Teton River Canyon Yellowstone Cutthroat Trout Conservation Project

– Badger Creek Rotenone Treatment –

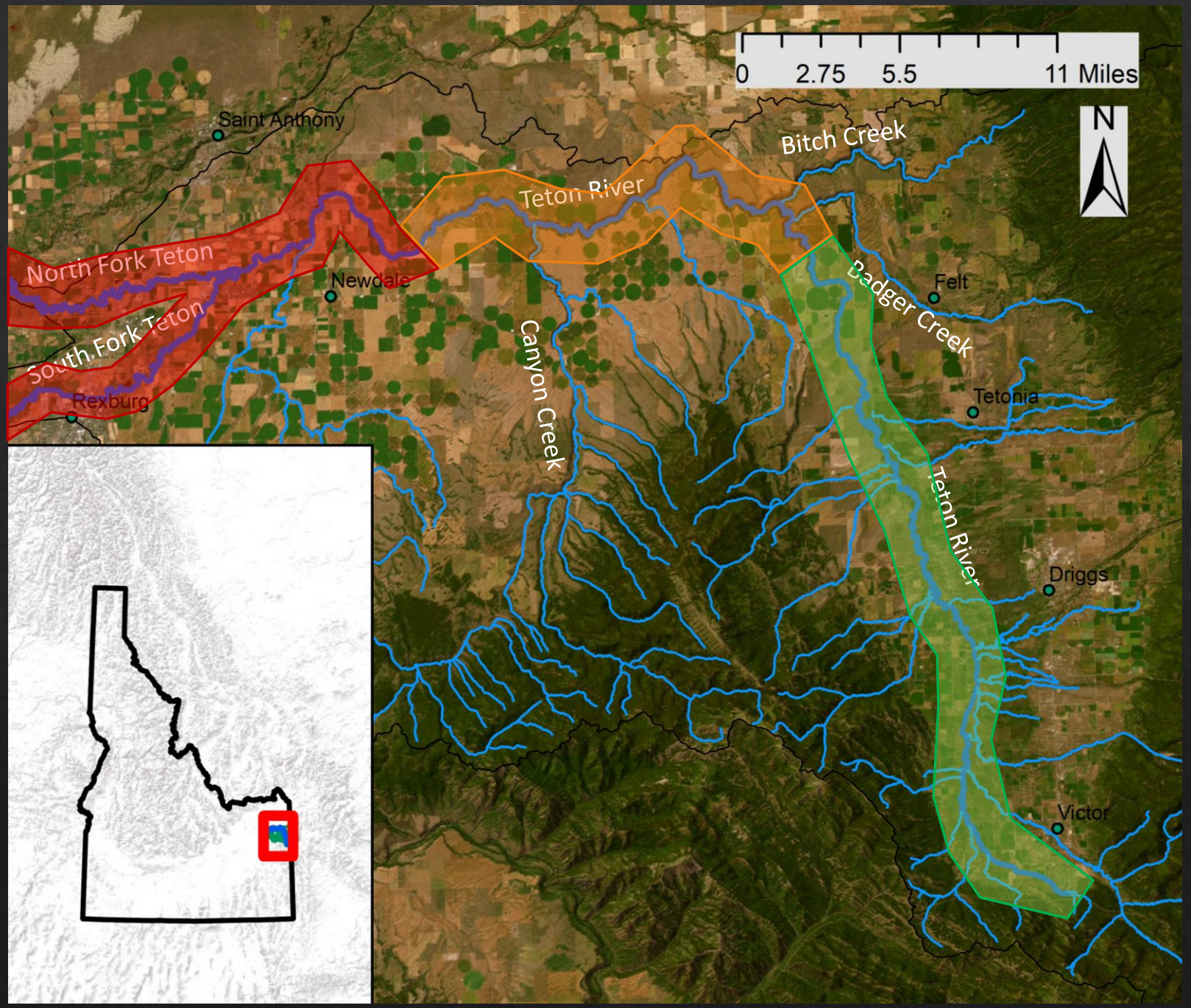
RBT

YCT

Nathan Tillotson
Regional Fisheries Biologist - IDFG
Nathan.Tillotson@IDFG.Idaho.gov

