

APPENDIX D

Analysis of Active Floodplain Migration

APPENDIX D: HISTORIC ACTIVE FLOODPLAIN ANALYSIS

BACKGROUND

Some objectors commented that ADWR did not properly map the full extent of floodplain Holocene alluvium (FHA) since it relied on surficial geology, which is not stable, and did not address potentially overlapping tributary Holocene alluvium (fan deposits). In response to these comments, ADWR analyzed how the location of the active floodplain has changed over time for the San Pedro and Babocomari Rivers and Aravaipa Creek. The purpose of this analysis was to look for evidence where the active floodplain of these major streams is now covered by fan deposits.

For this analysis, the active floodplain was considered the relatively flat surface adjacent to the active channel that is periodically inundated by overbank flows and largely consists of unconsolidated stream sediments. Secondary, high flow and flood flow channels may occur within the active floodplain but only convey flow during large flow events. The boundary of the active floodplain thereby delineates the extent to which FHA is periodically transported downstream and is distinguishable from adjacent fan deposits.

DATA

Table D-1 lists the aerial imagery that ADWR used to delineate historic active floodplains in the watershed including their flight years, scale and data sources. The following years of imagery were selected for analysis based on availability, scale, watershed coverage and relation to regional flood events:

- 1935
- 1954-56
- 1984-85
- 1992/1996
- 2007.

Figure D-1 compares these years to annual peak flows measured at U.S. Geological Survey (USGS) stream gages in the watershed. The figure shows that the aerial imagery selected by ADWR should document the effects from major recent flood events. The largest measured flood on the San Pedro River occurred in 1926 and its geomorphic effect on the active floodplain is captured by the 1935 imagery. Effects from relatively large flows during 1940, 1951 and 1954 are reflected in the 1954-56 imagery, and the 1984-86 imagery documents prior flooding on the San Pedro River during 1978-79 and 1984 as well as the 1984 flood of record for Aravaipa Creek. The 1992/1996 imagery also shows the effect of flood events captured in the 1984-86 imagery and was available as digital orthophoto quadrangles (DOQs). Finally, the 2007 imagery represents the most recent, high resolution aerial photography currently available for the entire watershed.

METHODS

Active floodplains were delineated using the aerial imagery described above and the Geographic Information System (GIS) software ARCMAP 9.3. Hard copy photographs from 1935 and 1954-56 were digitally imaged and then georeferenced to ensure their locational accuracy. Hard copy photographs from 1984-85 were compared to the 1992/1996 DOQs, which had already been georeferenced to an accuracy of less than 1 meter, and any active floodplain features observed on the former were aggregated with the latter. The 2007 imagery was available as seamless digital orthophotographs that could be directly input to ARCMAP.

The extent of the active floodplains was identified based on differences in the tone, texture, shape and pattern of the imagery. Active floodplain surfaces were distinguished as either unvegetated or sparsely vegetated areas along the streams that appear in the imagery with light to medium tones. Small channels and swales as well as flood debris produce rippled textures with linear or lenticular patterns in the direction of flow. Sparse vegetation on the active floodplain produces patches with mottled or granular texture which are dissected by unvegetated features also oriented parallel to flow. (van Zuidam, 1986 and Way, 1973)

Geomorphic surfaces outside of the active floodplain include inactive floodplains and terraces, upland areas and exposed bedrock. Bedrock surfaces generally appear in medium or gray tones with variable texture and lack the linear or lenticular patterns seen in the active floodplain. Inactive floodplain, terrace and upland surfaces also lack these patterns but often exhibit uniformly speckled or granular texture indicative of vegetation. (Pandy, 1987 and Ray, 1984)

RESULTS

Attachment 1 shows how the active floodplain of the San Pedro and Babocomari Rivers and Aravaipa Creek has varied in location since the 1930s. Along some reaches, the active floodplain has been relatively stable and its location varied little over the period. Along other reaches, the active floodplain has been more dynamic and its location migrated across the floodplain and/or changed appreciably in width. For comparison, the boundaries of the active floodplain in 1935, 1950s, 1980s/1990s and 2007 are plotted using different colors along with a composite boundary that delineates the full extent of the floodplain during this time.

Attachment 2 presents a series of quadrangle maps that cover the stream reaches that ADWR determined had perennial or intermittent flows during predevelopment. Each map plots the composite active floodplain boundary delineated by ADWR on top of the generalized surficial geology that ADWR presented in its Subflow Zone Delineation Report. Review of these maps shows certain areas where the historic (1930s to 2007) active floodplain, depicted using a hatched pattern, is currently covered by fan deposits which are depicted in yellow. In these areas of overlap, it is likely that FHA occurs beneath the fan deposits.

USE IN DELINEATION OF EXTENT OF FLOODPLAIN HOLOCENE ALLUVIUM

The historic active floodplain mapping described above could be used to better delineate the full extent of FHA along major streams in the watershed. In areas where the composite active floodplain is now covered by fan deposits, the extent of FHA could be extended to include the areas of overlap.

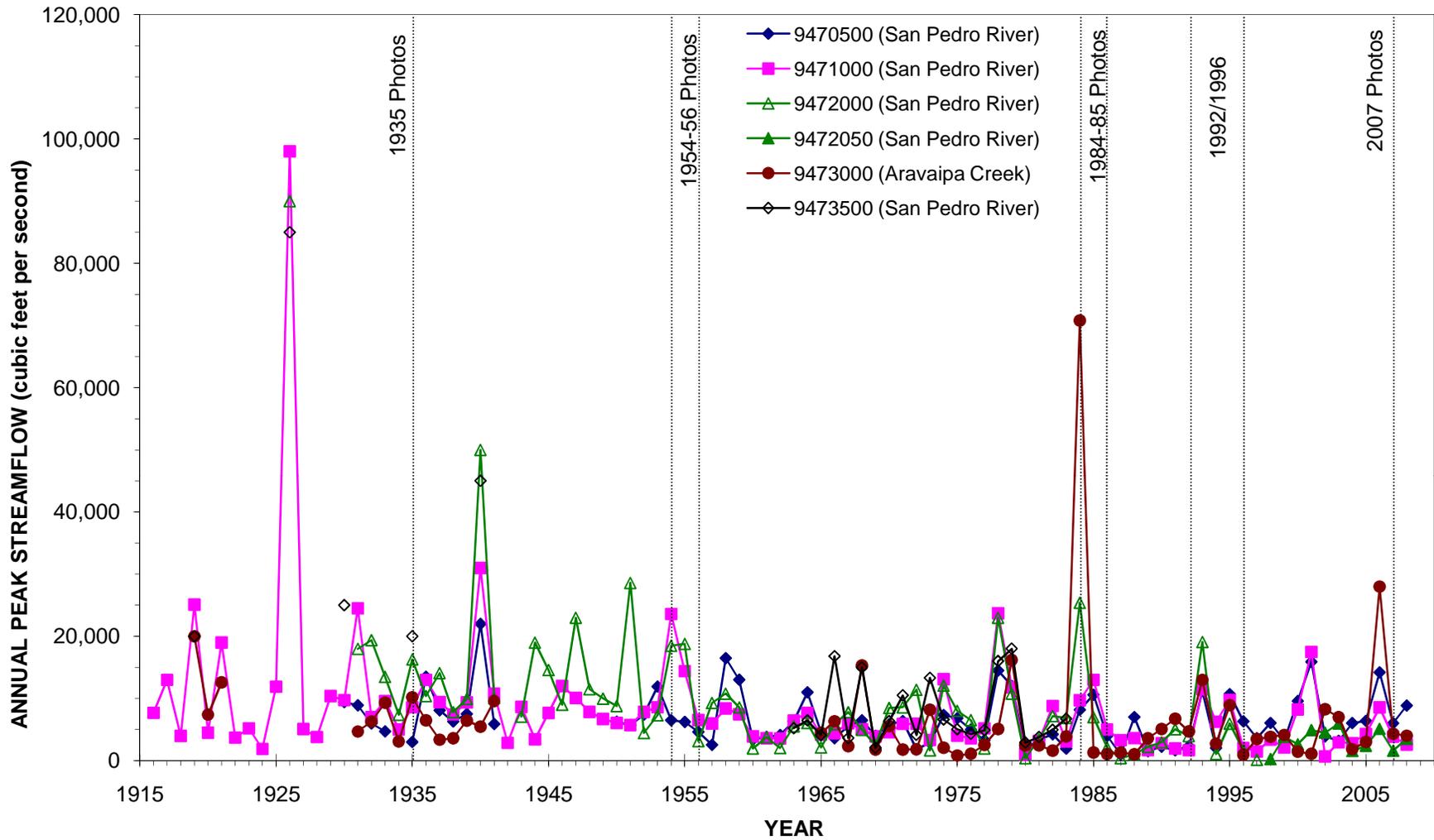
TABLE

TABLE D-1. AERIAL PHOTOGRAPHY USED FOR HISTORIC ACTIVE FLOODPLAIN ANALYSIS IN THE SAN PEDRO RIVER WATERSHED

FLIGHT YEAR(S)	SCALE	SOURCE
1935	1:24,000	Soil Conservation Service (SCS)
1954-56	1:20,000-23,600	SCS / U.S. Geological Survey (USGS)
1984-86	1:24,000	Arizona Department of Water Resources
1992,1996	1:24,000	USGS
2007	1-m resolution	USGS

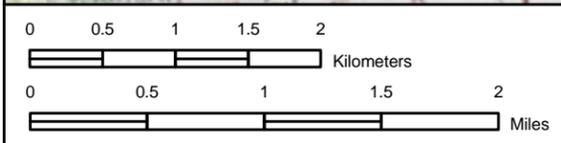
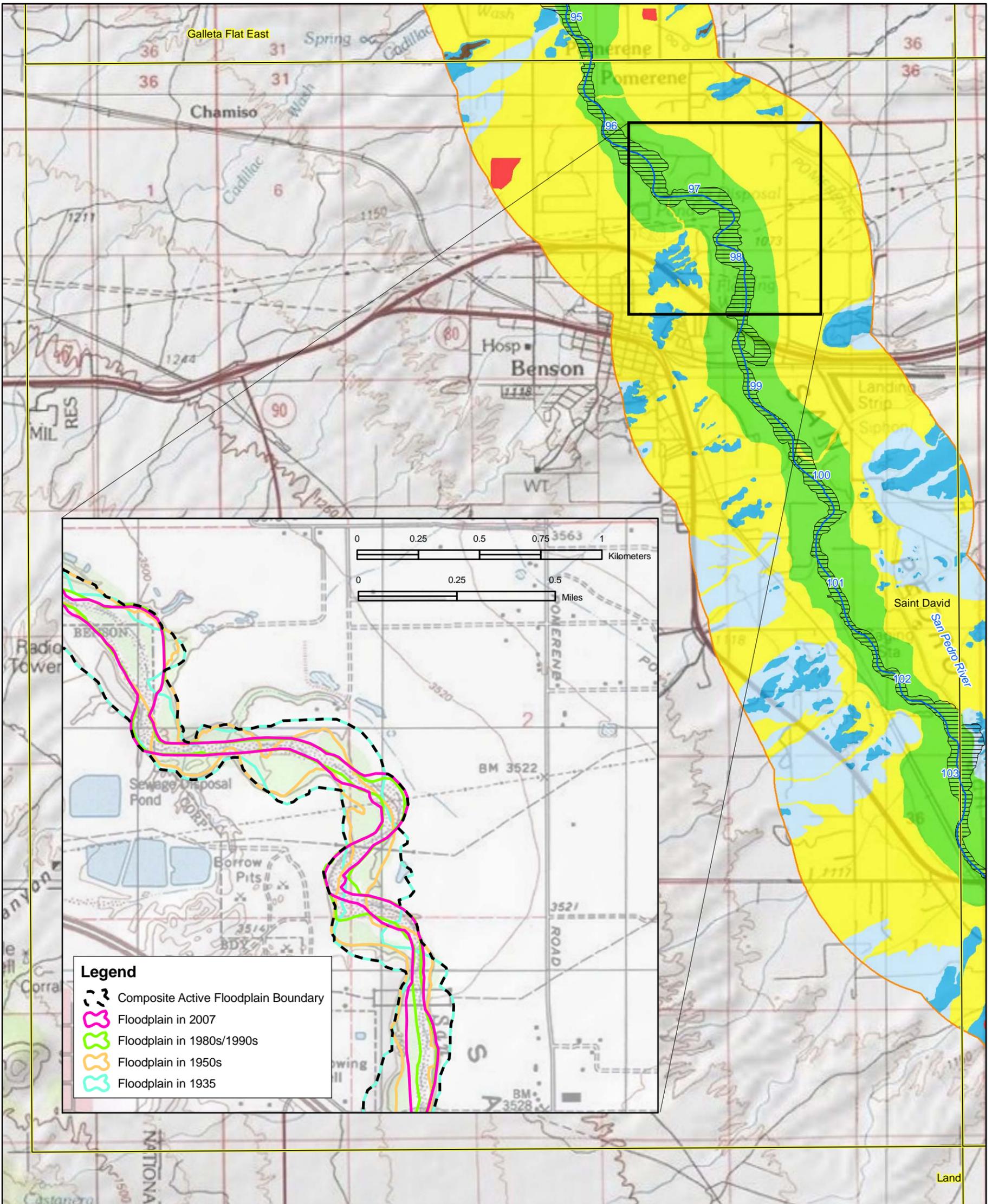
FIGURE

Figure D-1. Comparison of Annual Peak Streamflows at USGS Gaging Stations to Aerial Photography Flight Years within the San Pedro River Watershed (1916-2008)



ATTACHMENTS

Attachment 1



Appendix D - Attachment 1
Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Benson Quad

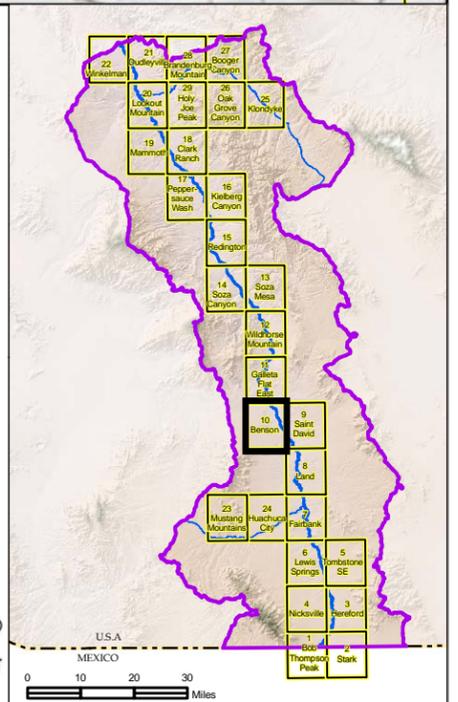
Relatively Dynamic Reach
of the San Pedro River (Part 1)

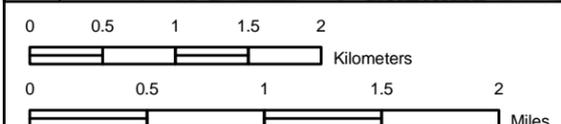
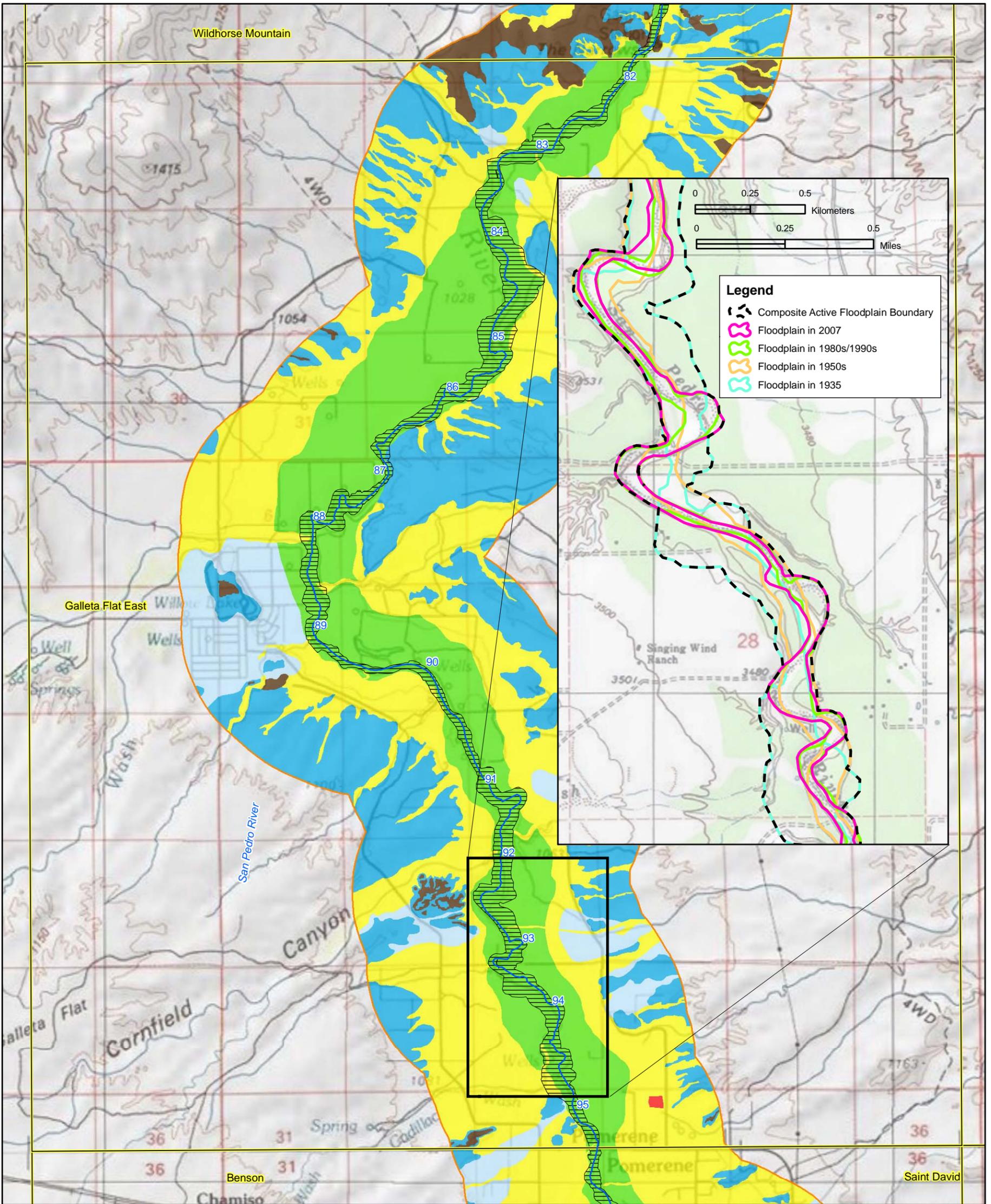
Response to Comments and Objections
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 Delineation Report for the
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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
 - Floodplain Holocene Alluvium (FHA)
 - Tributary Holocene Alluvium (THA)
 - Holocene Basin Fill
 - Older Basin Fill
 - Bedrock
 - Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary



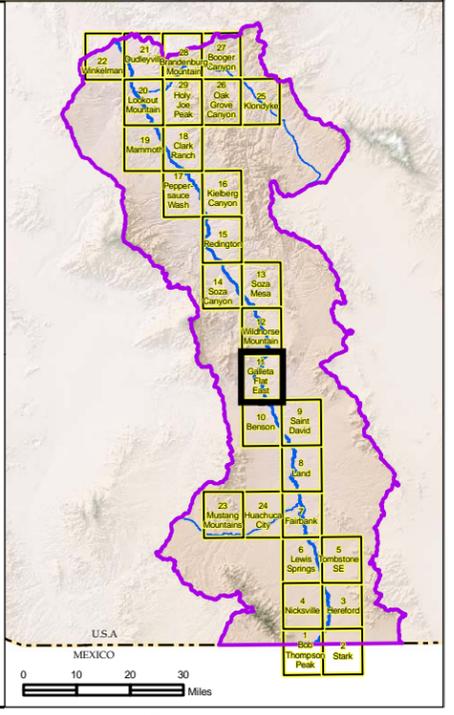


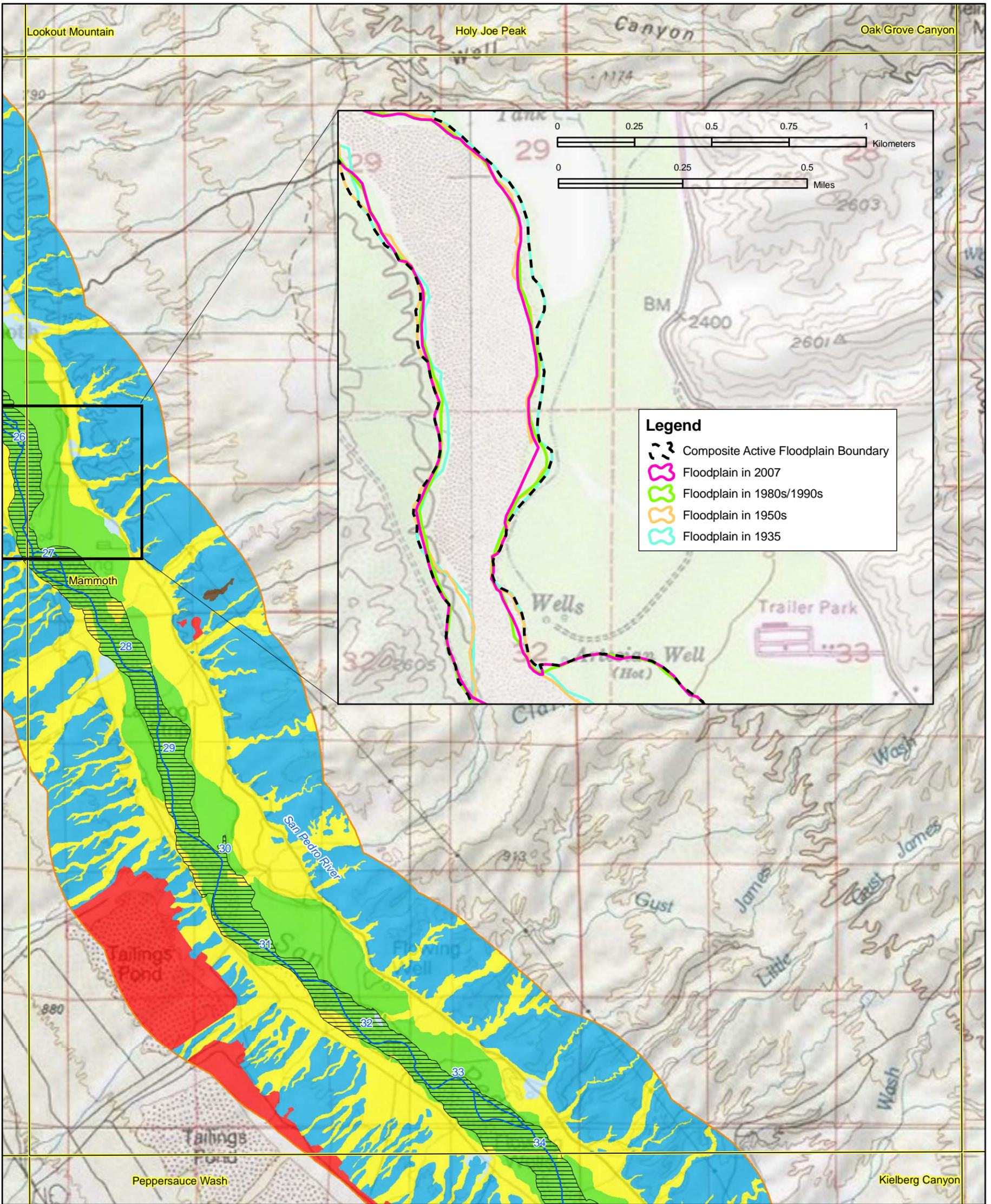
Appendix D - Attachment 1
Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Galleta Flat East Quad
Relatively Dynamic Reach
of the San Pedro River (Part 2)

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- Legend**
- Historical (1930s to 2007) Composite Active Floodplain Boundary
 - Surficial Geology Mapped by AZGS (2009)
 - Generalized Geologic Units**
 - Floodplain Holocene Alluvium (FHA)
 - Tributary Holocene Alluvium (THA)
 - Holocene Basin Fill
 - Older Basin Fill
 - Bedrock
 - Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





Appendix D - Attachment 1
Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Clark Ranch Quad
Relatively Stable Reach
of the San Pedro River

