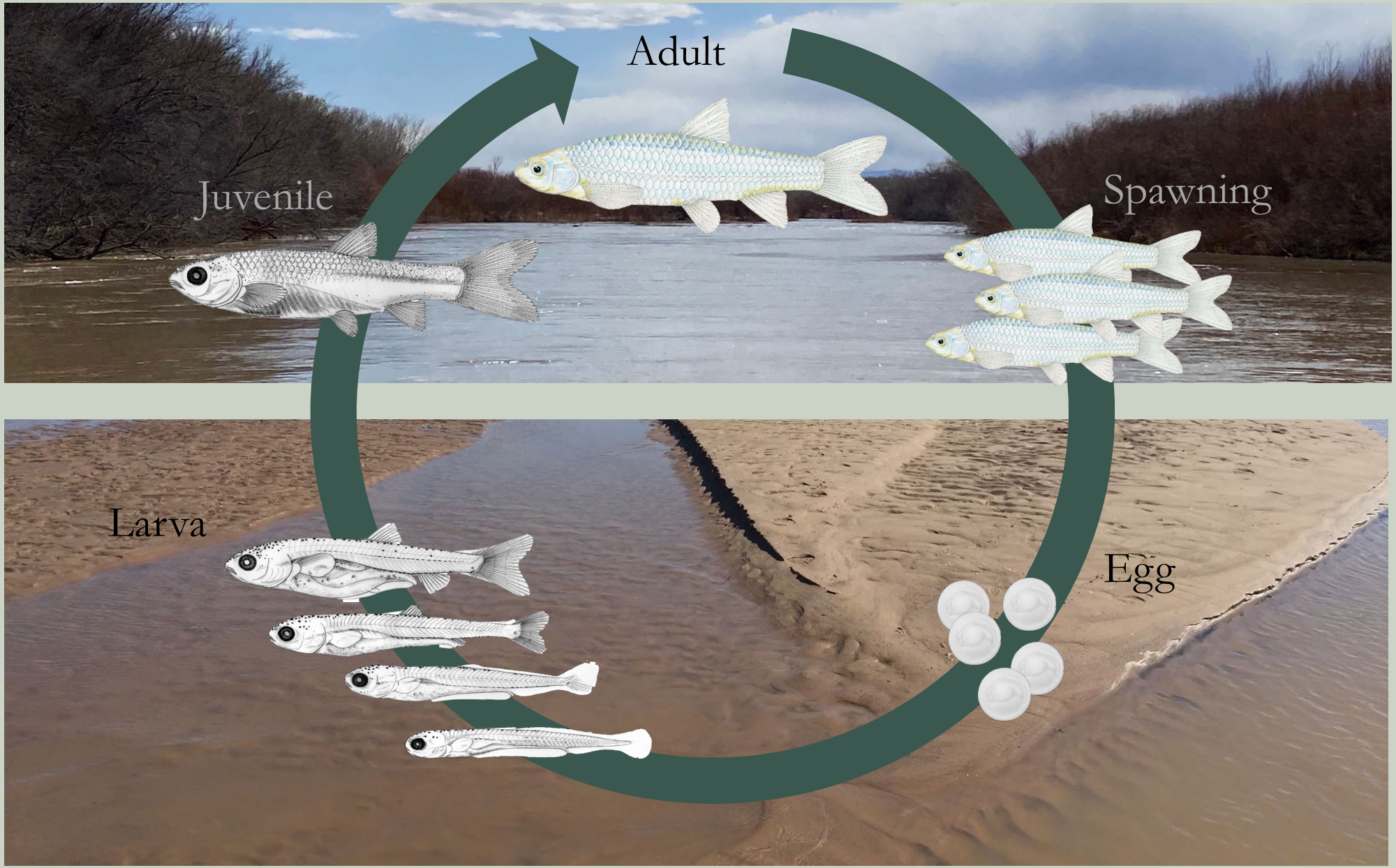
Peter D. Mackinnon
Department of Watershed Science, Utah State University, 5200 Old Main Hill, Logan, Utah 84322, USA

Mark C. McKinstry
U.S. Bureau of Reclamation, 125 State Street, Office of Adaptive Management, Salt Lake City, Utah 84138, USA

Why PITPASS?