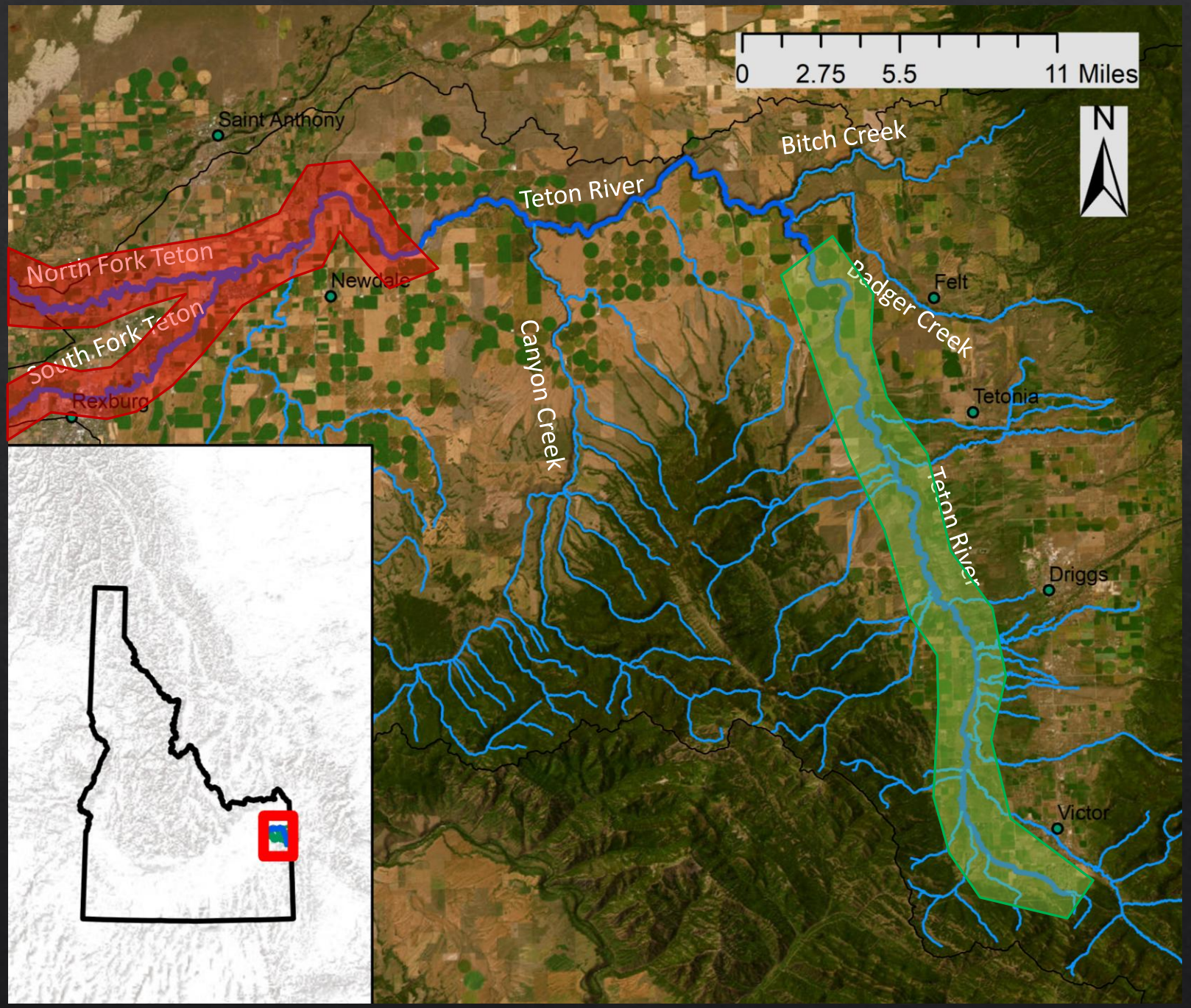
Where?

- Teton River Drainage in southeast Idaho
- Tributary to the Henrys Fork Snake River
- Divided into 3 major reaches
  - The Valley
  - The Canyon
  - The Lower



Where?

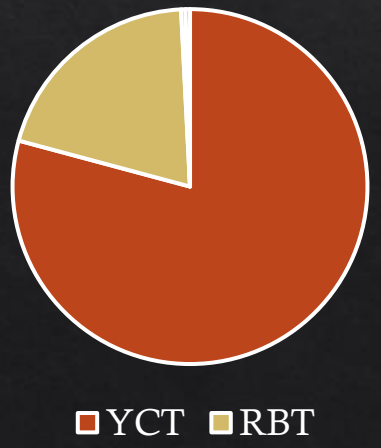
- The Valley & The Lower
  - Dominated by nonnative trout

