Brown Trout telemetry at Lees Ferry and Grand Canyon, Arizona

Robert Schelly¹, Brian Healy¹, Clay Nelson², Benjamin Vaage², David Ward², Brandon Albrecht³, Ron Kegerries³, Harrison Mohn³, Jan Boyer⁴

¹ National Park Service, US Department of the Interior, Grand Canyon National Park, Flagstaff, AZ
² U.S. Geological Survey, Southwest Biological Science Center, Grand Canyon Monitoring and Research Center, Flagstaff, AZ
³ Bio-West, Logan, Utah
⁴ Arizona Game and Fish Department, Research Branch, Flagstaff, AZ
Funded by Reclamation, NPS, and GCA
History of Brown Trout in Grand Canyon:

- Brown Trout introduced as eyed eggs into Shinumo, Garden, and Bright Angel Creeks between 1926-34
- Glen Canyon Dam completed 1963, providing cold, clear tailwater and downstream habitat suitable for trout
- Greater predation threat from Brown Trout than Rainbow Trout
- In recent decades, highest main-channel Brown Trout captures have centered on Bright Angel Creek

Joseph R. Tomelleri
AZGFD Monitoring, Speas et al. 2003
6 seasons of Bright Angel Creek trout removals: electrofishing and weir
Bright Angel Creek weir Brown Trout recaptures - Movement

- small percentage of PIT tagged fish moved up to 92 mi

Movements of tagged BNT – 2002-2017, n=47

Source: PIT tag #’s cross-checked against GCMRC Master Database for original tagging information
AZGFD preliminary results, prepared by Jan Boyer

Lees Ferry

Recent increased captures of Brown Trout and observations of spawning
Brown Trout telemetry project objectives:

- Gather data on movements and habitat preferences, both daily and seasonally, and better identify spawning period
- Identify periods of vulnerability and invulnerability to electrofishing (shallow nearshore vs. deep habitats)
- Improve understanding of rates of adult migration downstream from Lees Ferry
- Potentially identify new spawning aggregations
SUR (Submersible ultrasonic receiver)
Towable hydrophone
Sonic tag
Manual tracking unit
passive tracking
Lees Ferry Brown Trout Telemetry Pilot Study

- 10 Brown Trout implanted with dual sonic / RF tags on Feb 1, 2017 at -4 mi bar (9 males, 1 female)
- 2 active telemetry passes/day for 1st week (boat with towable hydrophone from Glen Canyon Dam to Lees Ferry)
- Weekly passes for first month
- Monthly passes through present

Expanded in winter 2017-2018

- 12/19/2017 – additional 14 Brown Trout tagged (4 males, 9 females, 1 unknown)
- 1/9/2018 – additional 15 Brown Trout tagged (11 males, 4 females)
- Grand total of 39 fish tagged over 3 tagging events
Expanding SUR network: Lees Ferry, Marble Canyon, and Grand Canyon
Scan for PIT tag (fish with adipose clips might have just a PIT tag, or both a PIT tag and sonic tag. Surgery scars from February 2017 had healed)
CO\textsubscript{2} used to anesthetize fish
Incision
Stuff in sonic tag and PIT tag
Suture, clip adipose fin, and release
Results after year of tracking 10 fish:

- In the 2-3 months following Feb tagging, most contacts remained within ~1 mi up or downstream of -4 mi bar
- Utility of day / night telemetry passes reconsidered; hydrophone too imprecise to identify small movements
- Diminishing contacts through time
- Of initial 10 fish, 3 tags were found to have stopped transmitting upon recapture this season
- 2 fish were angled, and tags returned
- 2 or 3 individuals spent summer months in deep, electrofishing invulnerable eddy at -2.5 mi (including the 1 female tagged in Feb)
- 2 outmigrations from Ferry, with detections again next season
BNT 3148: Tagged 2/1/2017
Moved downstream 2/5 – 2/9/2017
Motionless from 2/5 – 9/17, suspected mortality
Not dead! Contacted at -4.2 mi on November 6 2017
BNT 3148: Reckoned 12/3/2017 again reach 1/19/2018 at 4.3 mi on 12/2/2017
BNT 3085
Male
BNT 3085: Tagged 2/1/2017; downstream migration past Ferry 2/6/2017; contact at -4.2 mi on 11/6/2017.
BNT 3085: Downstream past Ferry at 20:12 on 11/11/2017
Upstream return between 02:47-03:05 on 11/12/2017
Downstream past Ferry 20:38-02:38 on 12/19-20, 2017
Returned upstream 07:30-09:03 on 1/2/2018
BNT 3091: Downstream past Ferry at 19:32-20:53 on 10/12/2017
Upstream return at 20:32-20:53 on 10/12/2017
(very) Preliminary results of winter 2017-18 tagging:

• Many contacts still in vicinity of -4 mi bar (some signal interference), with 3 contacts further upstream, as far as -11.9 mi (unique #'s not obtained)

• 3 unique newly tagged fish detected on Lees Ferry SURs in late December – early January, all possible outmigration downstream

• Tagging events in December and early January fell earlier in spawning period, captured a more balanced female:male ratio

• Continuous expansion of Marble Canyon SUR network should help to precisely describe distance and timing of downstream movements
Questions?