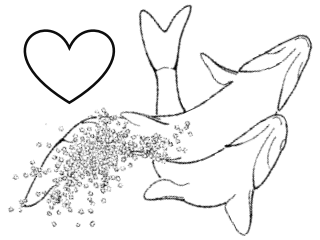
- Increased longitudinal coverage
- Enables collection of habitat use information
- Repeatable– build encounter history for individuals
- High detection rate
- Differentiation between live fish and shed tags
- Benign sampling method

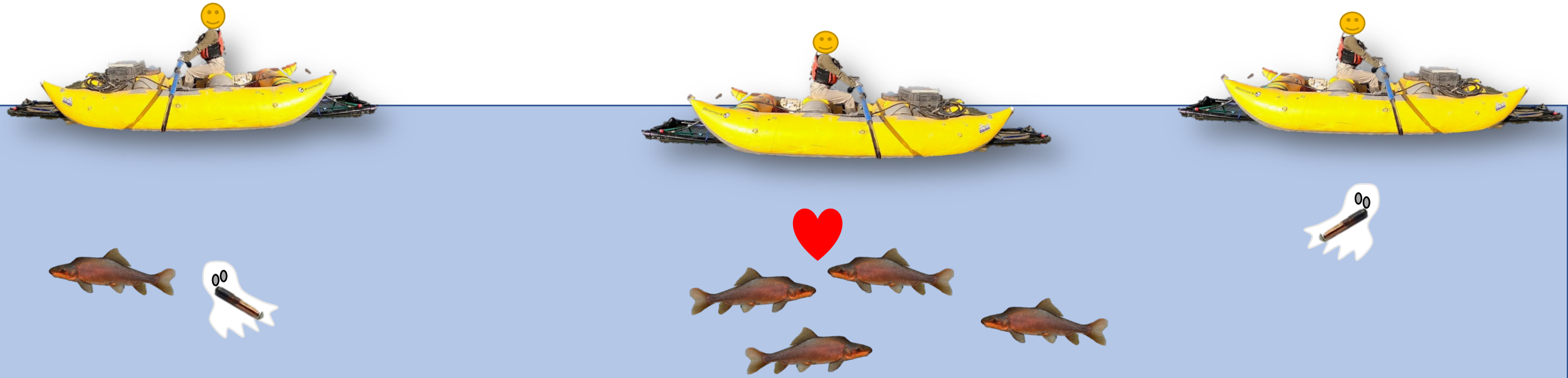
Movement patterns and space use



Life history

- Detect spawning aggregates





Rio Grande Silvery Minnow (RGSM)

