

## **Potential Site Locations**

Visited 6 sites, two sites mentioned have not had site visits (Figure 1).

**See potentially multiple strategies that would benefit the Pecos bluntnose shiner population.**

- 1. Multiple small projects - provide refuge habitat for fish displaced from core population areas.**
  - a. Pros – May be most beneficial biologically allowing displaced fish areas to move upward.**
  - b. Cons –**
    - i. May use all project dollars for logistics instead of on ground work.**
    - ii. Refuge habitat may already exist on private land. Many diverse areas evident on aerial photos.**
    - iii. Small projects difficult to maintain.**
- 2. Large project – one location**
  - a. Pros –**
    - i. May have large local impact on fish population. Could potentially create a second area where fish self maintain.**
    - ii. Helps prevent fish from being lost into Brantley Reservoir.**
    - iii. Easiest logistically, most economical.**
  - b. Cons**
    - i. Unknown how large an area is needed to contain a self sustaining population.**
    - ii. Unknown how a small population downstream would add to viability of species.**
- 3. Combination**

**Currently locations with best potential appear to be BLM, Grassey, Langenegger, and Karr Farms. Unknown how private landowners may view projects.**

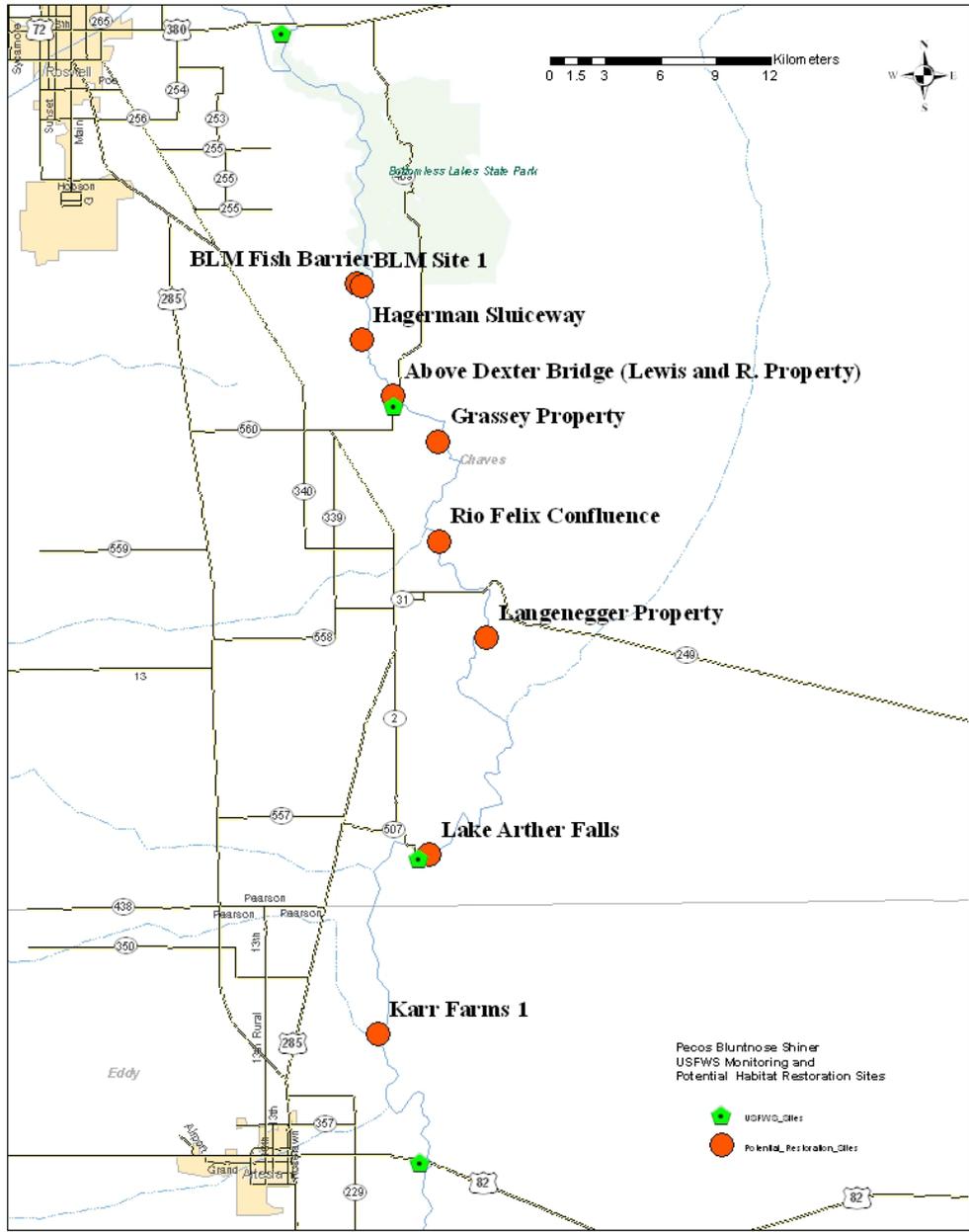


Figure 1. General location of potential sites for habitat restoration projects for Pecos bluntnose shiner.

**BLM Property South of Bottomless Lakes State Park**

*Description of site – proposed action.*

BLM property south/downstream of Bottomless Lakes State Park (Figure 2). There is currently a weir on the north-east shore of the river that prevents the river from overbanking and moving dynamically in the area (Figure 3).

