A Partnership to Control Giant Salvinia
Lower Colorado River
Arizona-California & Mexico

Bob Pitman
U.S. Fish and Wildlife Service
Aquatic Invasive Species Coordinator-Southwest Region

http://www.lcr-anstf.org/
Partnership Fundamentals

- Establish central coordination
- Build on partnership authorities
- Recruit & include partners
- Collaboratively develop & implement adaptive controls
- Develop a system for universal accountability
  - Solid & Transparent
- Consistently track/prepare progress reports
  - Archive records for future management
Central Coordination & Partnership Authorities are linked in this case history because elements of coordination are part of the authorities.

The collaborative team developed for giant salvinia control in the LCR used the federal response to the zebra mussel invasion in Great Lakes mid-1980s as a model.
Ballast Water Exchanges into the Great Lakes

Promoted a national response to invasive species

Ballast water pathway introduced multiple species from all around the world.

Zebra mussels arriving mid-1980s

Native to Caspian Sea
Zebra mussels rapidly spread throughout Great Lakes on boats & equipment

Partnership to control & prevent spread

www.100thMeridian.org
Prolific zebra mussels are not large.
Nonindigenous Aquatic Nuisance Prevention & Control Act of 1990

- This legislation provides authority to agencies for coordinated aquatic invasive species (AIS) control.
1990 Legislation established the ANS (Aquatic Nuisance Species) Task Force
Comprised of 13 Federal agencies

USFWS – NOAA – USACOE –
The ANS Task Force has 12 Ex-officio Members

- International Association F & W Agencies
- Great Lakes Commission
- Native American F & W Society
- Am Water Works & Am Public Power Associations
- Smithsonian Environmental Research Center, and others

www.ANSTaskForce.gov
Task Force meets regularly to **coordinate** government efforts to control aquatic invasive species in the United States with those of the private sector and other North American interests.

- Prevention
- Detection
- Monitoring
- Control
- Support elements
  - Research, education, technical assistance

www.100thMeridian.org
The Task Force (as legislatively authorized) established interlocking regional panels to coordinate and prioritize national/international issues & controls.
Review of pre-salvinia partnership building blocks

- All of the essential elements for a partnership invasive species control were in-place based on the 1990 legislation.
- Structure, authority, models, guidance, funding links
- Plus – practical, large scale partnership experience had been gained since early 90s
Due to ANS Task Force experience, all the basic components were in-place when giant salvinia was discovered in the Colorado River, Aug 1999.

*Salvinia molesta* is a floating fresh water fern native to Brazil. Introduced to North America from the aquarium trade. First detected in U.S. waters in 1998 near Houston, TX.
EXPLOSIVE growth characteristics were well known.

- Floating mats can double every 5 days
- Thick mats block sunlight
- Prevent water usage
- Ruin property values
- Easily spread by boats

Easy to see why it is an aquatic invasive species.

Unfortunate TX-LA lake
Property owners wanted some answers

Harris Pond, TX

Mr. Harris
Predicting US Range of Giant Salvinia

- Water-hyacinth
- Giant Salvinia
- USDA hardiness zones 8, 9 & 10
Source - Palo Verde Irrigation District (PVID) - west side drain

Discovered in the Colorado River, Aug 1999
Recruit & Include Partners

- Giant salvinia’s reputation was well known
- It had been federally listed as a prohibited species since the 70s
- It was prohibited in CA and listed in AZ soon after it was reported
- Key partners came together quickly to control giant salvinia and prevent spread
- Palo Verde Irrigation District (PVID)
- Bureau of Reclamation
- Fish & Wildlife Service
  - Cibola & Imperial Natl Wildlife Refuges
- USDA - APHIS
- Bureau of Land Management
- CA Dept of Food & Ag
- California Dept of Fish & Game
- AZ Game & Fish
- AZ Dept of Ag
- California Regional Water Quality Control Board
- University of Arizona
- International Boundary & Water Commission
- Mexico – International Boundary Water Commission

http://www.lcr-anstf.org/
First Actions

- Assessment by a scientific advisory panel
- Establish central coordination
- Identify work teams & assign responsibilities
- Draft an action plan
- Submit compliance permits for controls
- Hold public meetings – Outreach
  - Engage media & provide press releases
- Invite Mexico to participate on control team
Web-based Central Coordination

Coordination provided by FWS with support from the University of Arizona

http://www.lcr-anstf.org/
Initial pathway assessments were conducted. Giant salvinia was found in an upper part of the Palo Verde Irrigation District (PVID) drain adjacent to a well traveled highway north of Blythe. How did it get there?
Possible aquatic-product pathways
- bait dealer & aqua-farm nearby
- or an aquarium dumping
Raise Awareness

Developed a standard message describing:

• The problem
• Where the problem is located
• What’s being done about it
• Who’s doing it
• Where to find information
• How they can help
Develop & Implement Adaptive Controls

✓ Regular team meetings (4, 3, 2/year) to assess effectiveness, propose changes & integrate control work.