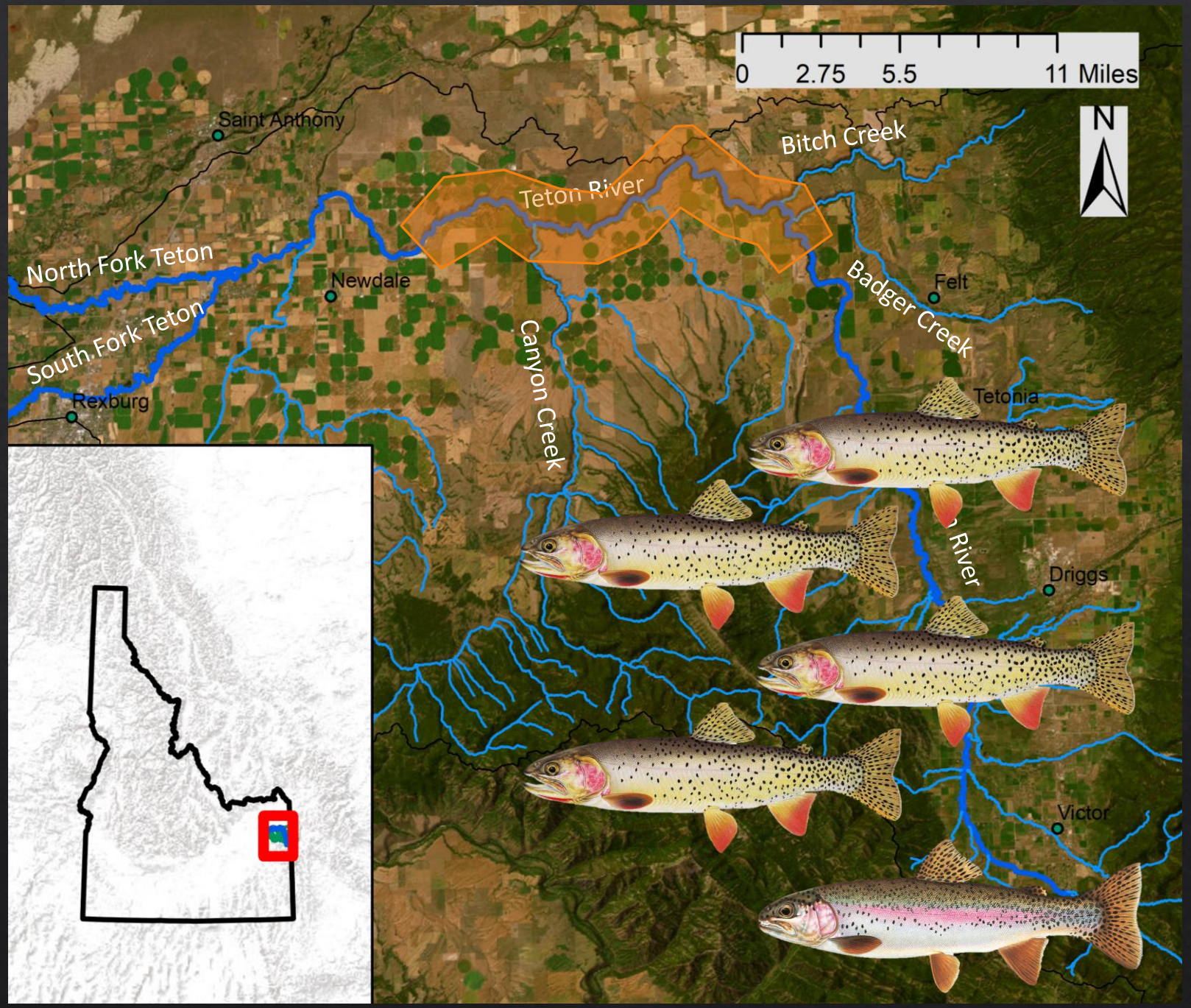


Where?

- The Canyon
  - Last remaining reach still YCT dominant
  - Non-native threats exist…

Teton Canyon Species Composition

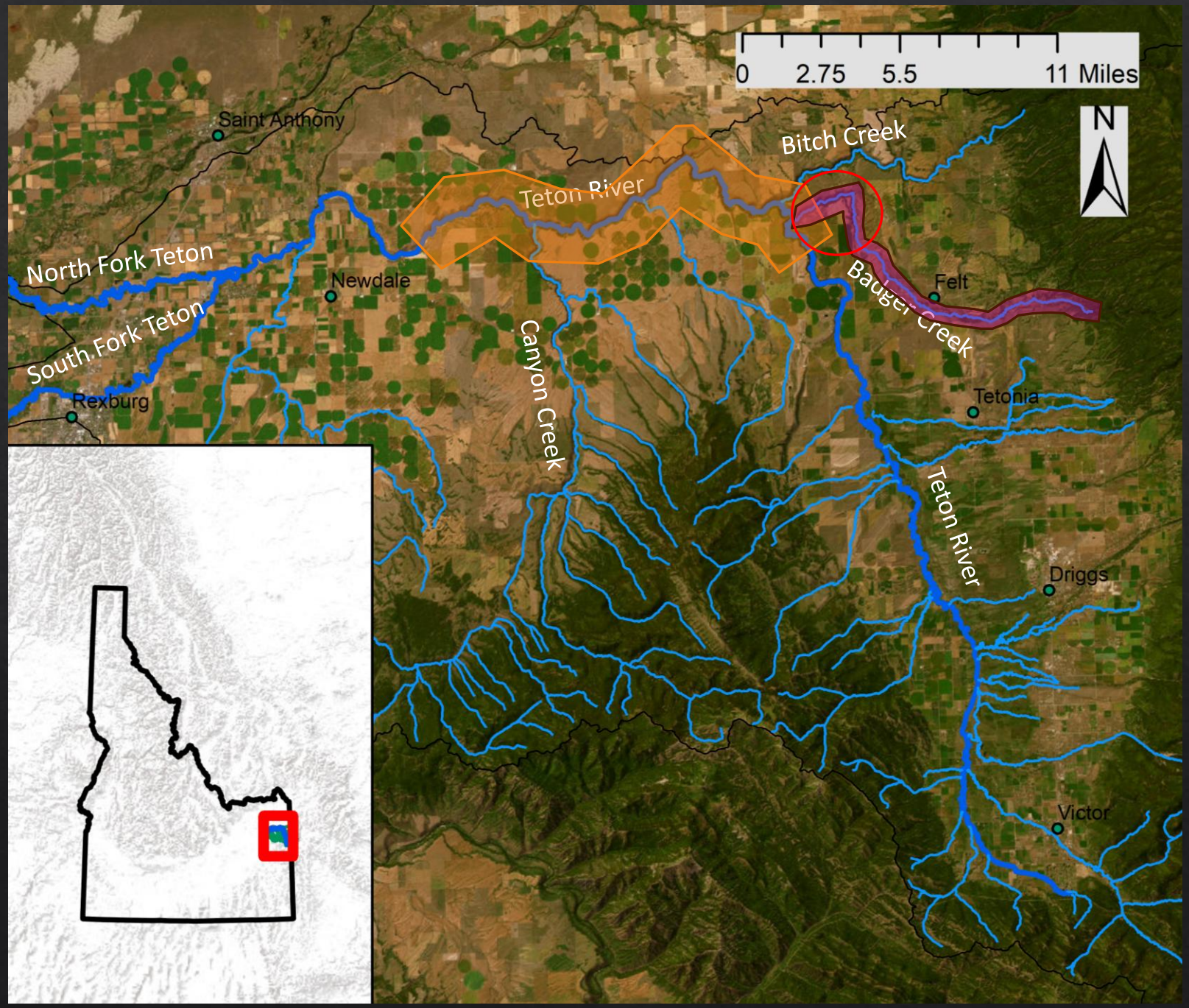




Where?