Hybognathus amarus

Average Body Length: 50 mm SL
Age–0 to Age–3
Maturity: <1 year

Photo by Tom Kennedy

Approach

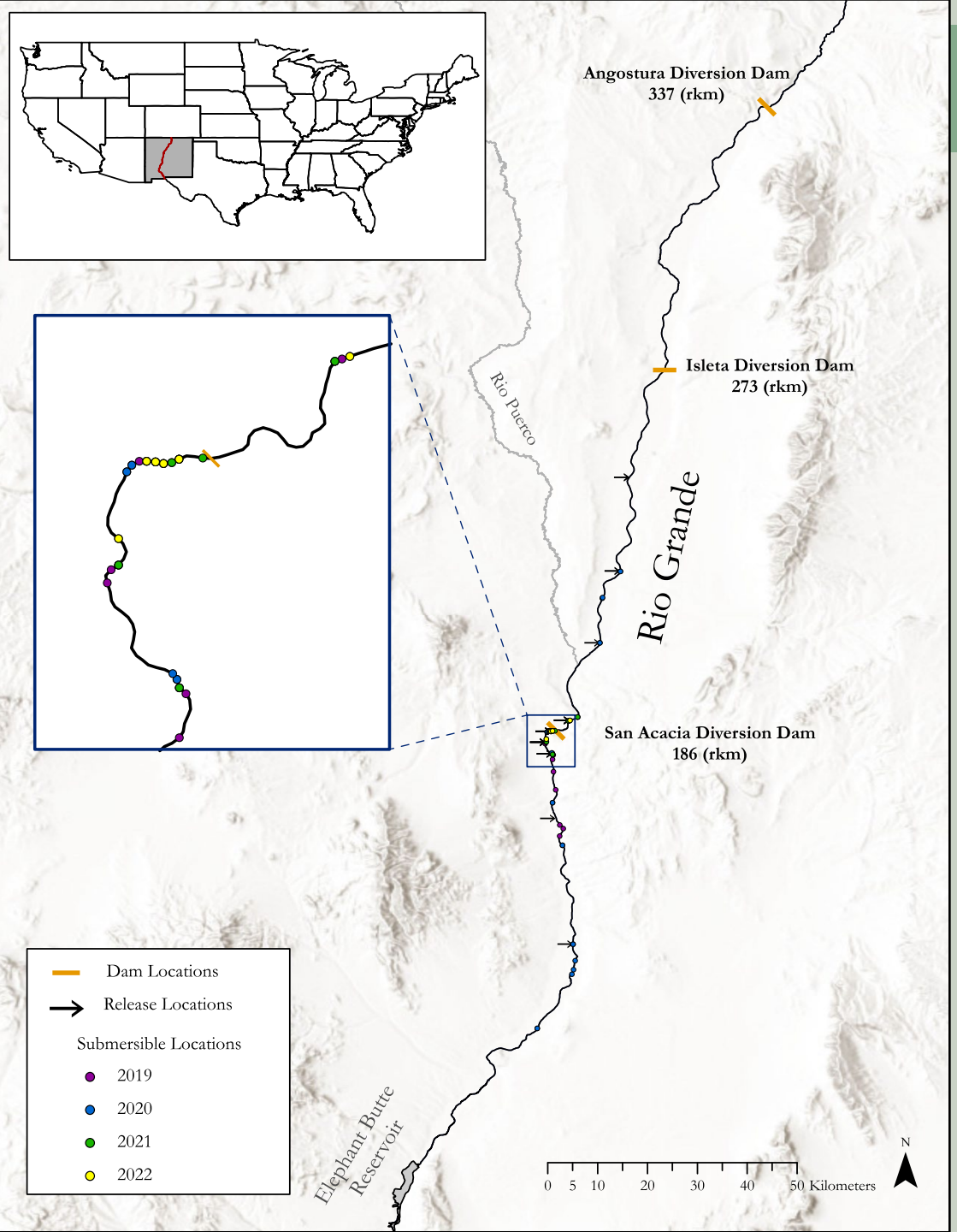
Research objectives

1. Characterize movement patterns
2. Document passage through San Acacia Diversion Dam
3. Quantify movement metrics

Methods

1. PIT tag hatchery reared RGSM
2. Detect RGSM movements using mobile floating antennas and submersible antennas
3. Characterize movement patterns based on detection data