Weed harvester provided from CA Food & Ag to BoR to mechanically remove floating plants to reduce spread from irrigation system into Colorado River. Sounded good but did not work.
PVID drain sections were identified for strategic and systematic eradication from source down to where the irrigation system waters return to the Colorado River.

About 35 miles of west-side drain
Adaptations for herbicide control.

Early spray efforts were unsuccessful due to bank vegetation.

BoR & PVID worked together to clean banks for wall-to-wall spraying.

GOAL: Eradicate in Reach 1,2,3,4
Spraying – herbicide control moved down the drain after successful eradication in the upper sections.

Palo Verde Irrigation District outfall drain near the beginning of Control Reach 2.
Infamous “browns drain” opposite previous picture of spray crew.

Eradicated several times … kept coming back.
Consistent Progress Tracking

Regular river surveys recorded giant salvinia levels in approximately 35 miles of irrigation system and 70 miles Colorado River. Mexico reported survey data from their extensive irrigation/water delivery system of 50+ miles. These critical reports progressively tracked control progress.
Developing & Implementing Effective Bio-control Program

Characteristic “egg beater” hairs covering giant salvinia complicate herbicide control.

Giant salvinia bio-control agent, *Cyrtobagous salviniae*, from S. America not impressed with egg beaters, provides effective control for the world’s worst weed.
Agency Collaboration

- The partnership team concept was important in integrating a bio-control program by USDA-APHIS-PPQ, with herbicide control and efforts to eradicate giant salvinia in upper sections of the PVID.
Biological Control of Giant Salvinia

Earl Andress, Dewey Murray, Glen Ball
Types of Biological Control

• Classical
  – Intentional introduction of exotic BC agents for permanent establishment and long-term exotic pest control.

• Conservation/Enhancement
  – BC agents not released; environment modified to enhance populations of existing natural enemies.

• Augmentative
  – Release of BC agents without the goal of permanent establishment.
  – Natural enemies such as fungi, bacteria and nematodes, bred up and applied in higher than natural doses. (Mass Rearing)
Annual Totals of *Cyrtobagous salvinia* Released on the Lower Colorado River
River mile 33 August of 2004.

August 2007

River mile 33 in summer of 2005.

Salvinia population infested with *Cyrtobagous salvinia*. Notice the brown coloration from decaying plant biomass.
Contact Information:

USDA, APHIS, PPQ
Dewey Murray – Domestic Program Coordinator (Arizona)
3658 East Chipman Road
Phoenix, Arizona 85040

602-431-8930 ext. 207
Cell # 602-692-5515
USDA-APHIS-PPQ monitoring data of release sites and weevil populations which now actively join herbicide controlled sections in the PVID drain.
Collecting accountability information and cost estimates from agencies, organizations & stakeholders is difficult.

Simple spreadsheet to accumulate costs was almost never completed. Recommend developing a good strategy to do this at the beginning of a partnership control.
Records of compliance and the monitoring data to show compliance throughout the control are valuable for all members of the partnership.

Collective report archiving by a non-governmental agency is a plus. Future managers may need to know what was done, where and how well the control worked.
CA Water Quality Permit (NPDES); Permit expires August 2009, will need to re-apply.

Monitoring
5 total treatment areas:
PVI D 1-4 and Walters Camp (PVI D5)

Pre-event, Event, Post-event; (3) samples each at minimum of two points (middle and bankline)

Water Quality Standards: Copper (25-50 ug/l), Hardness, Glyphosate (700 ug/l), Diquat (20 ug/l)
No violations since 2004.
Control records are archived at the University of Arizona, Tucson, by Dr. Kevin Fitzsimmons & students. Kevin and students have provided advice, field assistance, and maintained a central coordination website since the team developed in 1999.
Bait bucket covered with zebra mussels.