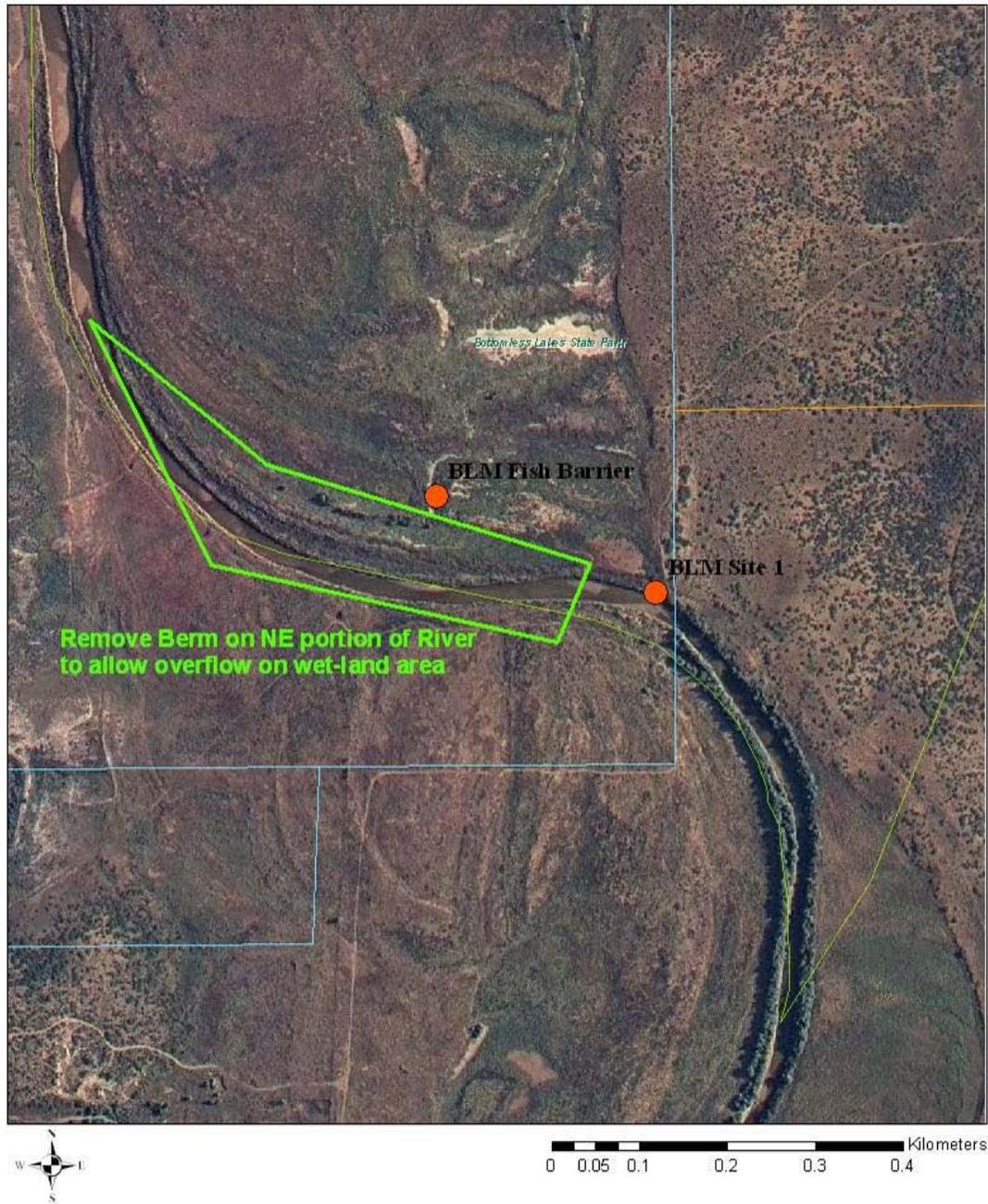


Figure 2. Aerial view of BLM proposed site and action.

Pros-

- This activity would be on federally owned property (BLM) which may make logistics easier.
- The river is not highly entrenched in the area so restoration activities would not have to move as much material as more entrenched sites.

Cons –

- Channel is currently fairly functional in the area; there is some diversity of habitat.

- Nearby, there is a fish barrier on an outflow from one of the Bottomless Lakes to protect Pecos pupfish habitat from possible introduction of sheepshead minnow. Movement of the river into the floodplain may compromise this barrier.



Figure 3. Views of BLM property. Upper Left – View of berm. Upper Right – Top of Berm. Middle Left – Upstream view from gage site. Middle Right – Downstream view from gage site. Lower Left – Fish Barrier on outflow area.

## Hagerman Sluiceway Confluence with Pecos River

*Description of site – proposed action.*

Private land – unknown owner (Figure 4). No site visit. Potential area for backwater construction.



Figure 4. Aerial view of confluence of Hagerman Sluiceway.

## Dexter Bridge Site

*Description of site – proposed action.*

Site is mixed private (at least two landowners) and BLM leased property less than half mile upstream of the Dexter Bridge (Figure 5). Very diverse area with dynamic river movement (Figure 6). There are at least two detached oxbows in the area. Area is just upstream of the USFWS monitoring site. Agricultural fields west of river in production.

Pros –

- Site is currently very dynamic, small management tweaks may have large effects.

Cons –

- Site is currently very dynamic
  - conditions already benefit Pecos bluntnose shiner habitat

- dynamic nature of site may have unforeseen outcomes of management to nearby fields.
- Dexter Bridge just downstream – management actions may compromise bridge.

