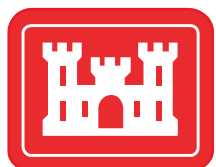


Middle Rio Grande, Isleta Reach Habitat Restoration Analysis

*Mapping of Completed Restoration
Projects, Contemporary Vegetation, Modeled
Floodplain Inundation, and Historic
Fluvial Geomorphology*

April 2013

Prepared for



U.S. Army Corps
of Engineers
Albuquerque District

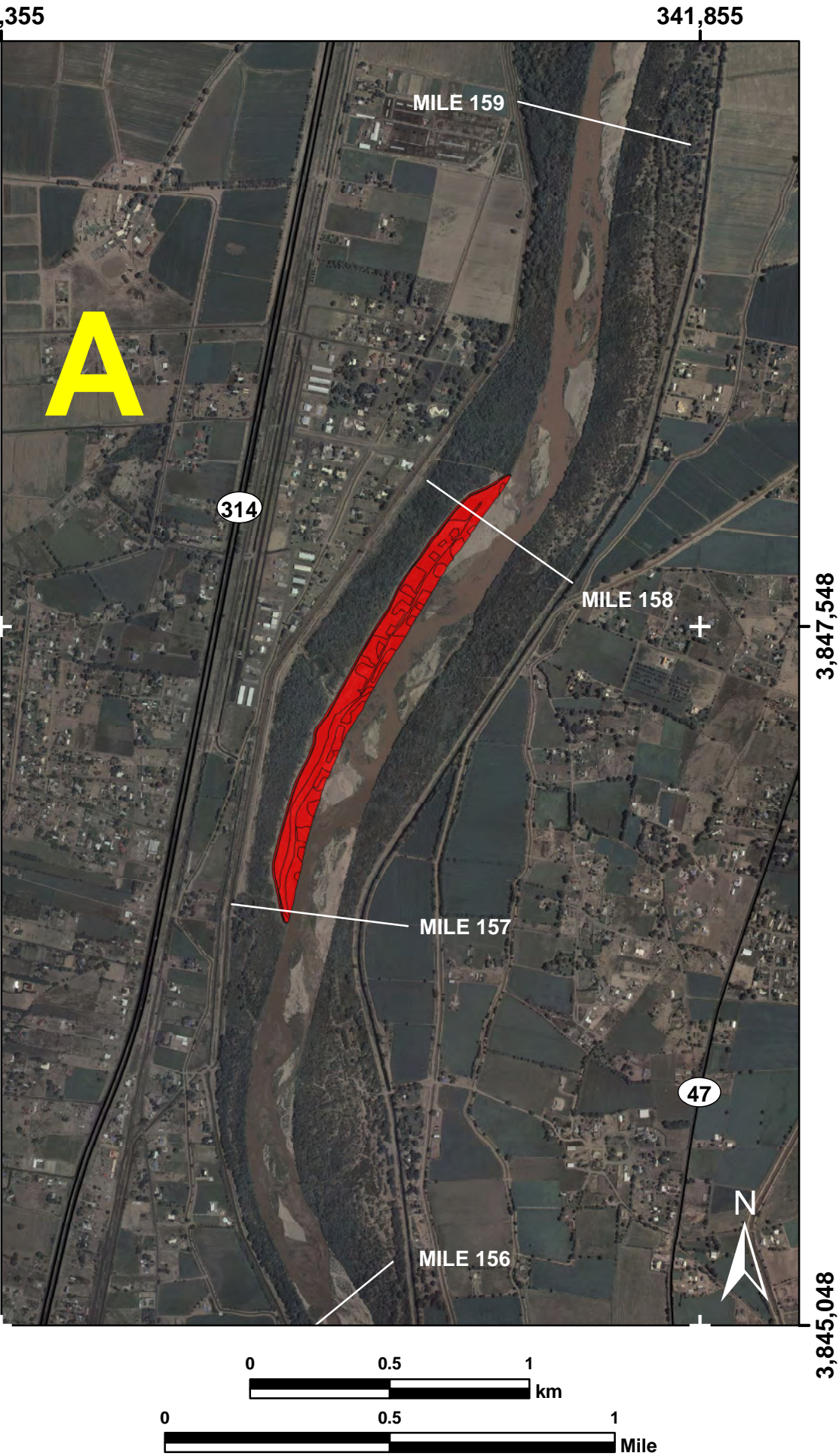
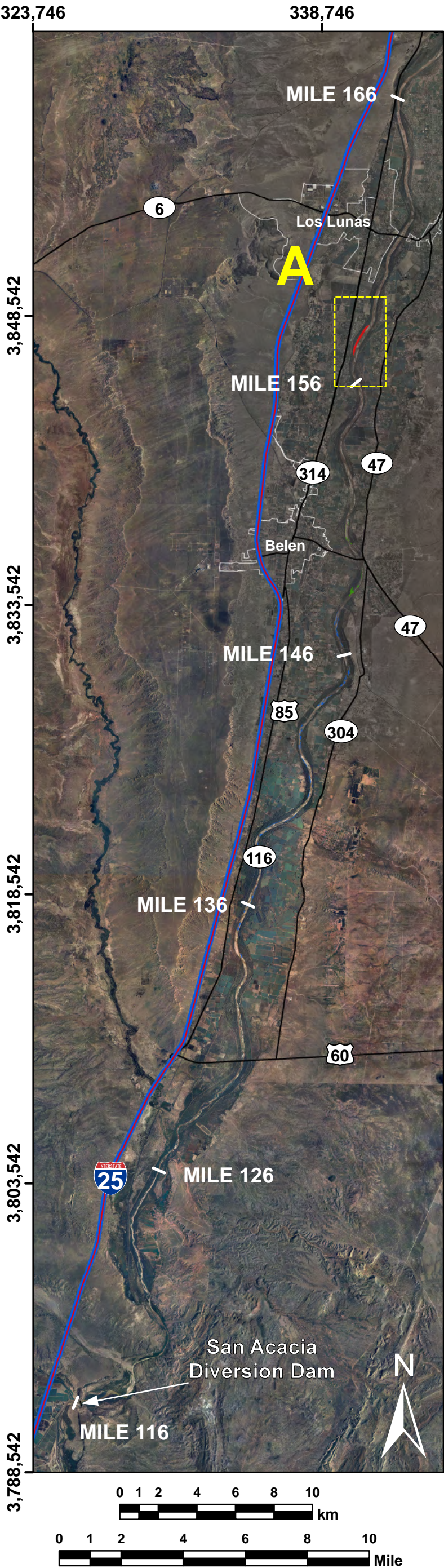
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Completed Under Delivery Order 20,
Contract No. W912PP-08-D-0009




Prepared by



TETRA TECH



Completed Projects

-  **USACE and USBR, Los Lunas Habitat Restoration Project; floodplain lowering and revegetation, 43.2 acres total. Construction completed in 2002.**
-  **NMISC Isleta Habitat Restoration Sites, Phase I as-builts; various treatments, 24.1 acres total. Construction completed 2009.**
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Notes

