

# Upper Muddy River Integrated Science Plan

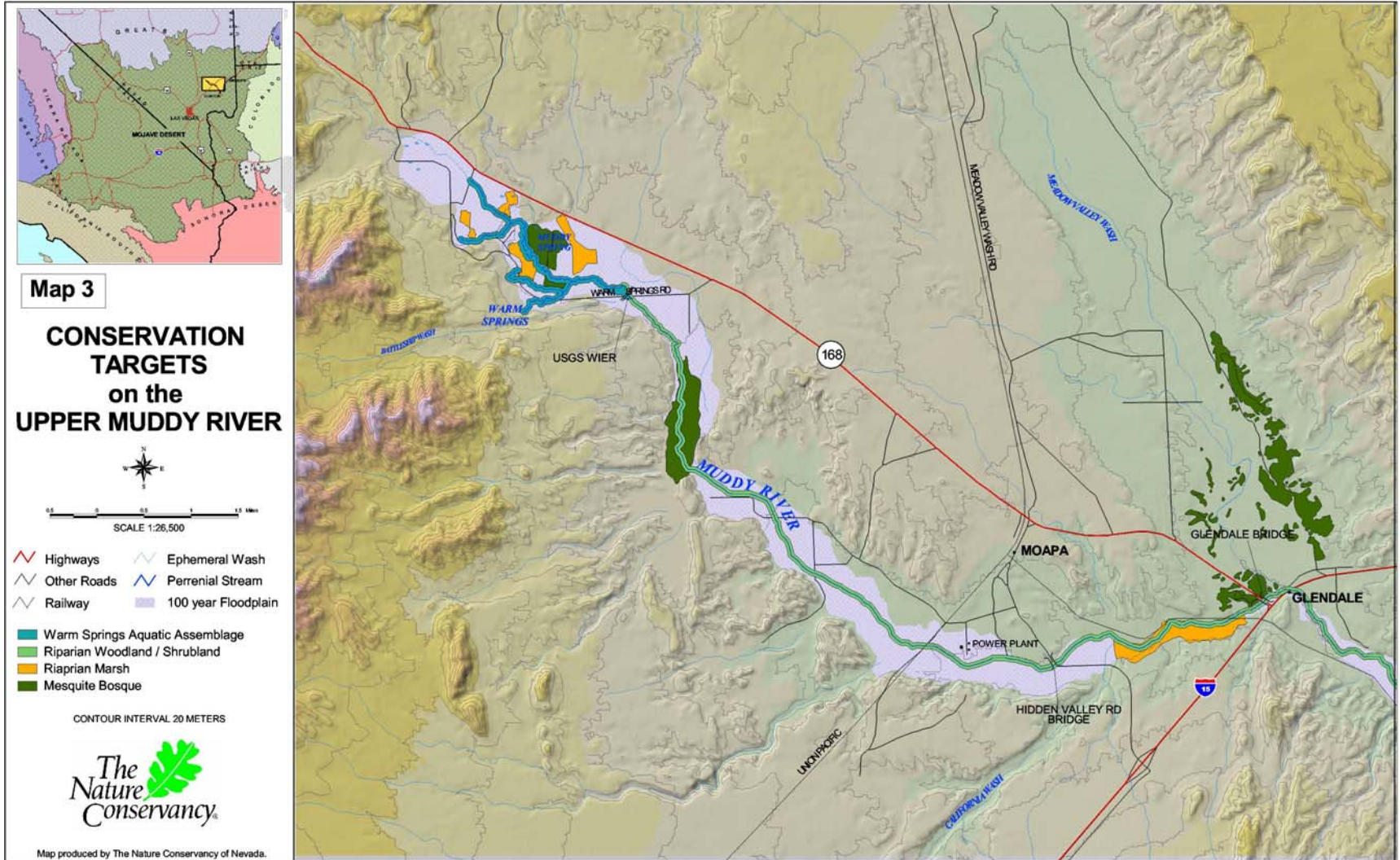


Louis Provencher



SAVING THE LAST GREAT PLACES ON EARTH

# Upper Muddy River Floodplain



# Geomorphic Assessment Goals

1. Review of the existing hydrologic, geologic, geomorphic, and groundwater data;
2. Characterize of river reaches along the main stem for channel geometry, slope, particle size distribution of streambed, sinuosity, and overbank flow; and
3. Provide recommendations for habitat and riverine restoration.