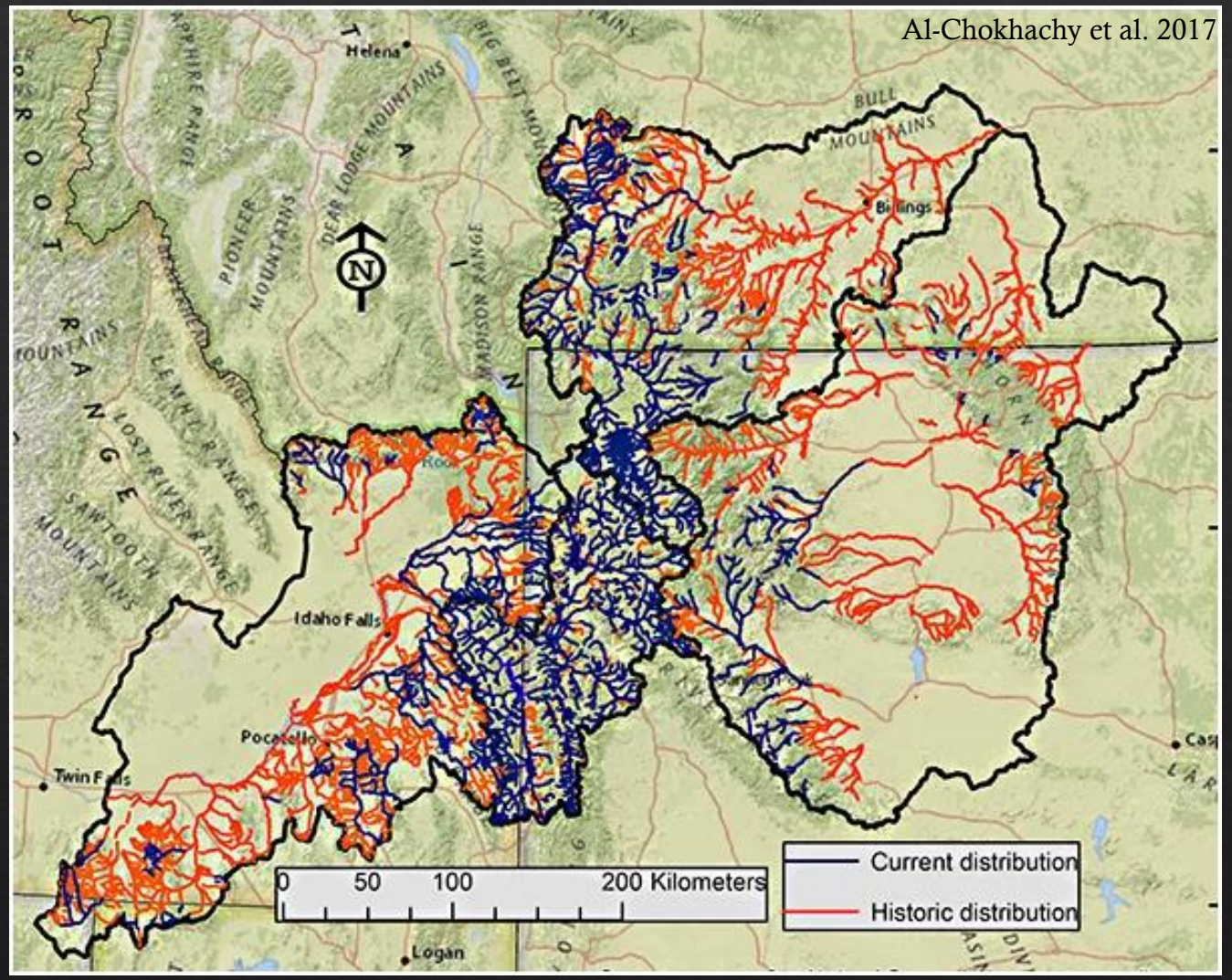
- Non-native threats to Teton Canyon YCT
  - Badger Creek
    - First tributary below Felt Dam
    - Perennial flow in the lower 4.2 miles, ephemeral reach, then perennial upper section
    - Upper section 99% YCT
    - Lower Section 99% RBT

Lower Badger Creek Species Composition



Why was it necessary?

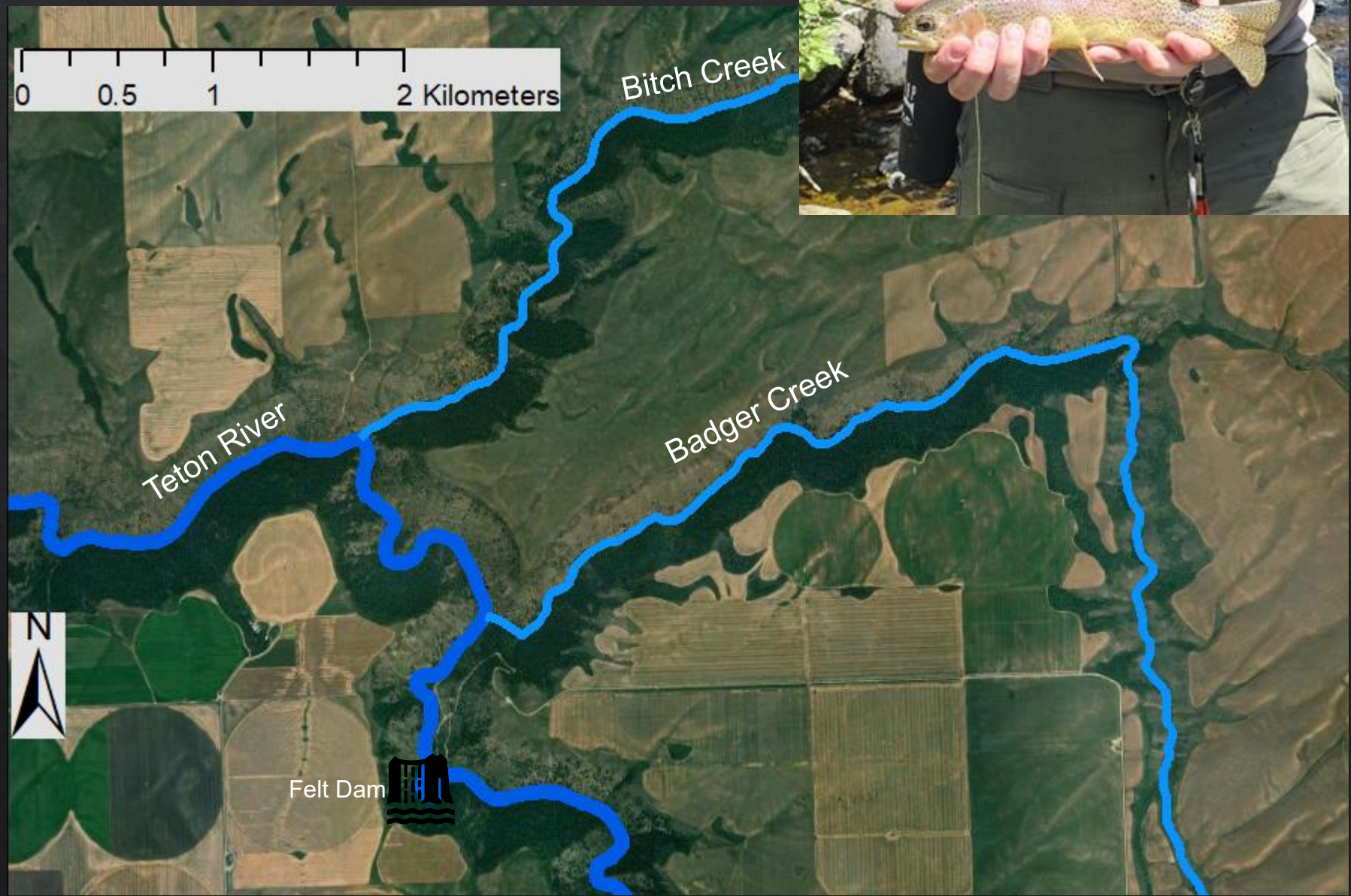
- RBT compete with YCT for food, space, and preferable habitat
- Also pose significant threats to YCT genetic integrity through hybridization and introgression
- YCT populations are disappearing throughout their native range due to habitat degradation and competition with non-native trout
- Only occupy 43% of their native range (Endicott et al. 2016)