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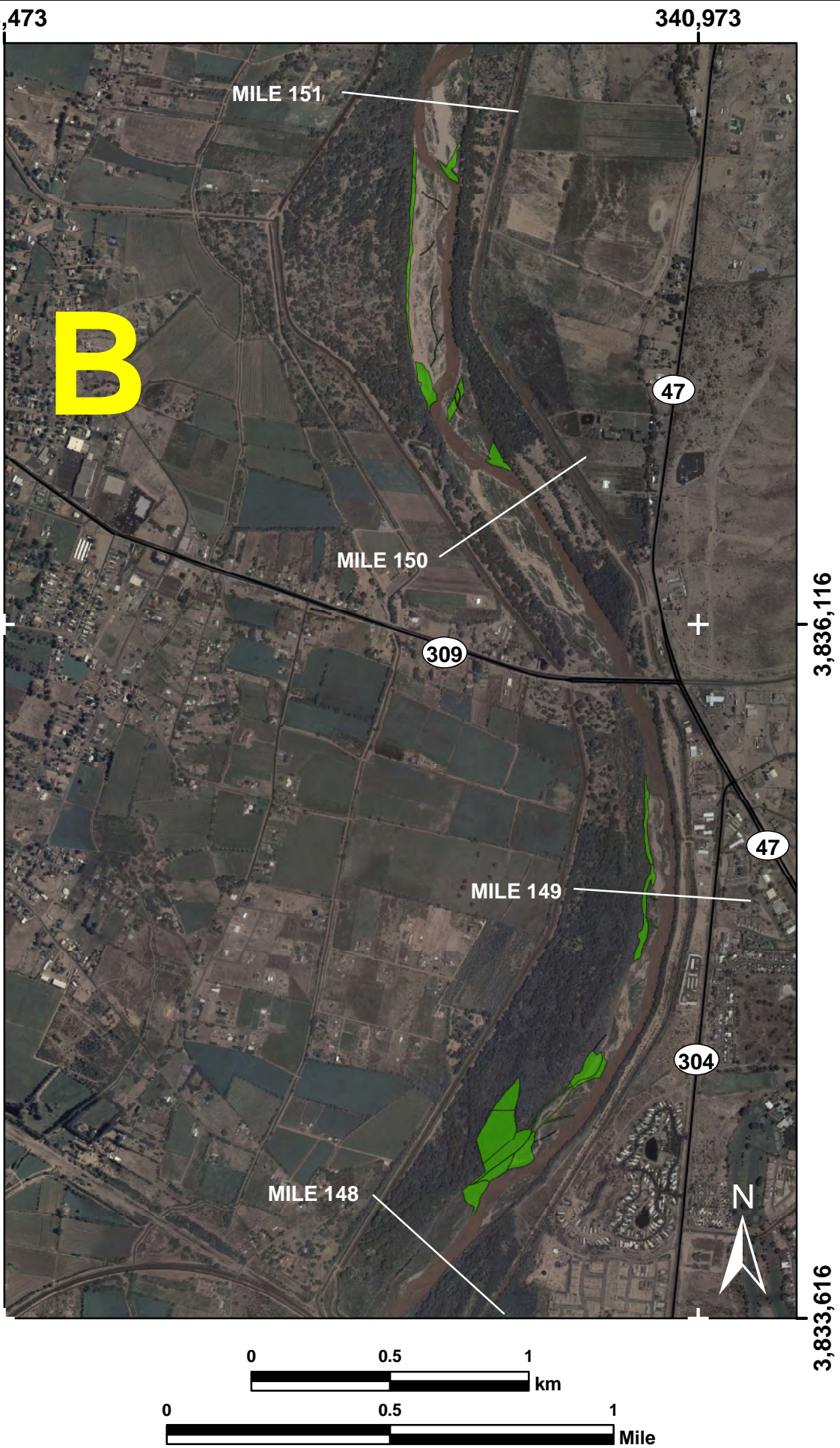
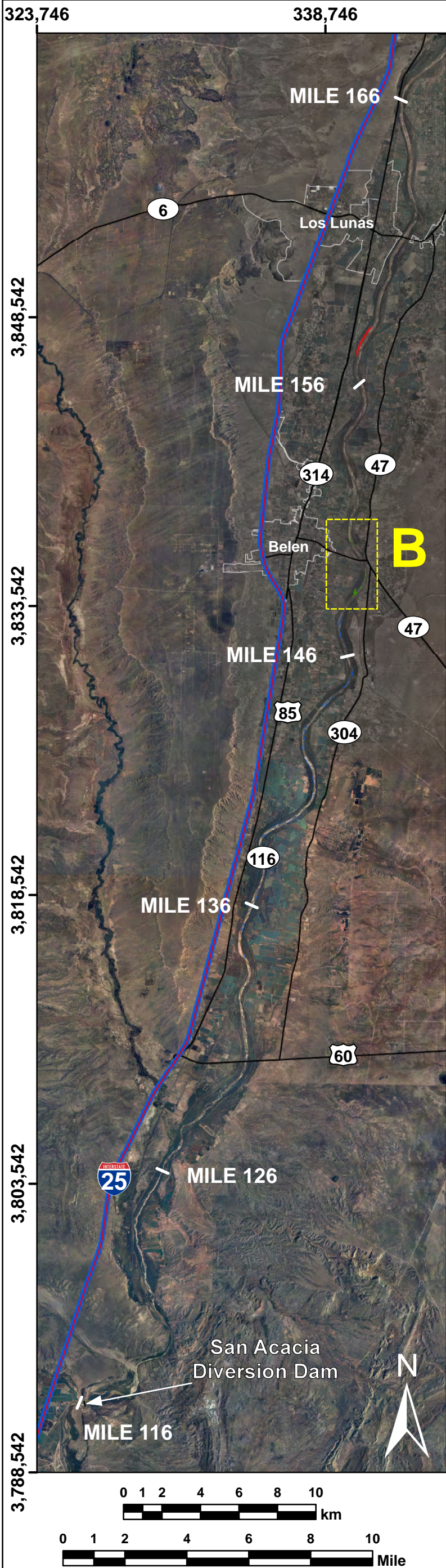
U.S. Army Corps
of Engineers
Albuquerque District

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**Middle Rio Grande Habitat
Restoration Site Mapping**

Isleta Reach Overview of Completed Projects



Completed Projects

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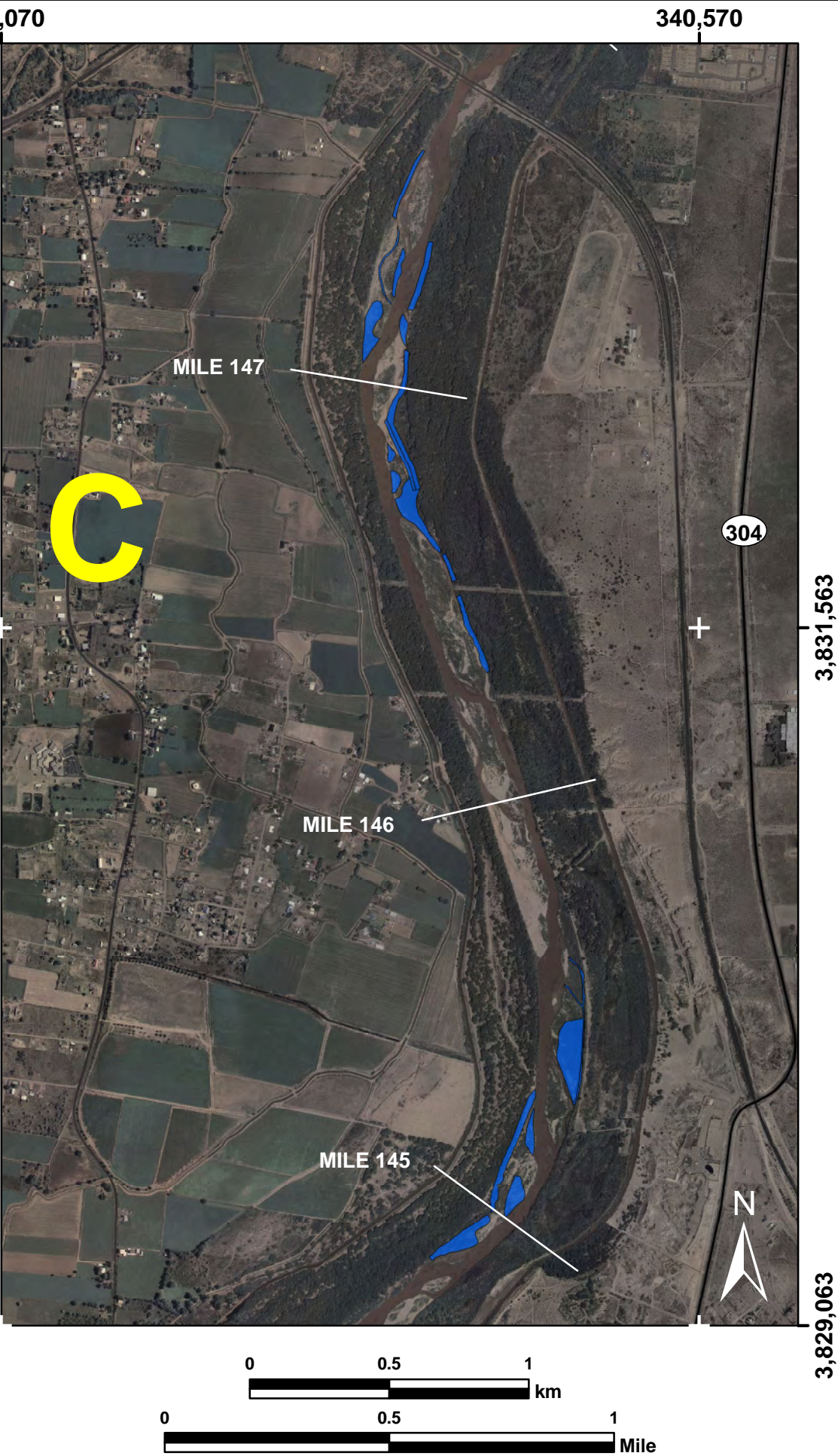
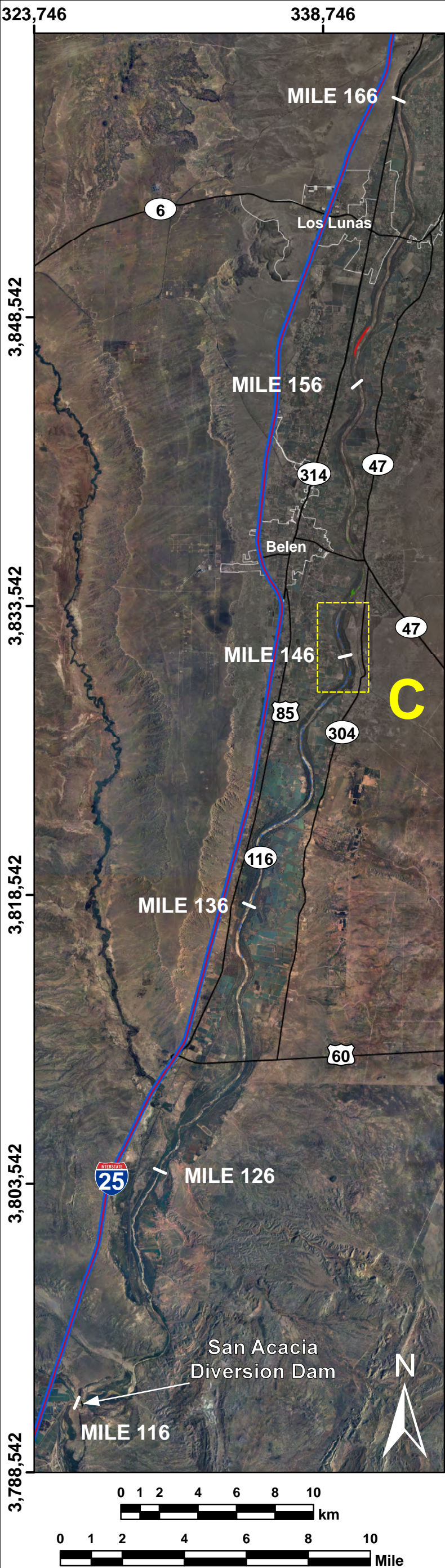
U.S. Army Corps of Engineers
Albuquerque District