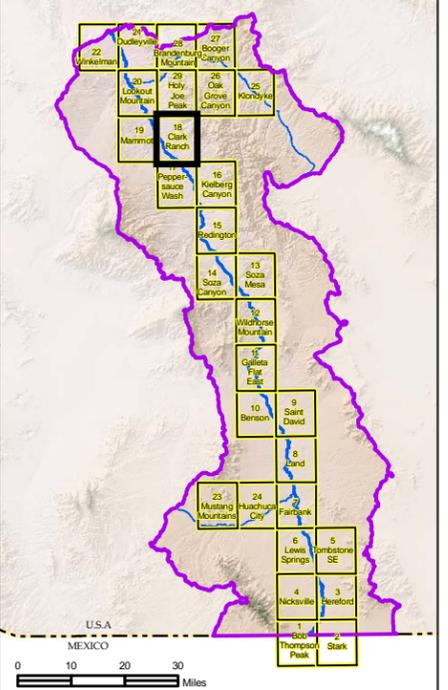
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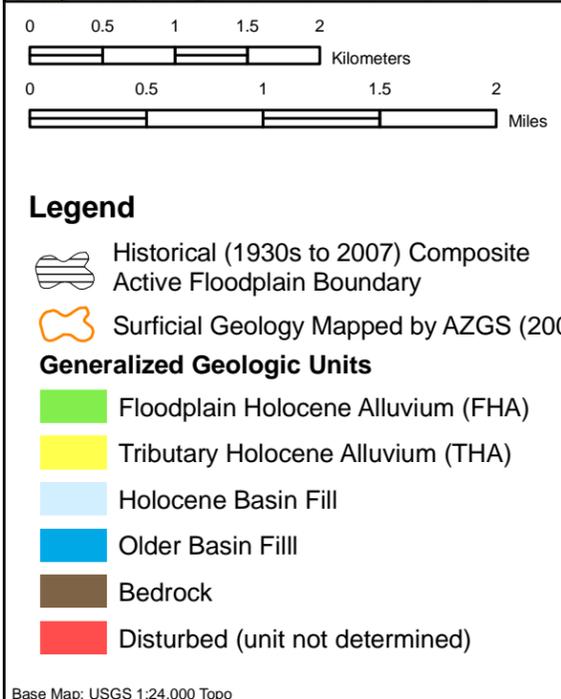
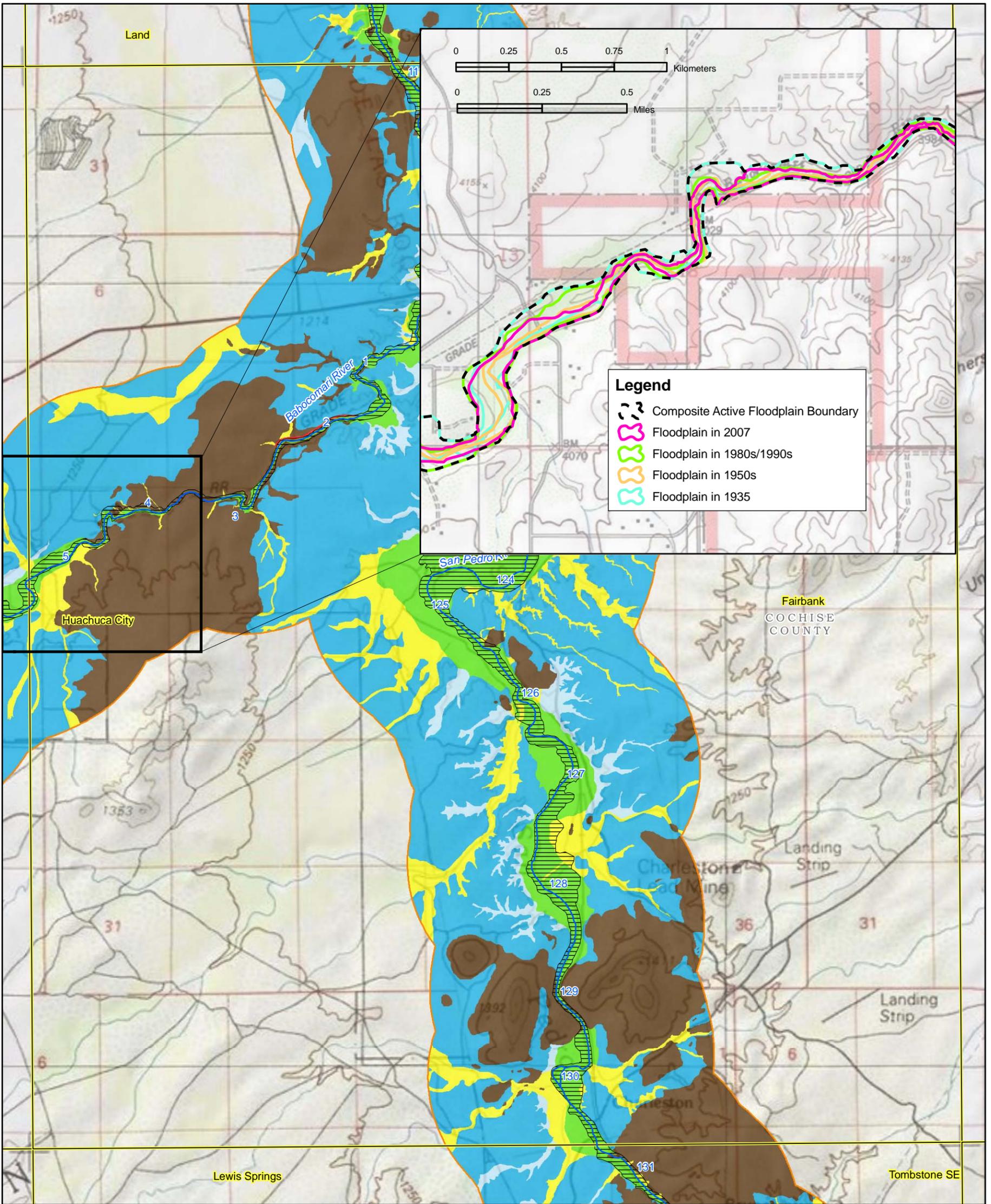
Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary

Base Map: USGS 1:24,000 Topo

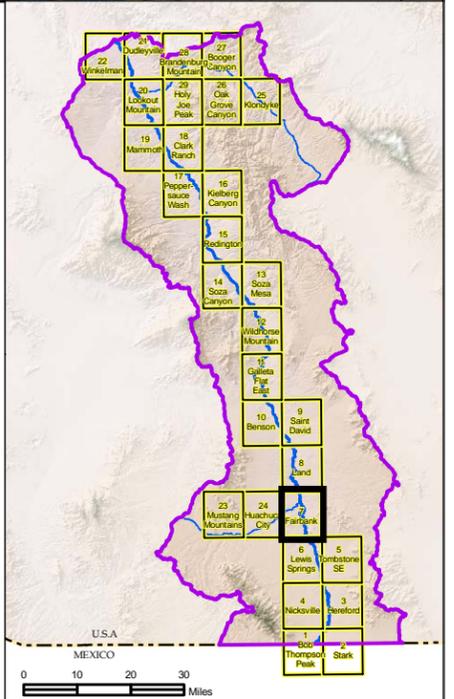


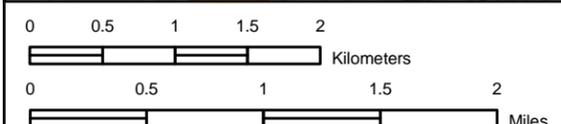
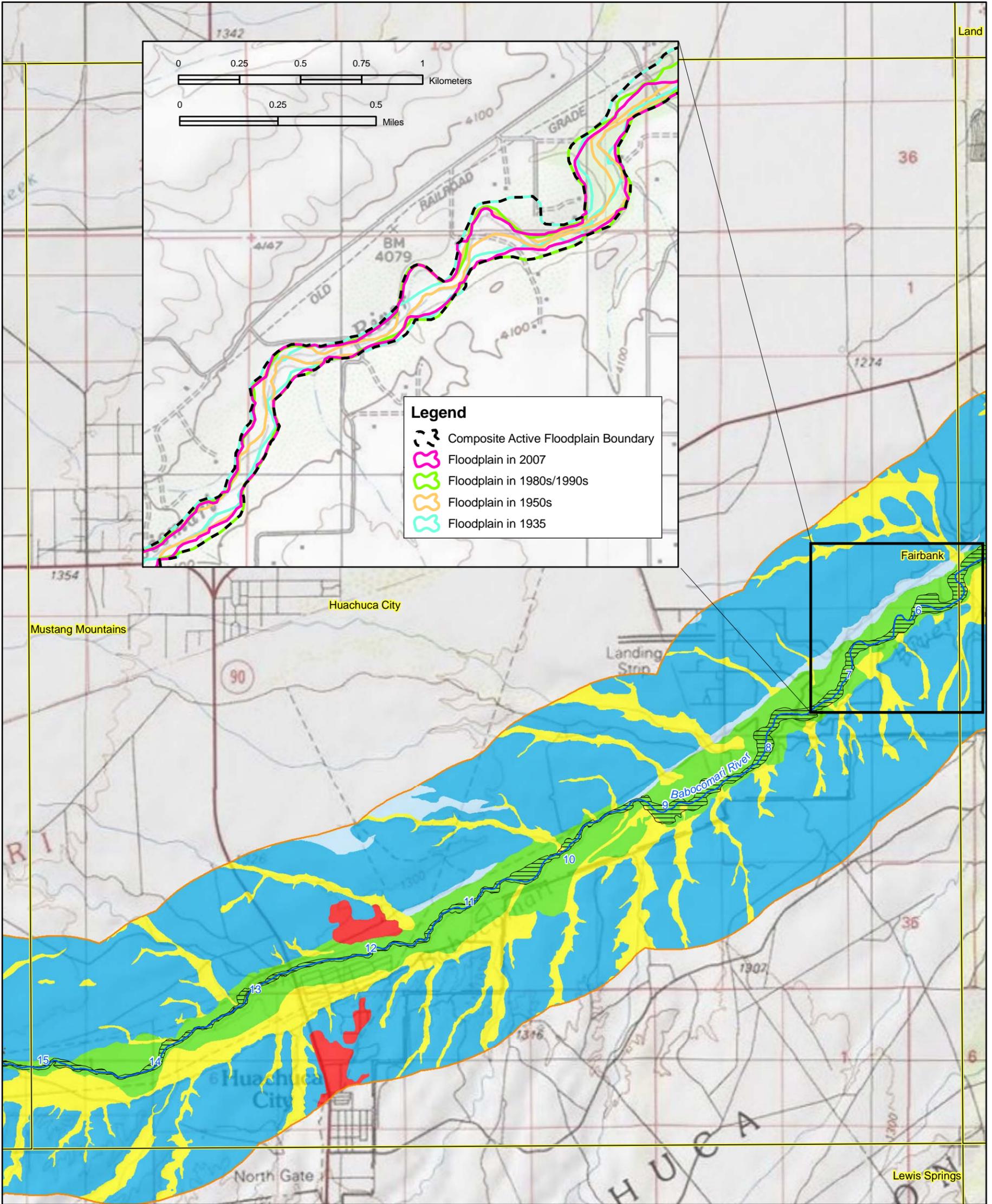


Appendix D - Attachment 1
Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Fairbank Quad
Relatively Dynamic Reach
of the Babocomari River (Part 1)

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Major Stream and River Mile Locations
 San Pedro River Watershed
 USGS Topo Quad Boundary
 County
 International Boundary



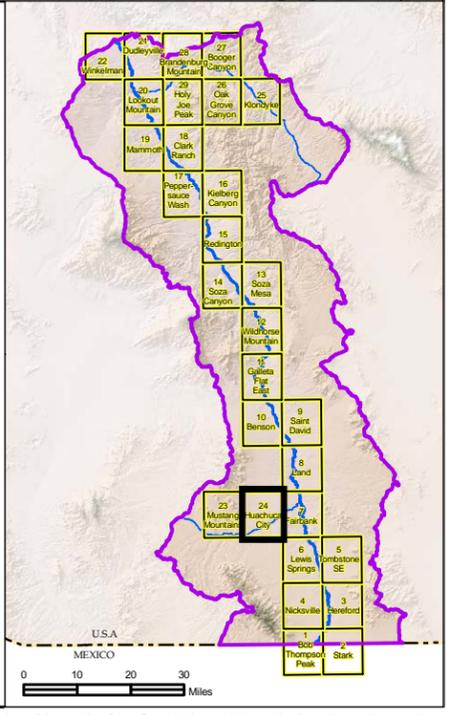


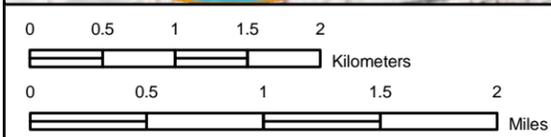
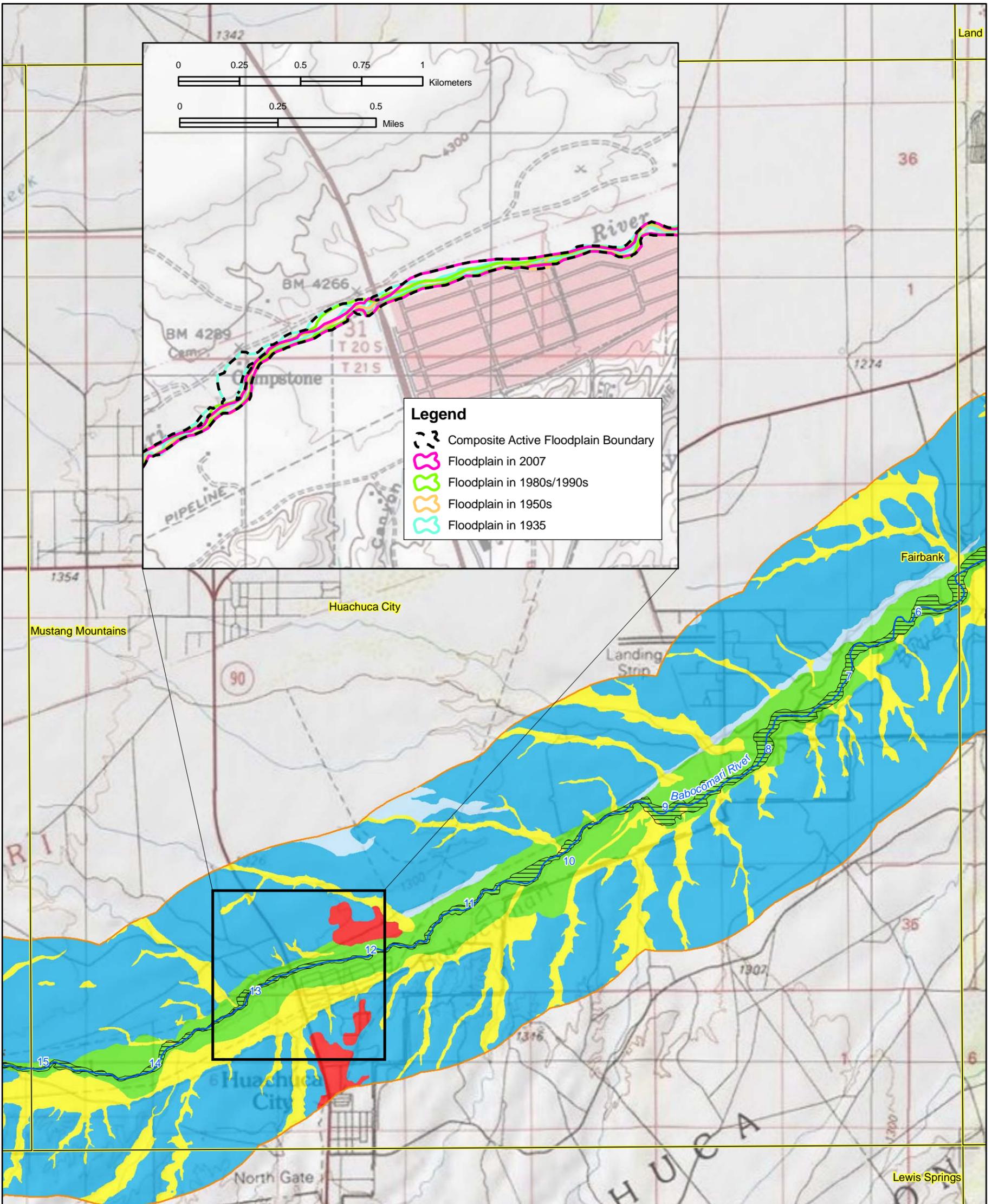
Appendix D - Attachment 1
Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Huachuca City Quad
Relatively Dynamic Reach
of the Babocomari River (Part 2)

Response to Comments and Objections
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- Legend**
- Historical (1930s to 2007) Composite Active Floodplain Boundary
 - Surficial Geology Mapped by AZGS (2009)
 - Generalized Geologic Units**
 - Floodplain Holocene Alluvium (FHA)
 - Tributary Holocene Alluvium (THA)
 - Holocene Basin Fill
 - Older Basin Fill
 - Bedrock
 - Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





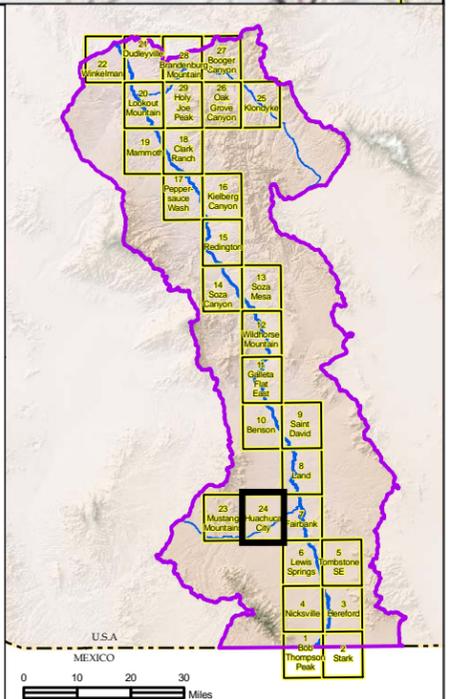
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Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Huachuca City Quad
Relatively Stable Reach
of the Babocomari River

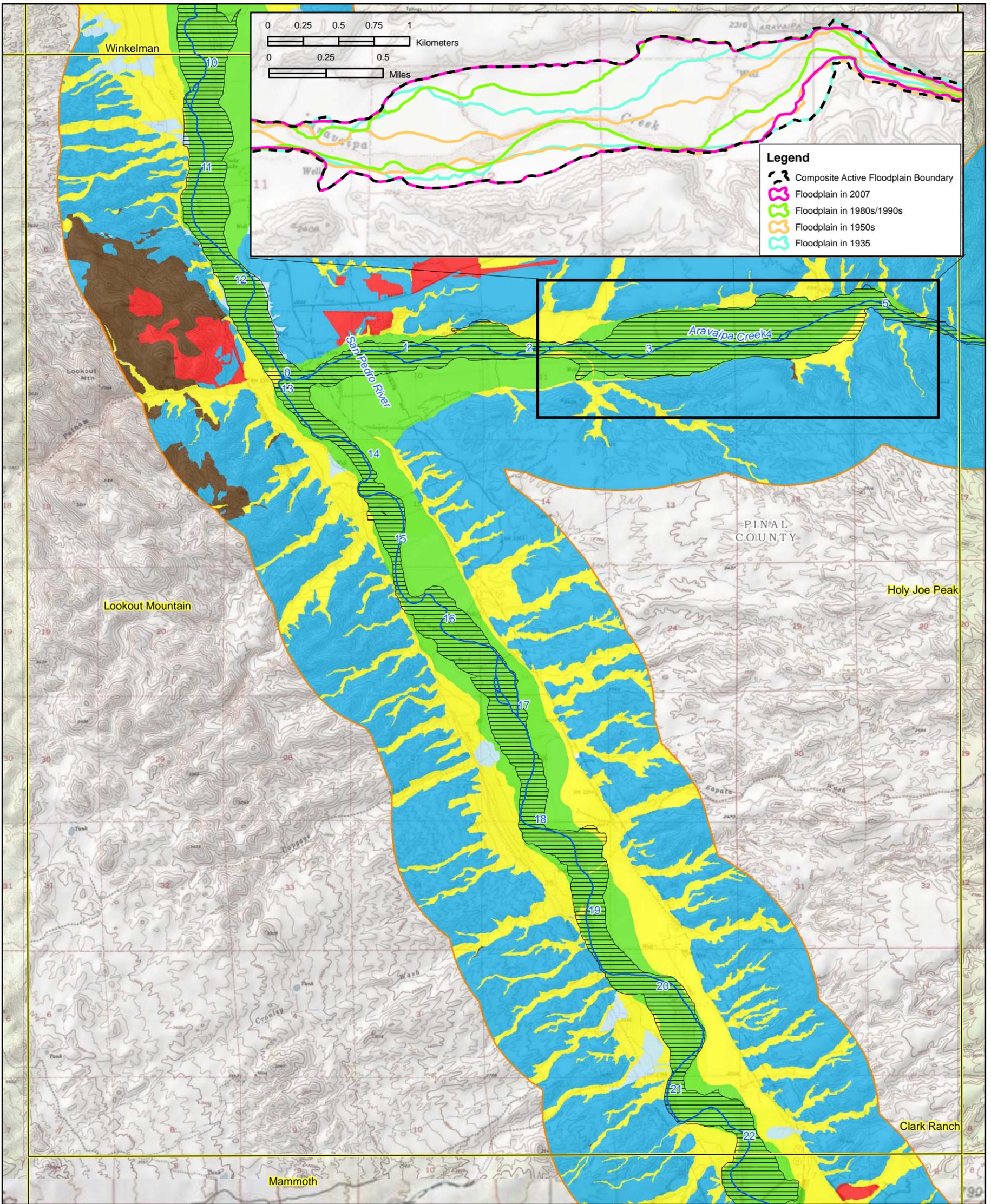
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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





Appendix D - Attachment 1
Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Lookout Mountain Quad
Relatively Dynamic Reach
of the Aravaipa Creek

Response to Comments and Objections
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 San Pedro River Watershed

157 Major Stream and River Mile Locations

San Pedro River Watershed

USGS Topo Quad Boundary

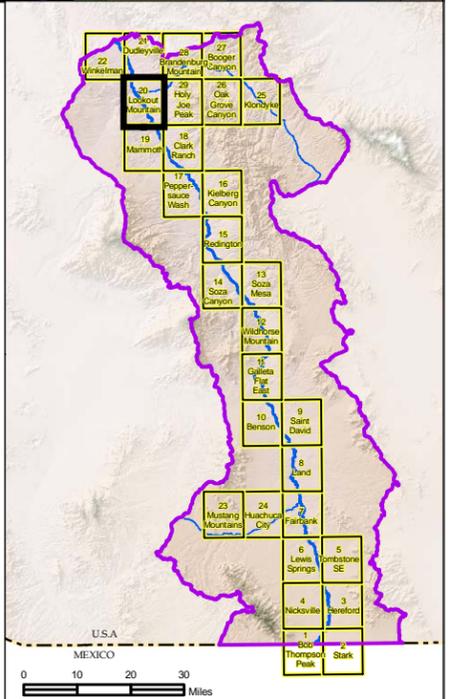
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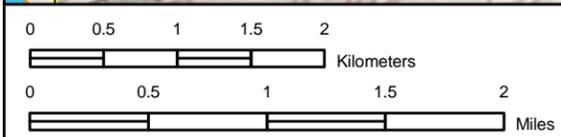
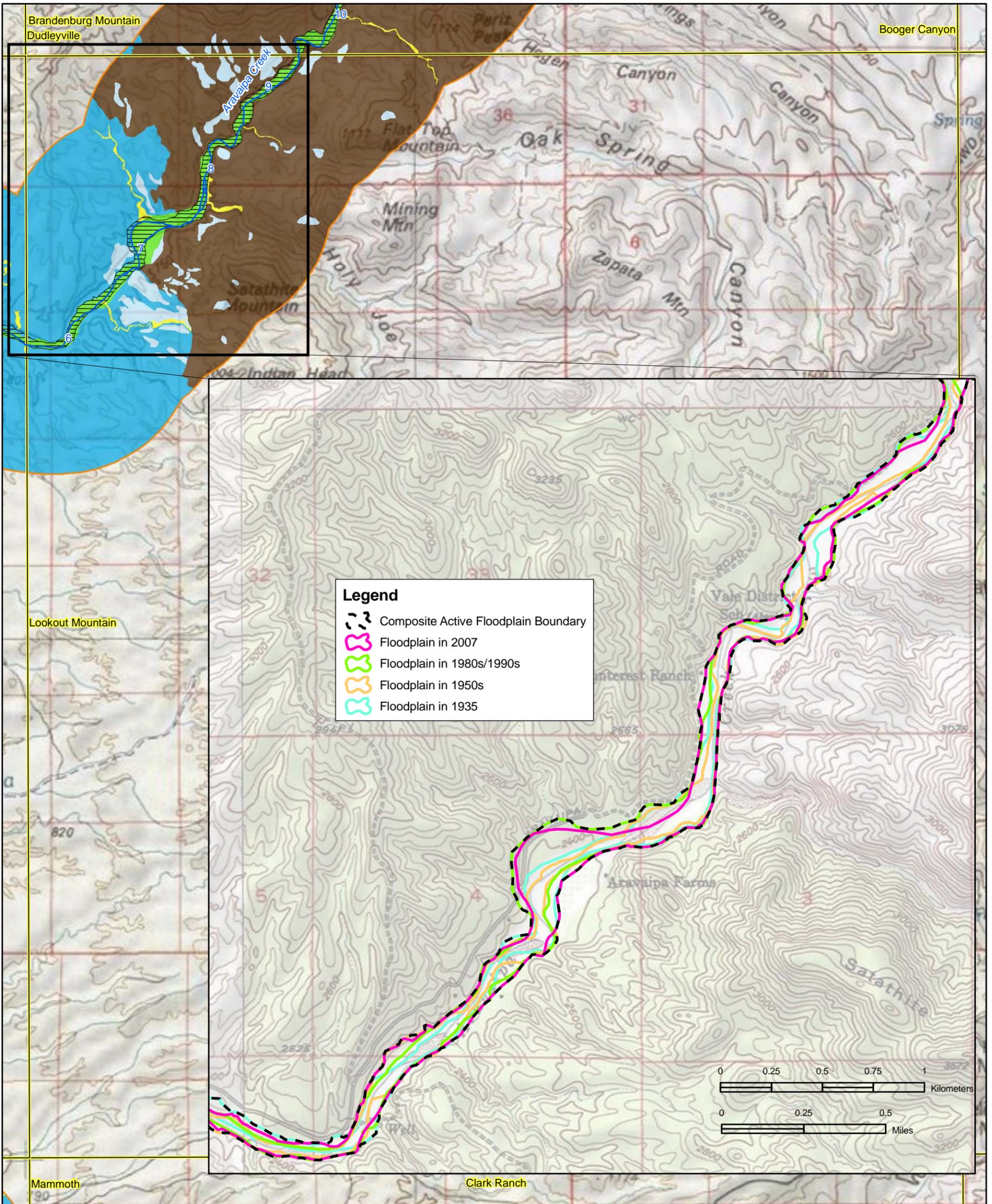
International Boundary