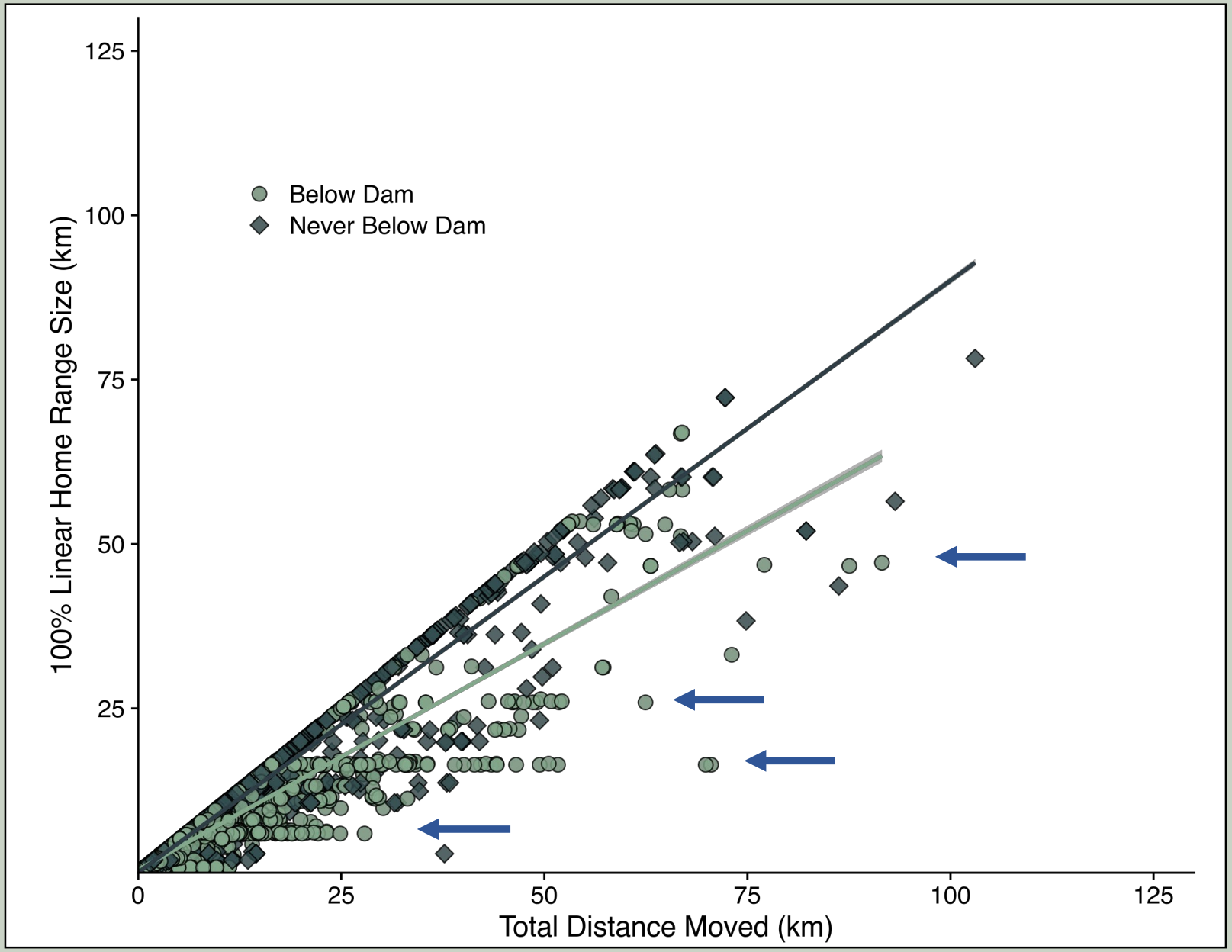
Study Area

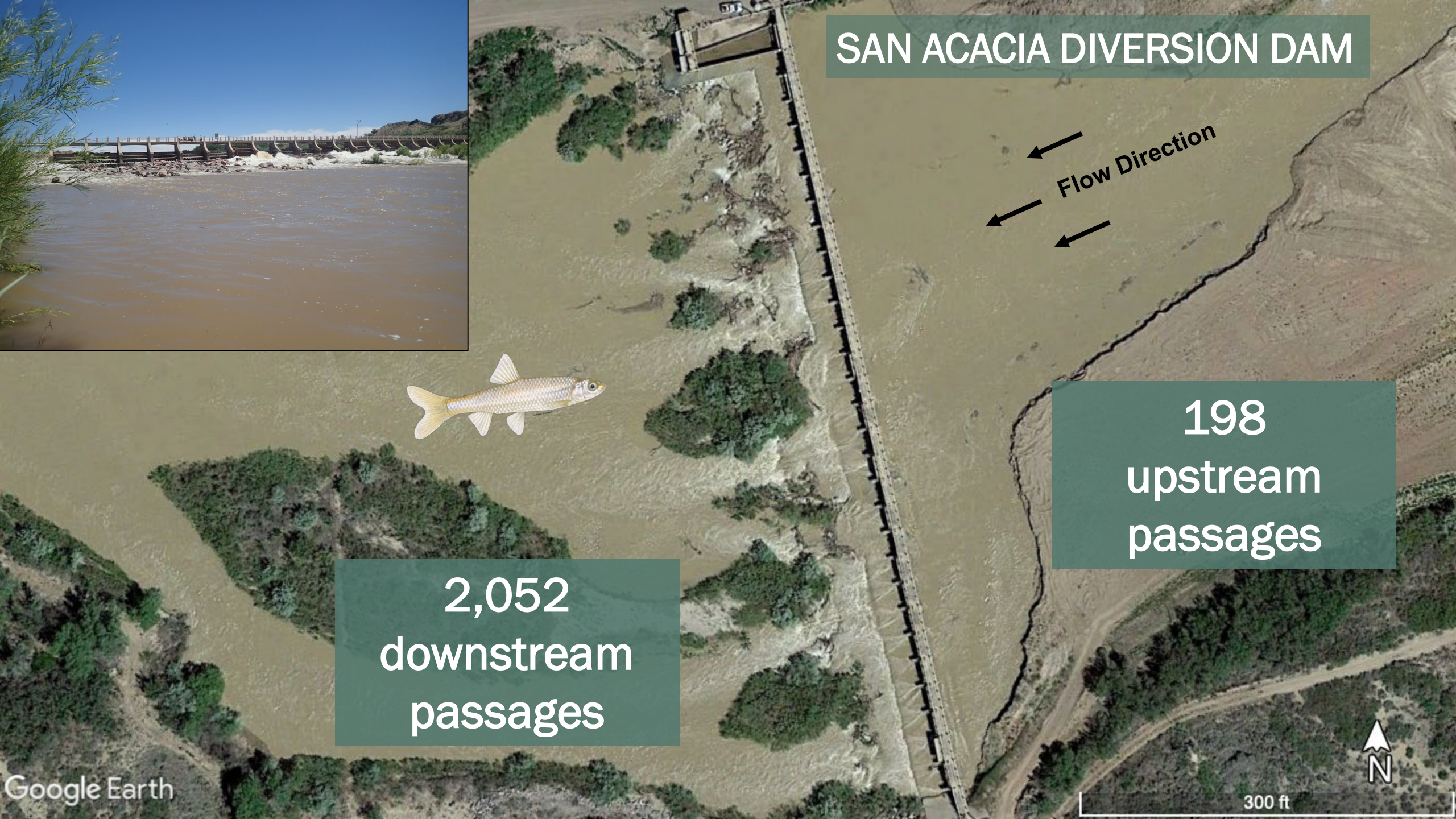


Total released	37,125
Unique detections	13,706
Detection Rate	36%

Results– Space Use

Total distances moved larger than home range sizes




SAN ACACIA DIVERSION DAM
Flow Direction
198
upstream
passages
2,052
downstream
passages
Google Earth
N
300 ft

Conclusions

- Effective detection approach in small-bodied short-lived species
- Documented long distance movements and dam passages
  - Highlight importance of connectivity
  - Documented RGSM moving farther than previously recorded
- Knowledge of movement patterns
  - Better estimates of range potential
  - Target and scale management and monitoring efforts