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Middle Rio Grande Habitat
Restoration Site Mapping

Isleta Reach Overview of Completed Projects



Completed Projects

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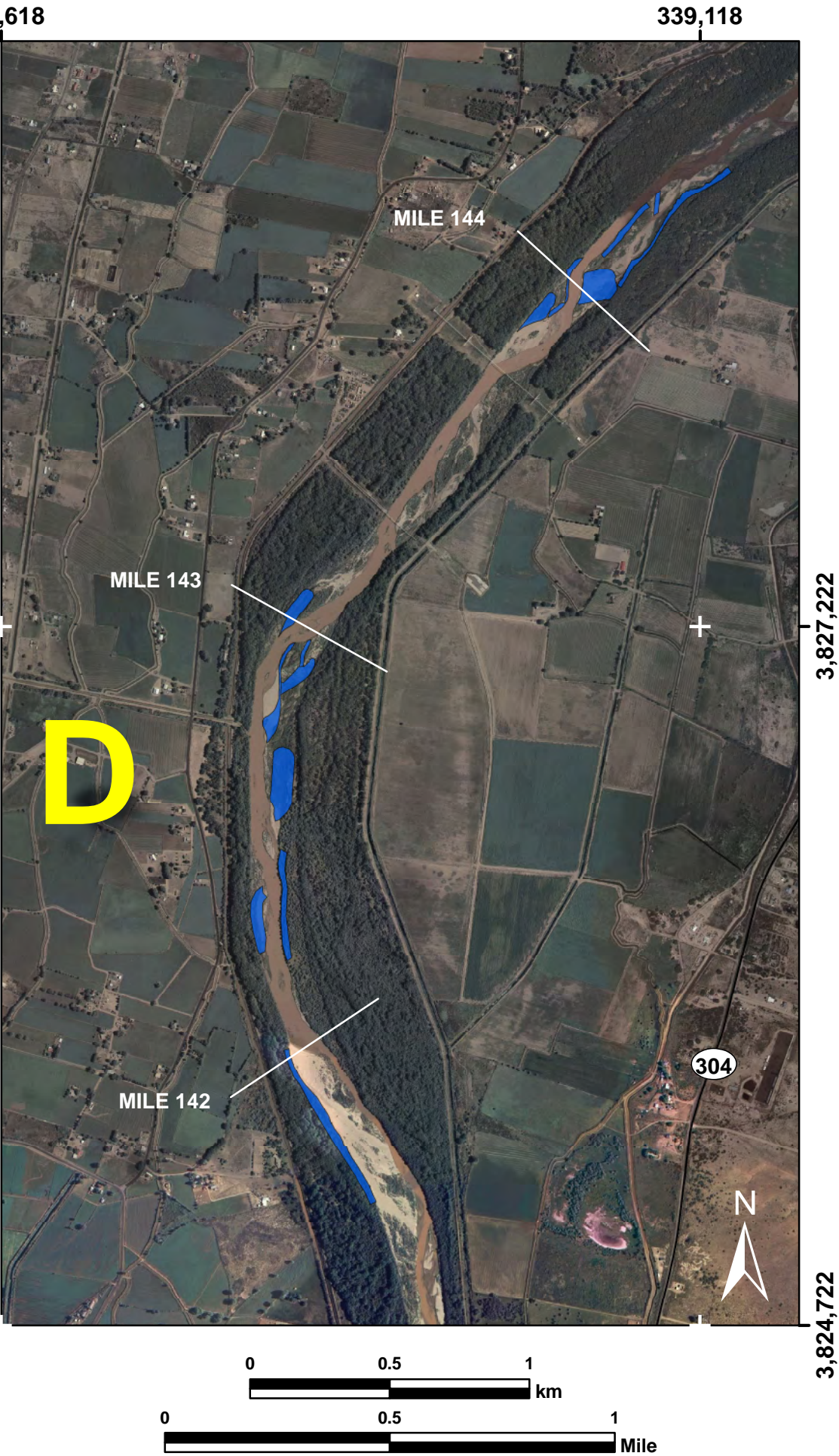
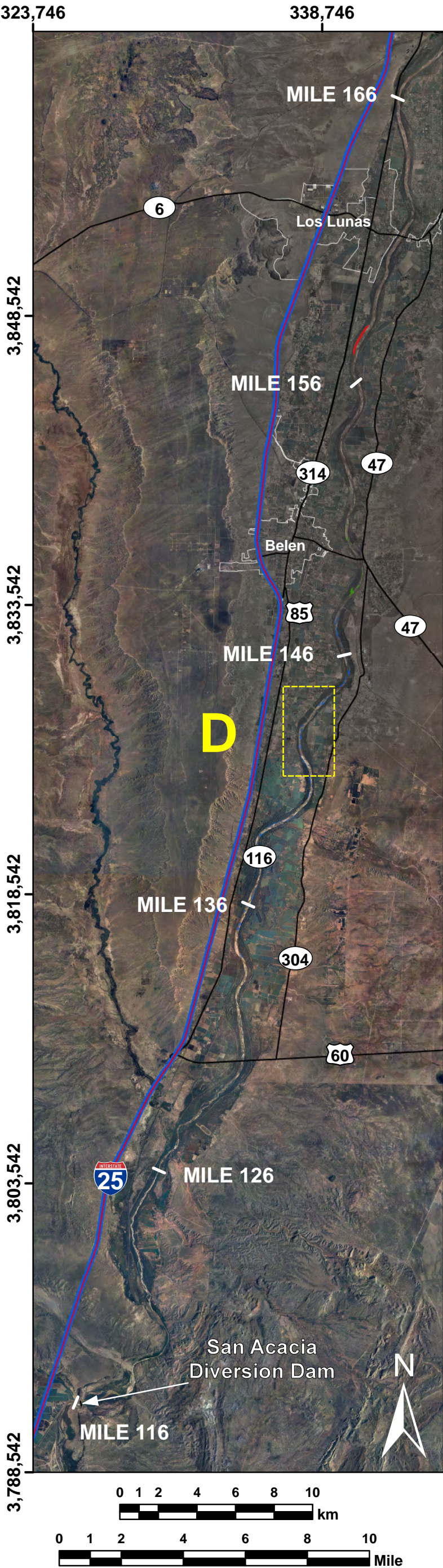
U.S. Army Corps of Engineers
Albuquerque District

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Middle Rio Grande Habitat
Restoration Site Mapping

Isleta Reach Overview of Completed Projects



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U.S. Army Corps of Engineers
Albuquerque District

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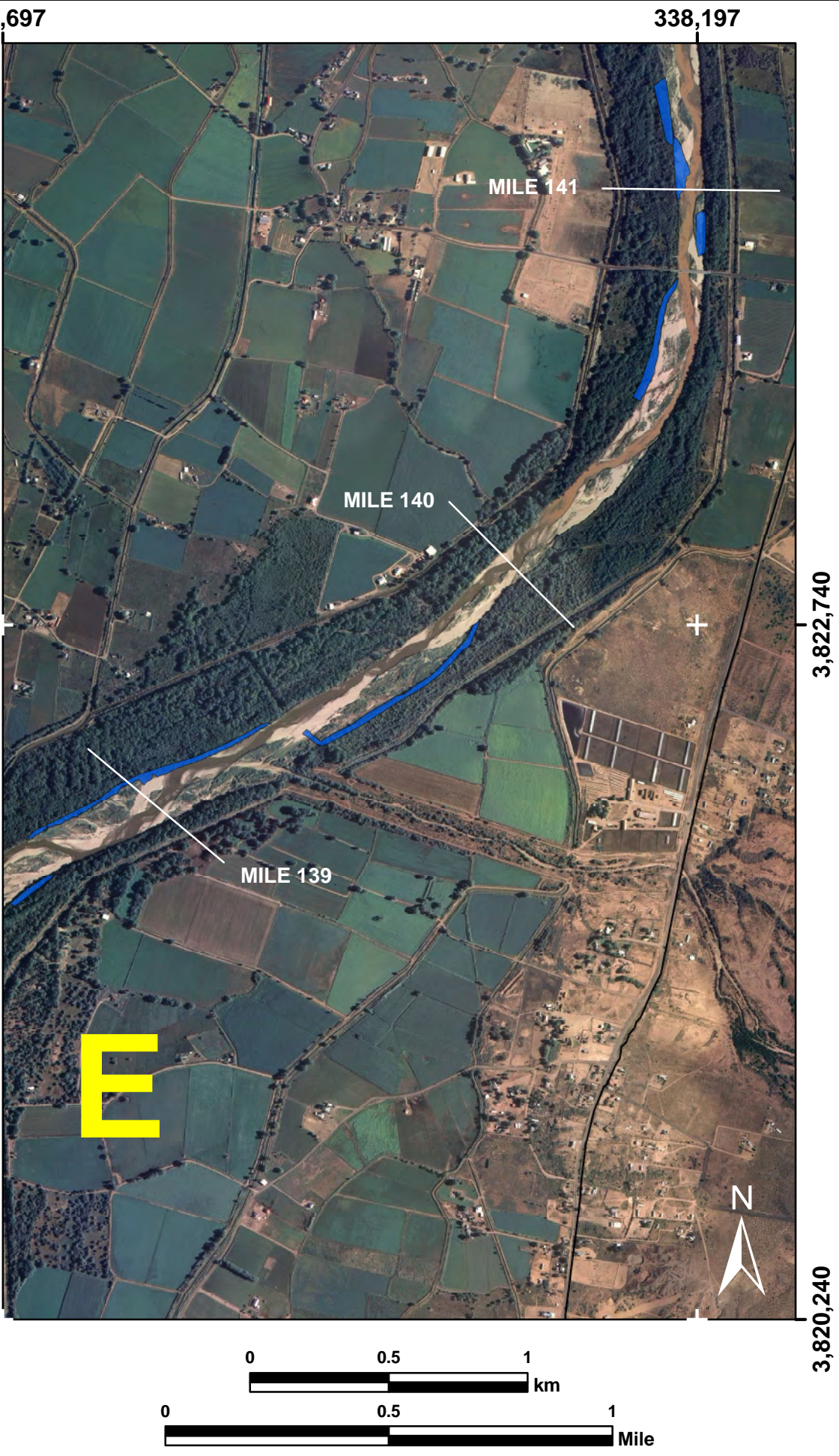
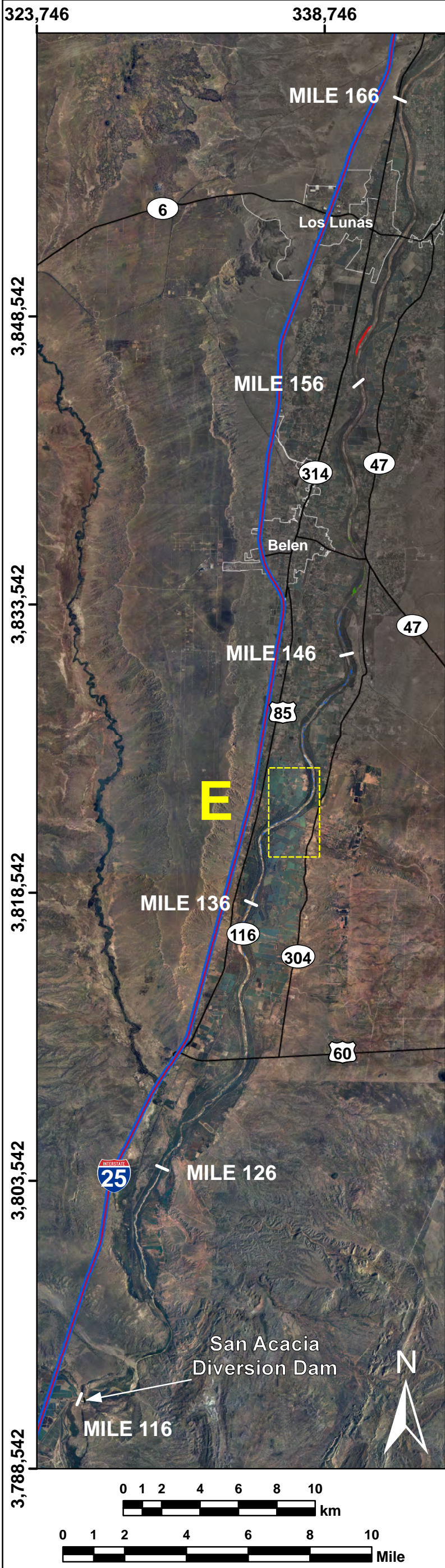