Why was it necessary?

- RBT have been increasingly “leaking” out of Badger Creek into the Teton River and Bitch Creek

- Bitch Creek is critical for YCT spawning and rearing in Teton Canyon, and increasing RBT in and around Bitch Creek could be detrimental for YCT



Why was it necessary?

- Given this risk to YCT, the Badger Creek RBT population warranted conservation action

- The goal of this project was to limit threats to YCT in Teton Canyon by significantly reducing RBT in the lower 4.2 miles of Badger Creek

- To accomplish this, we conducted a rotenone treatment on October 8, 2025

Why Rotenone?

- We considered alternatives to rotenone before settling on this path forward
  - Angler incentives for harvest
    - Angler harvest won't be efficient due to access difficulty
  - Mechanical suppression (electrofishing)
    - Similarly challenging, require more effort, and be less effective
  - No conservation action
    - Unacceptable

- Ultimately, rotenone is the best option

What is a rotenone treatment?

- Naturally occurring compound found in some plants
- It's been used for centuries by native peoples of South America to gather food, and has been used as a fisheries conservation tool since the 1930s
- It works by inhibiting gilled organisms from being able to effectively uptake oxygen
- It's routinely been one of the most effective, safest, and fiscally responsible ways to control fish populations

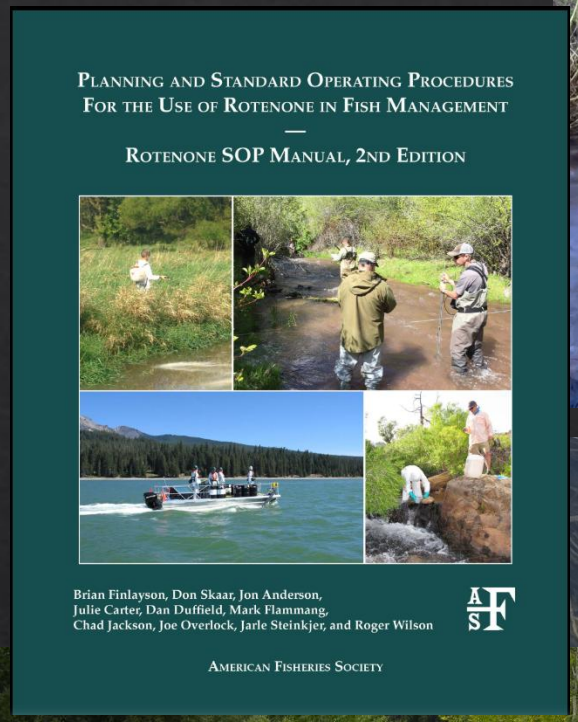
Deactivating Rotenone:

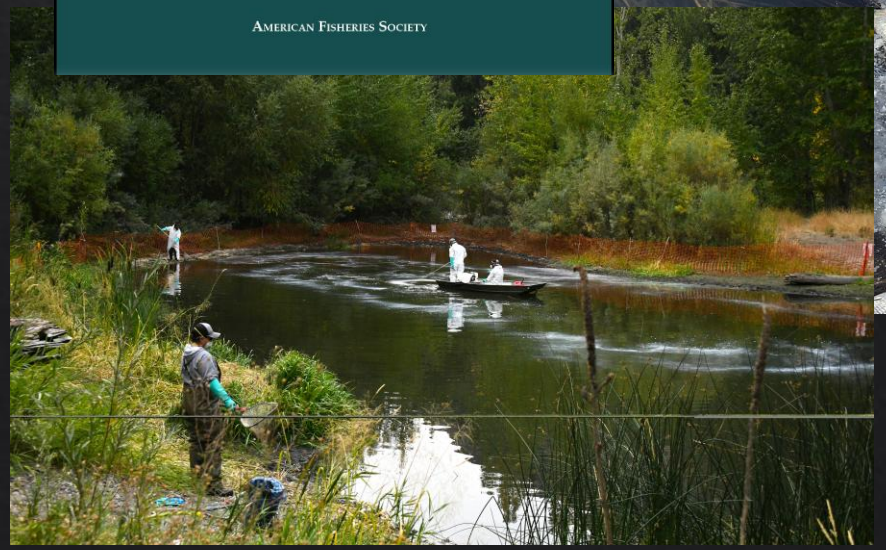
- Degrades naturally with exposure to sunlight and organics
- Potassium Permanganate ($KMnO_4$)
  - Oxidizing agent
  - Other uses include:
    - Disinfectant, deodorizing, water treatment

What is a rotenone treatment?