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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)





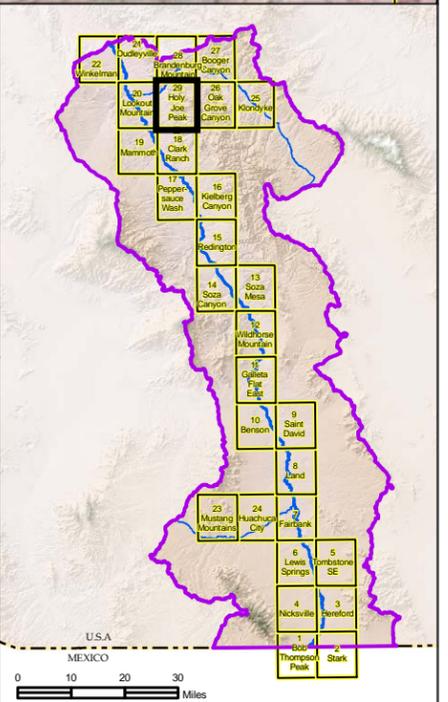
Appendix D - Attachment 1
Selection of Dynamic and Stable Reaches
Composite Active Floodplain Boundary
Holy Joe Peak Quad
Relatively Stable Reach
of the Aravaipa Creek

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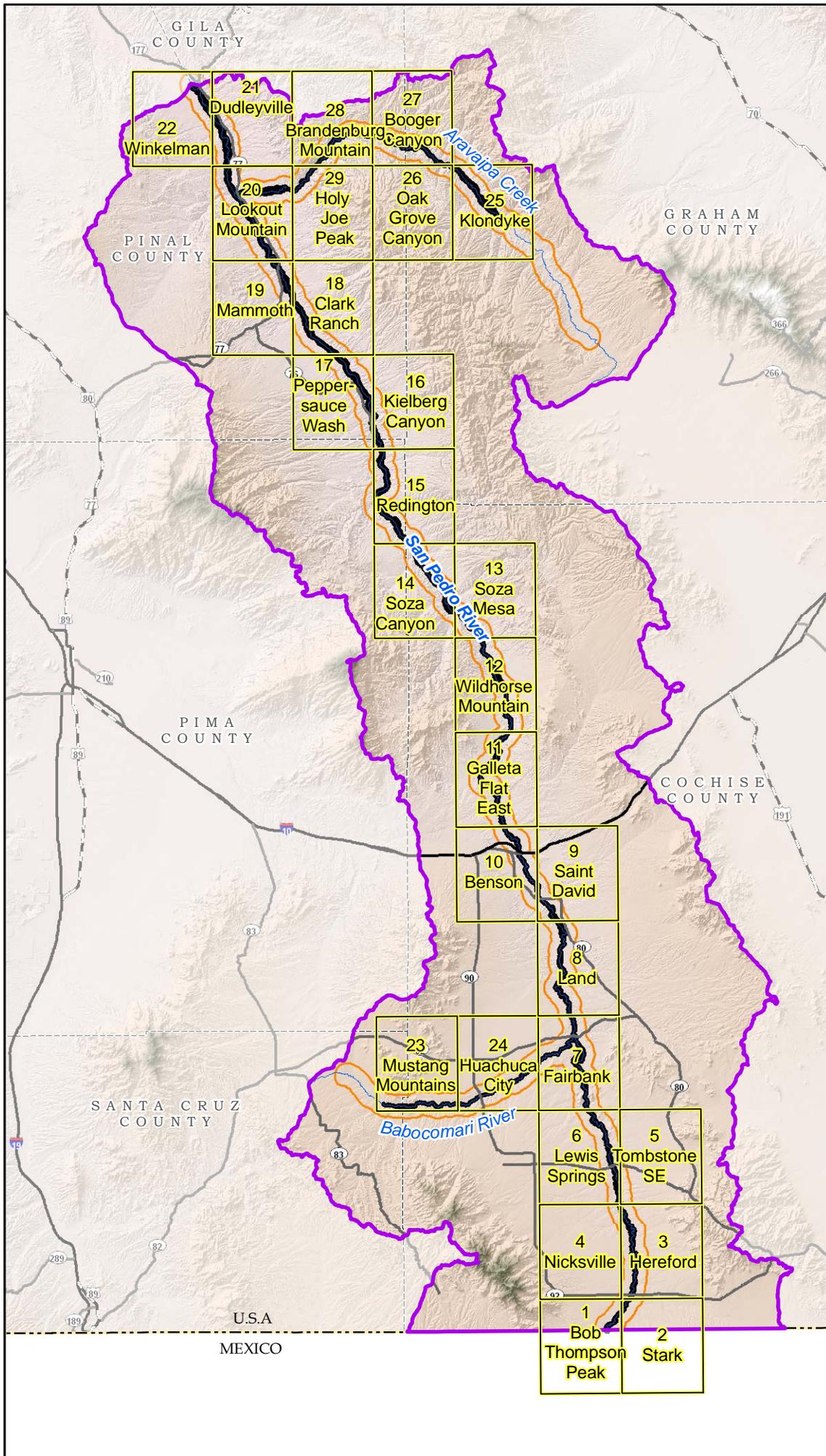
Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
 - Floodplain Holocene Alluvium (FHA)
 - Tributary Holocene Alluvium (THA)
 - Holocene Basin Fill
 - Older Basin Fill
 - Bedrock
 - Disturbed (unit not determined)

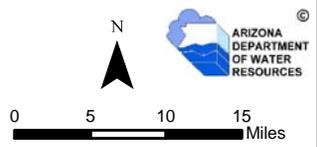
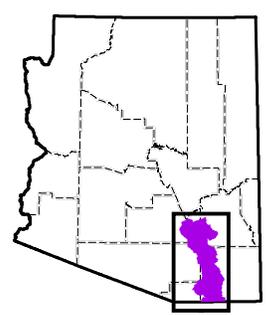
- 157 Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
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- International Boundary



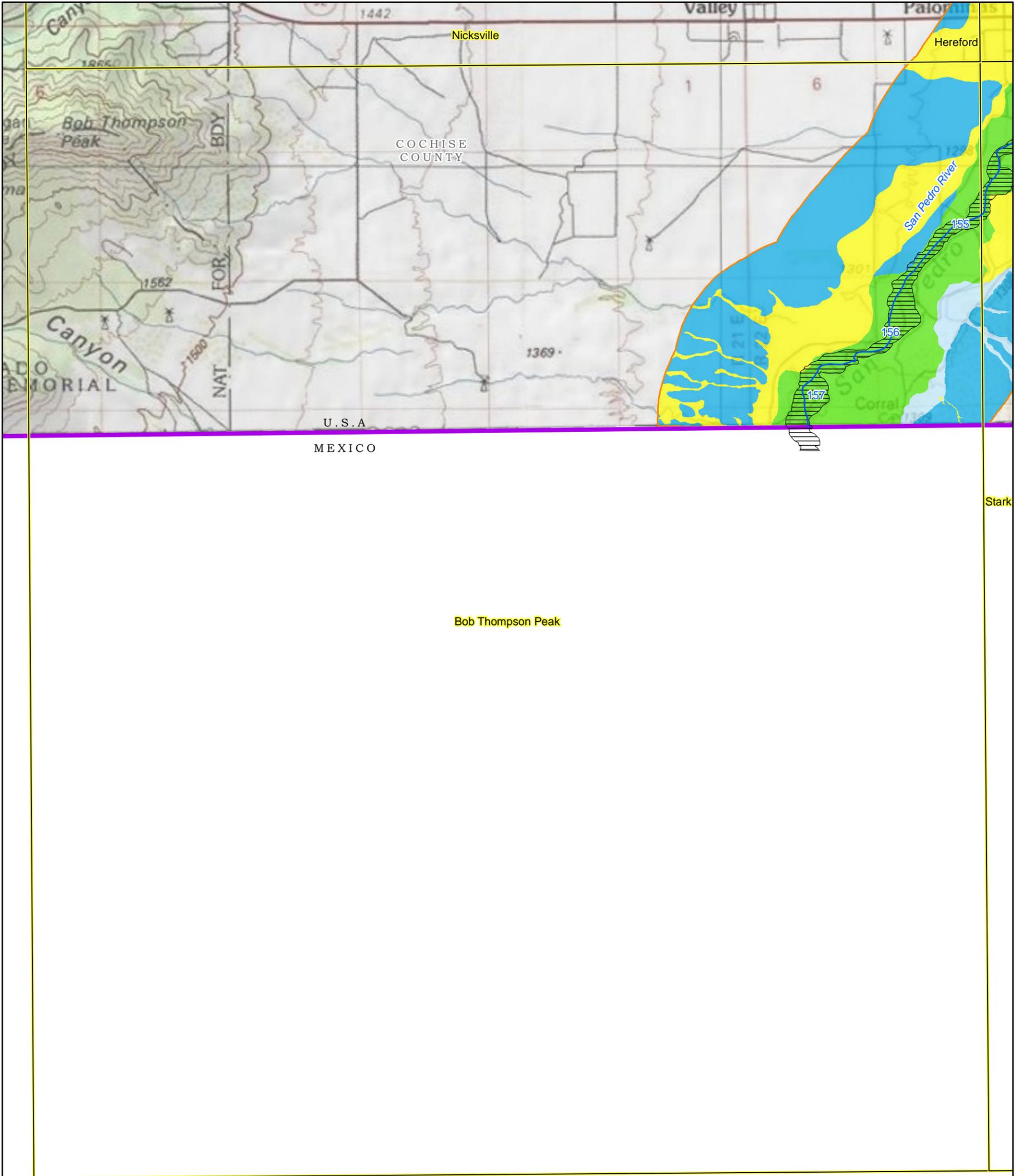
Attachment 2



- Legend**
- Historical (1930s to 2007) Composite Active Floodplain Boundary
 - Surficial Geology Mapped by AZGS (2009)
 - USGS Topo Quad Boundary
 - San Pedro River Watershed
 - Major Stream
 - Interstate Highway
 - U.S. Route
 - State Highway
 - County
 - State Boundary
 - International Boundary



Appendix D
Attachment 2
 Index Map
 Composite Active
 Floodplain Boundary
 Response to Comments
 and Objections Filed on
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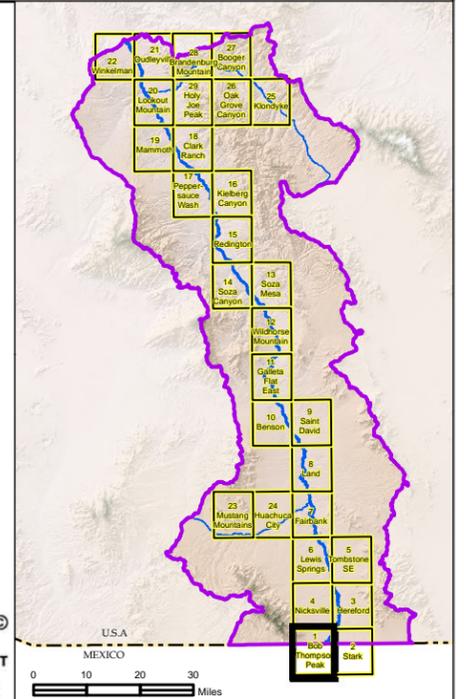
Appendix D - Attachment 2 Composite Active Floodplain Boundary *Bob Thompson Peak Quad (Page 1 of 29)*

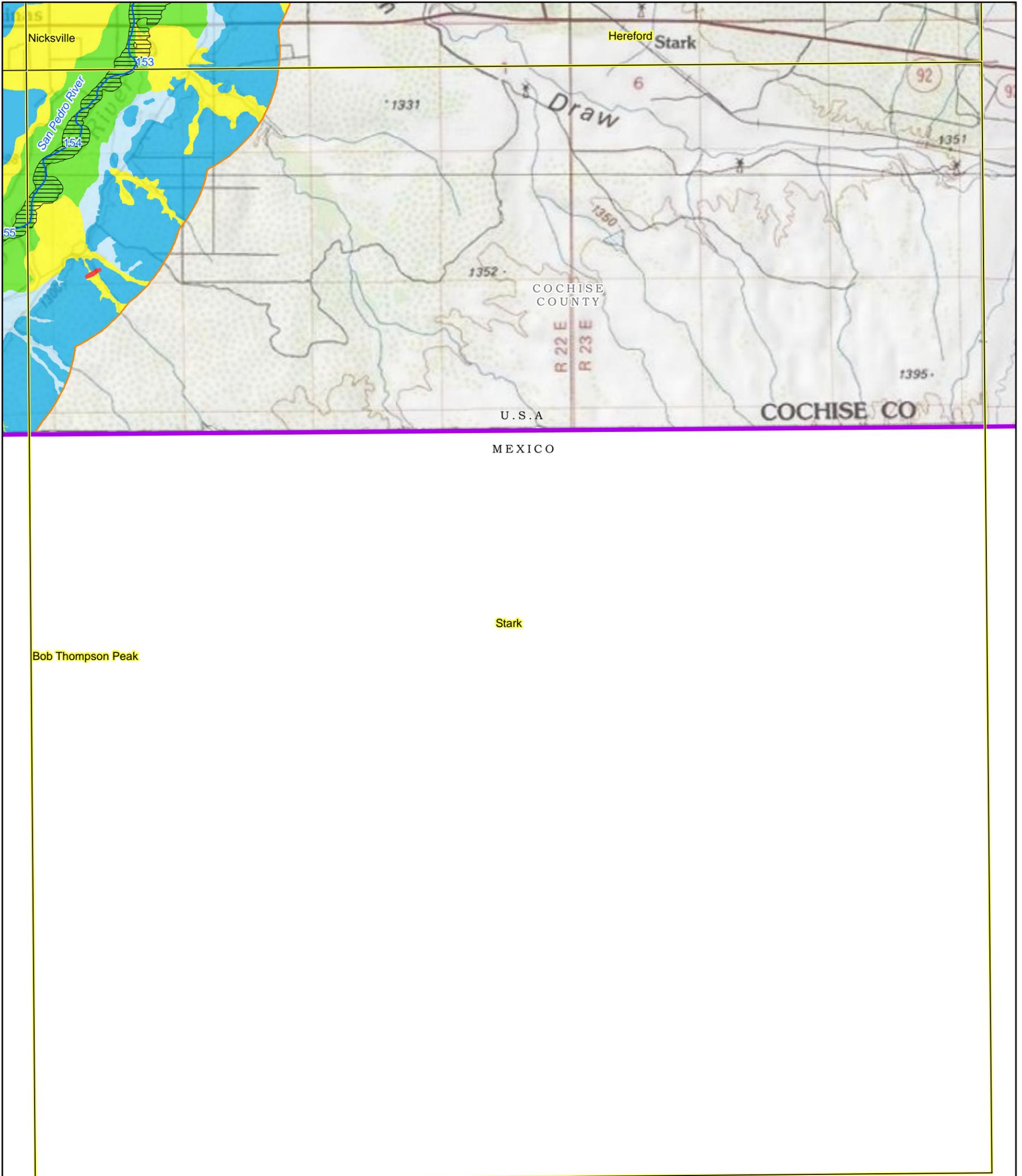
Response to Comments and Objections
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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





Appendix D - Attachment 2 Composite Active Floodplain Boundary Stark Quad (Page 2 of 29)

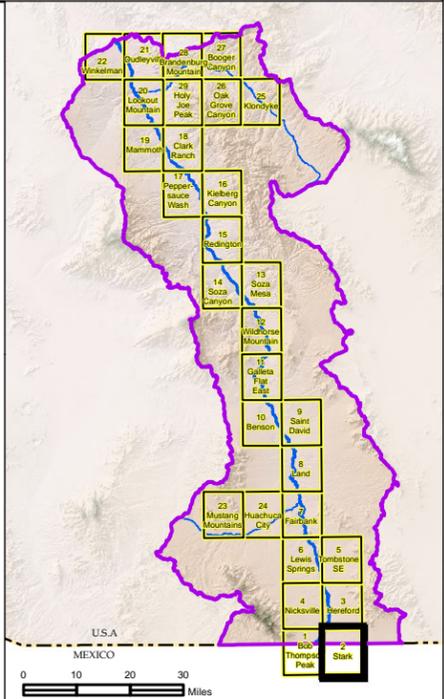
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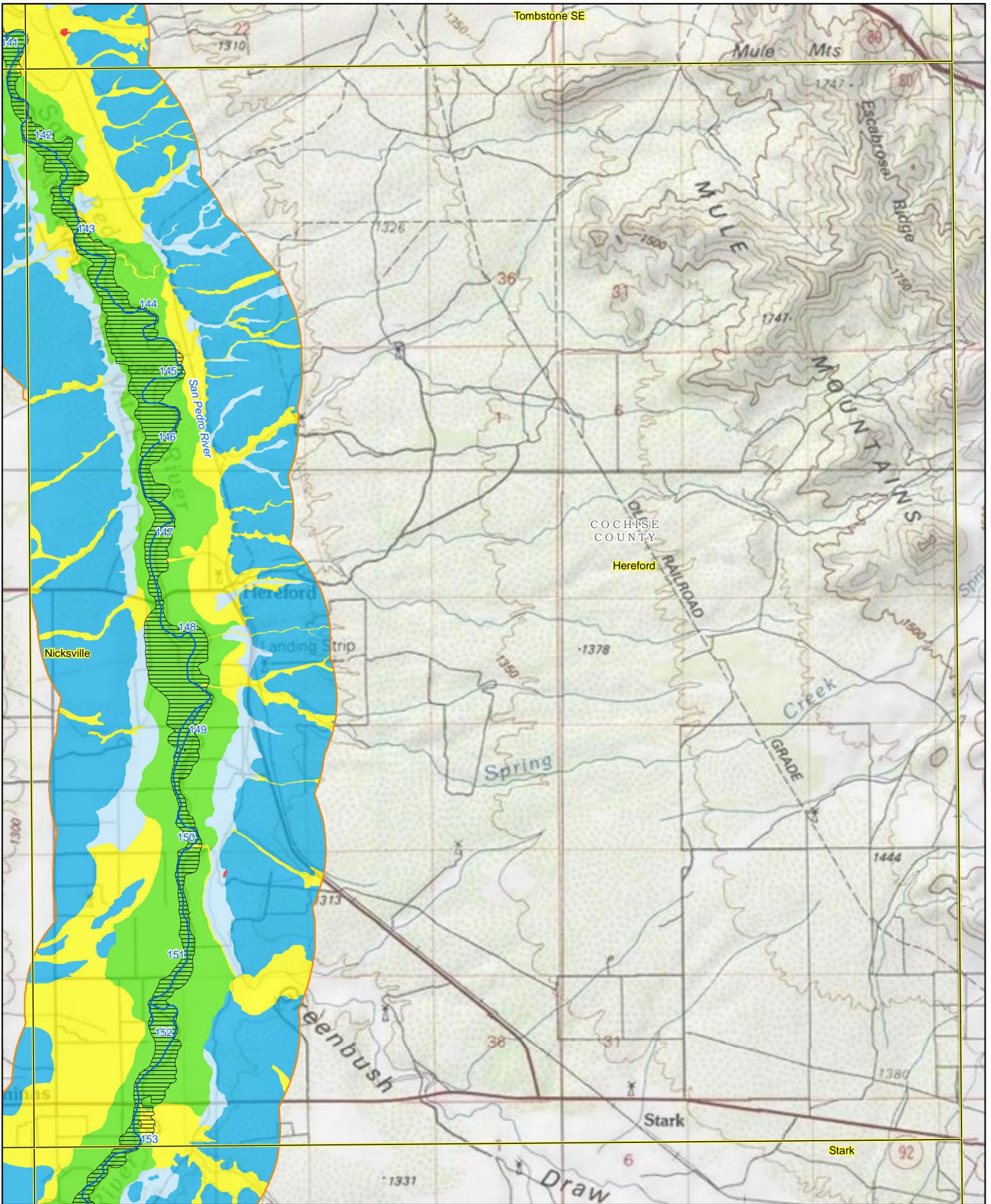


Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

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- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





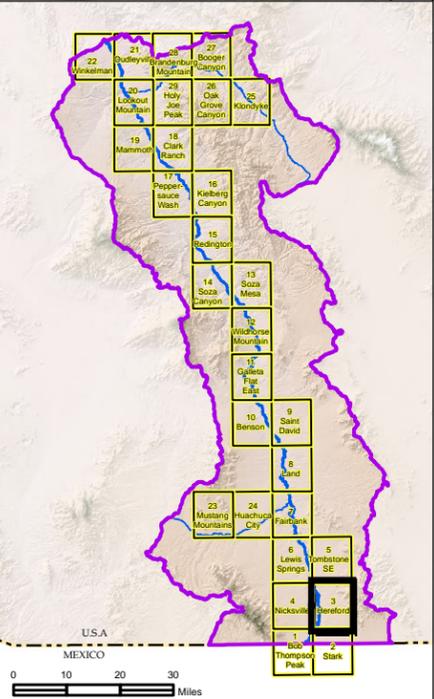
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Hereford Quad (Page 3 of 29)

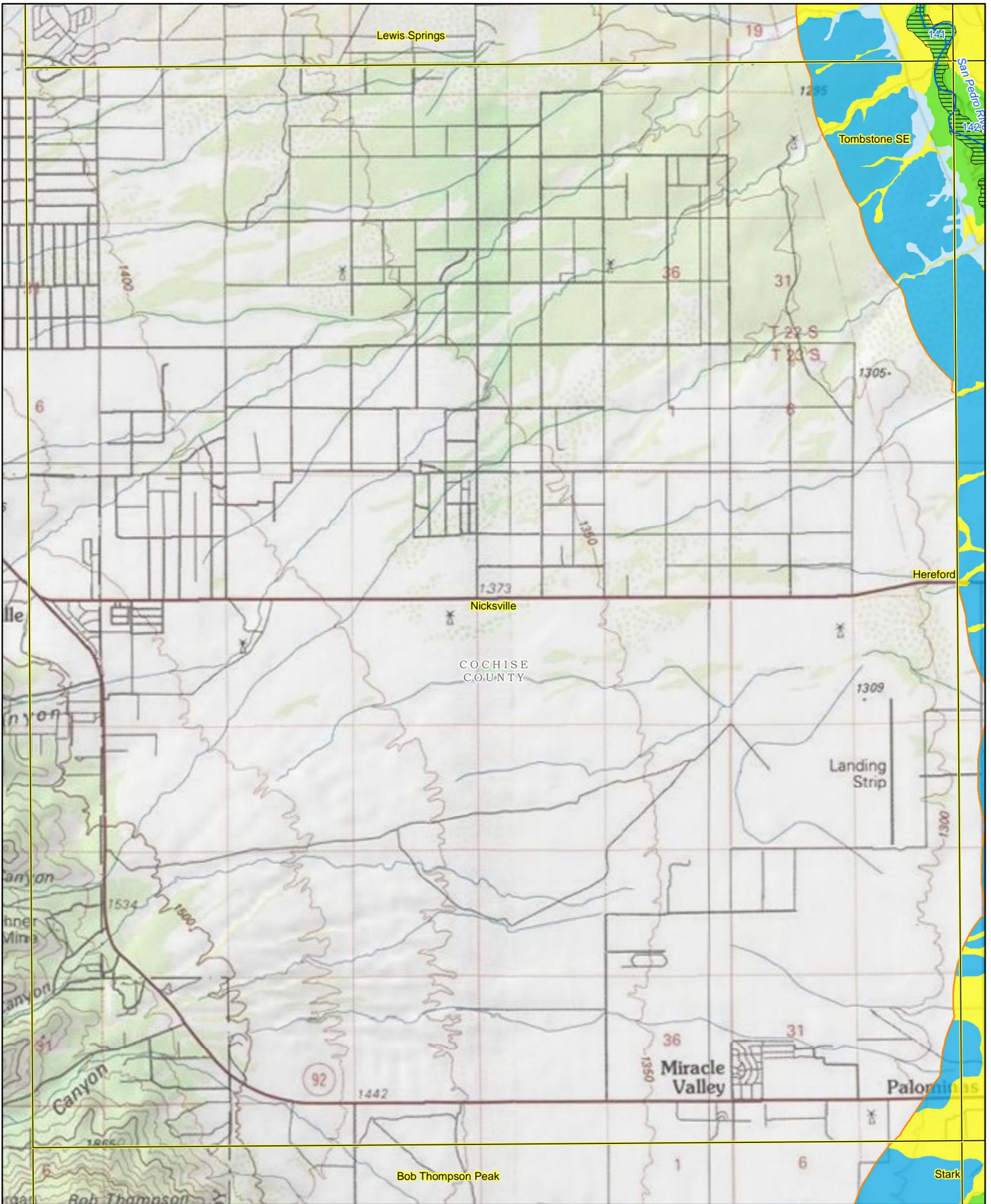
Response to Comments and Objections
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Legend

