COLORADO RIVER SLOUGH GREEN SUNFISH REMOVAL

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Cooperators

- Arizona Game and Fish Department
- National Park Service
  - Glen Canyon NRA
  - Grand Canyon NP
  - North Cascades NP
- USGS-GCMRC
- Fish and Wildlife Service
- Bureau of Reclamation
- Western Area Power Administration
- Hopi, Hualapai, Kaibab Paiute, Navajo, and Zuni

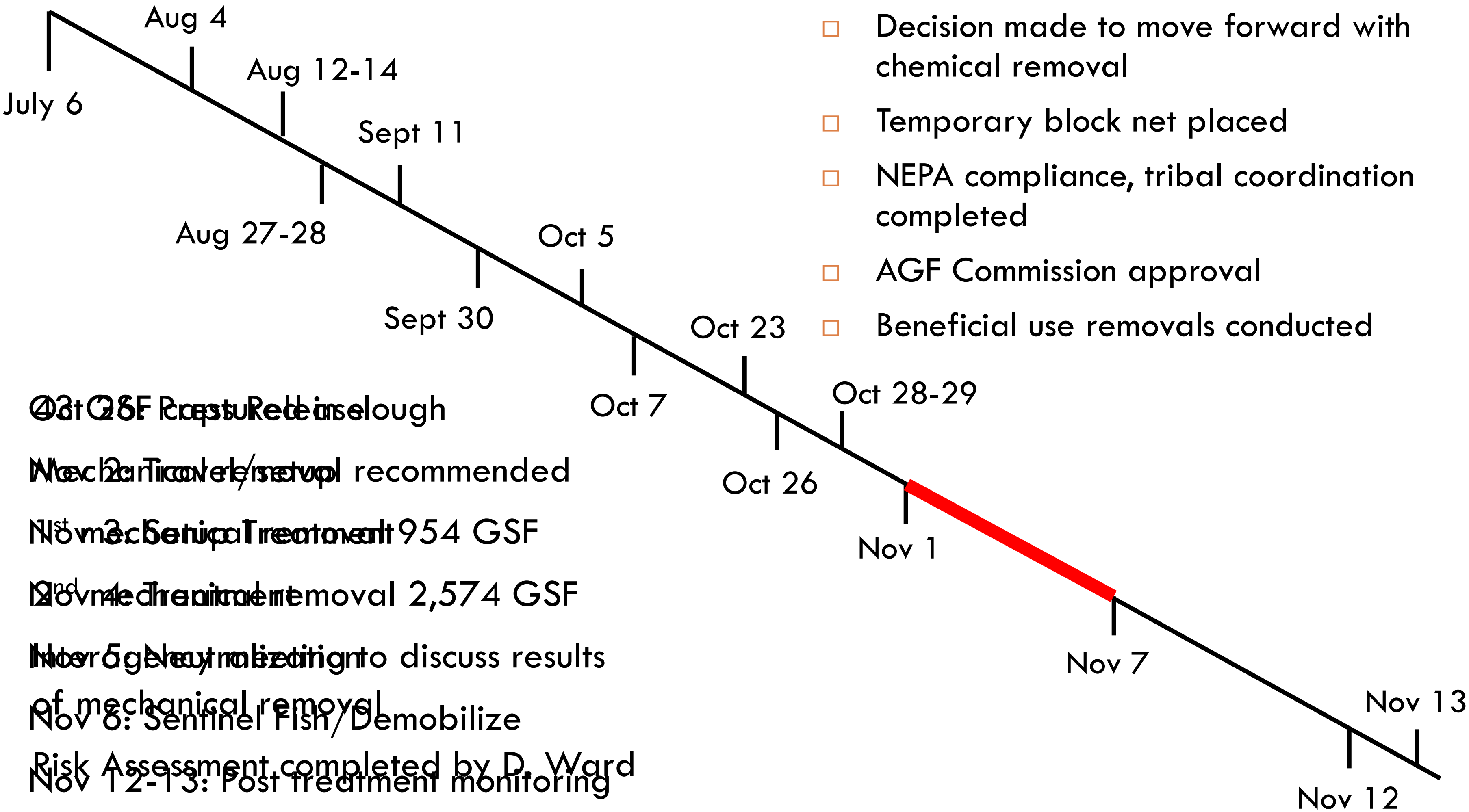
Cooperative Effort

- **NPS:** Coordination, planning, compliance, communication, security, safety, logistics, labor
- **USGS-GCMRC:** Mechanical removal, risk assessment, hydrology, fish collection, otolith extraction, logistics, labor, macroinvertebrate survey
- **WAPA:** Steady flows
- **AGFD:** Coordination, Initial detection, mechanical removals, planning, permitting, emergency approval (commission), lead implementation, logistics, labor
- **FWS:** Compliance, guidance, labor
- **BOR:** Funding, steady flows, HFE delay