Middle Rio Grande Habitat
Restoration Site Mapping




Isleta Reach Overview of Completed Projects

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD



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Albuquerque District

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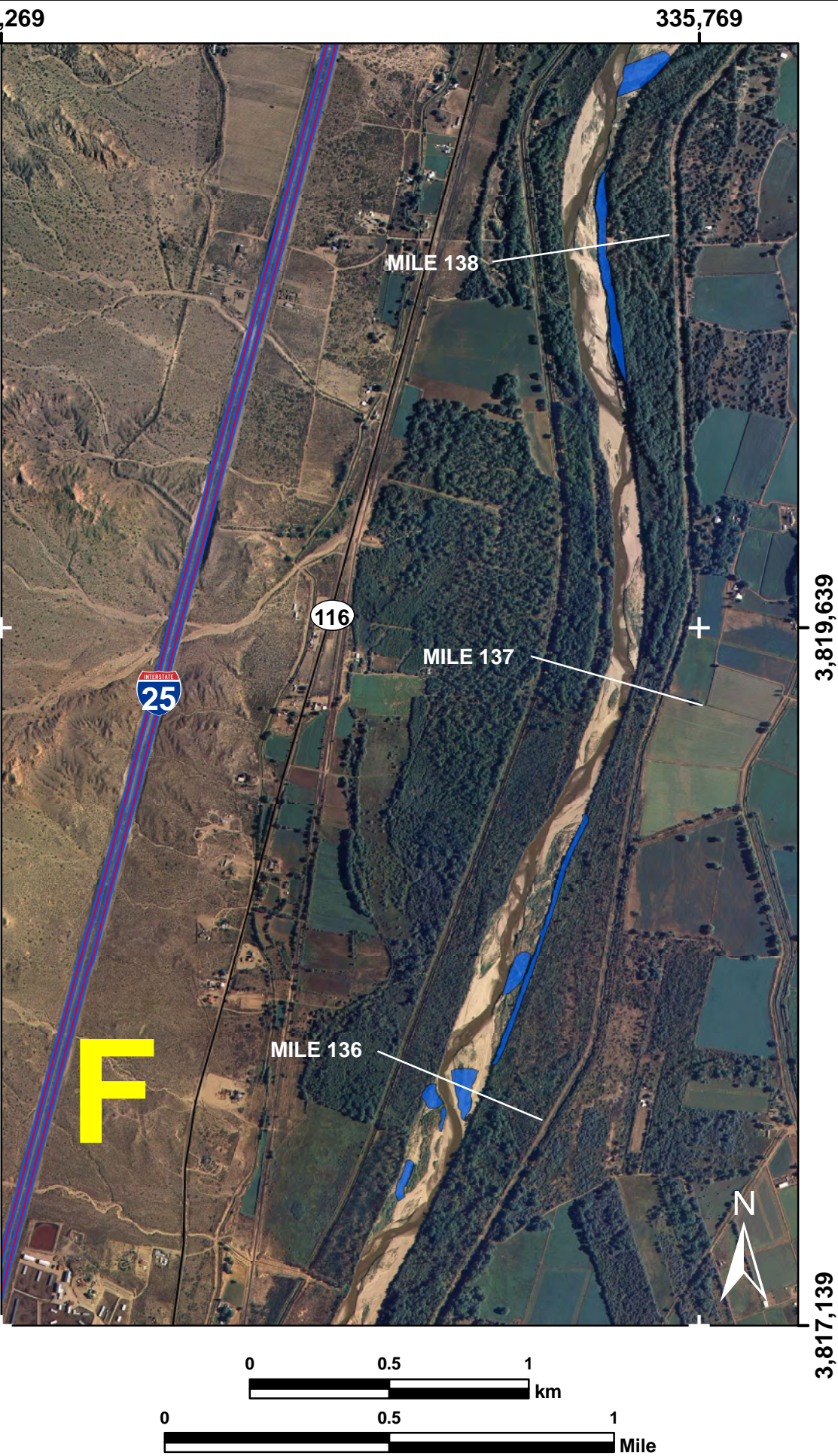
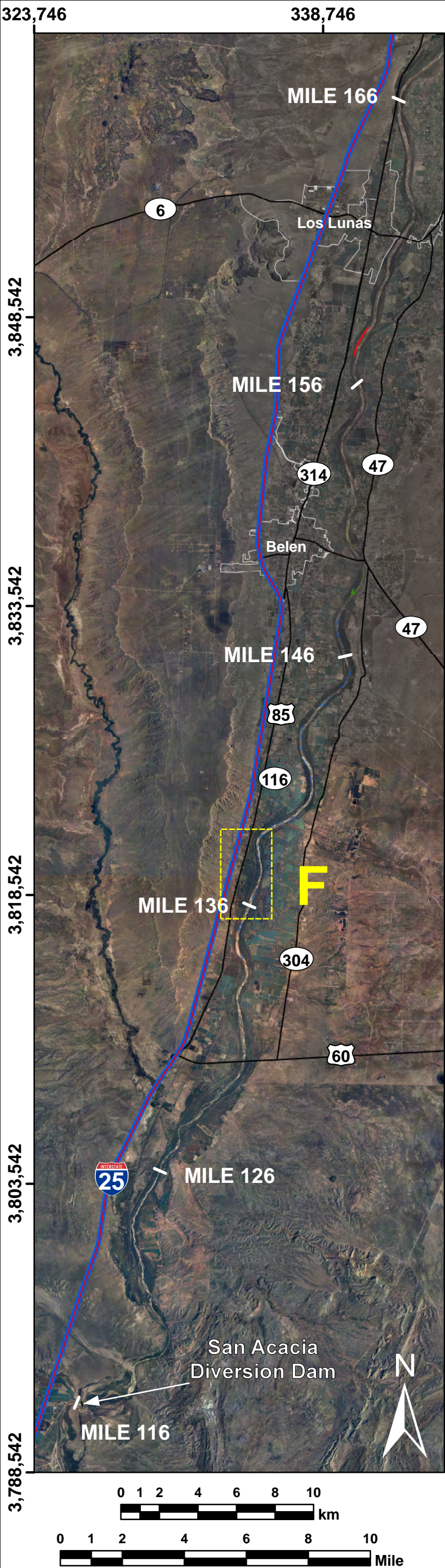