-  Historical (1930s to 2007) Composite Active Floodplain Boundary
-  Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
-  Floodplain Holocene Alluvium (FHA)
-  Tributary Holocene Alluvium (THA)
-  Holocene Basin Fill
-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

-  Major Stream and River Mile Locations
-  San Pedro River Watershed
-  USGS Topo Quad Boundary
-  County
-  International Boundary





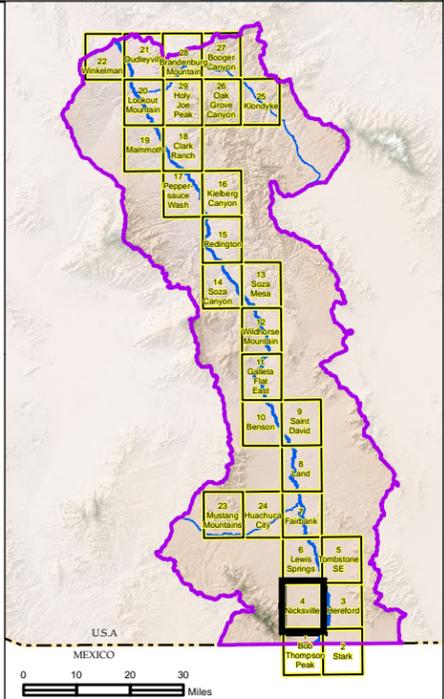
Appendix D - Attachment 2 Composite Active Floodplain Boundary Nicksville Quad (Page 4 of 29)

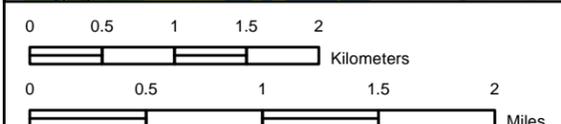
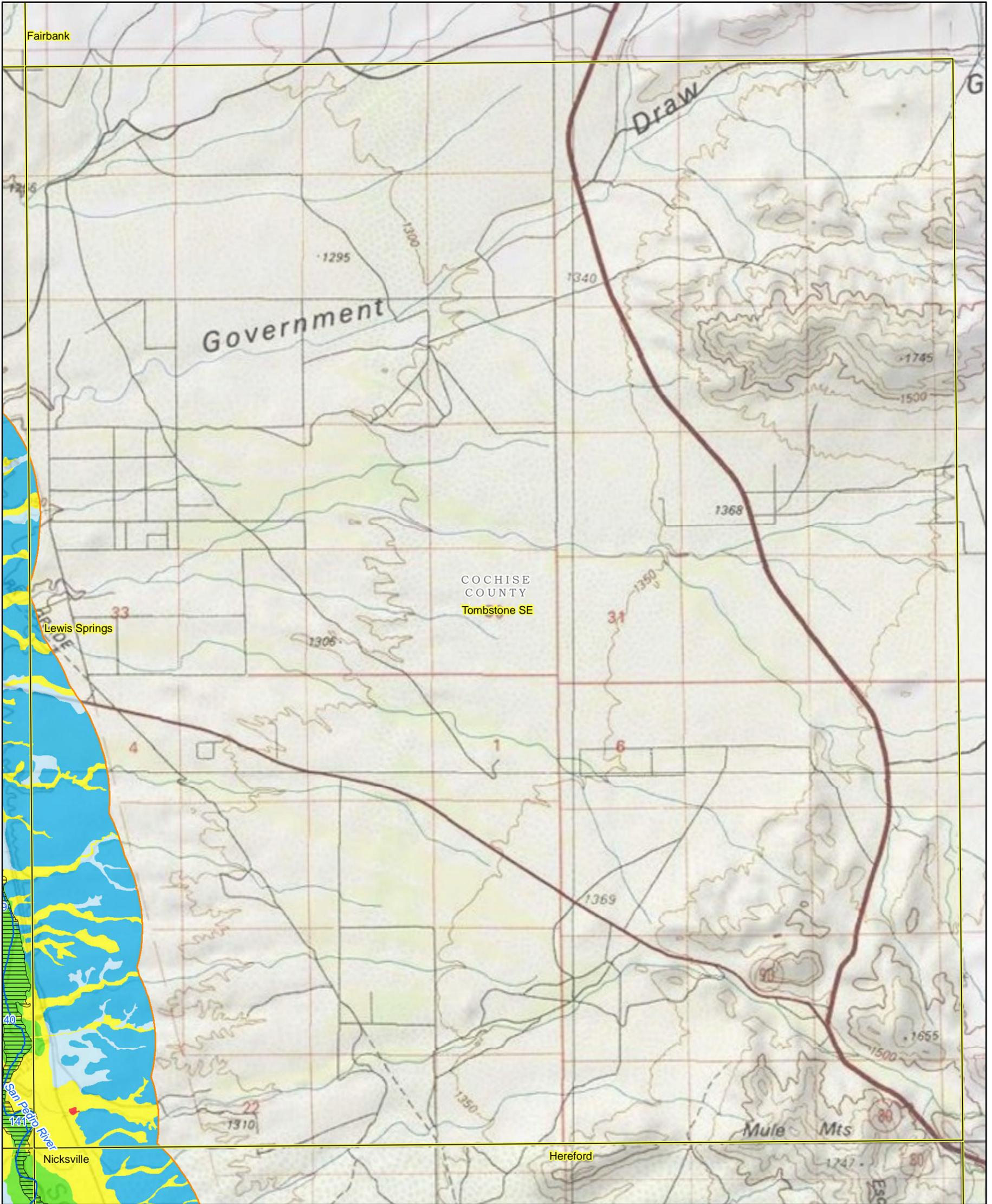
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- Historical (1930s to 2007) Composite Active Floodplain Boundary
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- Bedrock
- Disturbed (unit not determined)

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- San Pedro River Watershed
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Appendix D - Attachment 2
Composite Active Floodplain Boundary
Tombstone SE Quad (Page 5 of 29)

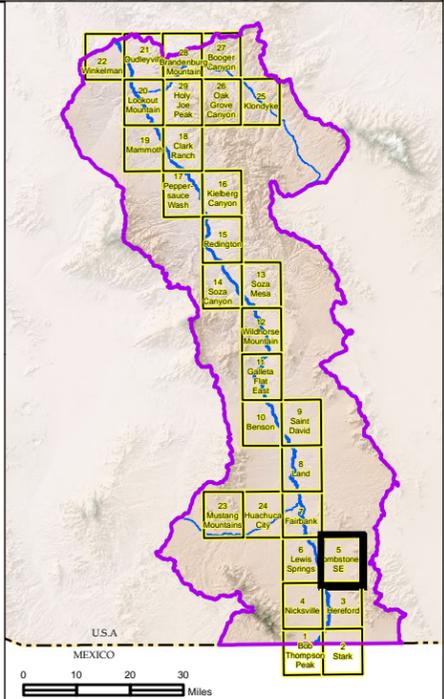
Response to Comments and Objections
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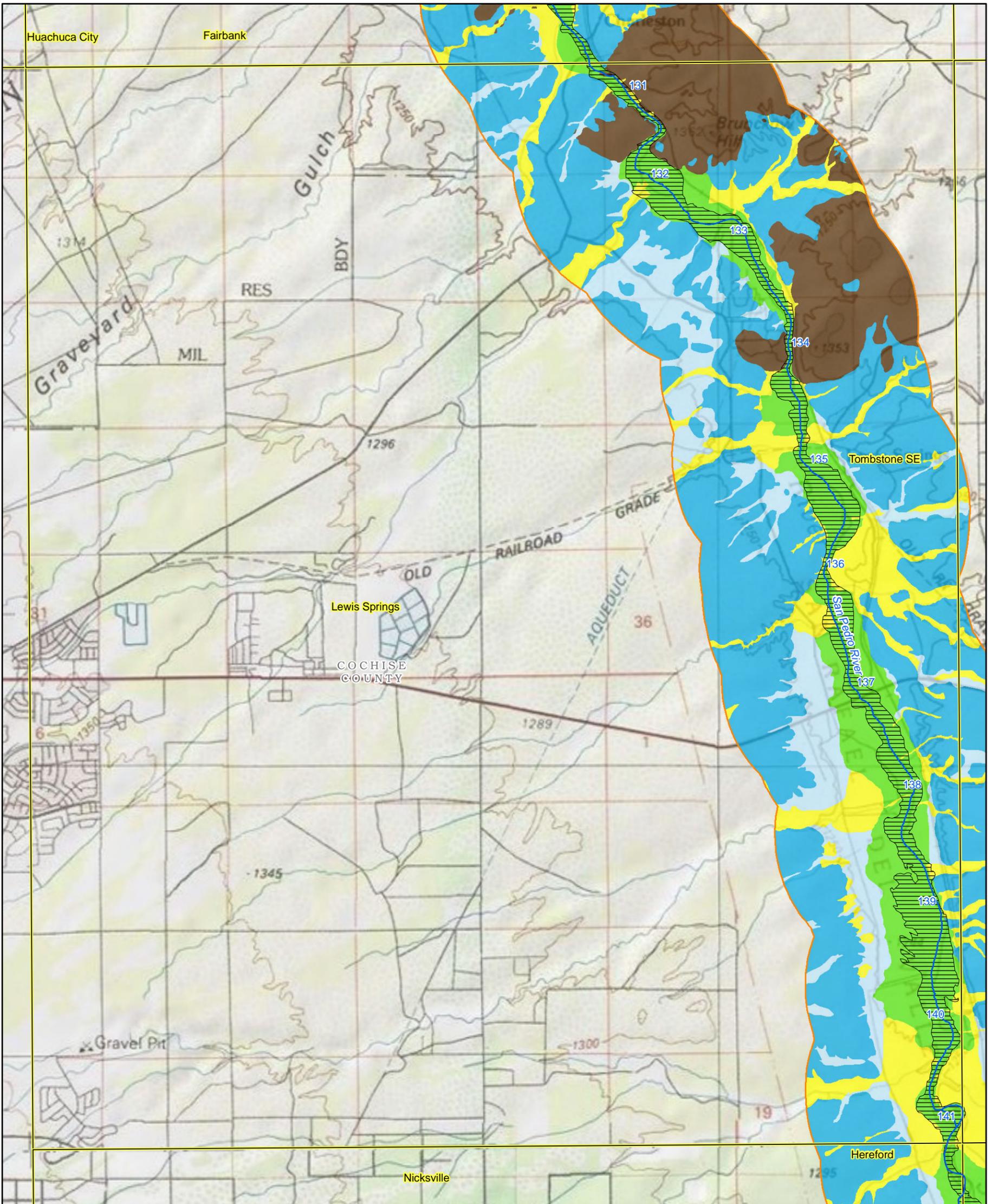


Legend

-  Historical (1930s to 2007) Composite Active Floodplain Boundary
-  Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
-  Floodplain Holocene Alluvium (FHA)
-  Tributary Holocene Alluvium (THA)
-  Holocene Basin Fill
-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

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-  San Pedro River Watershed
-  USGS Topo Quad Boundary
-  County
-  International Boundary





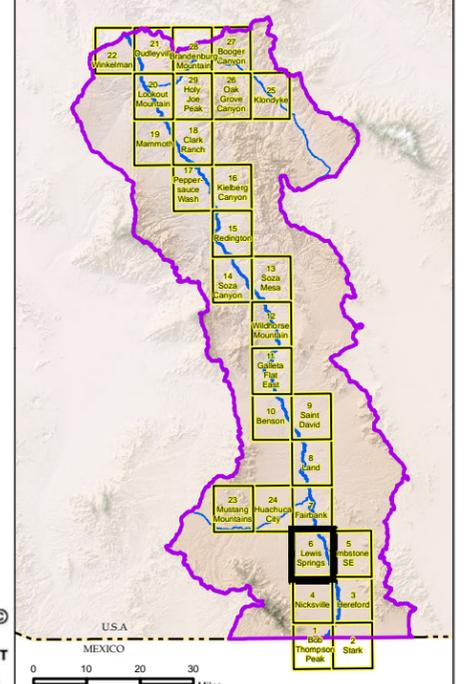
Appendix D - Attachment 2 Composite Active Floodplain Boundary *Lewis Springs Quad (Page 6 of 29)*

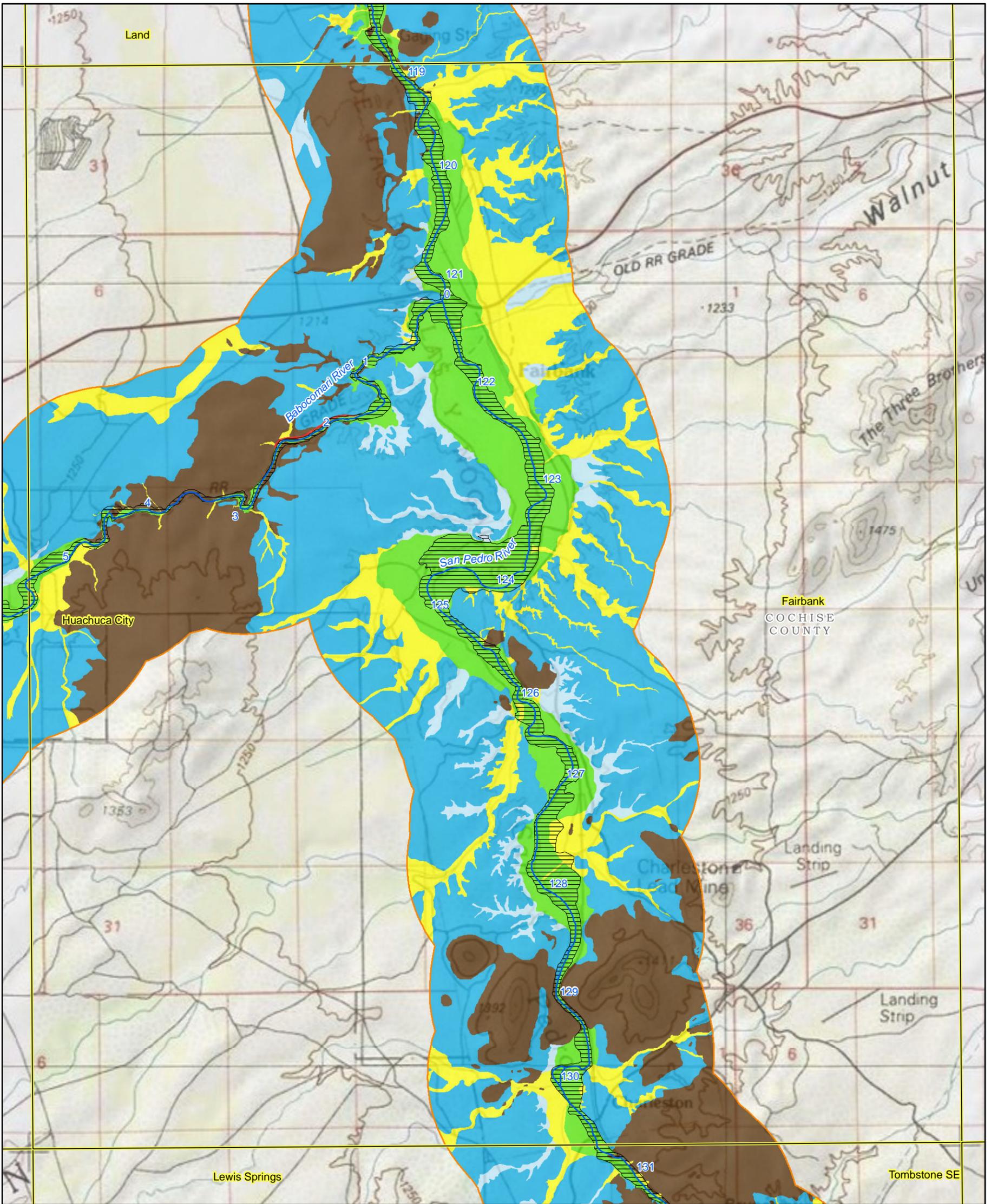
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San Pedro River Watershed

Legend

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-  Surficial Geology Mapped by AZGS (2009)
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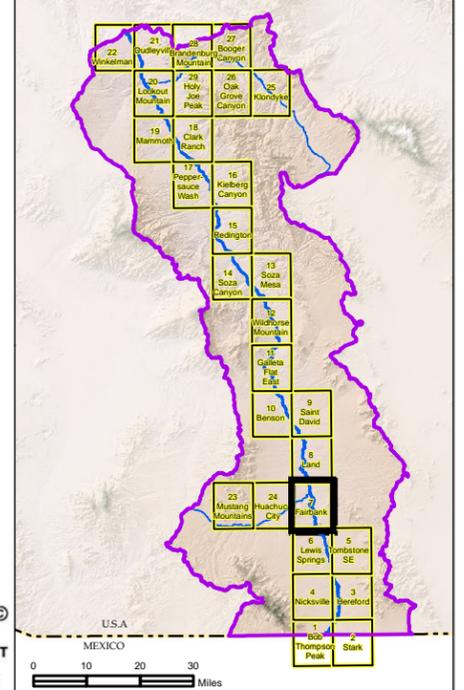
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Fairbank Quad (Page 7 of 29)

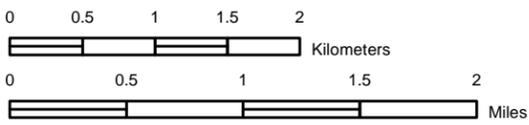
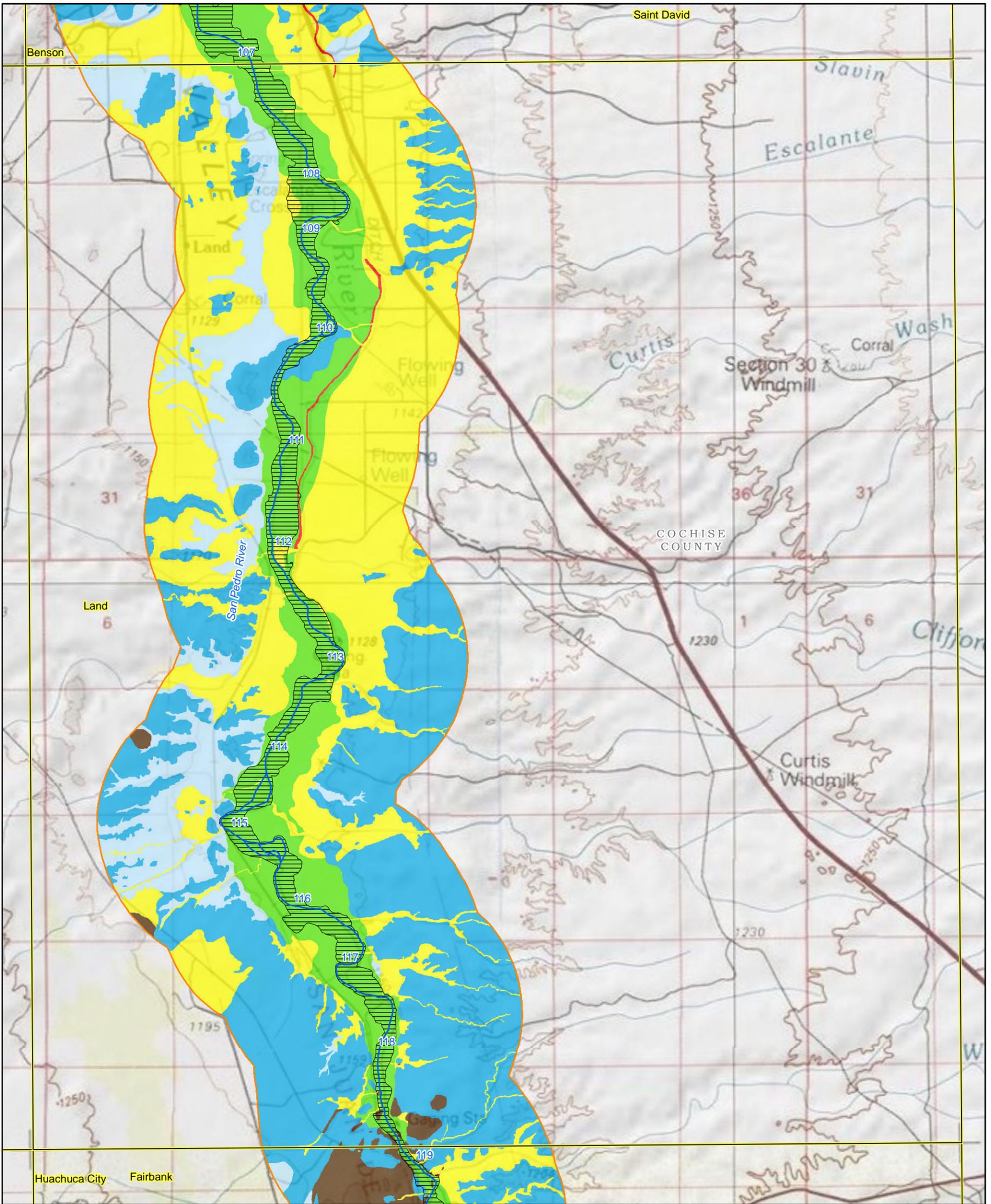
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Legend

-  Historical (1930s to 2007) Composite Active Floodplain Boundary
-  Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
-  Floodplain Holocene Alluvium (FHA)
-  Tributary Holocene Alluvium (THA)
-  Holocene Basin Fill
-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

-  Major Stream and River Mile Locations
-  San Pedro River Watershed
-  USGS Topo Quad Boundary
-  County
-  International Boundary





Appendix D - Attachment 2
Composite Active Floodplain Boundary
Land Quad (Page 8 of 29)