Overview

- Timeline
- Surveys
- Compliance
- Treatment

Treatment Timeline



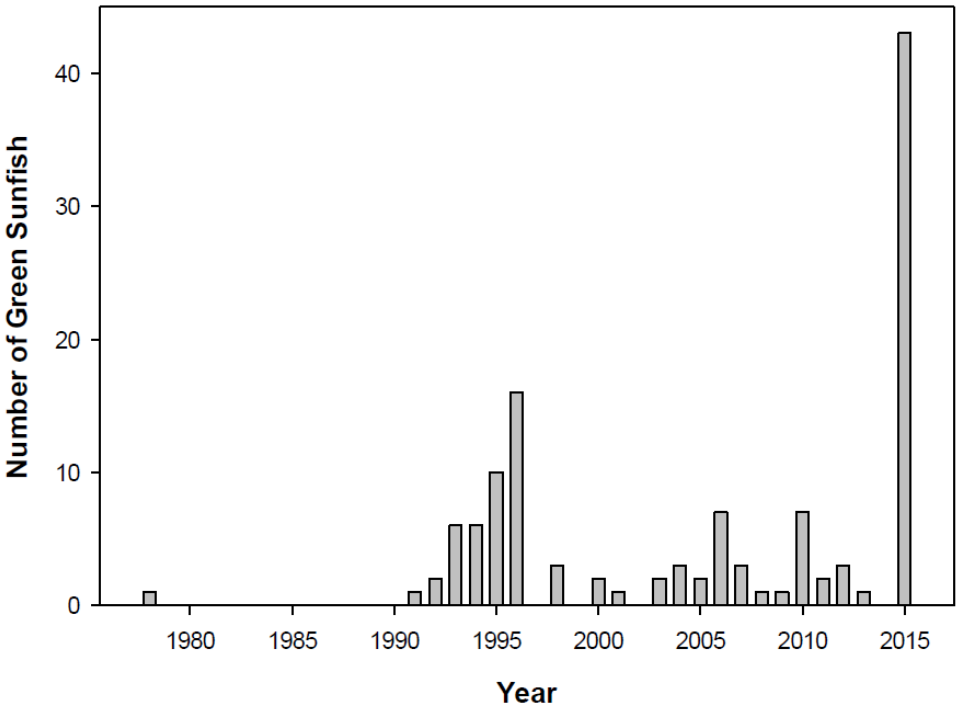
- Decision made to move forward with chemical removal
- Temporary block net placed
- NEPA compliance, tribal coordination completed
- AGF Commission approval
- Beneficial use removals conducted

- 43 GSF captured in slough
- Mechanical removal recommended
- 1st mechanical removal 954 GSF
- 2nd mechanical removal 2,574 GSF
- Interagency meeting to discuss results of mechanical removal
- Risk Assessment completed by D. Ward

- Oct 28: Press Release
- Nov 2: Travel/setup
- Nov 3: Setup/Treatment
- Nov 4: Treatment
- Nov 5: Neutralization
- Nov 8: Sentinel Fish/Demobilize
- Nov 12-13: Post treatment monitoring

Survey Results

- July 6 2015-AGFD-LF Rare Nonnative Fish Survey
  - 43 GSF Captured
- August 12-14
  - First mechanical rem
    - 954 GSF captured
- August 27-28
  - Second mechanical r
    - 2,574 GSF captured