Middle Rio Grande Habitat Restoration Site Mapping




Isleta Reach Overview of Completed Projects

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UTM NAD83
Transverse Mercator
Central Meridian: -105.00
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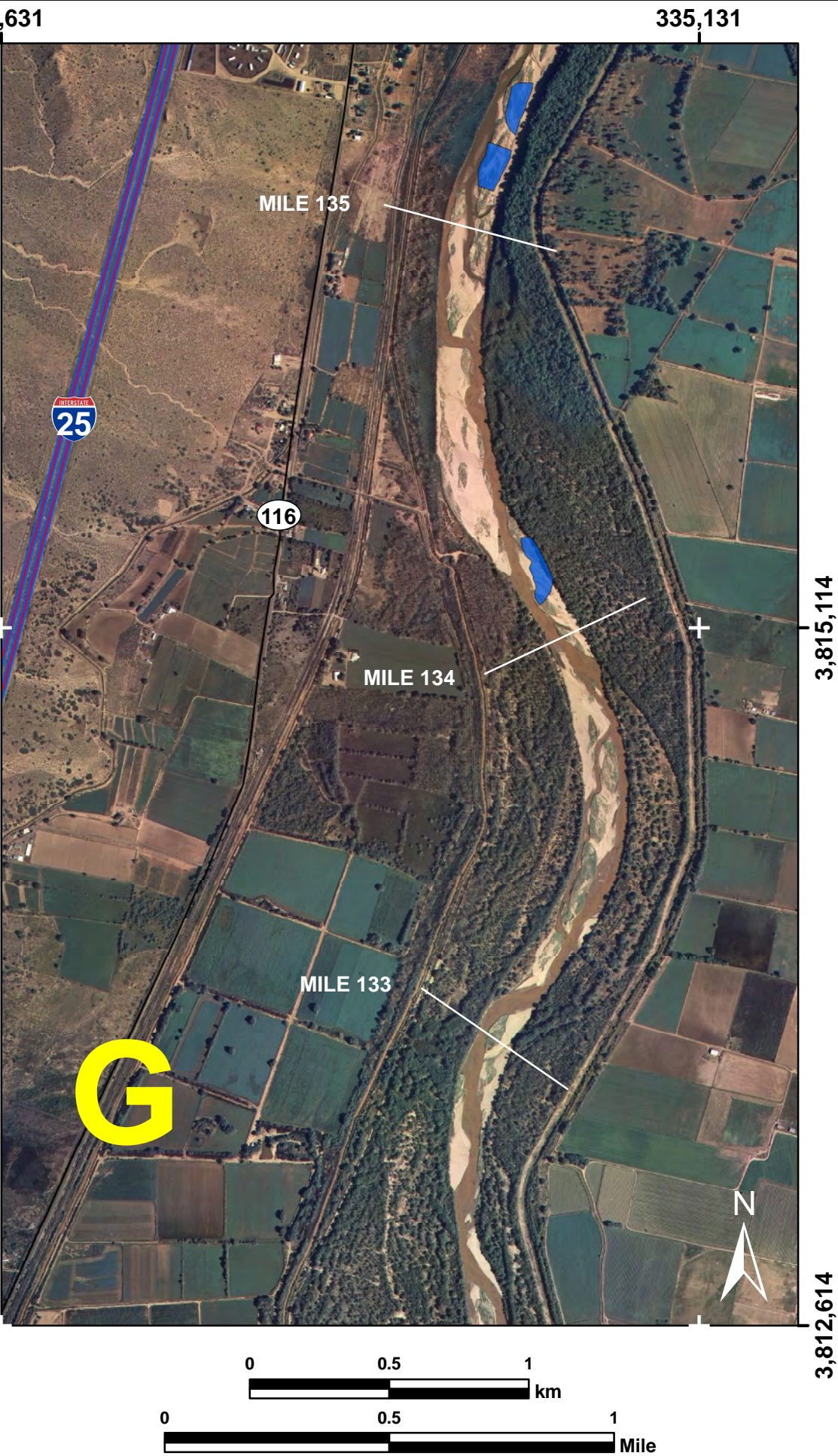
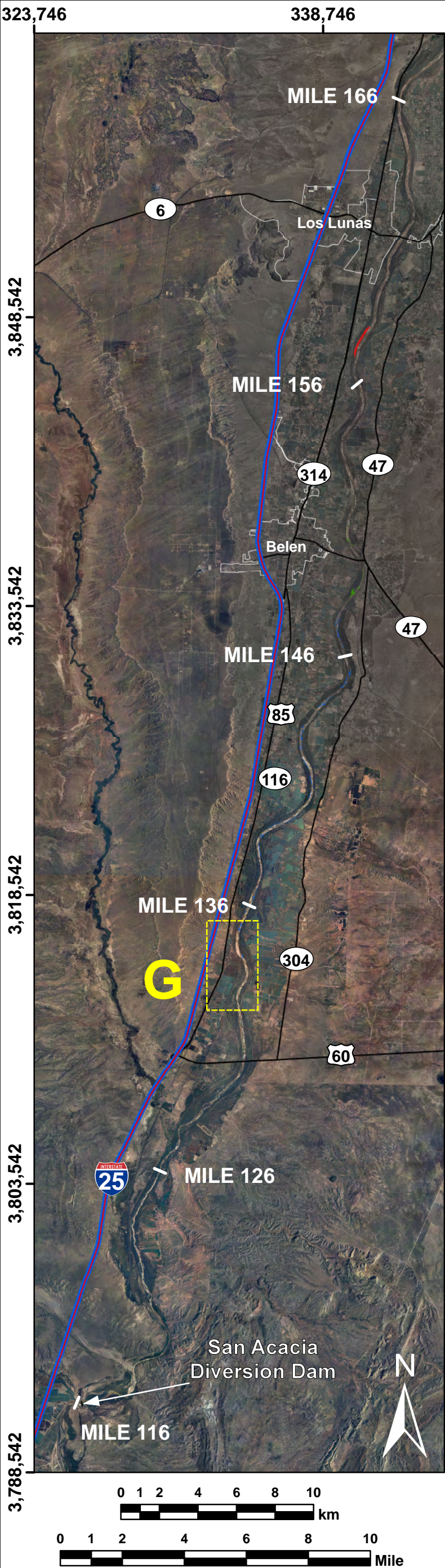
U.S. Army Corps
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Middle Rio Grande Habitat Restoration Site Mapping

Isleta Reach Overview of Completed Projects



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U.S. Army Corps of Engineers
Albuquerque District

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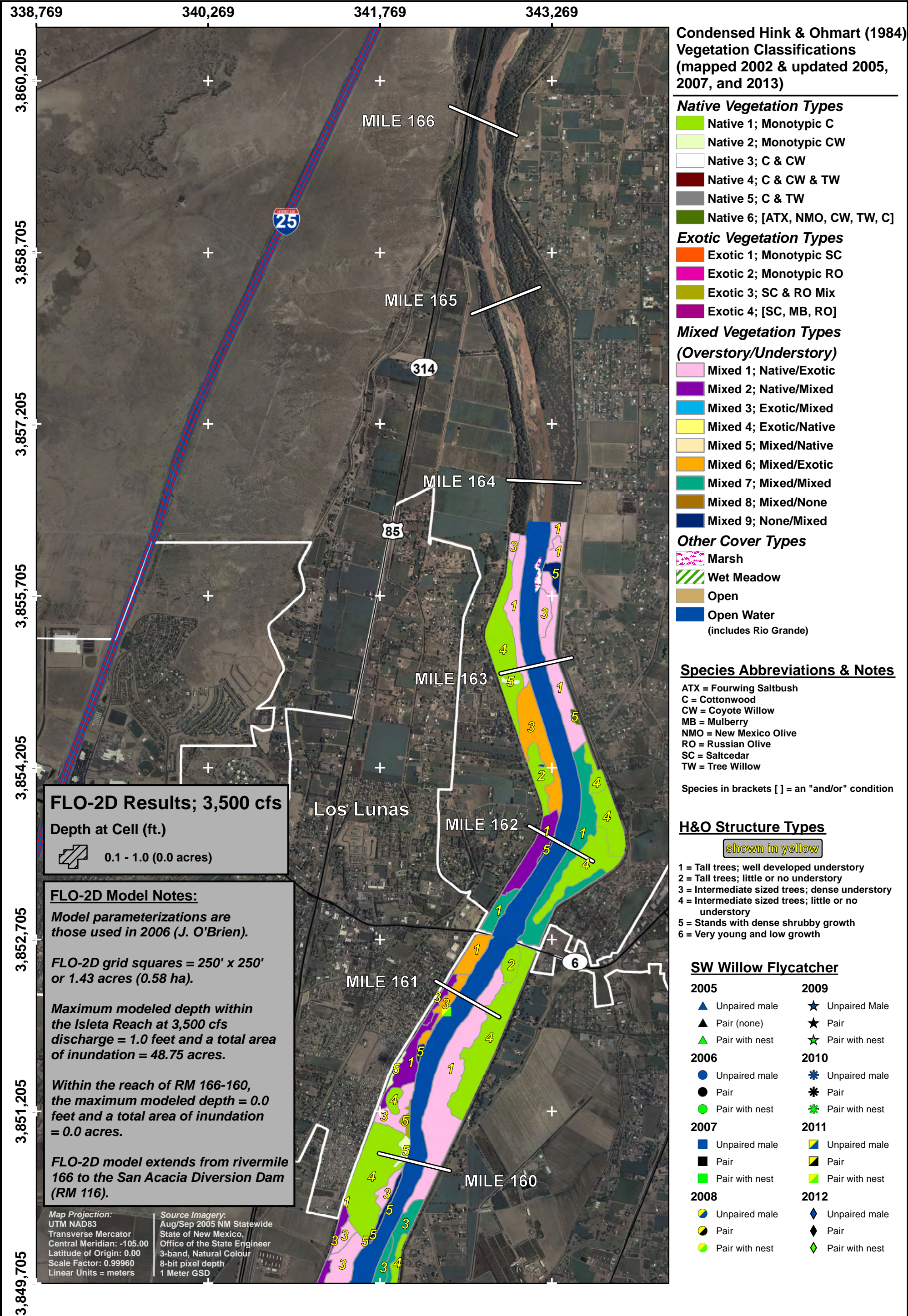