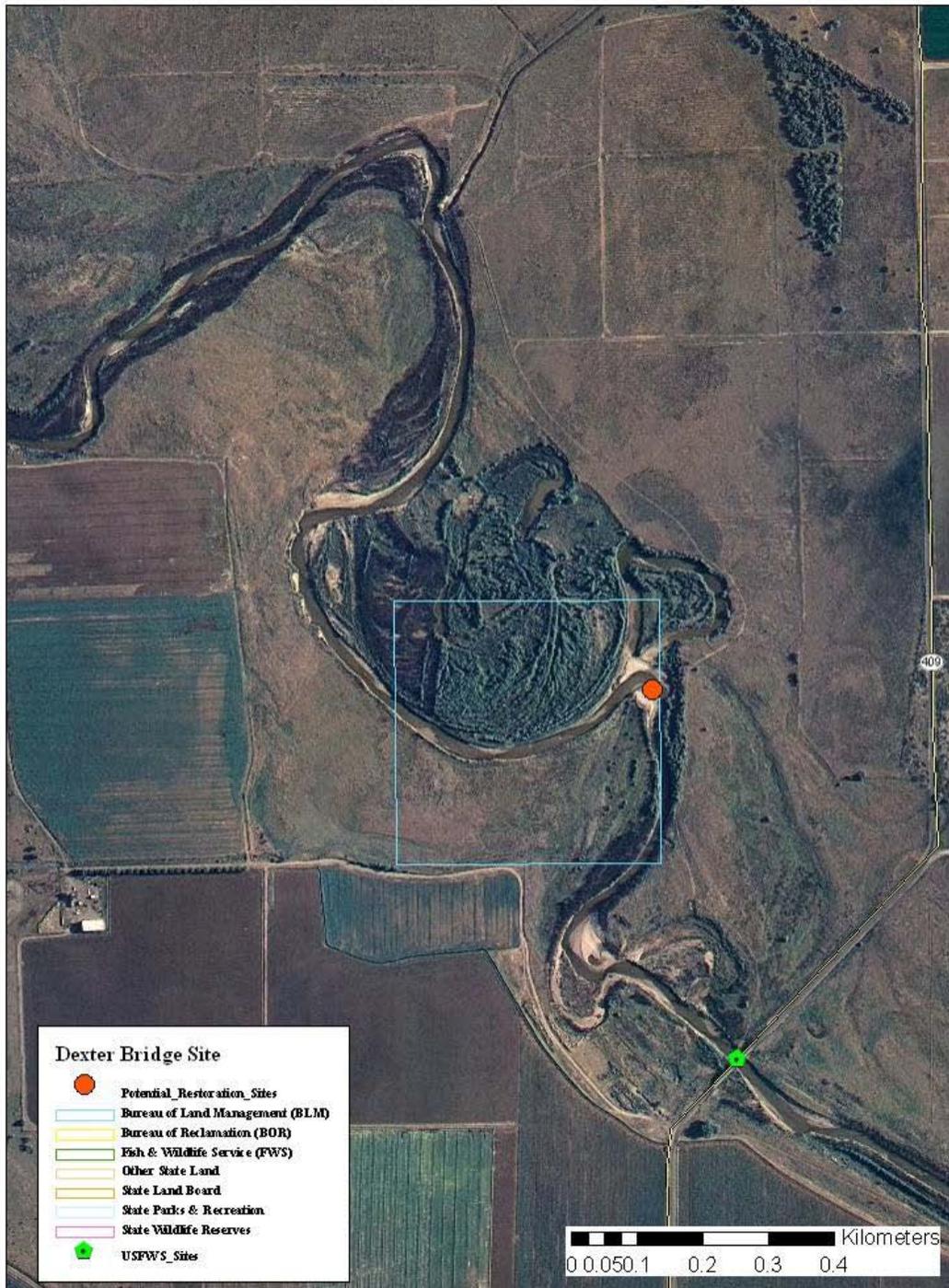


Figure 5. Aerial view of Dexter Bridge site.



Figure 6. Views within Dexter Bridge site. Upper right just below old oxbow.

### **Grassey Property**

#### *Description of site – proposed action.*

Private land parcel south of Dexter (Figure 7). Unknown boundaries of private land owned by Grassey. Very diverse area with dynamic river movement agricultural fields south west of site not in production. Control of nonnative vegetation within the area may help maintain the dynamic nature of this section.

#### Pros –

- Site is currently very dynamic, small management tweaks may have large effects.
- Native vegetation also well established in the area. Nonnative vegetation control may be long lasting.

#### Cons –

- Site is currently very dynamic
  - conditions already benefit Pecos bluntnose shiner habitat (Figure 8).