- For fisheries management, we apply the chemical at a very precise rate depending on the volume of water we plan to treat

- Several recent conservation wins due to rotenone treatments
  - Brook Trout removals in Bull Trout waters
    - Warm Creek
    - Crooked River
    - 5 Lakes Butte
  - Goldfish removals in urban fisheries
  - Brown Trout removals in ponds adjacent to Henrys Fork headwaters





Public Engagement/Communications Efforts

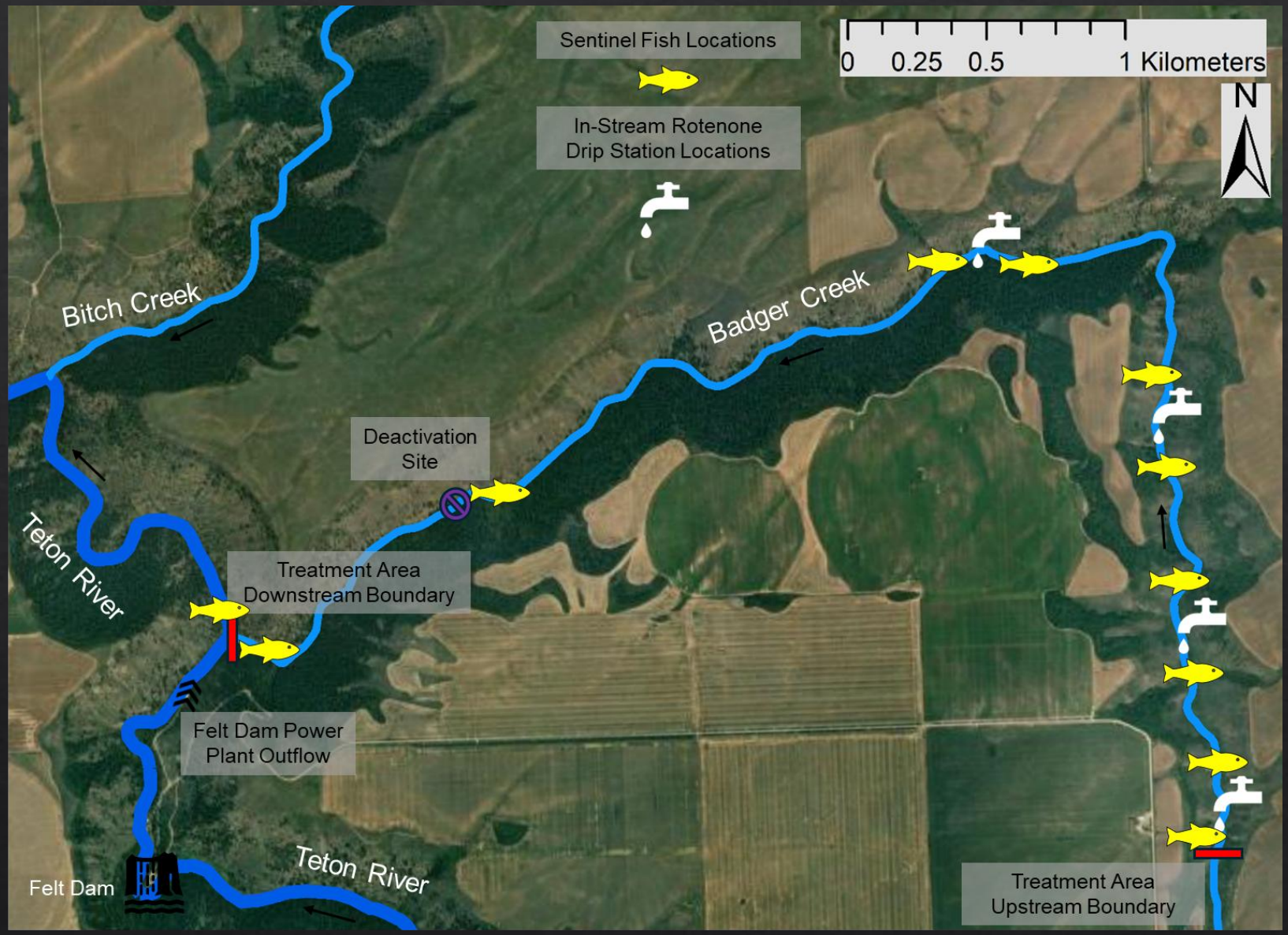
- In-person visits to fly shops and outfitters guiding in the drainage
  - These were extremely valuable. Helped put the rumor-mill to rest before it could start
- Early communication with surrounding landowners
- Collaboration with NGOs on messaging
- Detailed press release/social media post accompanying the public meeting announcement
- Public meeting

Implementation

- 5 in-stream drip stations
  - Avg transport time ~1hr between stations
- Flow ranged from 0.6 – 60 CFS
- 12 major springs in treatment reach
  - Inputs ranged <0.5 – 16 CFS
  - 6 required their own drip station (>1 CFS)