Middle Rio Grande Habitat
Restoration Site Mapping

Isleta Reach Overview of Completed Projects

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD



Condensed Hink & Ohmart (1984)
Vegetation Classifications
(mapped 2002 & updated 2005,
2007, and 2013)

- Native Vegetation Types**
- Native 1; Monotypic C
 - Native 2; Monotypic CW
 - Native 3; C & CW
 - Native 4; C & CW & TW
 - Native 5; C & TW
 - Native 6; [ATX, NMO, CW, TW, C]

- Exotic Vegetation Types**
- Exotic 1; Monotypic SC
 - Exotic 2; Monotypic RO
 - Exotic 3; SC & RO Mix
 - Exotic 4; [SC, MB, RO]

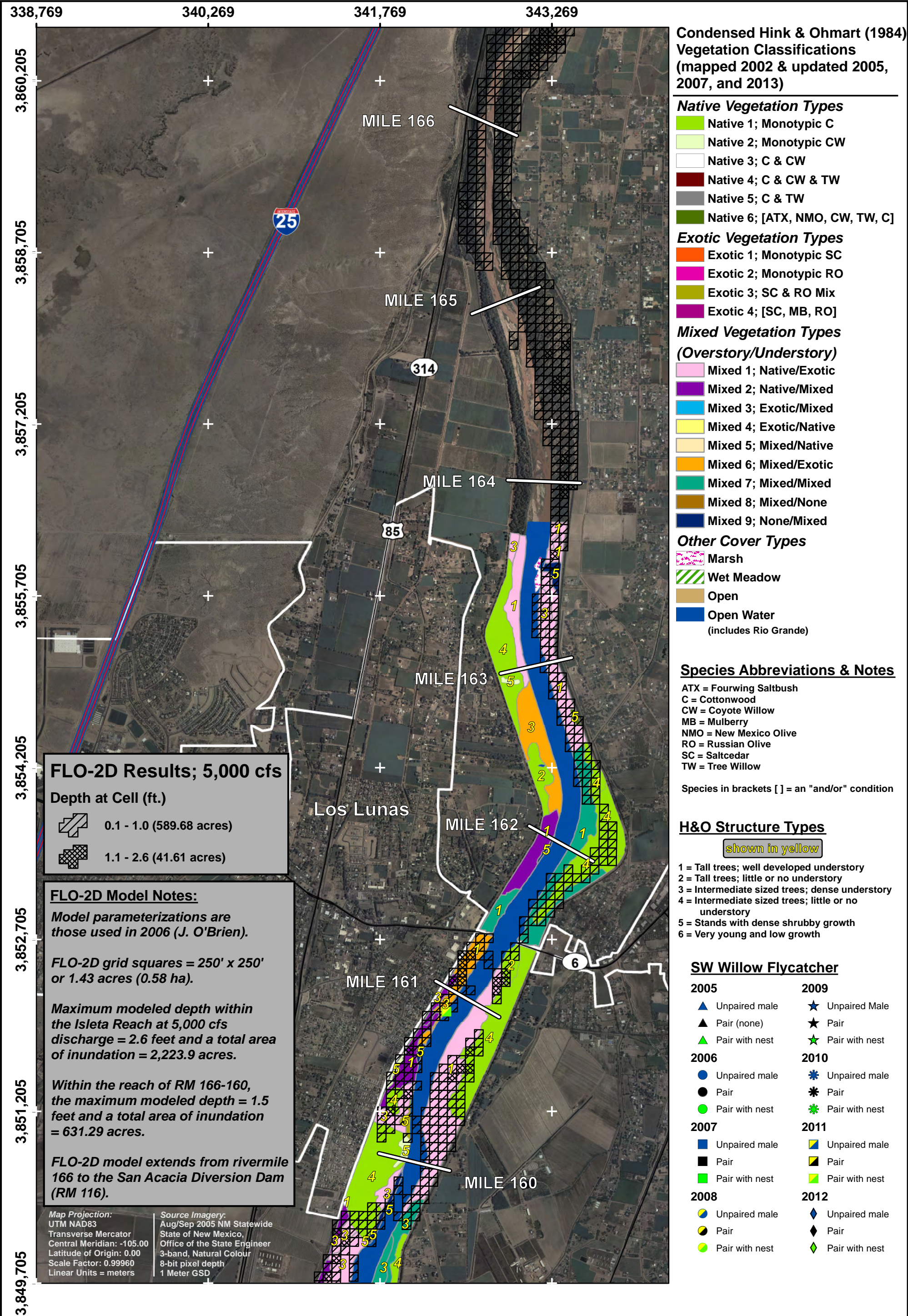
- Mixed Vegetation Types
(Overstory/Understory)**
- Mixed 1; Native/Exotic
 - Mixed 2; Native/Mixed
 - Mixed 3; Exotic/Mixed
 - Mixed 4; Exotic/Native
 - Mixed 5; Mixed/Native
 - Mixed 6; Mixed/Exotic
 - Mixed 7; Mixed/Mixed
 - Mixed 8; Mixed/None
 - Mixed 9; None/Mixed

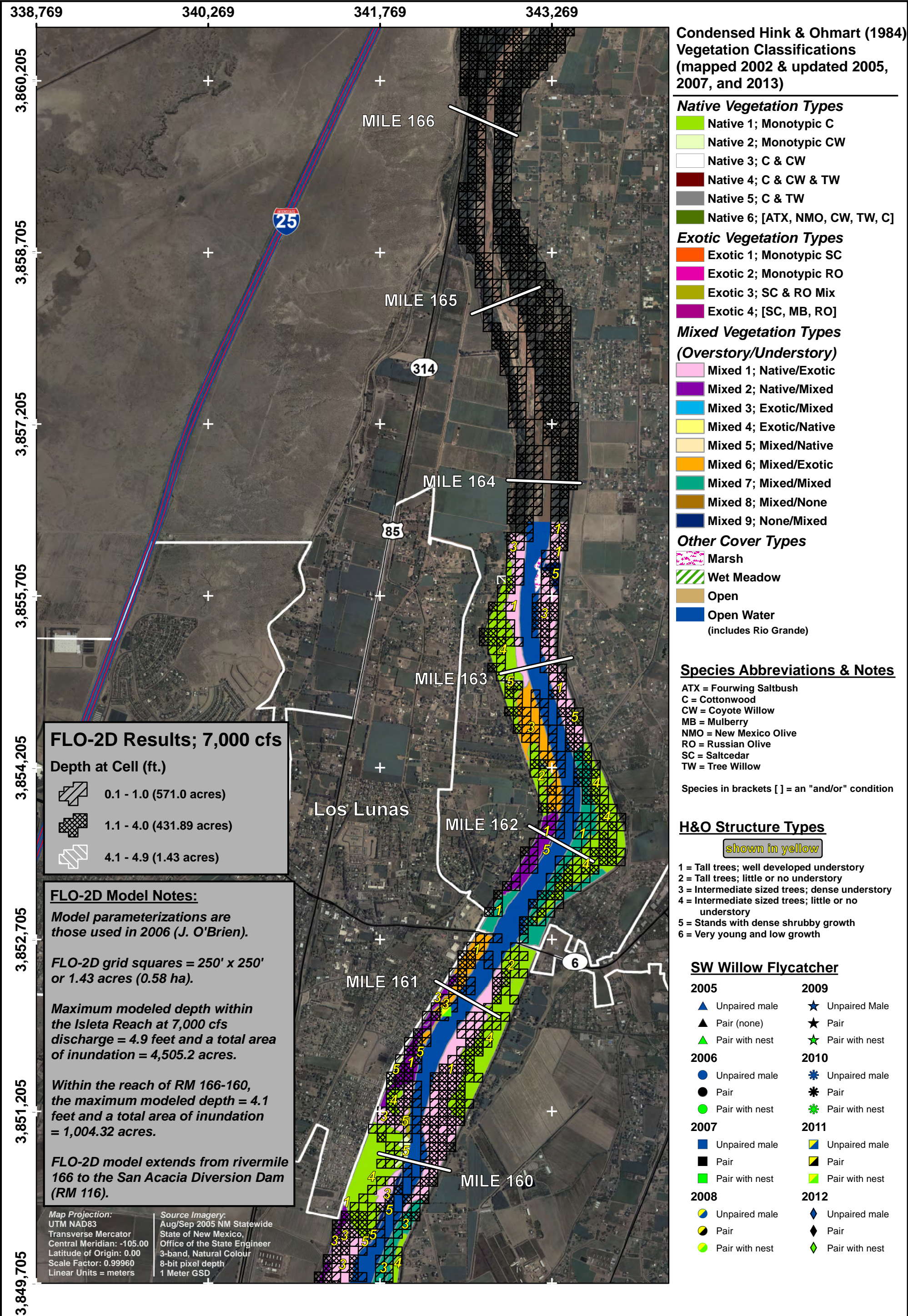
- Other Cover Types**
- Marsh
 - Wet Meadow
 - Open
 - Open Water
(includes Rio Grande)

- Species Abbreviations & Notes**
- ATX = Fourwing Saltbush
C = Cottonwood
CW = Coyote Willow
MB = Mulberry
NMO = New Mexico Olive
RO = Russian Olive
SC = Saltcedar
TW = Tree Willow
- Species in brackets [] are an "and/or" condition

- H&O Structure Types**
- shown in yellow
- 1 = Tall trees; well developed understory
 - 2 = Tall trees; little or no understory
 - 3 = Intermediate sized trees; dense understory
 - 4 = Intermediate sized trees; little or no understory
 - 5 = Stands with dense shrubby growth
 - 6 = Very young and low growth