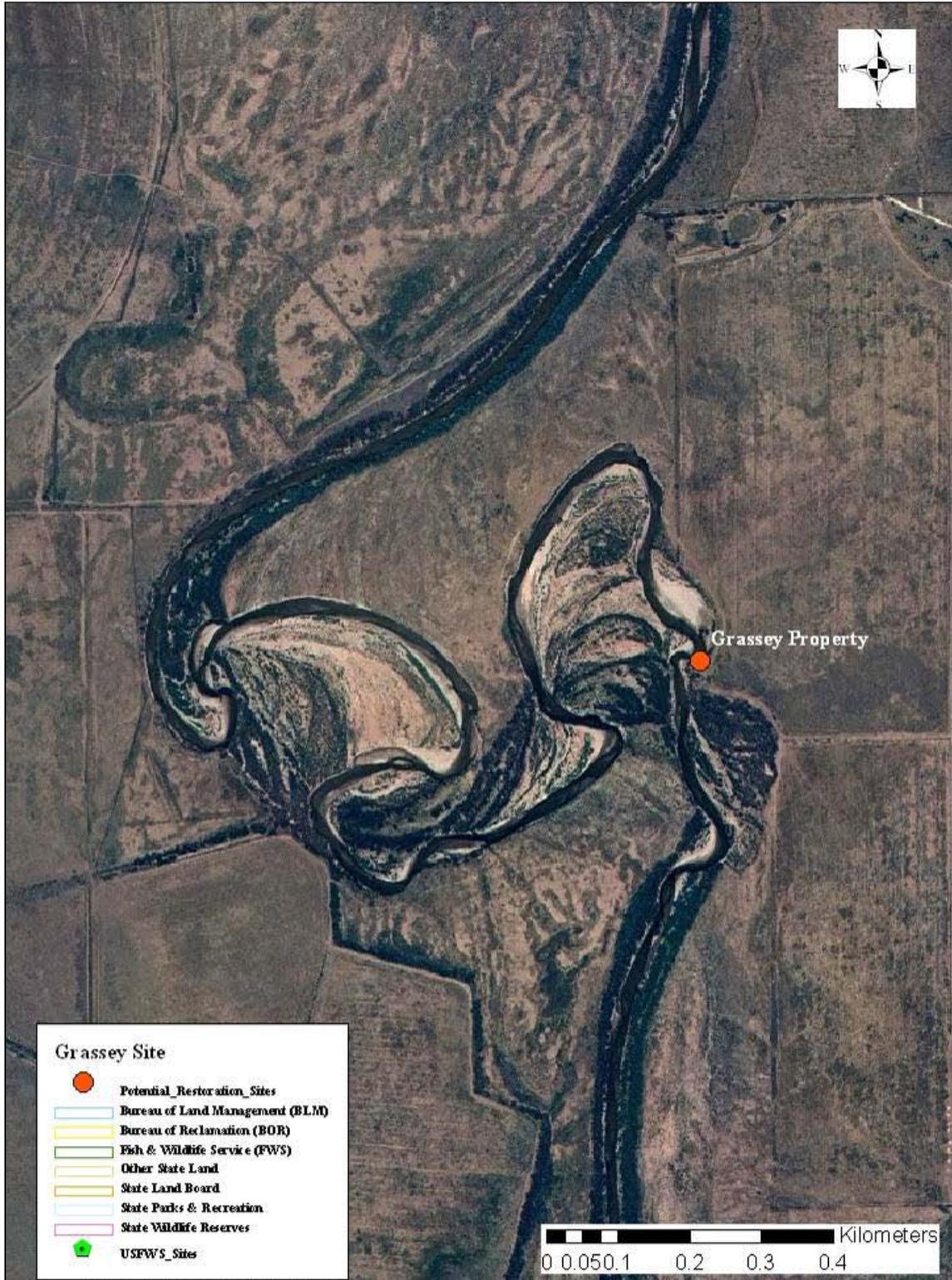


Figure 7. Aerial view of Grassey site.