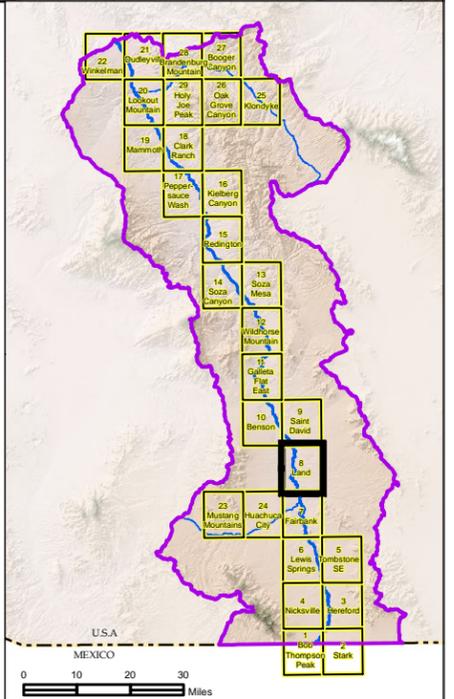


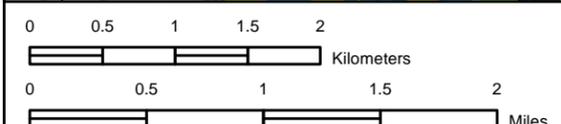
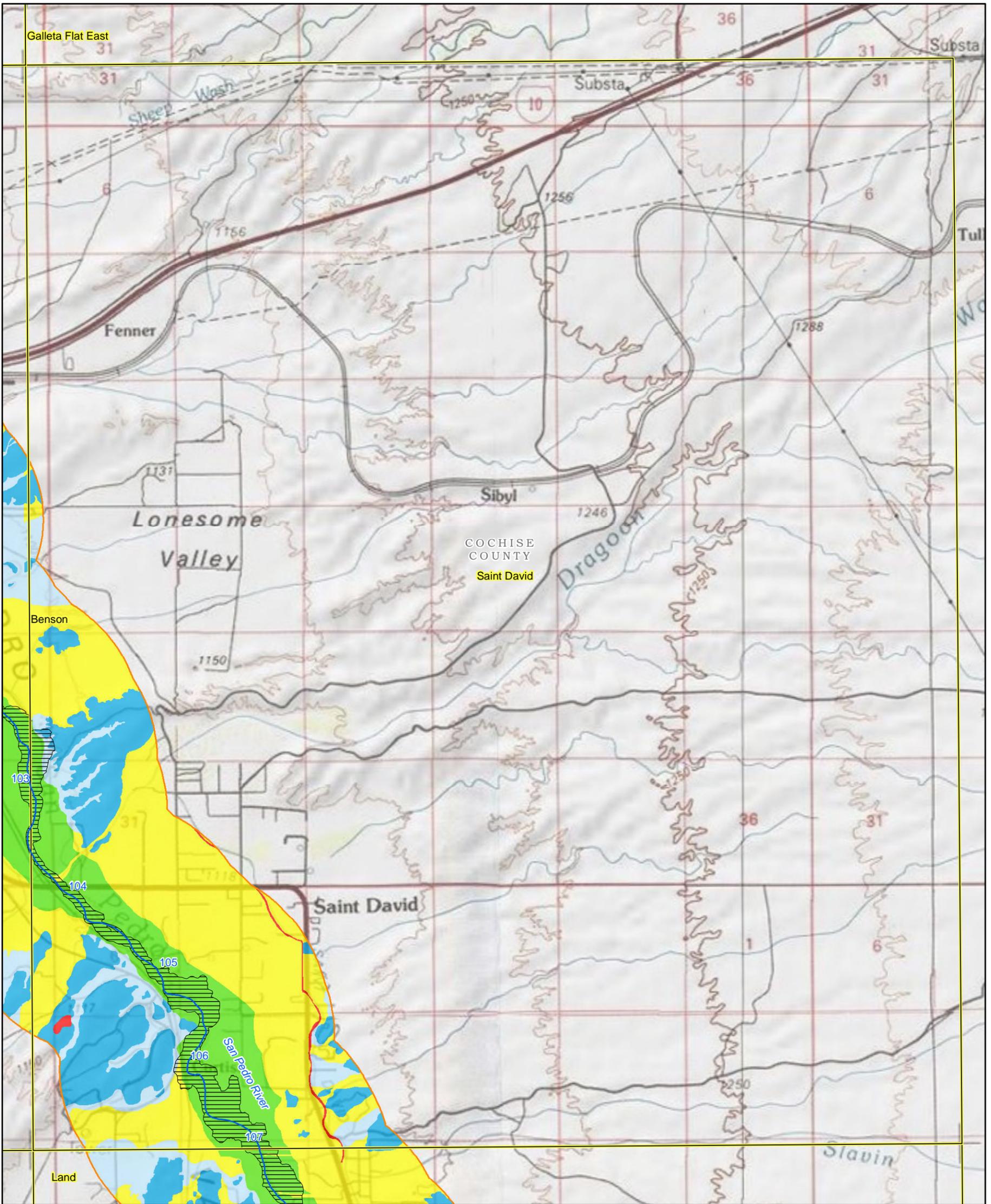
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-  Tributary Holocene Alluvium (THA)
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-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

-  Major Stream and River Mile Locations
-  San Pedro River Watershed
-  USGS Topo Quad Boundary
-  County
-  International Boundary





Appendix D - Attachment 2 Composite Active Floodplain Boundary *Saint David Quad (Page 9 of 29)*

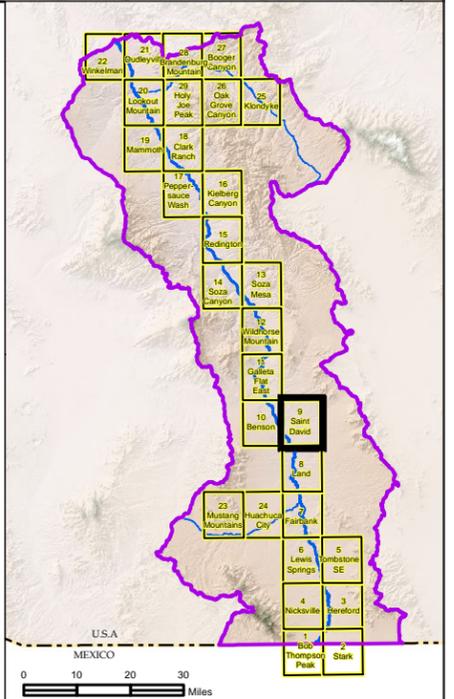
Response to Comments and Objections
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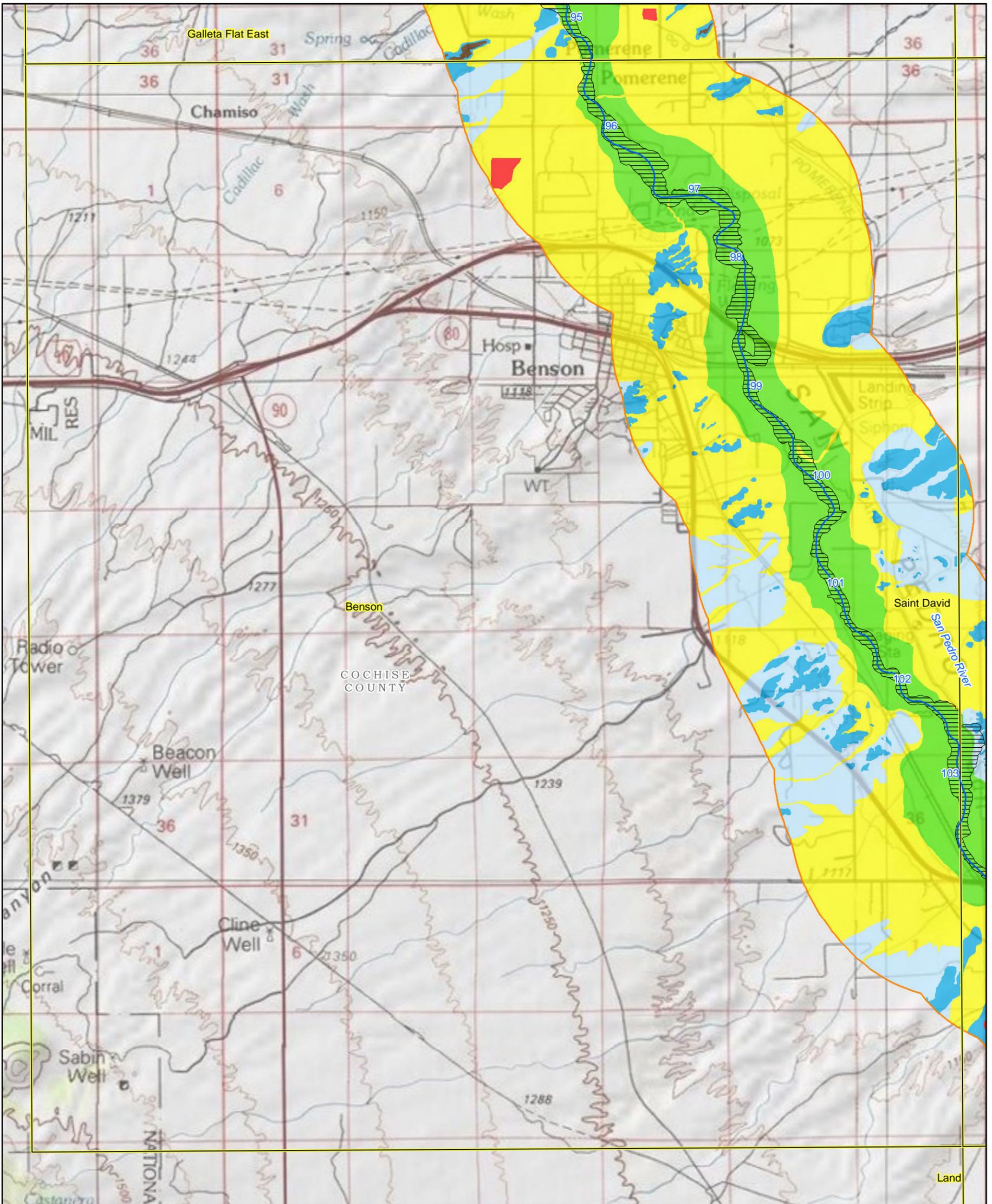


Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





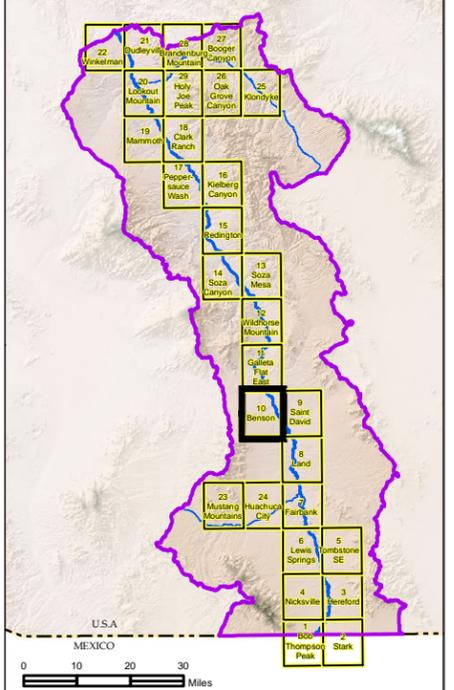
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Benson Quad (Page 10 of 29)

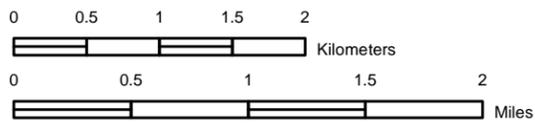
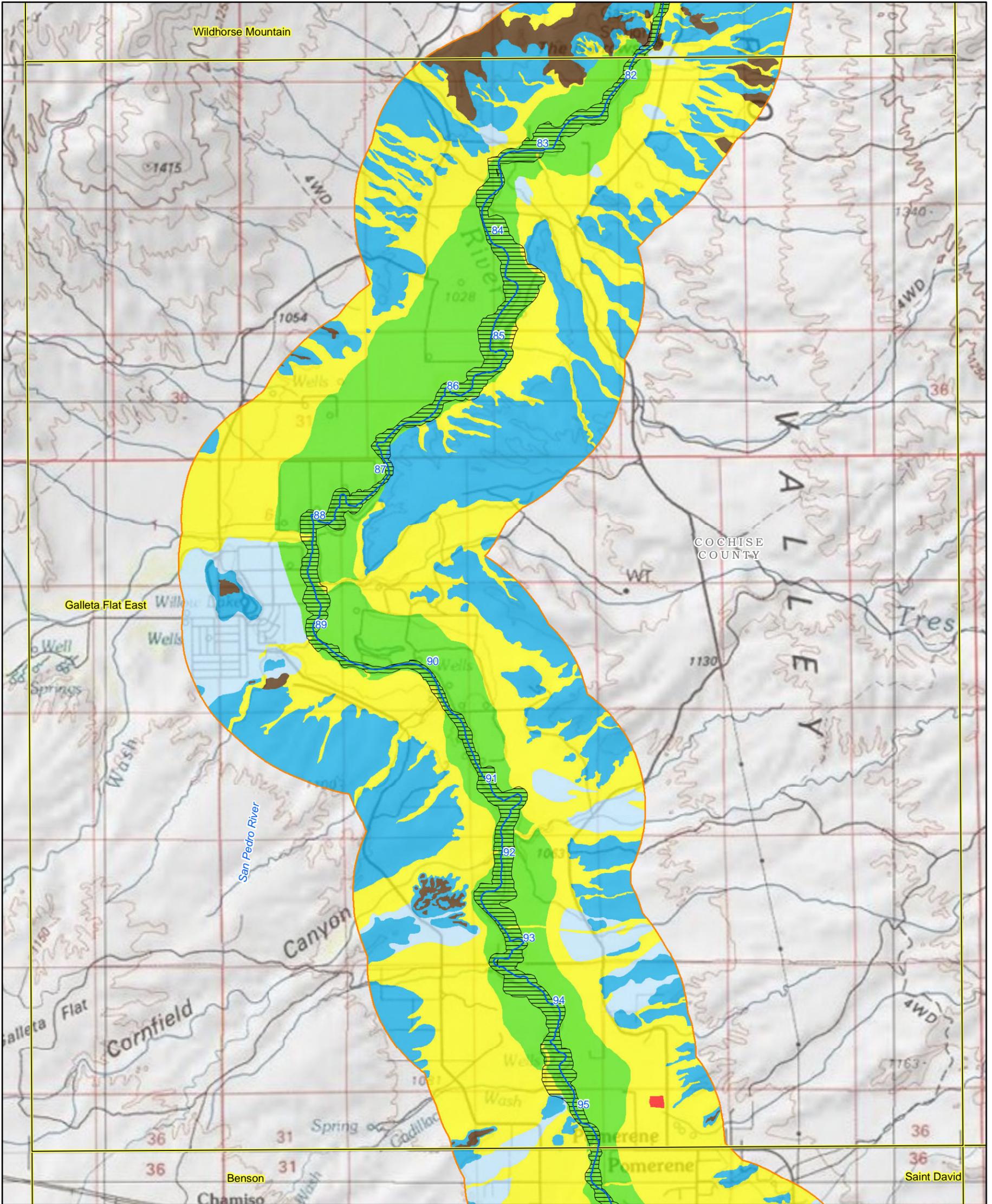
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Legend

-  Historical (1930s to 2007) Composite Active Floodplain Boundary
-  Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
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-  Tributary Holocene Alluvium (THA)
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-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

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-  San Pedro River Watershed
-  USGS Topo Quad Boundary
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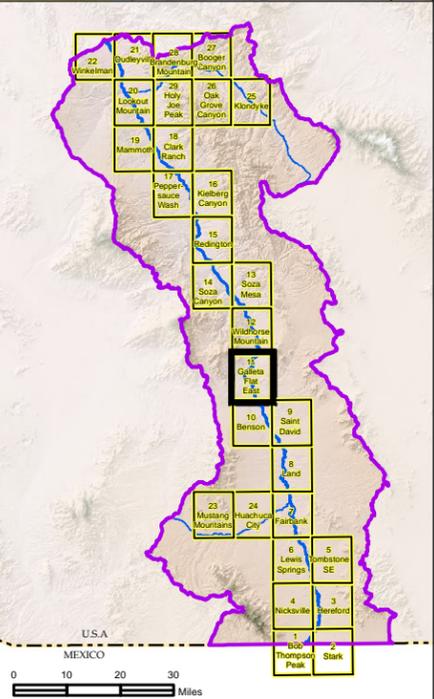
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Galleta Flat East Quad (Page 11 of 29)

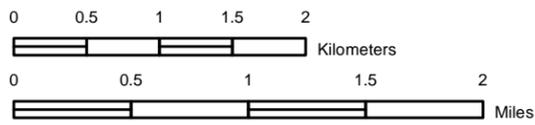
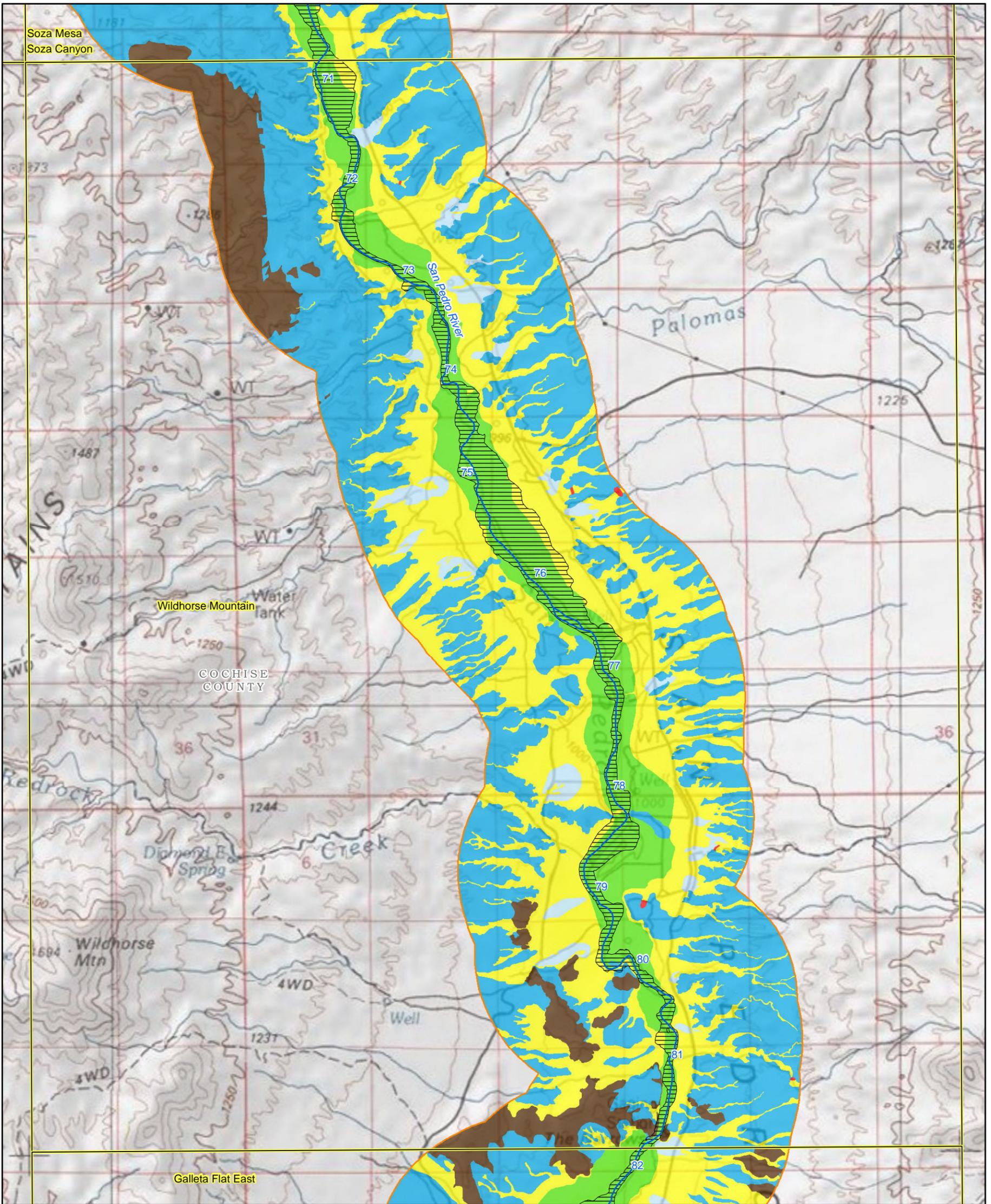
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-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

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-  USGS Topo Quad Boundary
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-  International Boundary





Appendix D - Attachment 2
Composite Active Floodplain Boundary
Wildhorse Mountain Quad (Page 12 of 29)

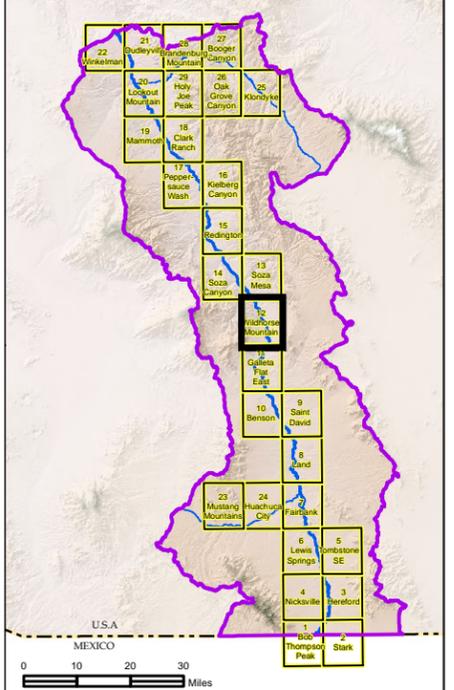


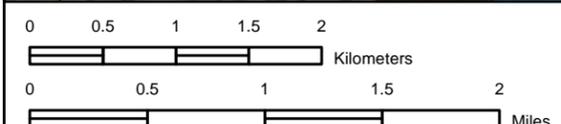
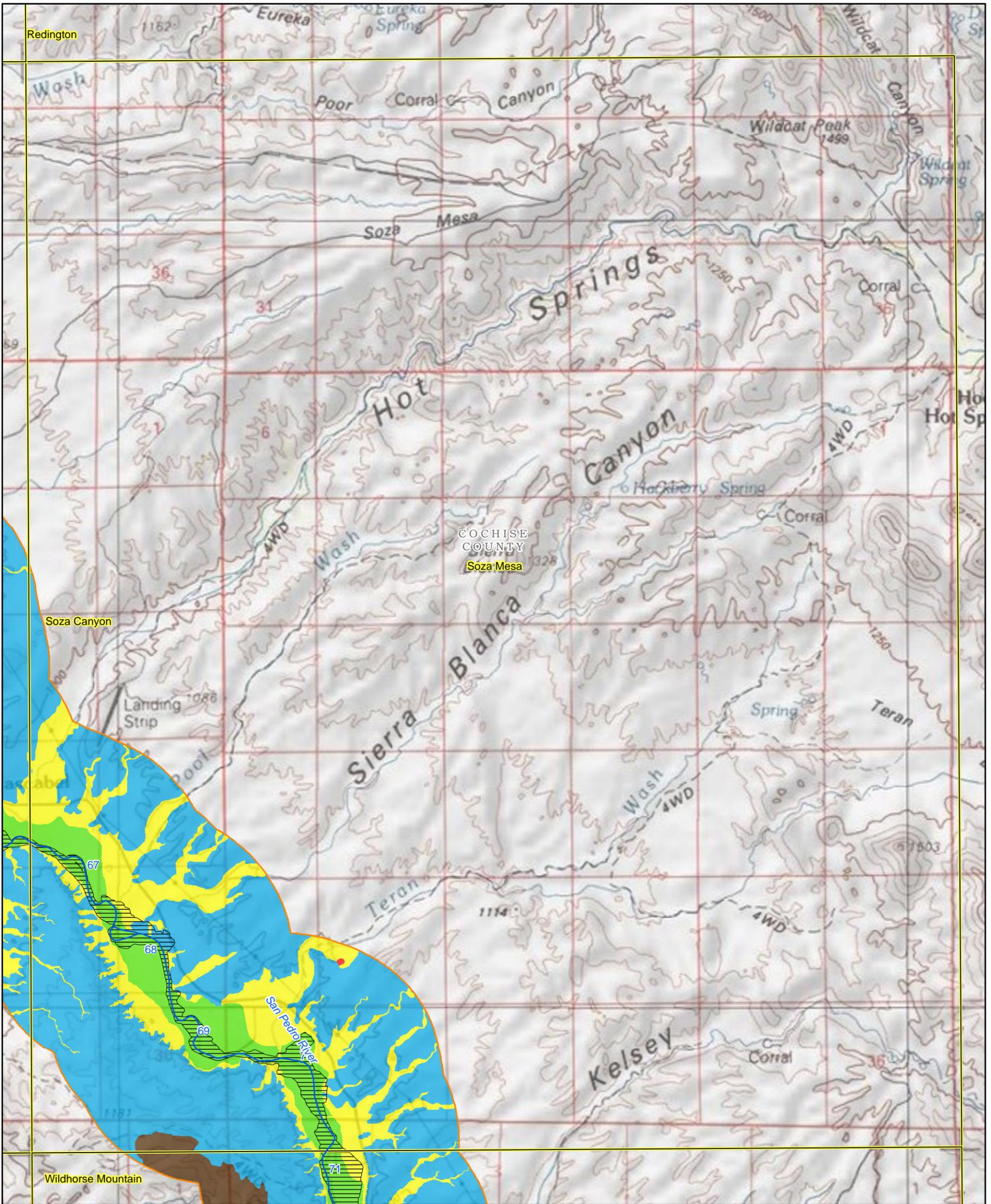
Legend

-  Historical (1930s to 2007) Composite Active Floodplain Boundary
-  Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
-  Floodplain Holocene Alluvium (FHA)
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Appendix D - Attachment 2 Composite Active Floodplain Boundary Soza Mesa Quad (Page 13 of 29)