# Integrated Science Plan Goals

1. Integrate existing scientific data and initial direction from the CCMSHCP adaptive management process as it relates to key conservation targets;
2. Develop restoration goals for species and communities; and
3. Recommend long-term management practices for the Moapa Valley National Wildlife Refuge and other agency parcels on the upper Muddy River.

# Desert Riparian Ecological Communities

Groups that simplify analysis

1. Warm spring/stream aquatic species
2. Muddy River aquatic species
3. Riparian woodlands
4. Riparian shrublands
5. Riparian marshes and seeps
6. Mesquite Bosque

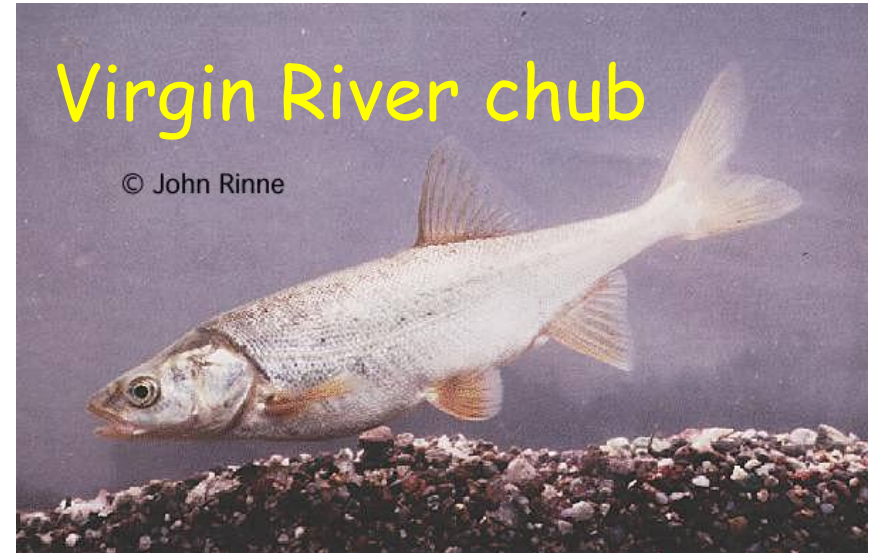
# Warm Spring/Stream Aquatic Species

## Moapa dace



*Photo: P. Rissler*

# Muddy River Aquatic Species



# Riparian Woodlands

Velvet Ash





# Riparian Shrublands



# Riparian Marshes and Seeps



# Mesquite Bosque



10.28.2003

# Stresses to Ecological Systems

## Water withdrawal

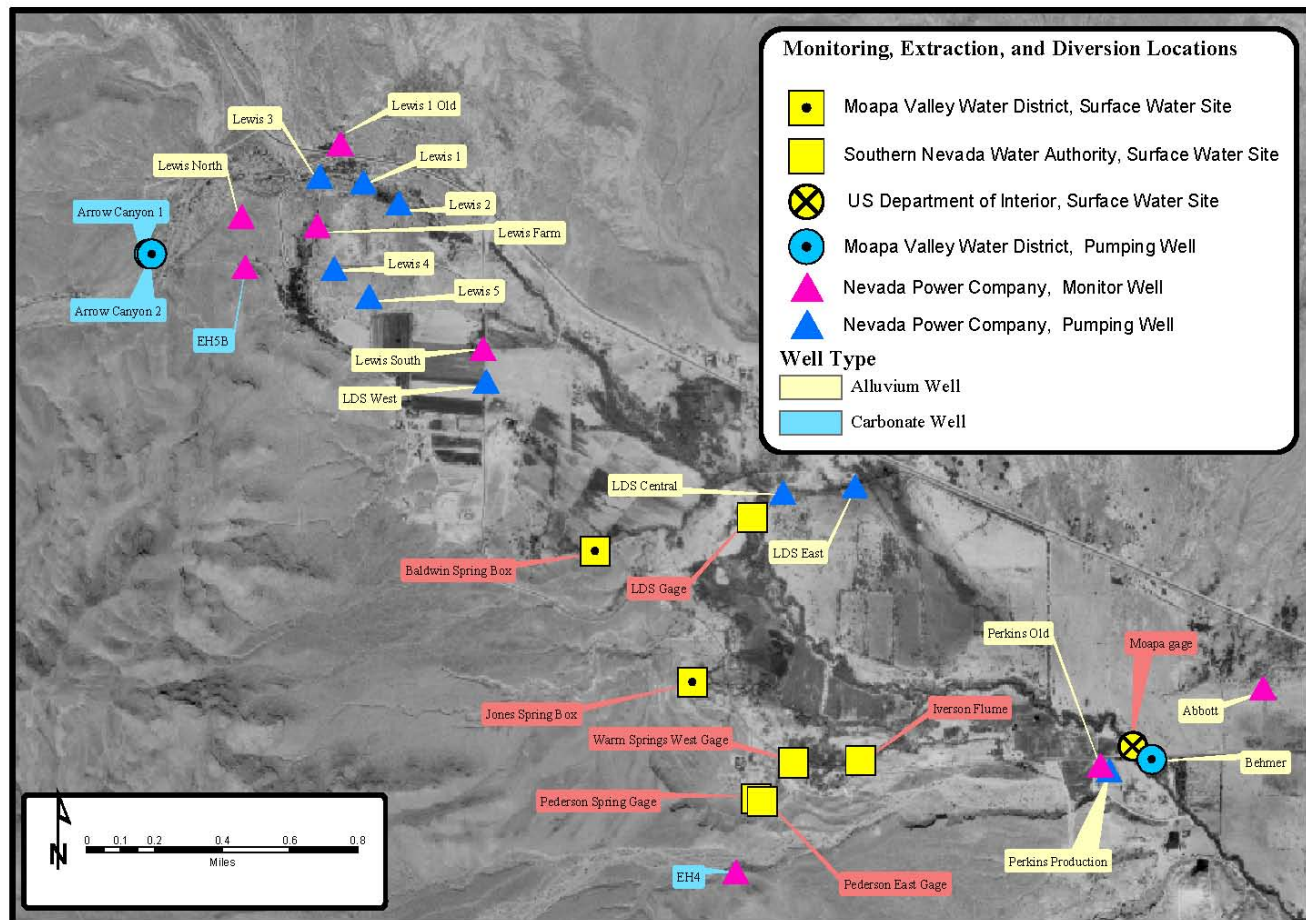


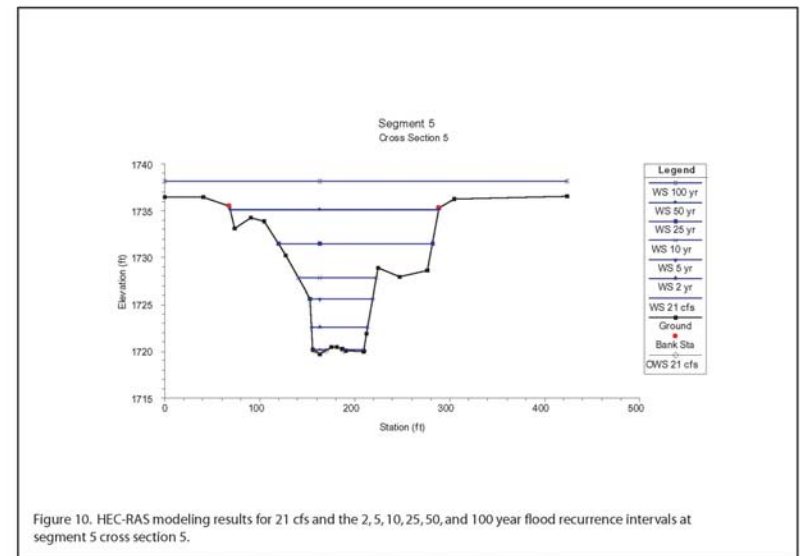
Figure 1. Groundwater and surface water monitoring, extraction, and diversion locations.