Razorback Sucker

Xyrauchen texanus

Adult Body Length: > 400 mm SL

Age: > 40 years

Maturity: 3–4 year

Photo by Joel Sartore

Approach

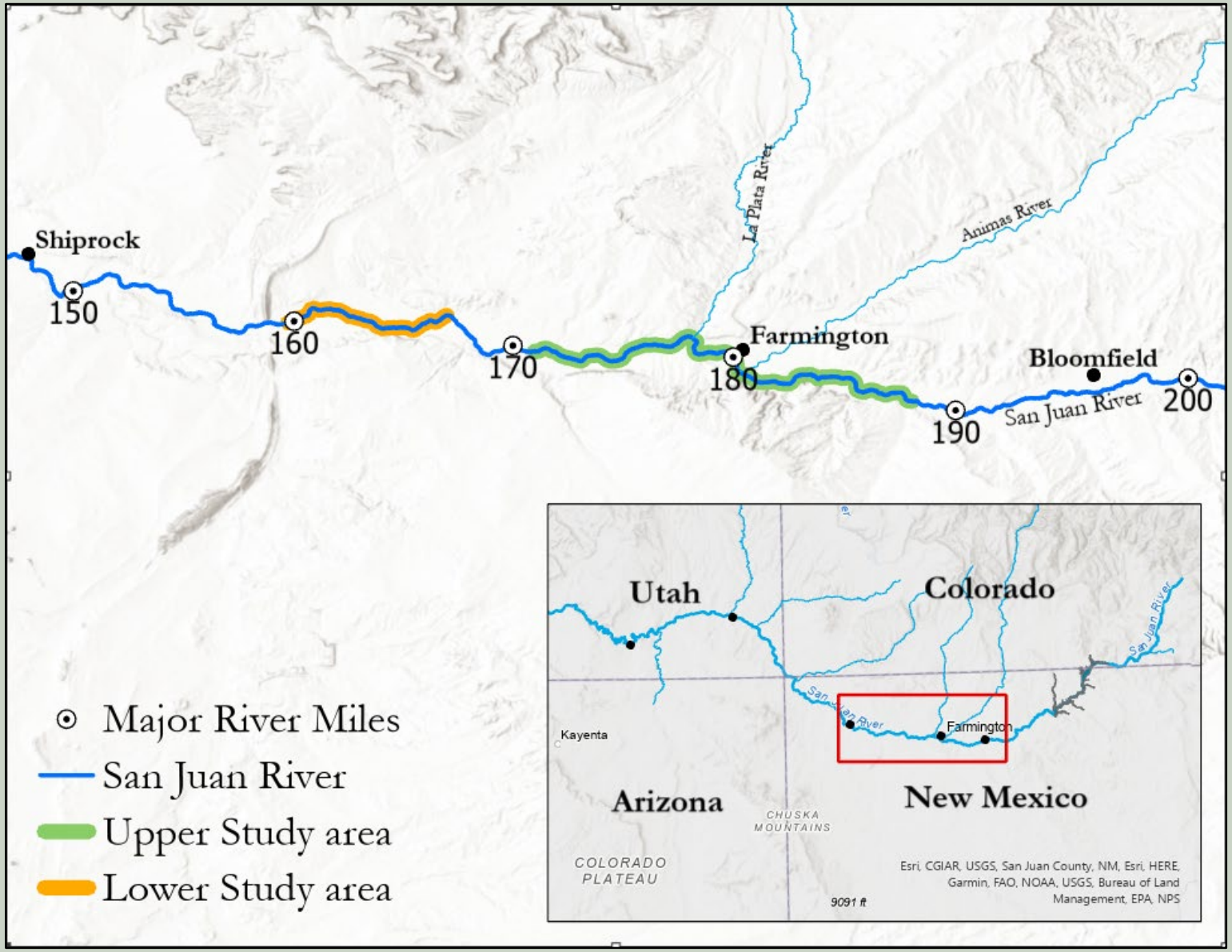
Research objectives

1. Identify Razorback Sucker spawning locations through detections of fish aggregates
2. Validate use of PITPASS for detection of Razorback Sucker spawning aggregates