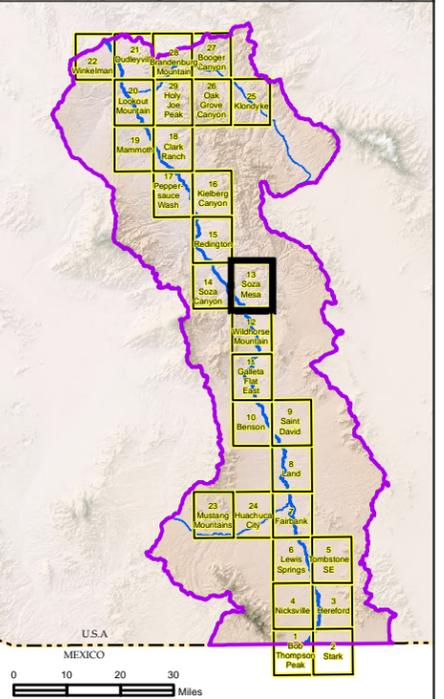
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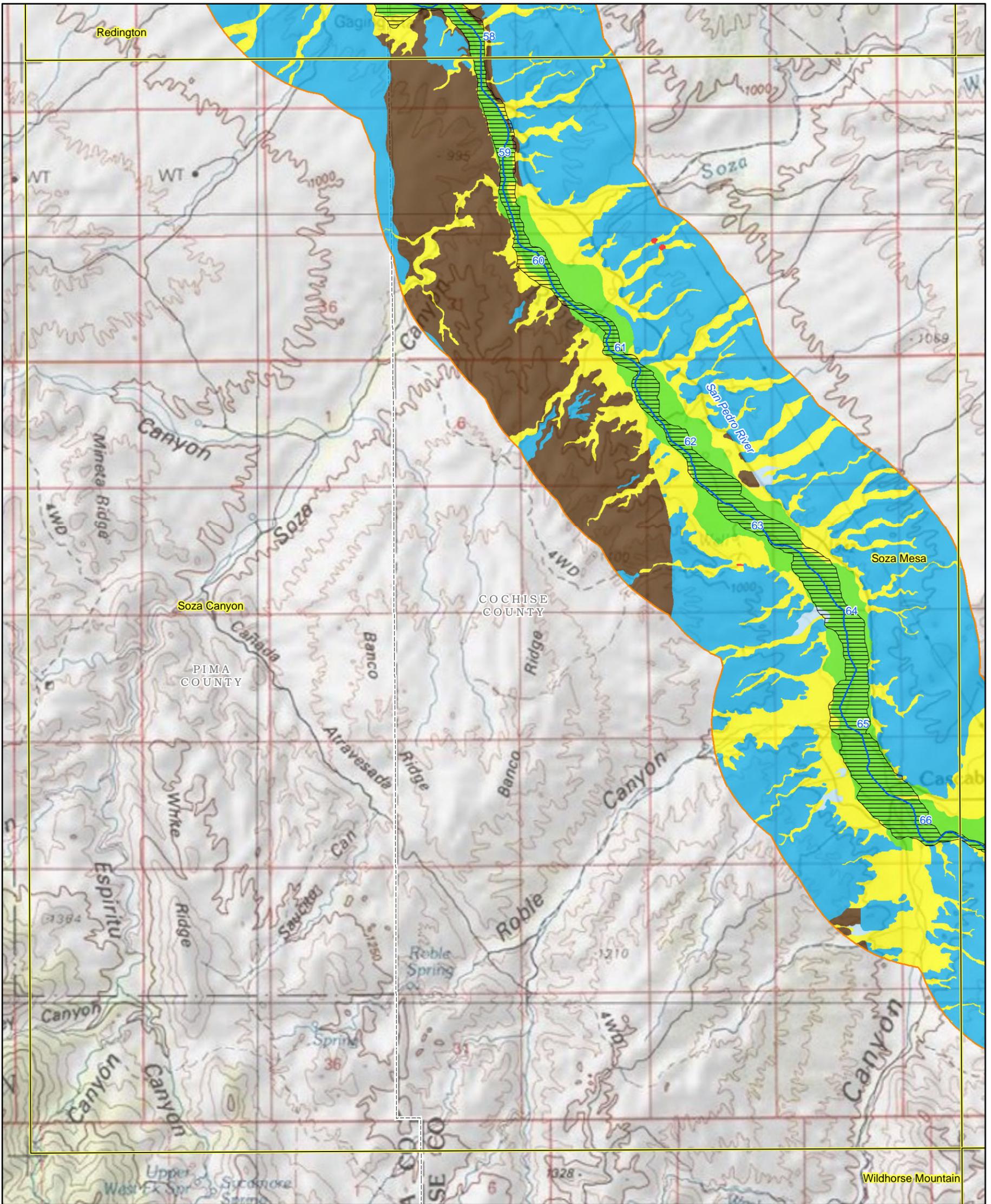


Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
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- International Boundary





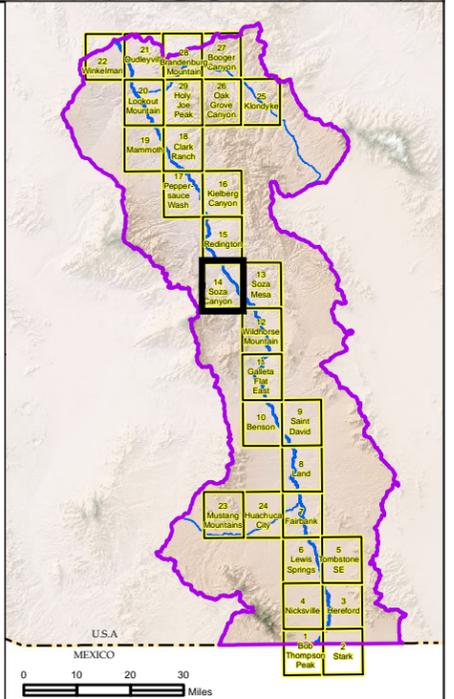
Appendix D - Attachment 2 Composite Active Floodplain Boundary Soza Canyon Quad (Page 14 of 29)

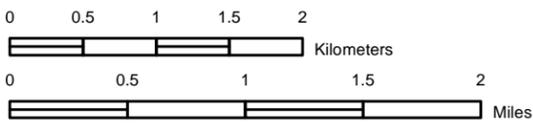
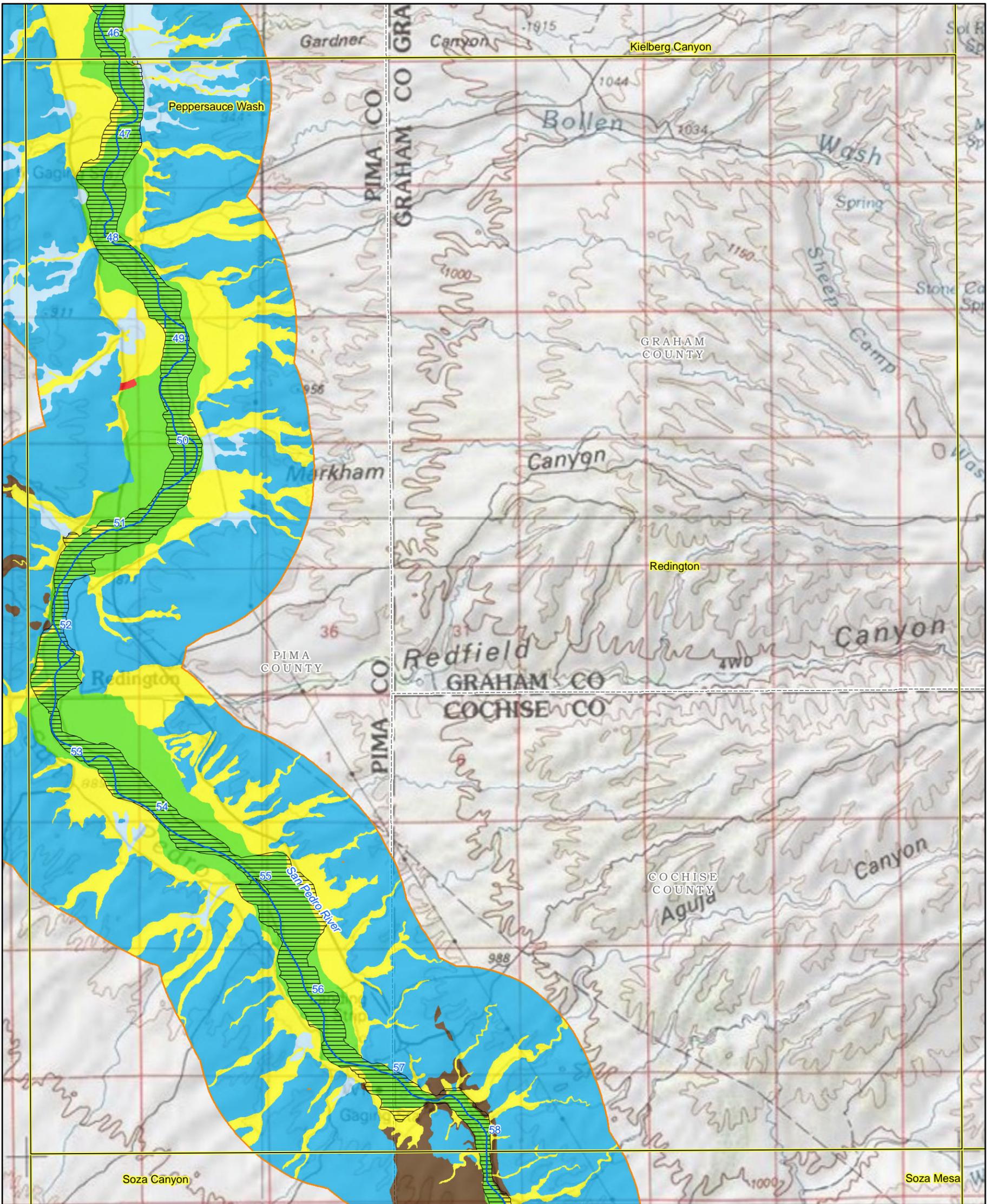
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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
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- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
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Appendix D - Attachment 2 Composite Active Floodplain Boundary *Redington Quad (Page 15 of 29)*

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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

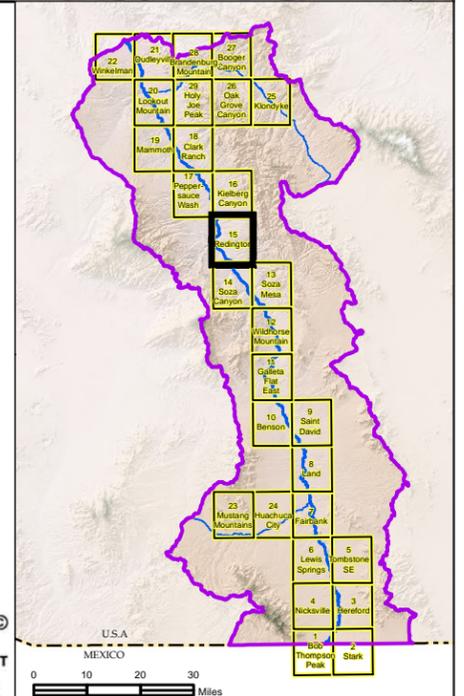
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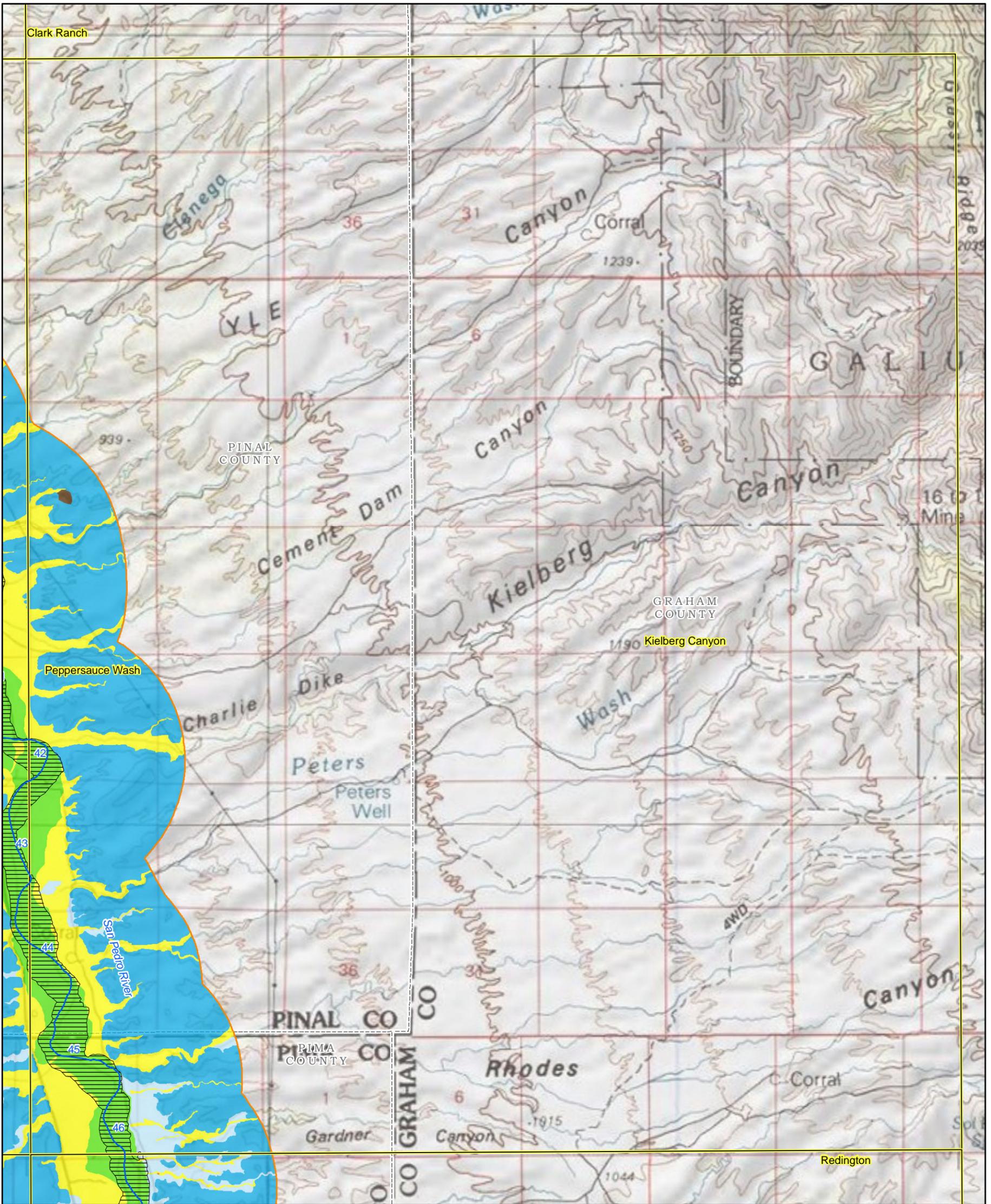
San Pedro River Watershed

USGS Topo Quad Boundary

County

International Boundary





Appendix D - Attachment 2 Composite Active Floodplain Boundary Kielberg Canyon Quad (Page 16 of 29)

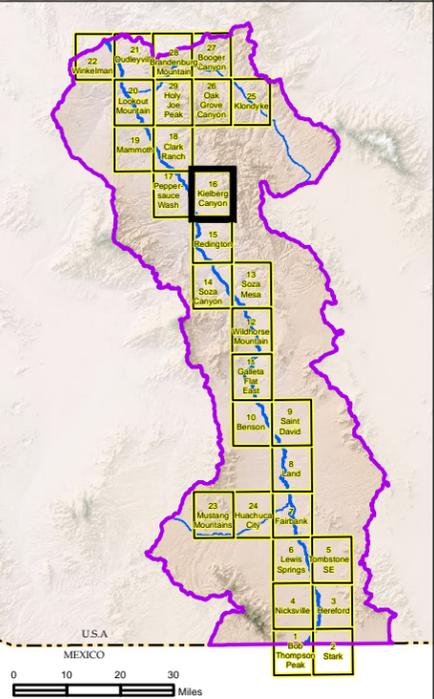


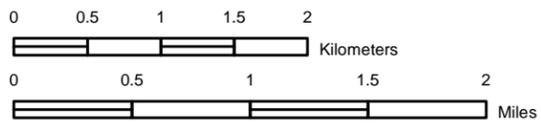
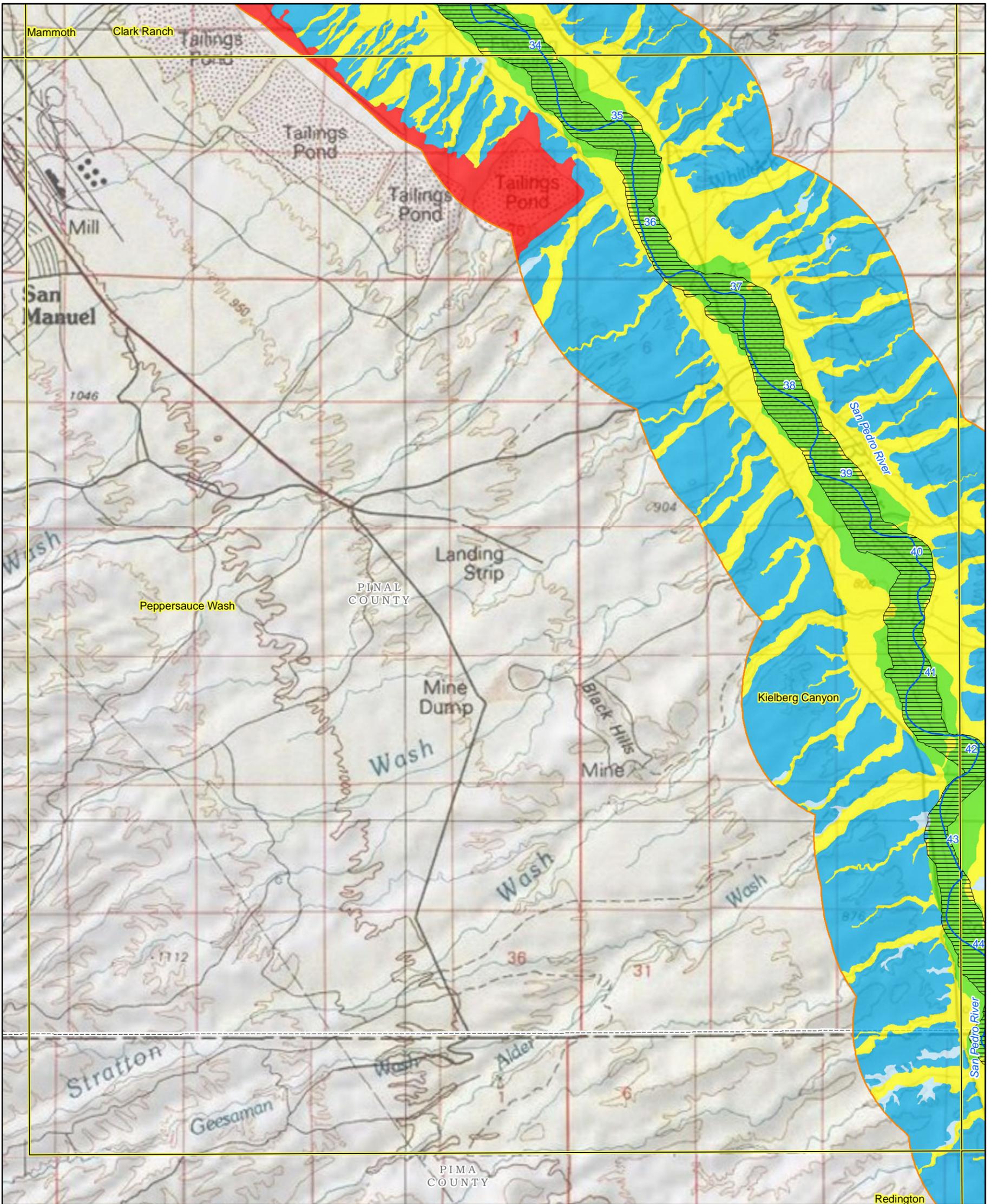
Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
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- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





Appendix D - Attachment 2 Composite Active Floodplain Boundary Peppersauce Wash Quad (Page 17 of 29)

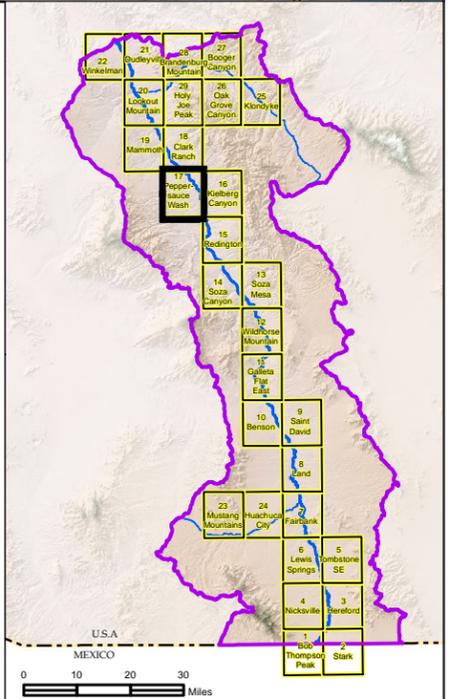


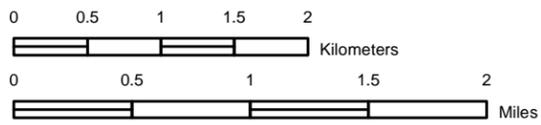
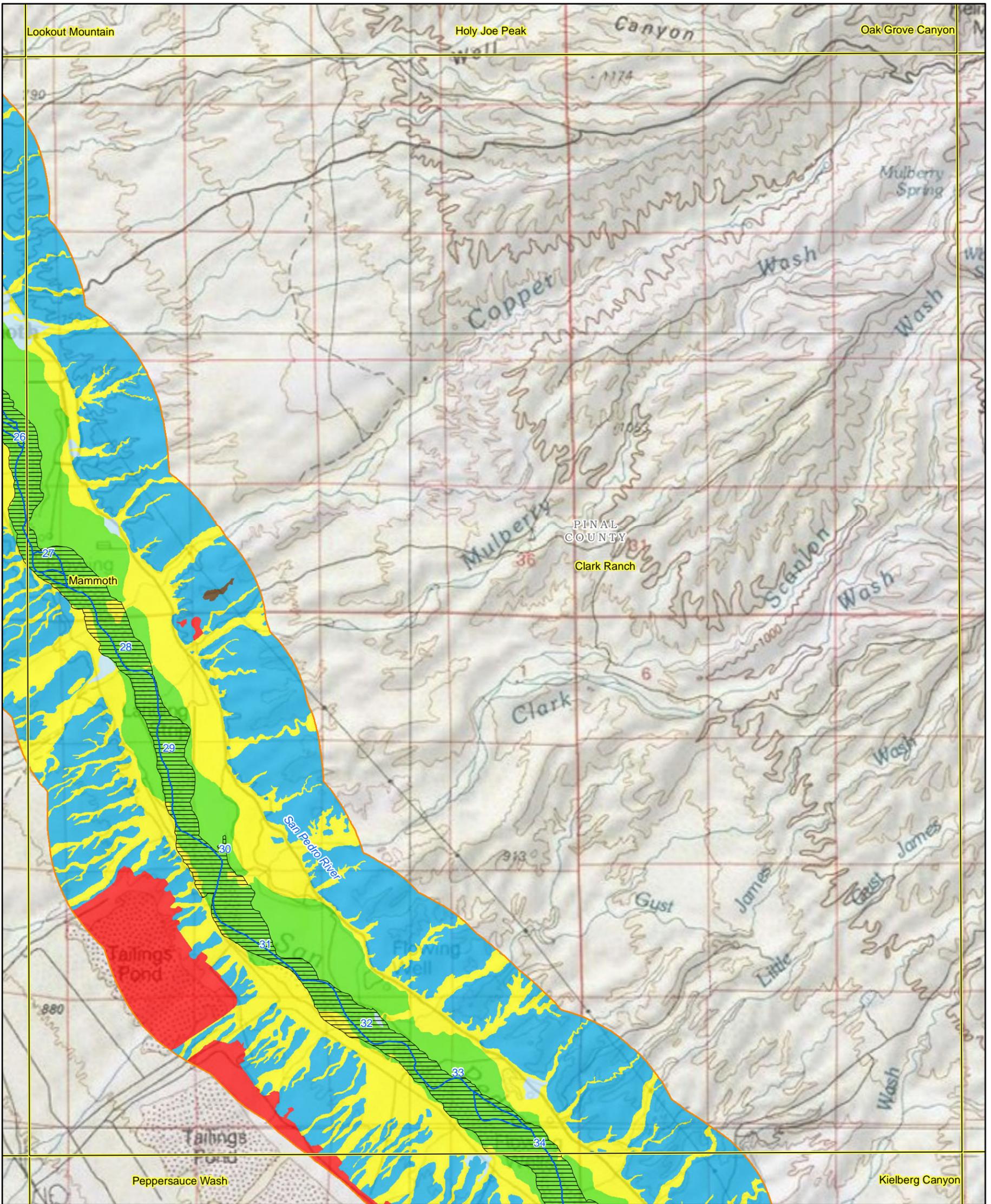
Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
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- San Pedro River Watershed
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- County
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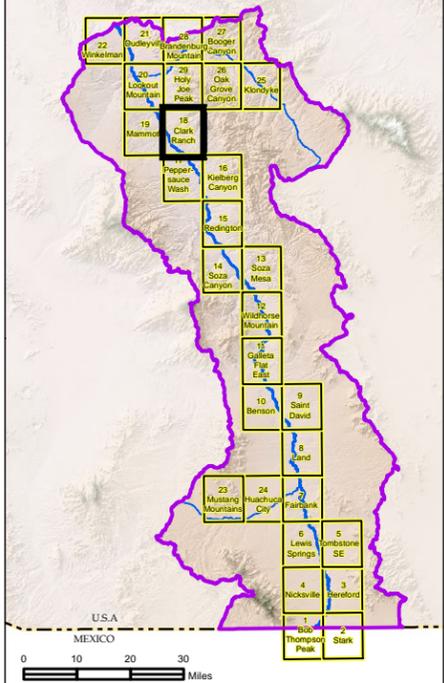
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Clark Ranch Quad (Page 18 of 29)