# Stresses to Ecological Systems

## River entrenchment



Loss of overbank flow during flood events



# Stresses to Ecological Systems

## Invasion by non-native plant species



# Stresses to Ecological Systems

## Invasion by non-native animal species

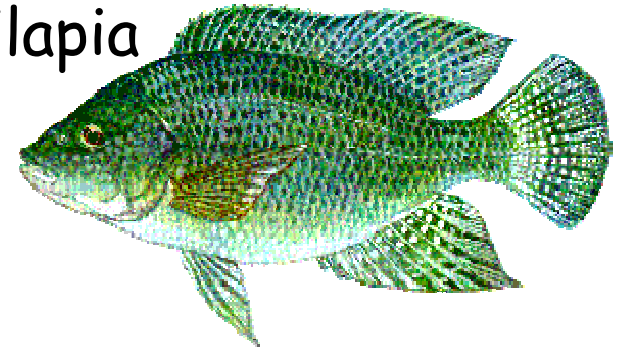
Red swamp crayfish



♂. *Procambarus clarkii*  
[male]

Photo: D. M. Holdich

Blue tilapia



Bullfrog



Photo: Jim Harding

# Stresses to Ecological Systems

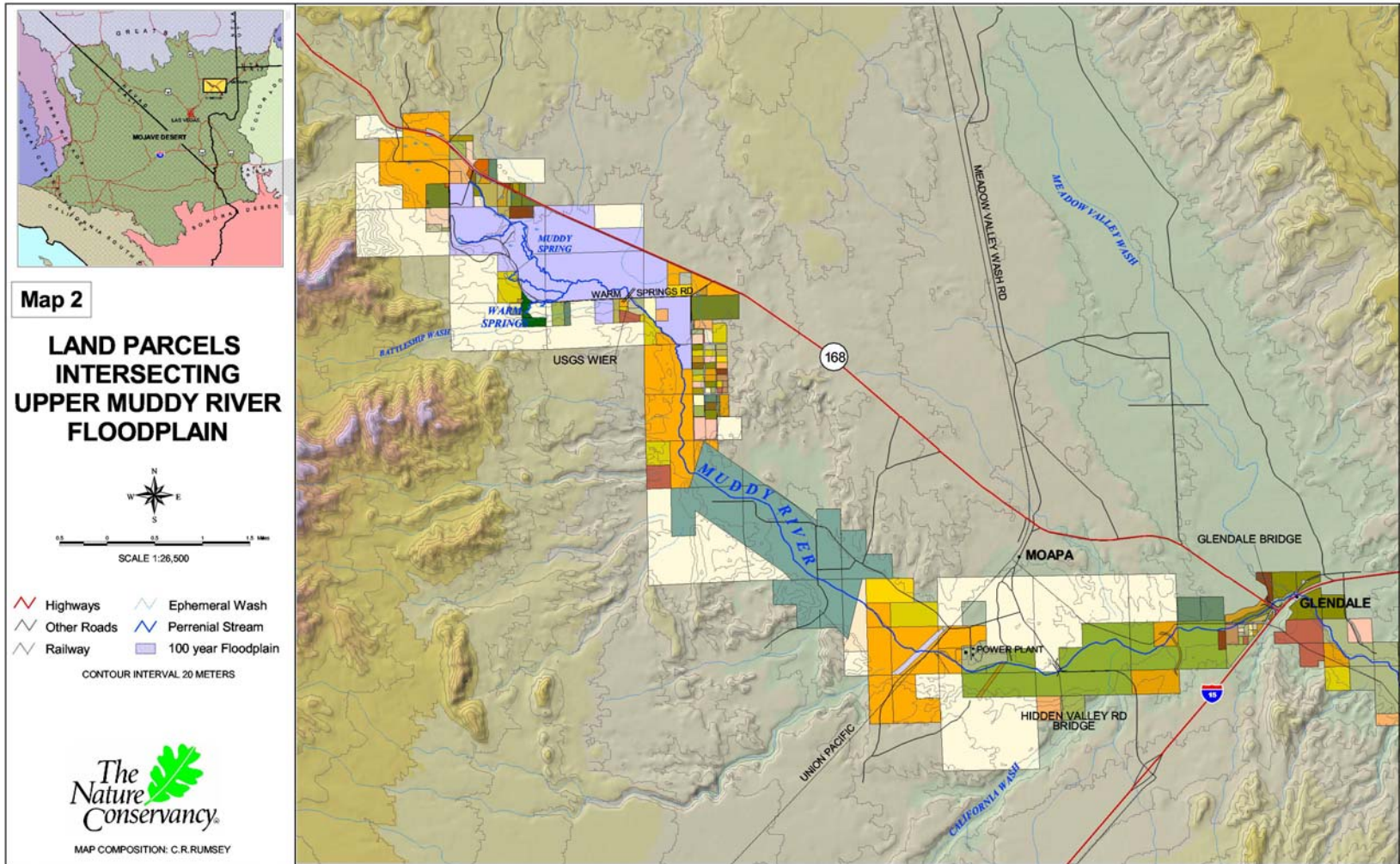
## Unnatural fire





# Stresses to Ecological Systems

## Land conversion & development



# Stresses to Ecological Systems

## Sediment trapping



# Restoration Options

Low: minimum actions to recover the Moapa dace and the cheapest other actions

Intermediate: all previous actions, complete channel reconstruction on BLM/Perkins property, and actions requiring conservation easements, but no major land acquisitions

High: all restoration actions in addition to major land acquisitions and additional channel reconstruction

# Restoration Option: Low

## Prerequisite actions:

1. Agreements with private owners
2. Complete NEPA & other state/federal documentation for public lands & waterways
3. Partnership with Moapa River Indian Reservation



1. Construct fish barriers & remove tilapia
2. Progressive removal of saltcedar, Russian knapweed, and other non-natives plants
3. Revegetation with native plants
4. Targeted removal of fan palms in critical Moapa dace habitat (warm springs & outflow creeks)