3. Evaluate density differences upstream and downstream of barriers to evaluate barriers

Methods

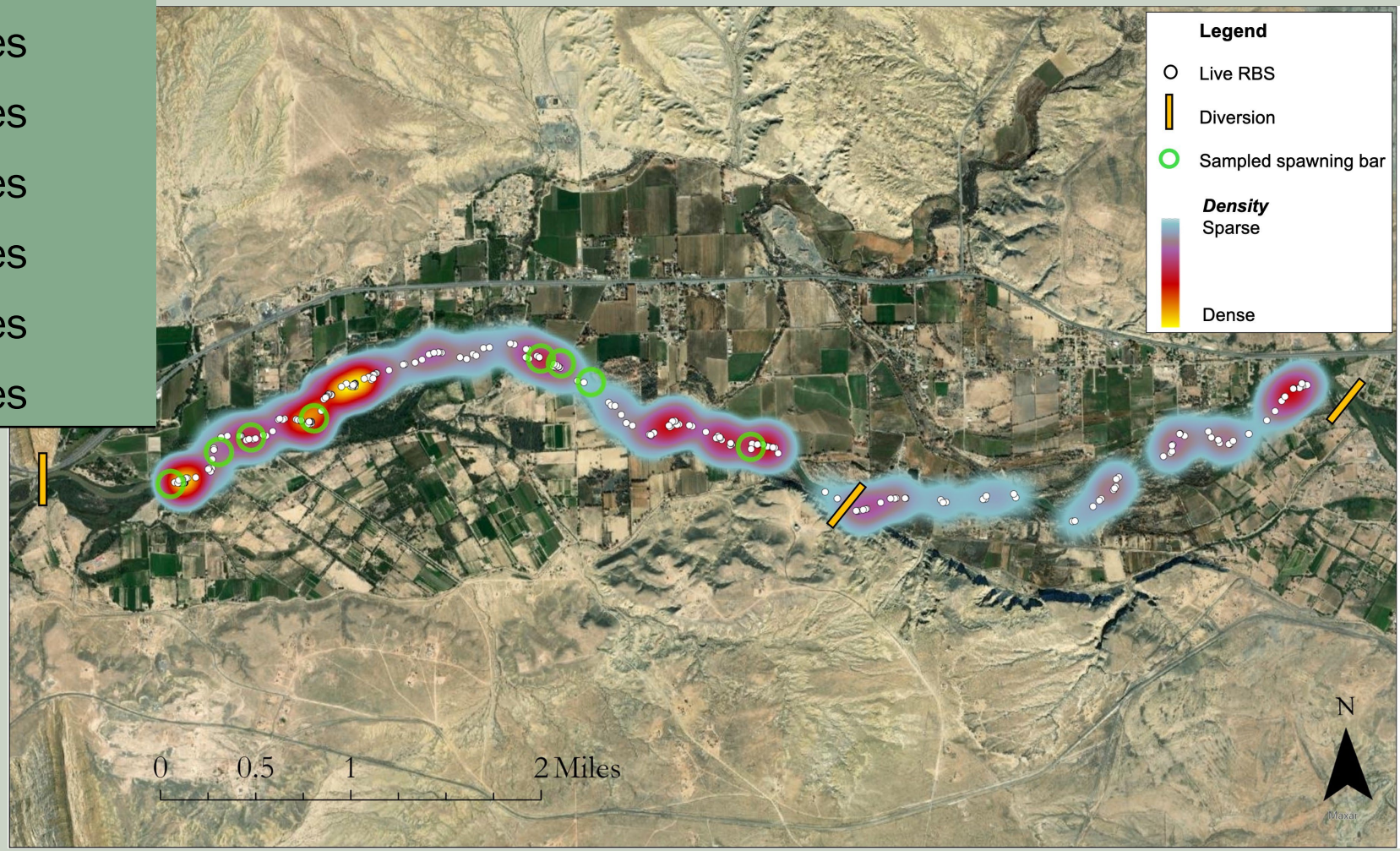
1. Perform repeated surveys during Razorback Sucker spawning period
2. Differentiate shed tags from live fish
3. Evaluate fish density patterns
    - Spawning aggregates
    - Fish passage at barriers
4. Confirm spawning sites