Implementation

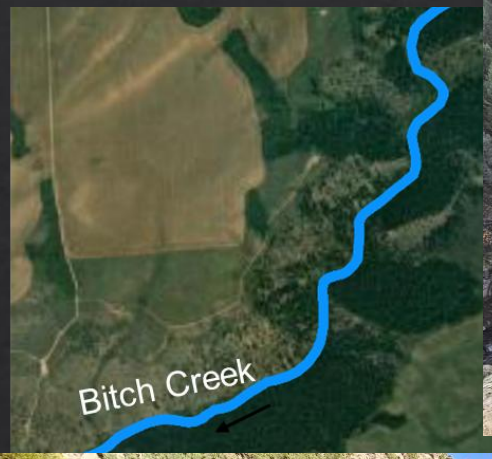
- Sentinel fish
  - Above and below each in-stream drip station
  - Above deactivation site
  - Inside and below Badger Creek confluence w/ Teton River

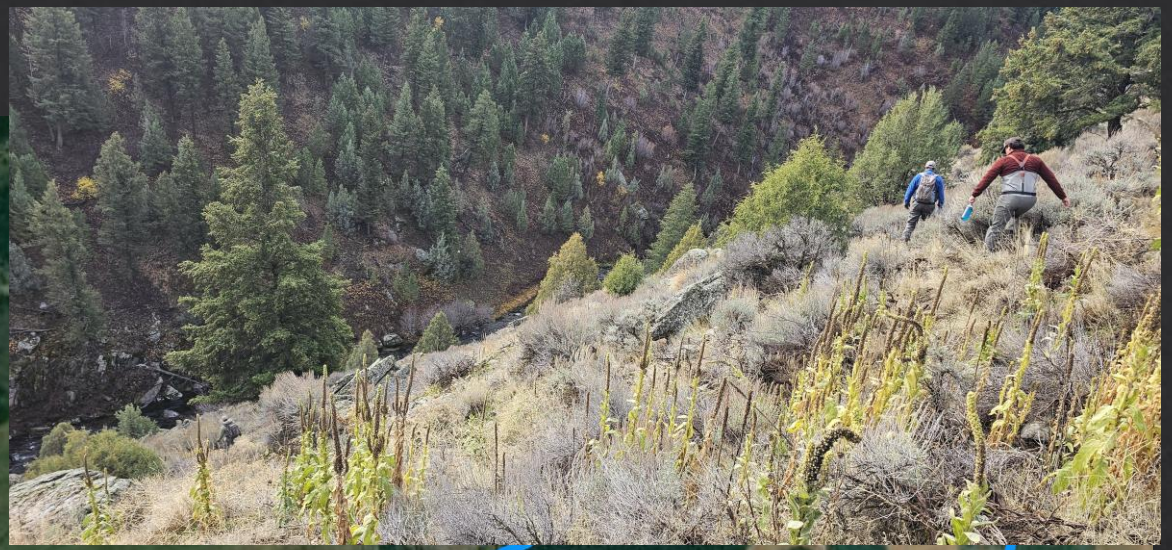


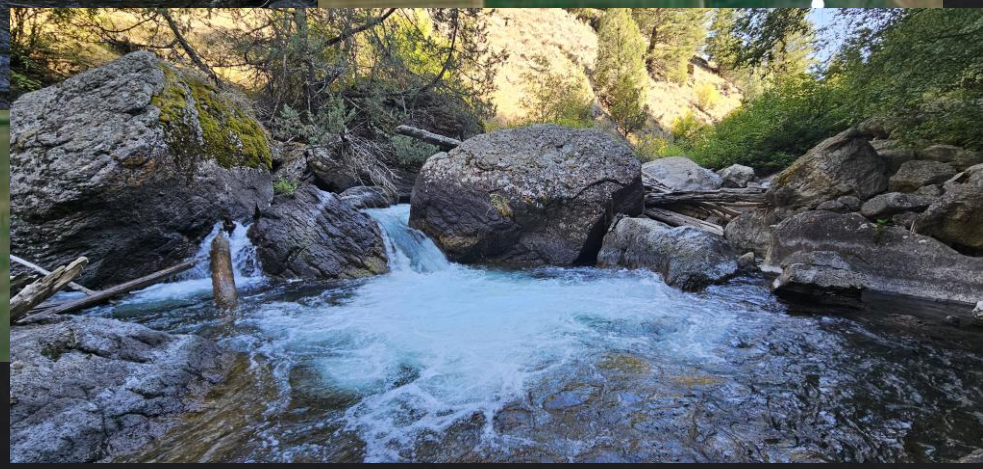
Implementation

Detox Debate: 3 main options

- Felt Power Plant Outflow
  - Mainstem Teton ~250 yards upstream of Badger confluence
  - Emergency detox at Bitch Creek slide
  - Detoxing untreated water…
  - Logistically the easiest
- Badger Confluence
  - Still detoxing Teton River
  - Somewhat logistically/ physically challenging