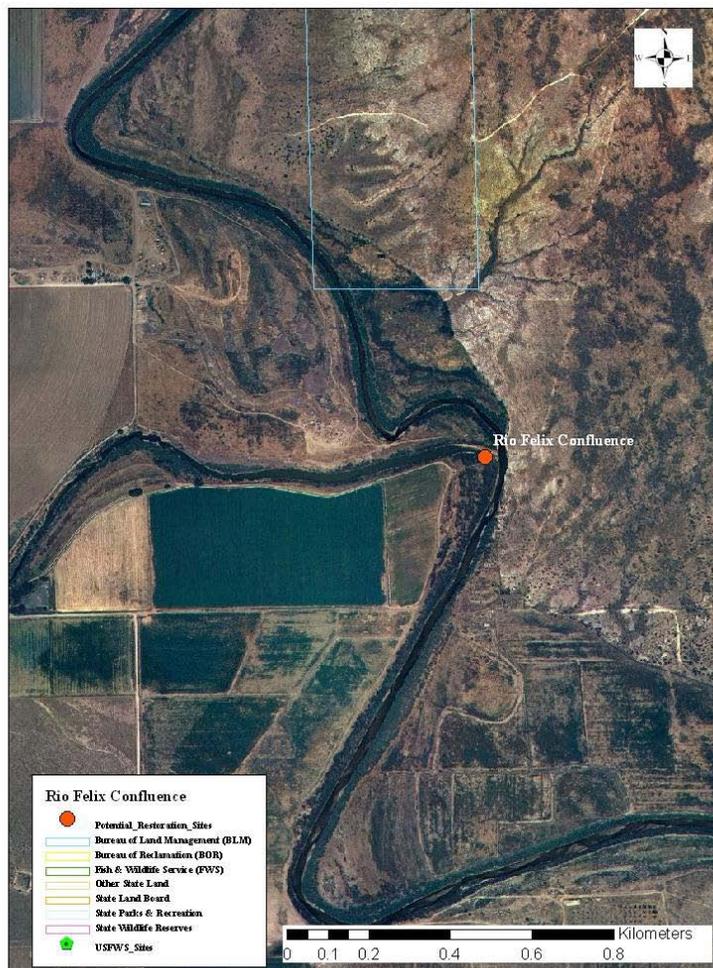


Figure 8. Grasse property site.

### Rio Felix Confluence

*Description of site – proposed action.*

Private land – unknown owner (Figure 9). No site visit. Potential area for backwater construction. Perennial water in Rio Felix for approximately one mile above confluence with Pecos



River.

Figure 9. Aerial view of Rio Felix confluence.

## Langenegger Property

### *Description of site – proposed action.*

Private land parcel (Figure 10). Unknown boundaries of private land owned by Langenegger. Very diverse area with dynamic river movement, some confinement from cap rock on east side of river. Agricultural fields west of site not in production, river-pumper site on east-upstream side in production. Vegetation control in area and reconnection of oxbows may maintain habitat diversity in the area (Figure 11).

Pros –

- Site is currently very dynamic, small management tweaks may have large effects.

Cons –

- Site is currently very dynamic unknown how long project would maintain.



Figure 10. Aerial view of Langenegger property.



Figure 11. Langenegger upstream view (left) and downstream view (right).

### **Lake Arthur Falls**

#### *Description of site – proposed action.*

Private land parcel (Figure 13). Unknown landowner. Very diverse area with dynamic river movement. Small ledge on north side of river is where “falls” were historically. River has moved southward, rock ledge now acts like weir creating a backwater area below (Figure 12). Proposal to move river back over falls.

Pros –

- Restore historic condition of river.
- May help maintain backwater area

Cons –

- Backwater currently functioning
- May present a fish passage issue for Pecos bluntnose shiner.



Figure 12. Current view of Lake Arthur falls.



Figure 13. Aerial view of Lake Arthur Falls area.

## **Karr Farm**

### *Description of site – proposed action.*

Karr Farm is owned by U.S. Bureau of Reclamation and managed by New Mexico Department of Game and Fish. There is a total of 7.35 river kilometers (4.35 miles) available within Reclamation and Game and Fish property (W.S. Huey). The area is currently deeply entrenched and nonnative *Tamarisk* dominates both shorelines (Figure 14). There are multiple restoration opportunities within the Karr Farm area (Figure 15).

1. Vegetation could be removed from the inside bank of the left turn in the upper area to allow for overbank flooding and channel widening in the area.
2. Vegetation could be removed and eastern levee moved to allow for meander within straight area.
3. Reconnect historic oxbow to perennial flow or high flow.
4. Strategic vegetation removal in the lower areas to allow for overbank flooding and channel widening in the area.



Figure 14. Downstream (left) and upstream (right) views of upper Karr Farm site.

### Pros –

- Property is owned by Reclamation so access logistics are simple. Also some water rights associated with property.
- Area is in poor condition, any management action likely to have positive effects.
- Adult Pecos bluntnose shiner have been found in the area for the past two years.
- Staff is on site for maintenance activities.

### Cons-

- Unknown how restoration in the area may benefit Pecos bluntnose shiner population as a whole. Site is downstream from areas that have historically had intact self maintaining populations. Area is traditionally considered a population sink for young-of-year being dispersed from upstream populations.
- Area is deeply entrenched, may make restoration activities difficult and expensive.