Compliance

- Risk Assessment (D. Ward)
- Treatment plan (AGFD, NPS)
- Notice of Intent/Pesticide Discharge Management Plan (AGFD)
- Tribal Coordination (NPS)
- Categorical Exclusion (NPS)
- ESA Consultation (NPS, USFWS, AGFD)
- Approval of environmental analysis (AGF Commission)
- Communication plan (NPS, AGFD)

Beneficial Use-Mechanical Removal

- Oct. 27-29
- Upper Slough
  - 736 GSF salvaged (Zuni)
- Lower Slough
  - 39 GSF (Zuni)
  - 40 Carp (moved to main channel)
  - 70 Rainbow Trout (moved to main channel)
  - 1 Flannelmouth Sucker (moved to main channel)

Treatment

- Low steady flow (9,000 cfs) during treatment and neutralization
- Bioassay
- Application of CFT Legumine
- Neutralization
- Post-Treatment Sentinel fish

Barrier – Turbidity Curtain

- 3, 50’ sections, 6’ depth
- Can be made to order
- Floats and weights included
- Reusable
- Portable (150 lbs/section)
- Impermeable (dye tests)
- $2500 including shipping
- 2-4 handlers


ALUMACRAFT

Treatment

- Based on bioassay results
  - Effective concentration 0.75 ppm
  - Treated lower slough at 1.5 ppm (2x minimum effective)
    - 9.3 L 5% CFT Legumine
  - Treated upper slough at 3.0 ppm
    - Increased organic load consumes rotenone
    - 1.7 L 5% CFT Legumine
- Duration
  - Planned 8 hour treatment
  - Increased duration to 24 hours

Treatment

Date	Species	Lower Slough	Upper Slough
5-Nov-15	Green Sunfish	180	1,787
	Common Carp	117	108
	Rainbow Trout	146	0
	Flannelmouth Sucker	3	0
	Bluegill	1	0
	Channel Catfish	1	0

Neutralization

- Applied potassium permanganate Nov. 5
  - 28 pounds in lower slough
  - 4 pounds in upper slough

Post-Neutralization

- Sentinel fish to determine if site can be opened to public
  - Water quality
  - Fish survive for 24 hours in treated water

- Sentinel fish survive 24 hours (Nov. 6)
- Collect water and sediment samples

Water and Sediment Samples

- Collected prior to, during, and after treatment
- Post-treatment samples must return to baseline levels
- Per label and SOP
  - <90 ppb-public reentry

Sample Date	Site	Rotenone Conc.
11/3/2015	Pretreatment Up	<2 (nd) ppb
11/3/2015	Pretreatment Down	<2 (0.8) ppb
11/4/2015	During 1	49.9 ppb
11/4/2015	During 2	52.3 ppb
11/4/2015	During 3	99.0 ppb
11/6/2015	Upper Slough	2.3 ppb
11/6/2015	Lower Slough	1.9 ppb
11/13/2015	Upper Slough	6.1 ppb
11/13/2015	Lower Slough	<2 (0.3) ppb
11/19/2015	Upper Slough	5.8 ppb

Post treatment monitoring

- Nov. 12
  - GCMRC staff backpack electrofish upper slough and place larval light traps
    - No fish captured during backpack electrofishing
- Nov. 13
  - GCMRC staff backpack electrofish and shoreline habitat in lower slough, check larval traps
    - No larval fish captured
    - No fish captured during backpack electrofishing

- **Second treatment deemed not necessary**

Beneficial Uses

- Purposeless killing within the Colorado River corridor is offensive to some tribes.
- Negatives can be offset by planning beneficial uses of the dead organisms.
- Prior to the treatment, as many non-GSF as possible were recovered and released or given to the Zuni aviary for feeding birds.
- During treatment, non-target organisms were saved to the extent possible.
- Rotenone-killed fish collected and frozen to benefit research efforts.
  - Rotenone-killed fish cannot be used for food or feed by EPA label. Fish could not be used for fertilizer either
- Macroinvertebrates were sampled before and after the treatment to better understand the non-target organism impacts.

Prevention

- Strongly suspect they came through Glen Canyon Dam
- As Lake Powell elevation declines, incidence of escapement likely to increase
- Smallmouth Bass of particular concern
- Annual treatment not desirable
- Strongly consider eliminating this habitat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