Study Area

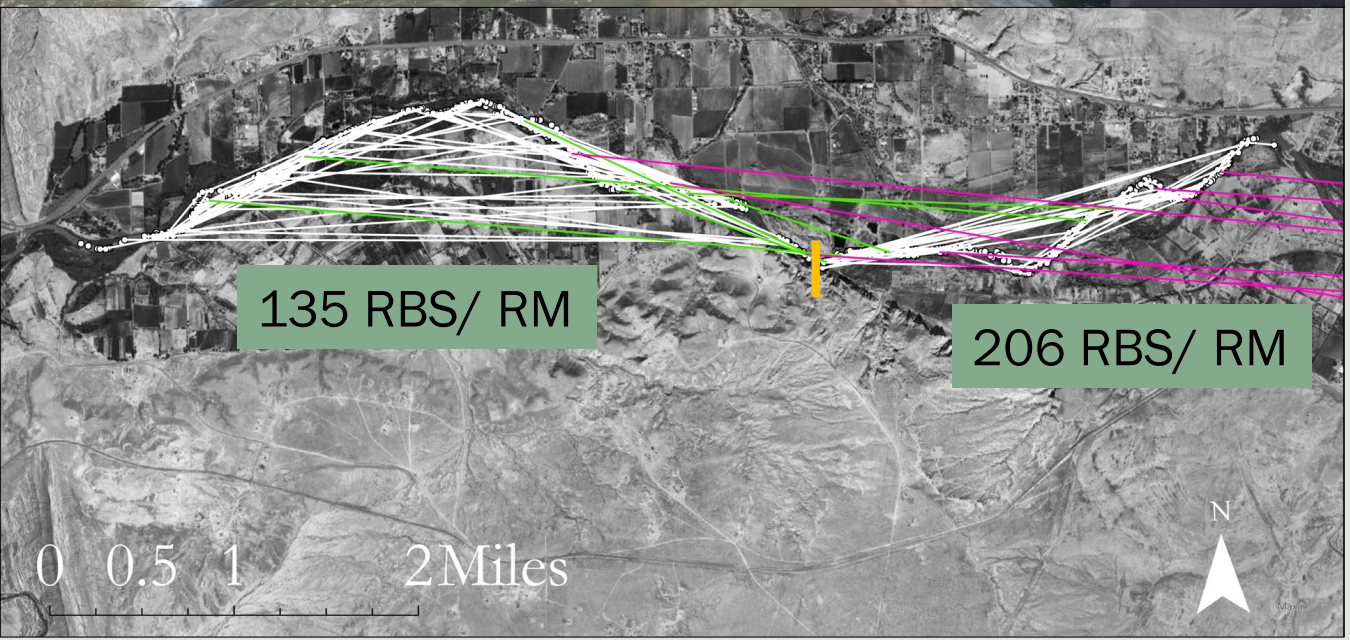

Shiprock
150
160
170
180
190
200
Farmington
Bloomfield
La Plata River
Animas River
San Juan River
Major River Miles
San Juan River
Upper Study area
Lower Study area
Utah
Colorado
Arizona
New Mexico
Kayenta
Farmington
CHUSKA MOUNTAINS
COLORADO PLATEAU
9091 ft
Esri, CGIAR, USGS, San Juan County, NM, Esri, HERE, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS

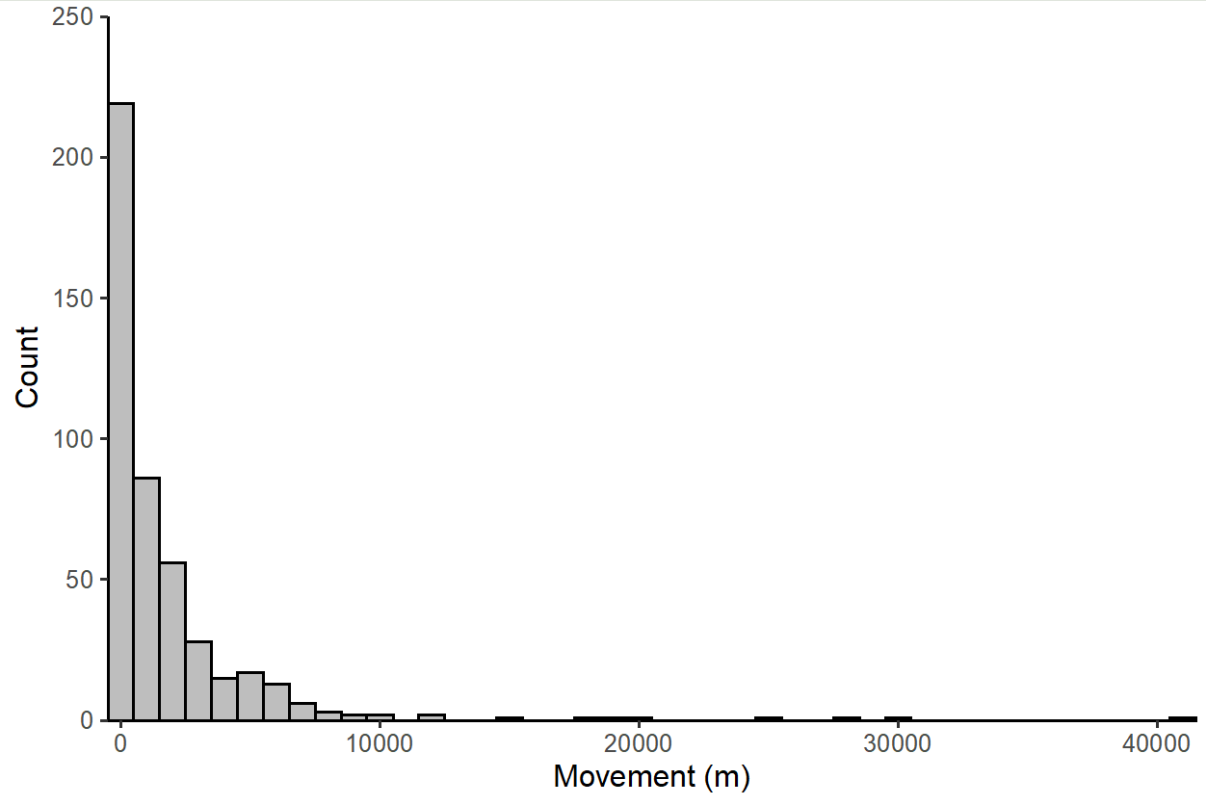
Hot spot analysis

River mile	G-i-* Confidence level	Embryos
163.2	Not significant	Yes
162.1	Not significant	Yes
161.9	Not significant	Yes
161.8	99%	Yes
160.8	99%	Yes
160.0	99%	Yes
159.9	99%	Yes
159.8	99%	Yes



Movement and passage





Results/ Conclusions

- Detected 2,225 unique Razorback Suckers
- Validated utility of PITPASS technology for detection of spawning aggregates
  - Identified RBS spawning locations in Upper San Juan River
- Density differences exist upstream and downstream of major weirs
  - Movement patterns suggest passage issues at two San Juan River weirs
- Implications for future projects developing low velocity larval fish habitat

Proven to be effective detection method

- Species with different life histories
- Different riverine systems
- For different objectives:
  - Characterize movement patterns
  - Assess passage efficiency
  - Estimate transition probabilities
  - Identify spawning aggregates

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Questions?