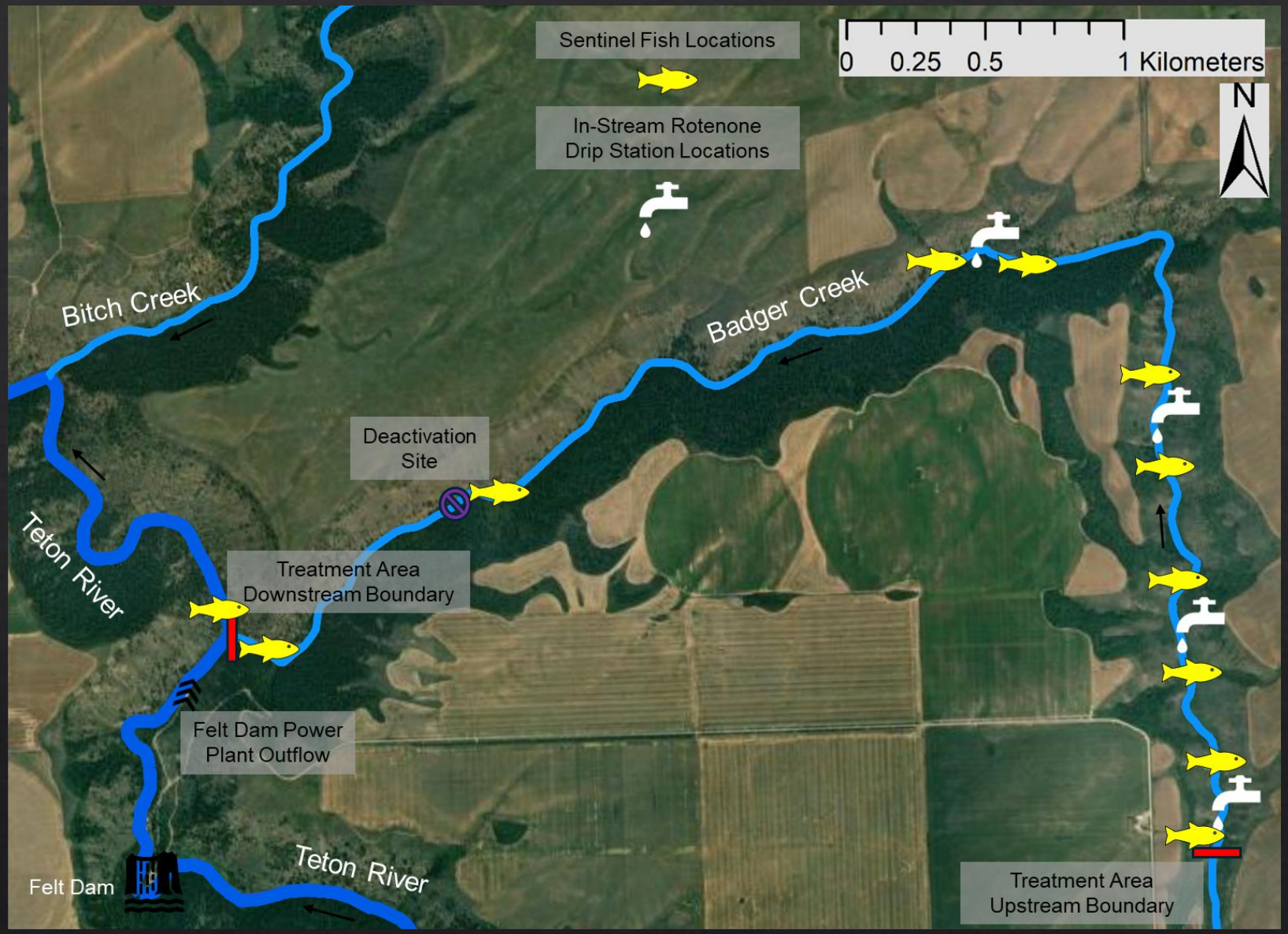




Implementation

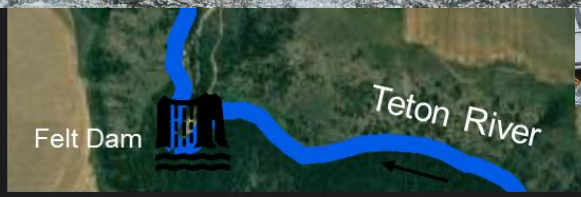
Detox cont..

- Inside Badger Creek
  - 30-min transport time upstream of confluence
  - Less $KMnO_4$ required
    - >3,300 lbs for Teton River at 310 CFS
    - 850 lbs for Badger Creek at 60 CFS
  - Emergency detox at Badger confluence
  - Logistically/physically hardest
  - Least risk to Teton River fishery



Imp

- Dea
  -
  -
  -
  -
  -
  -
- Then we had to get it all back out of there…



Treatment Day

- Needed 34 people for treatment day
- 15 people each of the prior 2 days for detox zone RBT depletion
- 10 people for 2 days of post-treatment gear extraction
- Pretty smooth sailing!
- Snorkel surveys 1-week post treatment found no live fish (thanks, Lucas!)

Next Steps

- No barrier on Badger Creek, so RBT are likely to come back without intervention
- As-needed electrofishing RBT suppression
  - Once YCT re-establish, it should reduce the frequency of necessary suppression
- Considering YCT translocation from Bitch Creek or upper Badger, but need to evaluate feasibility
  - Adults/juveniles
  - Fertilized eggs in artificial redds

Shout-outs

- Logistical advice/PDMP review:
  - Brett High, Joe Kozfkay, Eric Stark, Joe Thiessen, Tucker Brauer, Anthony Dangora
- IDFG boots on the ground:
  - Brett High, Ben Martin, Sage Unsworth, Ryan Hillyard, Kayla Hobbs, Chris Walker, Logan Peterson, Cade Bowlin, Selina Walters, Julianne Kirby, Sam Tacket, Gerren Steel, Adam Zambie, Travis Austad, Brenden Larson, Jovani Pannel, Michael Martin, Adrian Valdez, Ryan Walker, Brayden Burton, James Brower, Cydney Yost
- USFS:
  - Corey Lyman, Kat Villanueva
- BLM:
  - Ryan Whitworth, Lauren Garduno
- FTR:
  - Bryan Van Winkle
- Students/Volunteers:
  - Lucas Ellingson, Max Akey, Schuyler Lane, Dylan Bair, Ernie Unger, Katie Warner
- My Crew
  - Josh Pluid, Cooper Harbour, Hana Haakenstad, Ashton Mowrey

Questions/Comments?

Nathan Tillotson
IDFG Upper Snake Regional Fisheries Biologist
Nathan.Tillotson@idfg.Idaho.gov
208-535-8026