# Restoration Option: Intermediate

1. Define in-stream flow and buy senior water rights for beneficial wildlife use from willing sellers
2. All previous actions
3. On BLM/Perkins (with appropriate permits):
  - Add coarse substrate to improve fish spawning
  - Remove flood/sediment control barriers
  - Restoration/construction of wetlands
  - Complete channel reconstruction or small scale channel reconstruction (cheaper) or excavation of inset floodplain (most expensive)
4. Development of public use areas at MVNWR

# Restoration Option: Intermediate

(continued)

**New prerequisite actions:** Conservation easements from willing sellers

1. Add coarse substrate to improve fish spawning
2. Preservation of existing communities
3. Restoration/construction of wetlands
4. Reconnecting and reconstructing warm springs complex in historic Moapa dace habitat (tilapia removal required)
5. Small scale channel reconstruction
6. Excavation of inset floodplain

# Restoration Option: High

1. All previous actions with or without #2
2. **New prerequisite actions:** Property acquisitions from willing sellers



Complete channel/floodplain reconstruction in one more river reach

# Future Steps

- The fate of the upper Muddy River will depend on the vision and participation of local stakeholders
- Local restoration actions are already in progress
- Stakeholders will benefit from river restoration
- Decisions should be made soon because Moapa is changing and its water is highly coveted
- Funding is available to implement some restoration actions