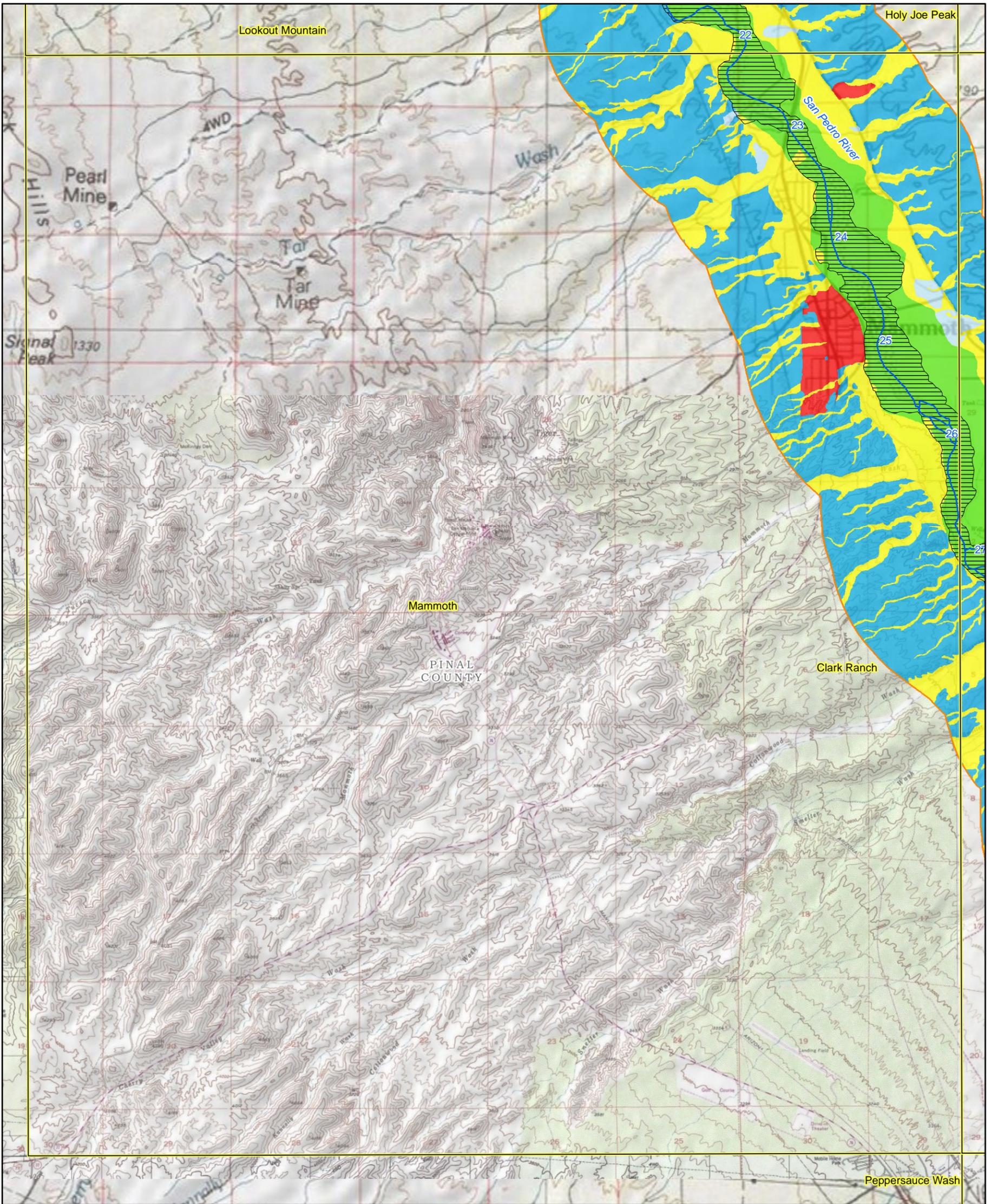
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Legend

-  Historical (1930s to 2007) Composite Active Floodplain Boundary
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- Generalized Geologic Units**
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-  Tributary Holocene Alluvium (THA)
-  Holocene Basin Fill
-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

-  Major Stream and River Mile Locations
-  San Pedro River Watershed
-  USGS Topo Quad Boundary
-  County
-  International Boundary





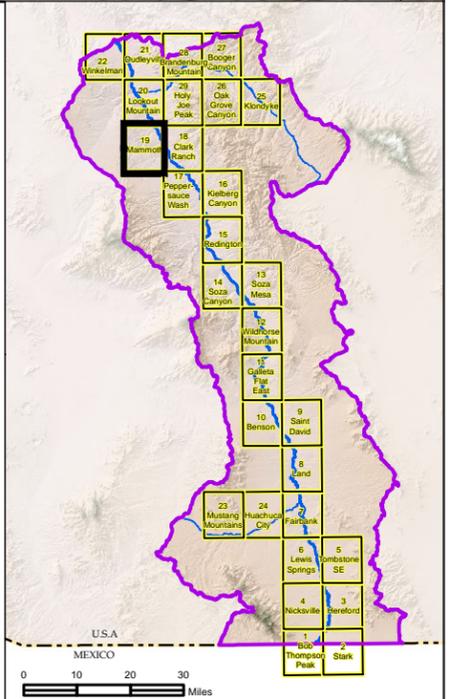
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Mammoth Quad (Page 19 of 29)

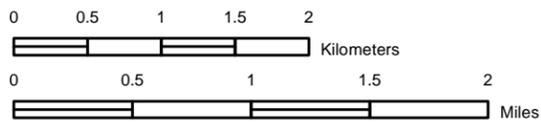
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Appendix D - Attachment 2
Composite Active Floodplain Boundary
Lookout Mountain Quad (Page 20 of 29)

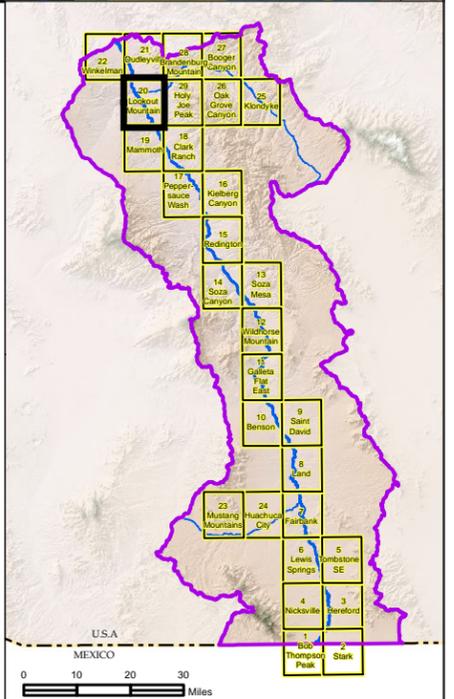


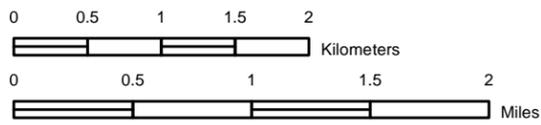
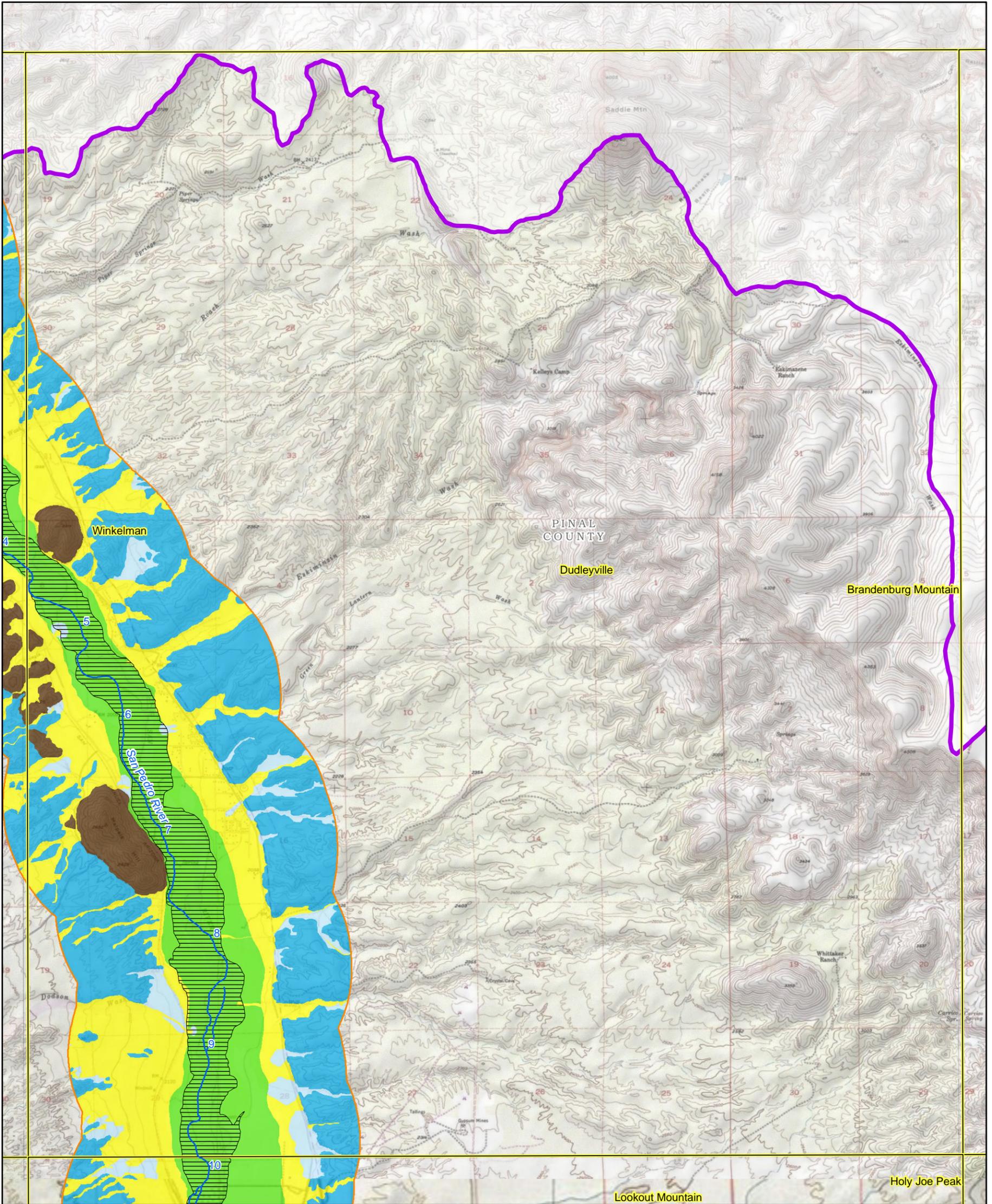
Legend

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-  Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
-  Floodplain Holocene Alluvium (FHA)
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-  Holocene Basin Fill
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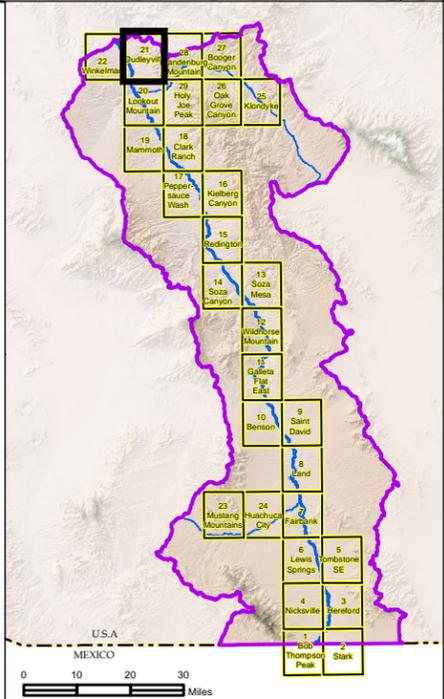
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Dudleyville Quad (Page 21 of 29)

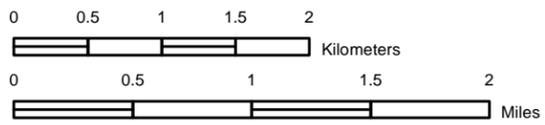
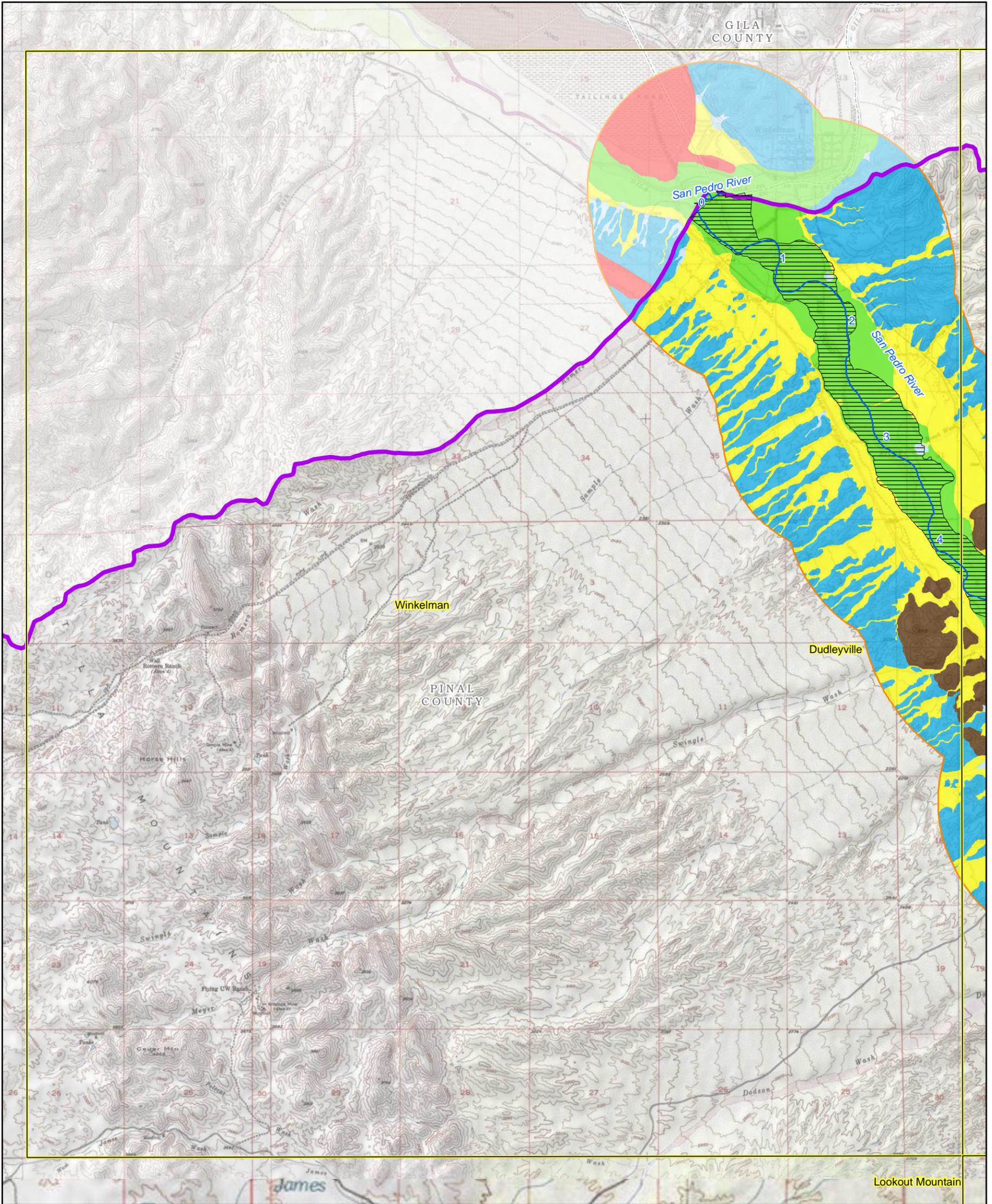
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-  Older Basin Fill
-  Bedrock
-  Disturbed (unit not determined)

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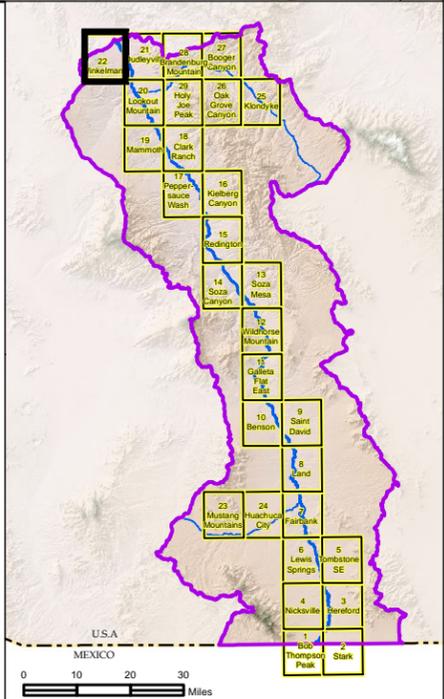
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Composite Active Floodplain Boundary
Winkelman Quad (Page 22 of 29)

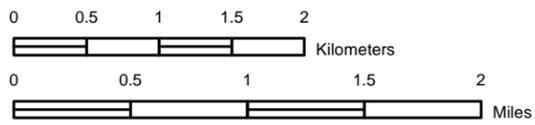
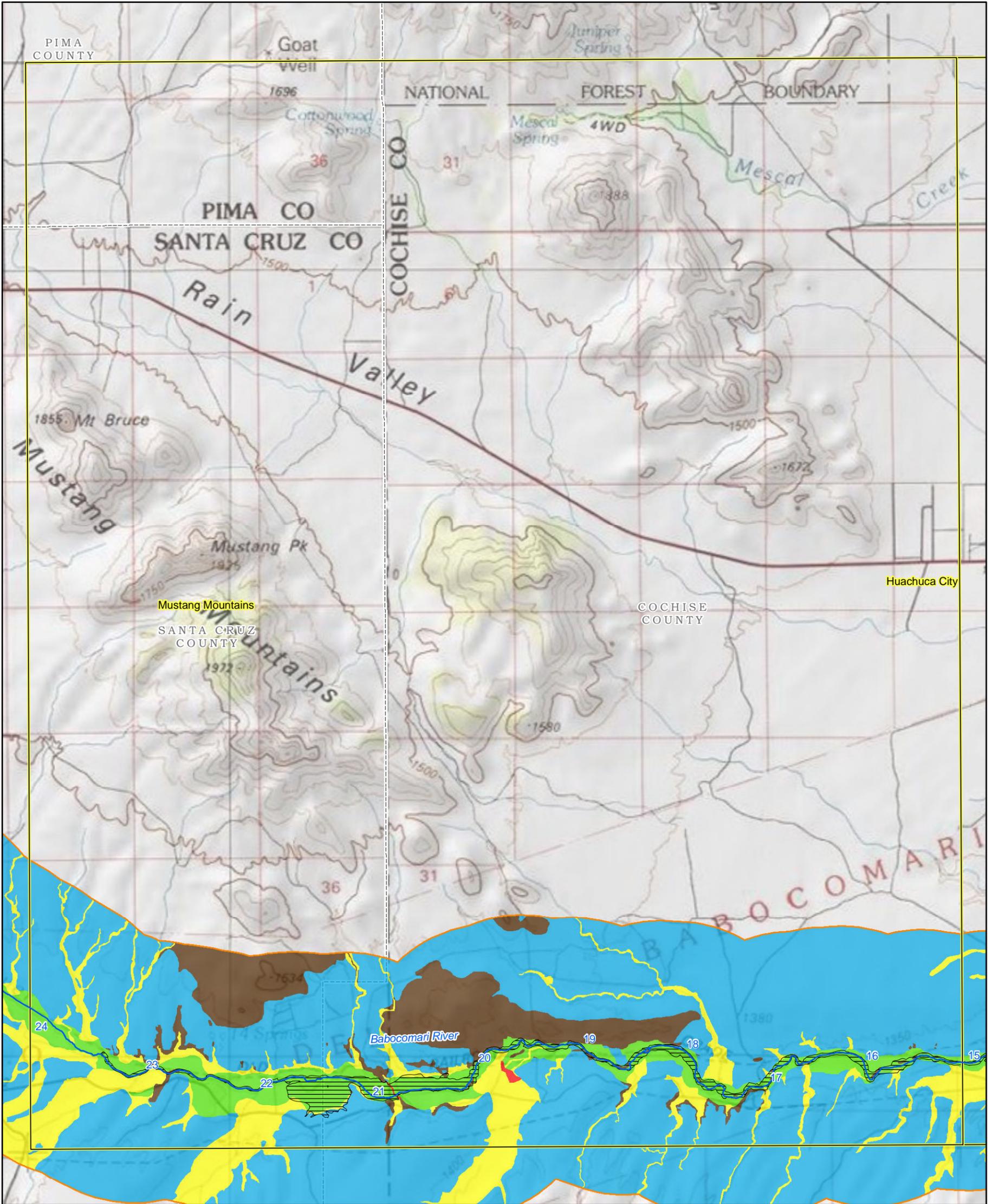
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Appendix D - Attachment 2
Composite Active Floodplain Boundary
Mustang Mountains Quad (Page 23 of 29)

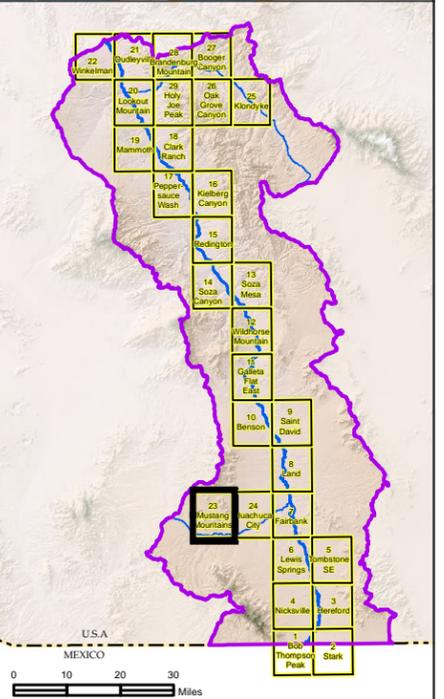


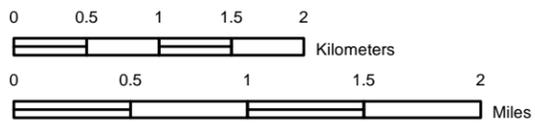
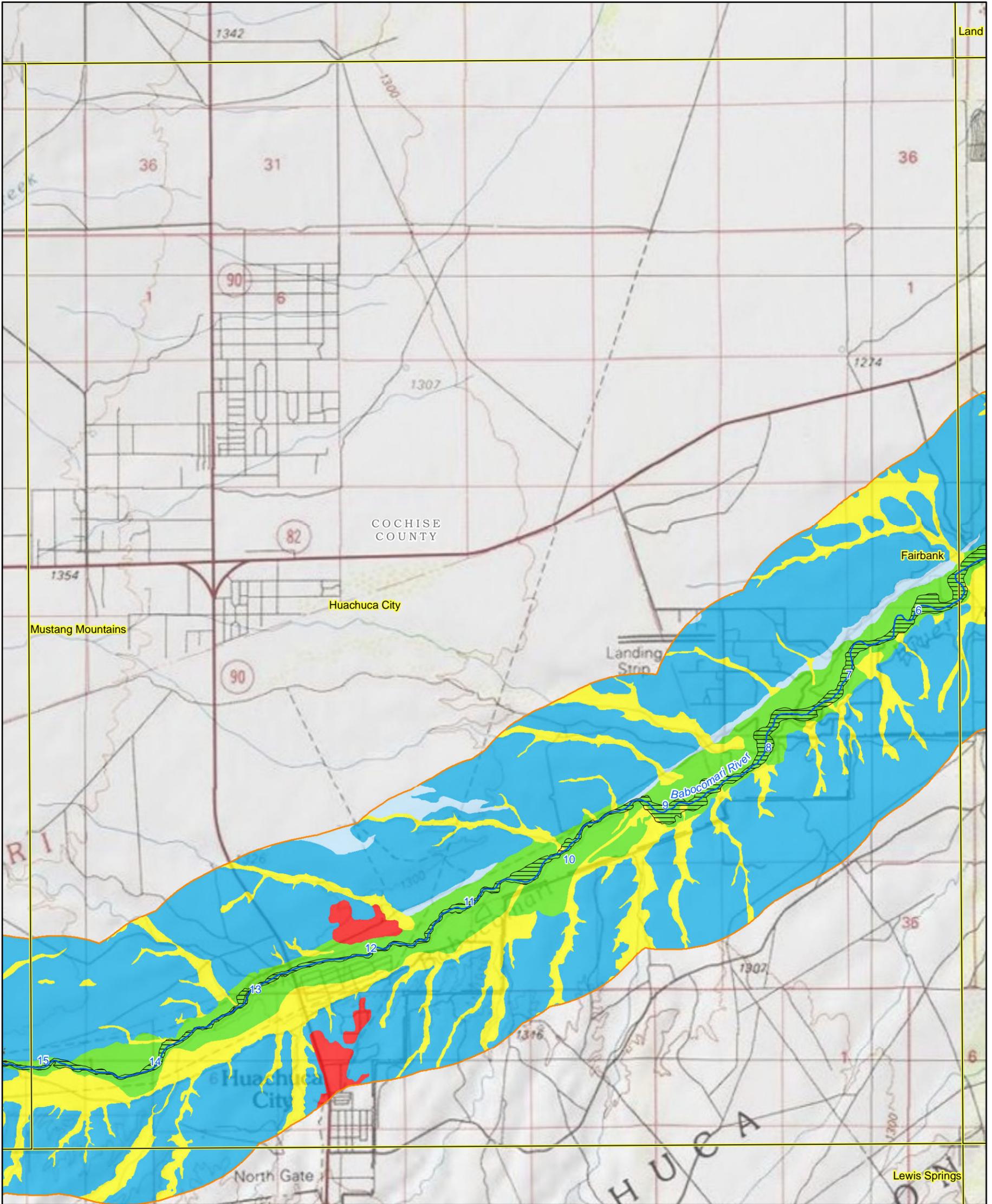
Legend