- SW Willow Flycatcher**
- | 2005 | 2009 |
|------------------|------------------|
| ▲ Unpaired male | ★ Unpaired Male |
| ▲ Pair (none) | ★ Pair |
| ▲ Pair with nest | ★ Pair with nest |
- | 2006 | 2010 |
|------------------|------------------|
| ● Unpaired male | ★ Unpaired male |
| ● Pair | ★ Pair |
| ● Pair with nest | ★ Pair with nest |
- | 2007 | 2011 |
|------------------|------------------|
| ■ Unpaired male | ■ Unpaired male |
| ■ Pair | ■ Pair |
| ■ Pair with nest | ■ Pair with nest |
- | 2008 | 2012 |
|------------------|------------------|
| ● Unpaired male | ◆ Unpaired male |
| ● Pair | ◆ Pair |
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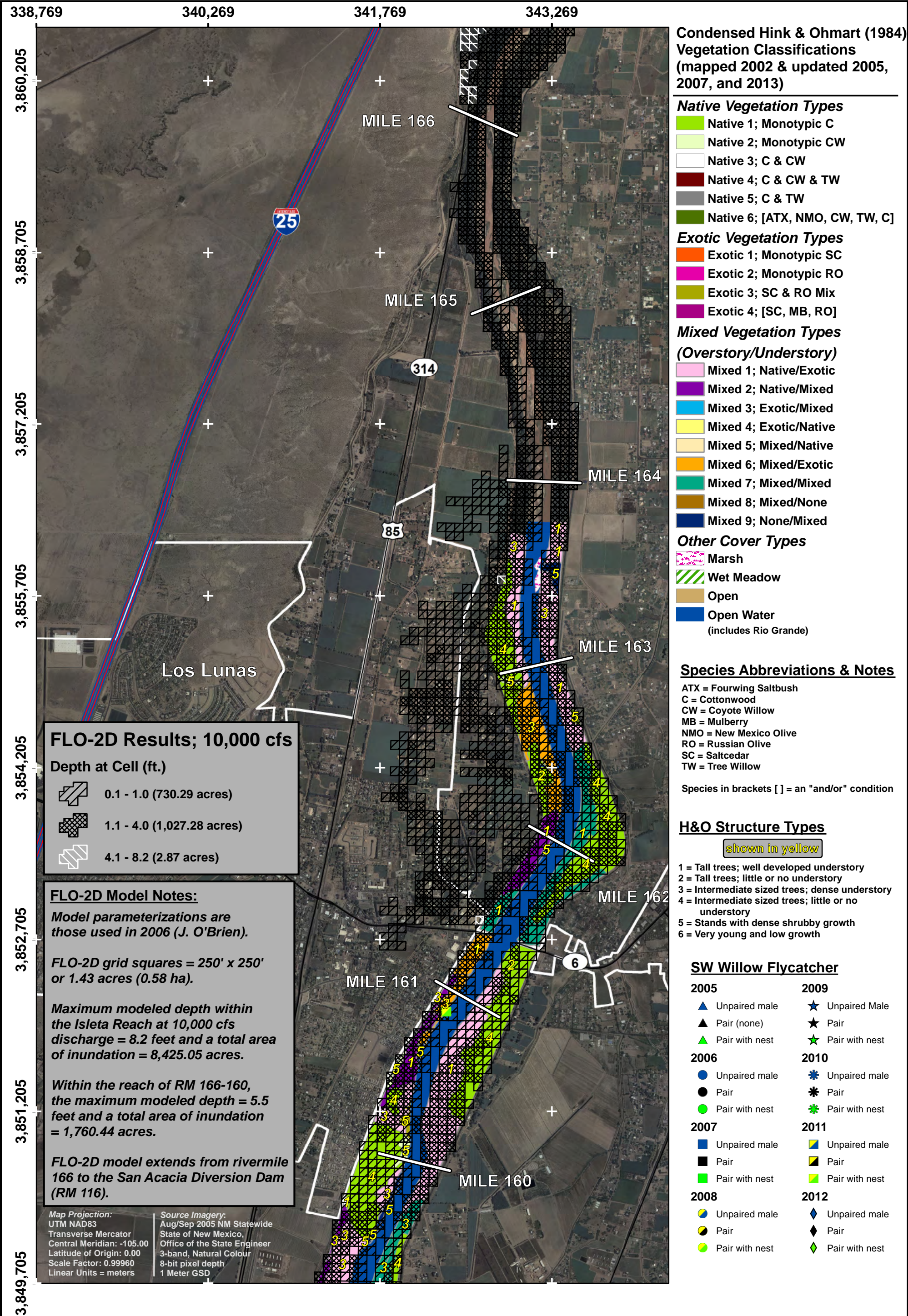
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SW Willow Flycatcher	
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2006	2010
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● Pair	★ Pair
● Pair with nest	★ Pair with nest
2007	2011
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■ Pair	■ Pair
■ Pair with nest	■ Pair with nest
2008	2012
● Unpaired male	◆ Unpaired male
● Pair	◆ Pair
● Pair with nest	◆ Pair with nest



Condensed Hink & Ohmart (1984)
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(mapped 2002 & updated 2005,
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■ Unpaired male	■ Unpaired male
■ Pair	■ Pair
■ Pair with nest	■ Pair with nest
2008	2012
● Unpaired male	◆ Unpaired male
● Pair	◆ Pair
● Pair with nest	◆ Pair with nest

FLO-2D Results; 10,000 cfs

Depth at Cell (ft.)

- 0.1 - 1.0 (730.29 acres)
- 1.1 - 4.0 (1,027.28 acres)
- 4.1 - 8.2 (2.87 acres)

FLO-2D Model Notes:

Model parameterizations are those used in 2006 (J. O'Brien).

FLO-2D grid squares = 250' x 250' or 1.43 acres (0.58 ha).

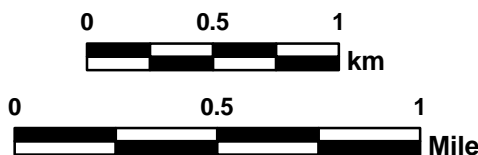
Maximum modeled depth within the Isleta Reach at 10,000 cfs discharge = 8.2 feet and a total area of inundation = 8,425.05 acres.

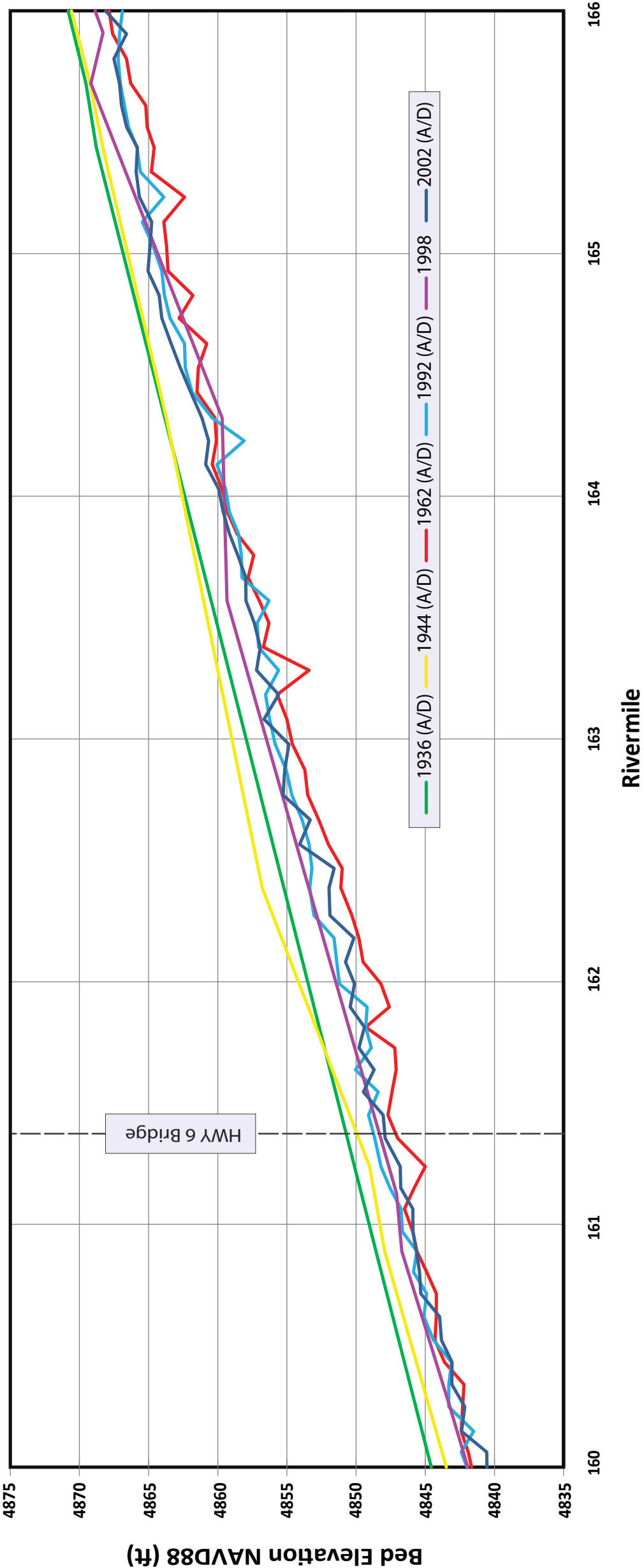
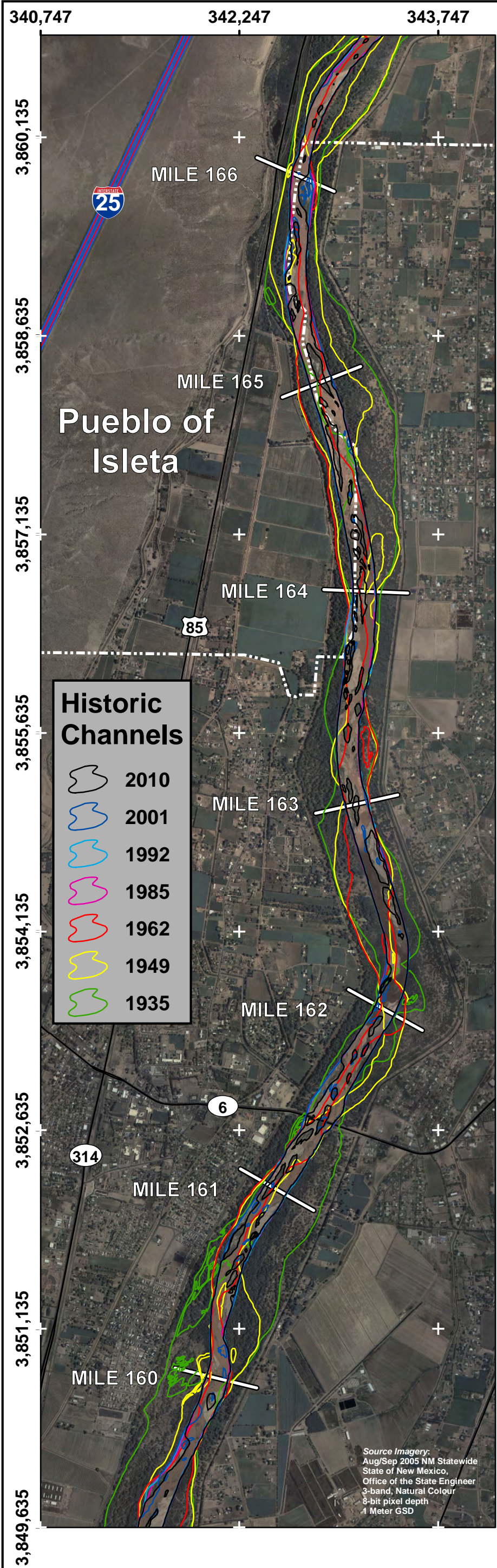
Within the reach of RM 166-160, the maximum modeled depth = 5.5 feet and a total area of inundation = 1,760.44 acres.