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-  Surficial Geology Mapped by AZGS (2009)
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-  San Pedro River Watershed
-  USGS Topo Quad Boundary
-  County
-  International Boundary





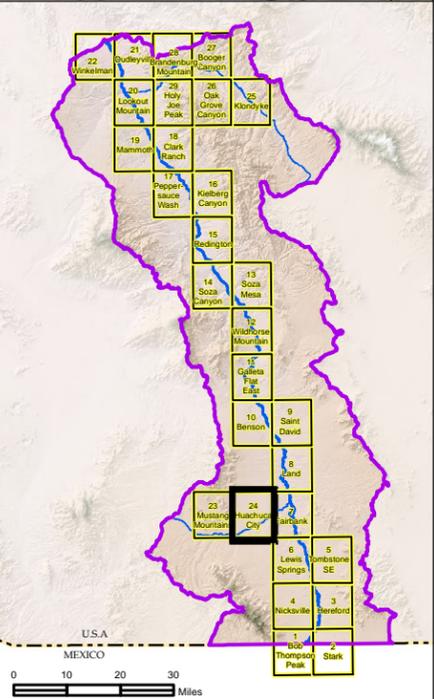
Appendix D - Attachment 2
Composite Active Floodplain Boundary
Huachuca City Quad (Page 24 of 29)

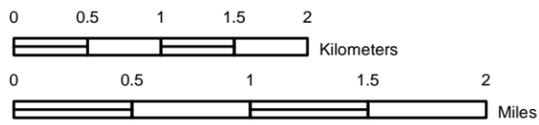
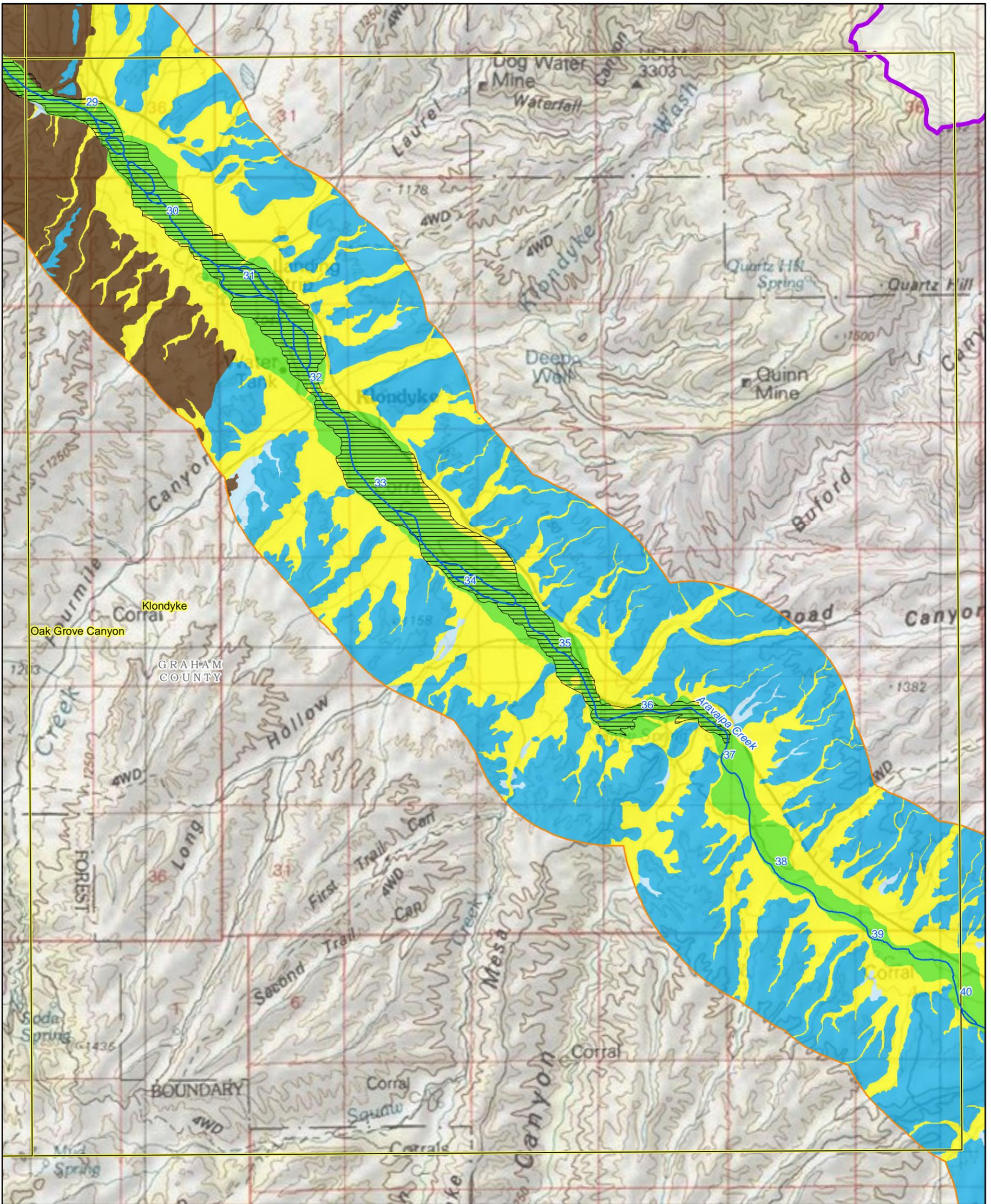
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- Surficial Geology Mapped by AZGS (2009)
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Composite Active Floodplain Boundary
Klondyke Quad (Page 25 of 29)

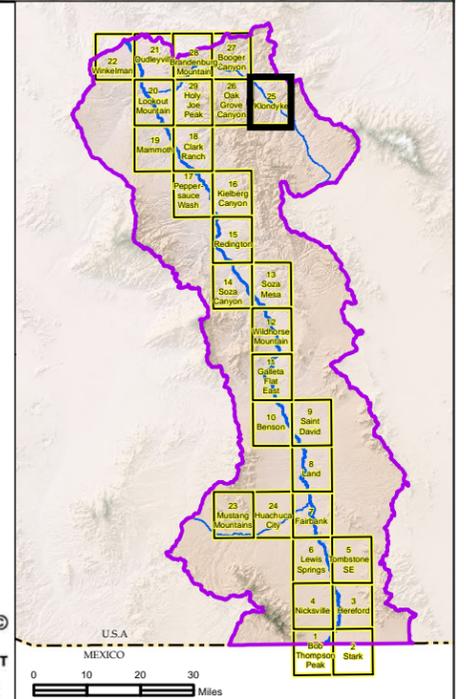
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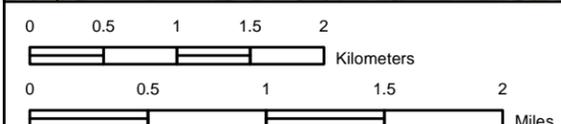


Legend

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- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





Appendix D - Attachment 2 Composite Active Floodplain Boundary Oak Grove Canyon Quad (Page 26 of 29)

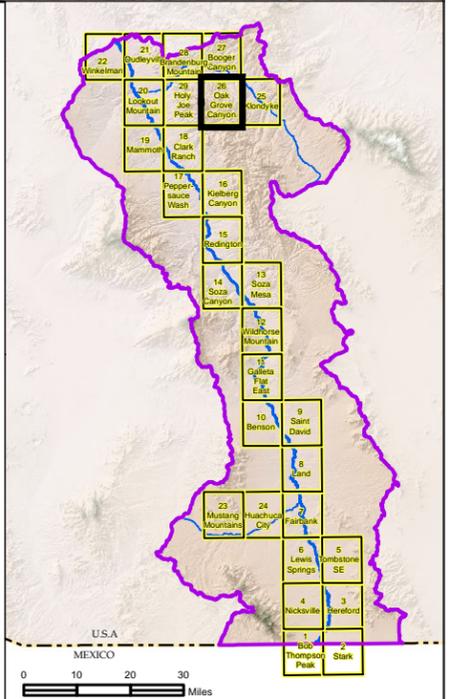
Response to Comments and Objections
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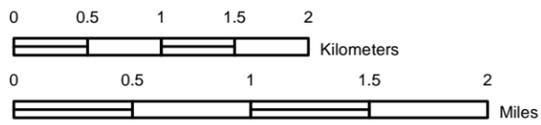
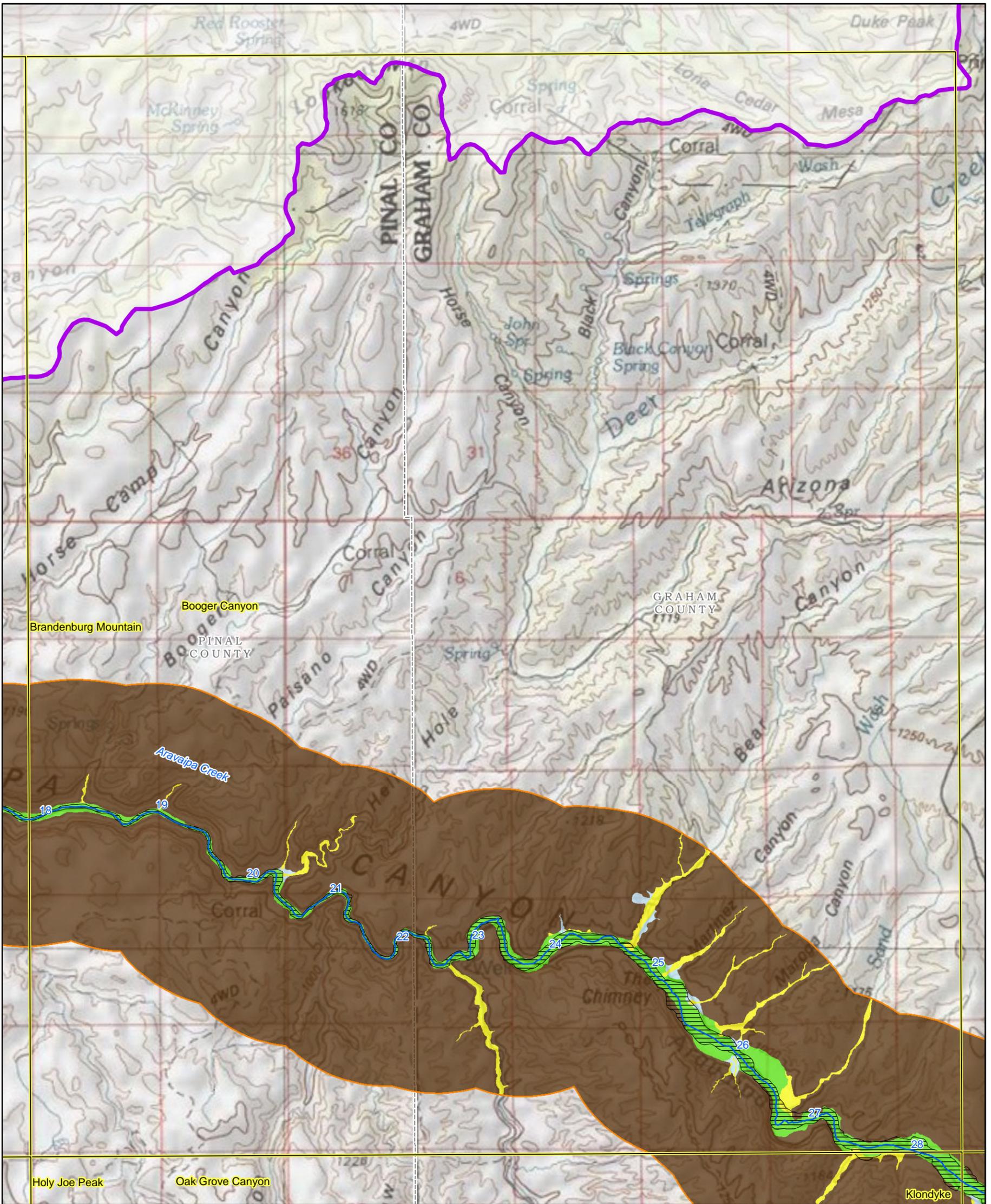


Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





Appendix D - Attachment 2 Composite Active Floodplain Boundary *Booger Canyon Quad (Page 27 of 29)*

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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

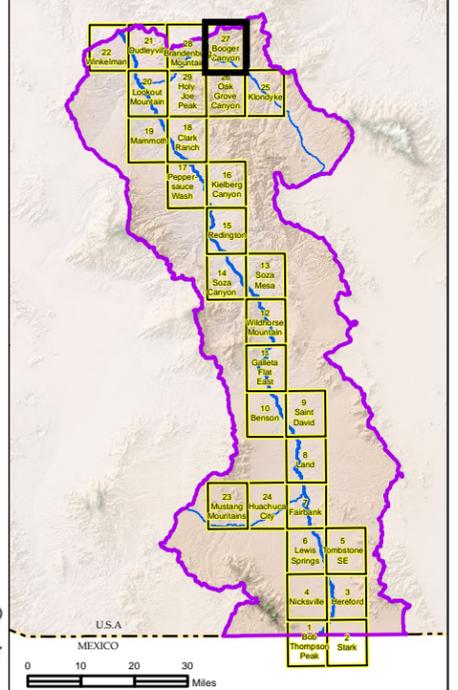
Major Stream and River Mile Locations

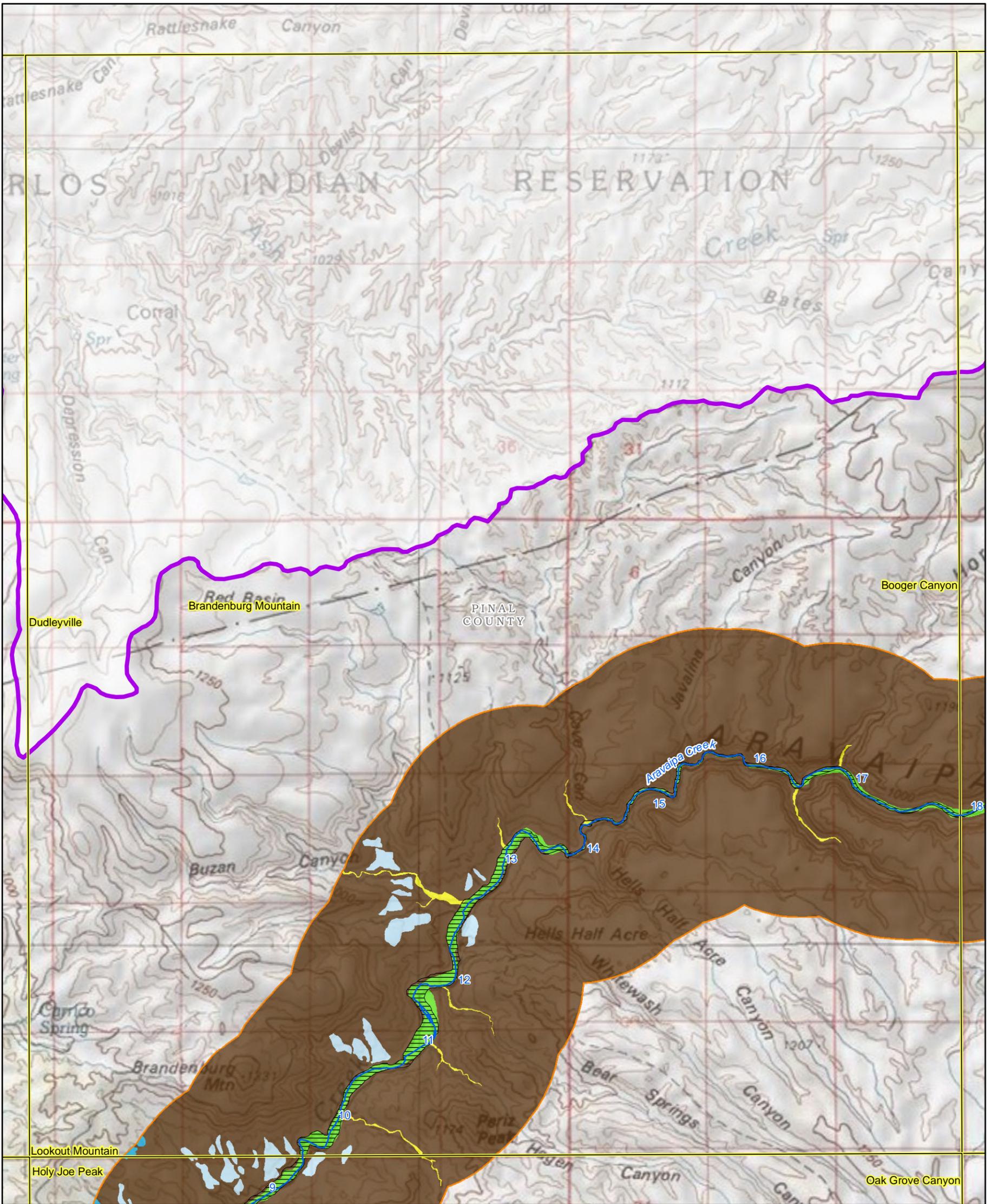
San Pedro River Watershed

USGS Topo Quad Boundary

County

International Boundary





Appendix D - Attachment 2
Composite Active Floodplain Boundary
Brandenburg Mountain Quad (Page 28 of 29)

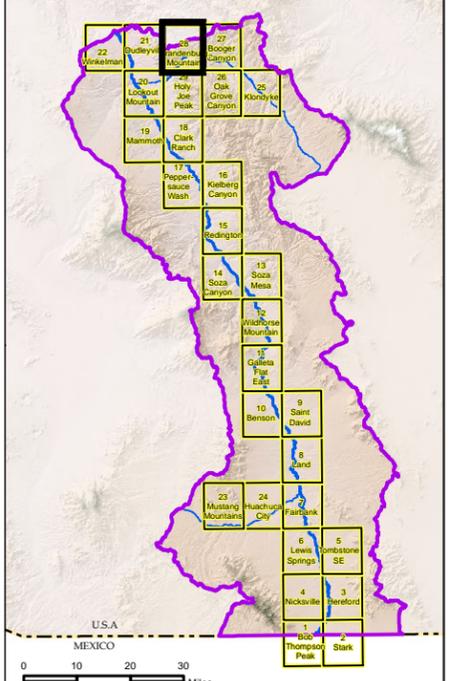


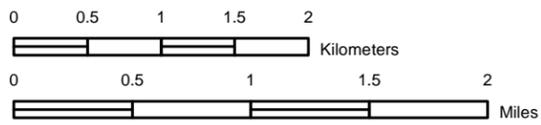
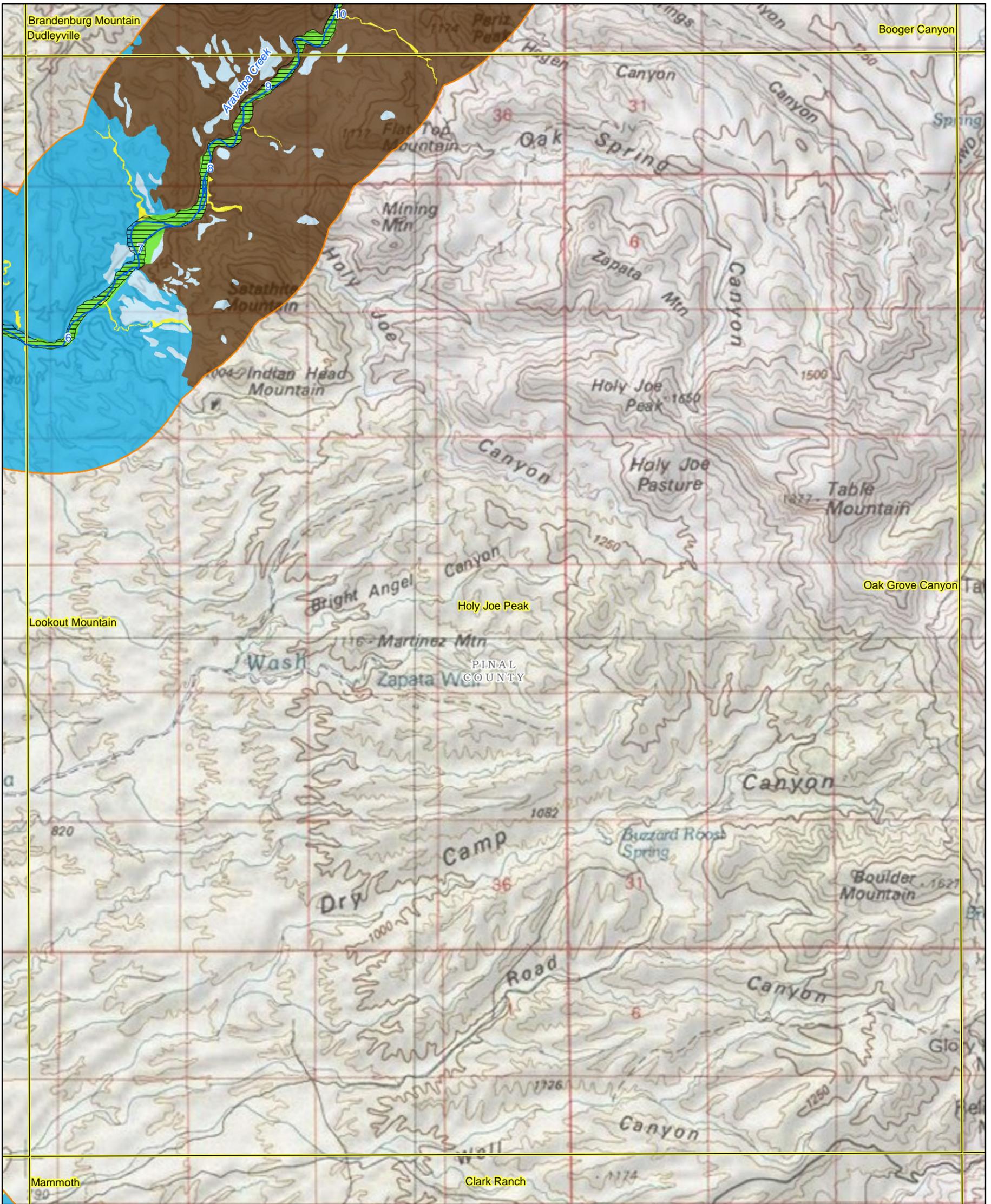
Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

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- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary





Appendix D - Attachment 2 Composite Active Floodplain Boundary *Holy Joe Peak Quad (Page 29 of 29)*

Response to Comments and Objections
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Legend

- Historical (1930s to 2007) Composite Active Floodplain Boundary
- Surficial Geology Mapped by AZGS (2009)
- Generalized Geologic Units**
- Floodplain Holocene Alluvium (FHA)
- Tributary Holocene Alluvium (THA)
- Holocene Basin Fill
- Older Basin Fill
- Bedrock
- Disturbed (unit not determined)

- Major Stream and River Mile Locations
- San Pedro River Watershed
- USGS Topo Quad Boundary
- County
- International Boundary