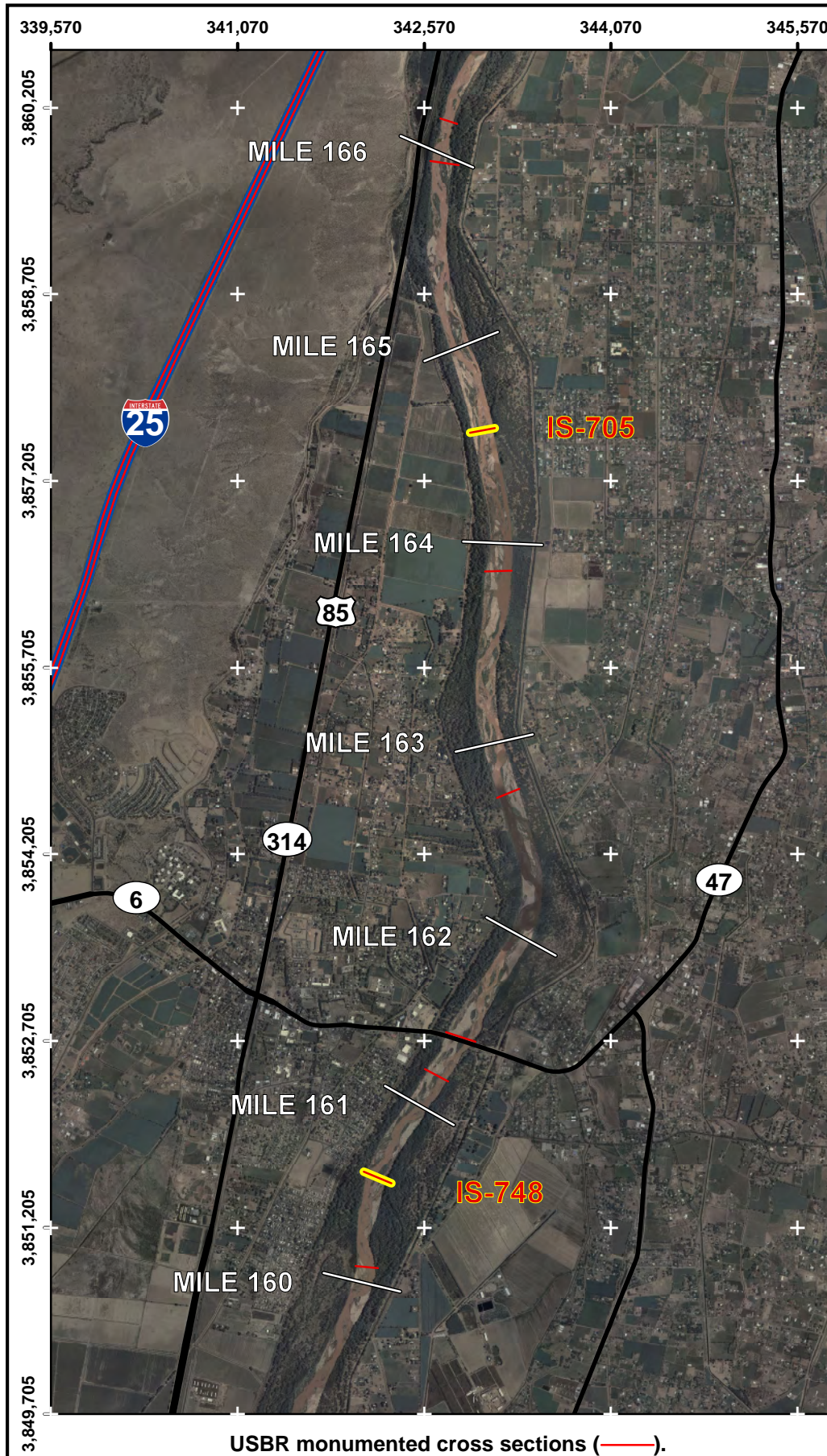
FLO-2D model extends from rivermile 166 to the San Acacia Diversion Dam (RM 116).

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD





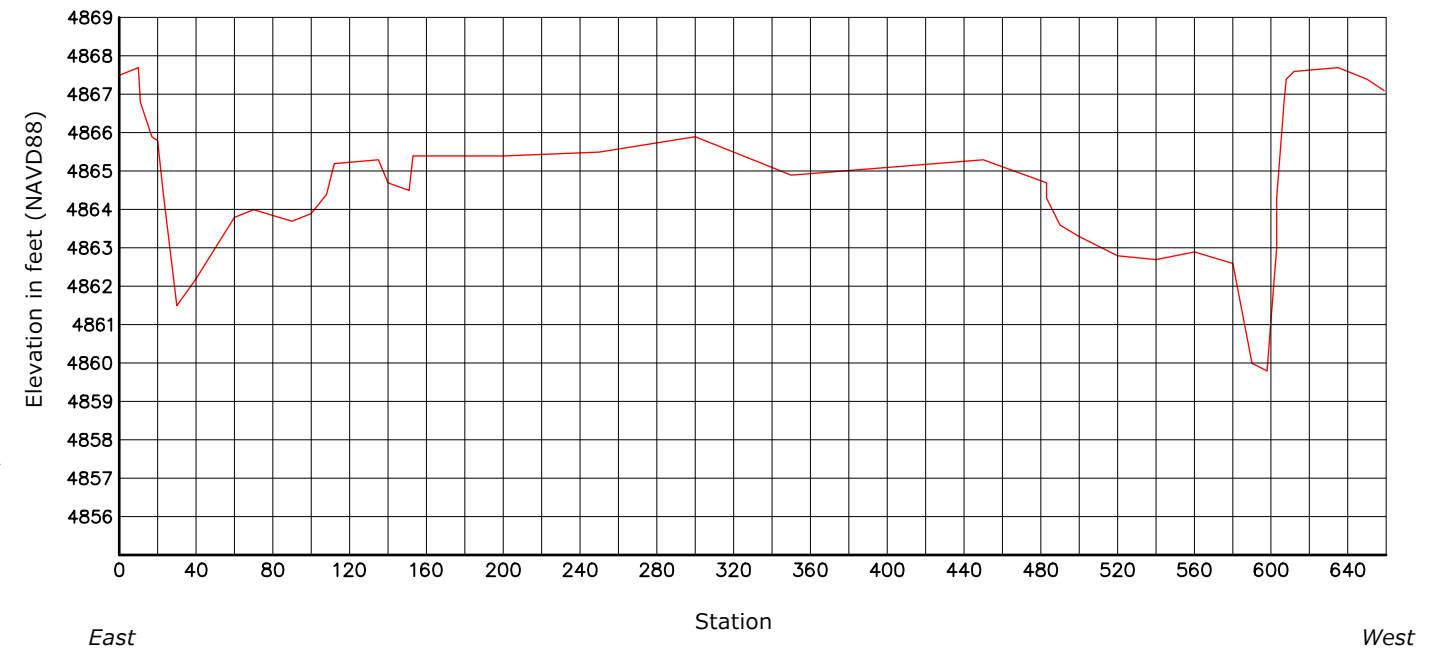


USBR monumented cross sections (—).

ISLETA LINE IS-705

JUNE 1998

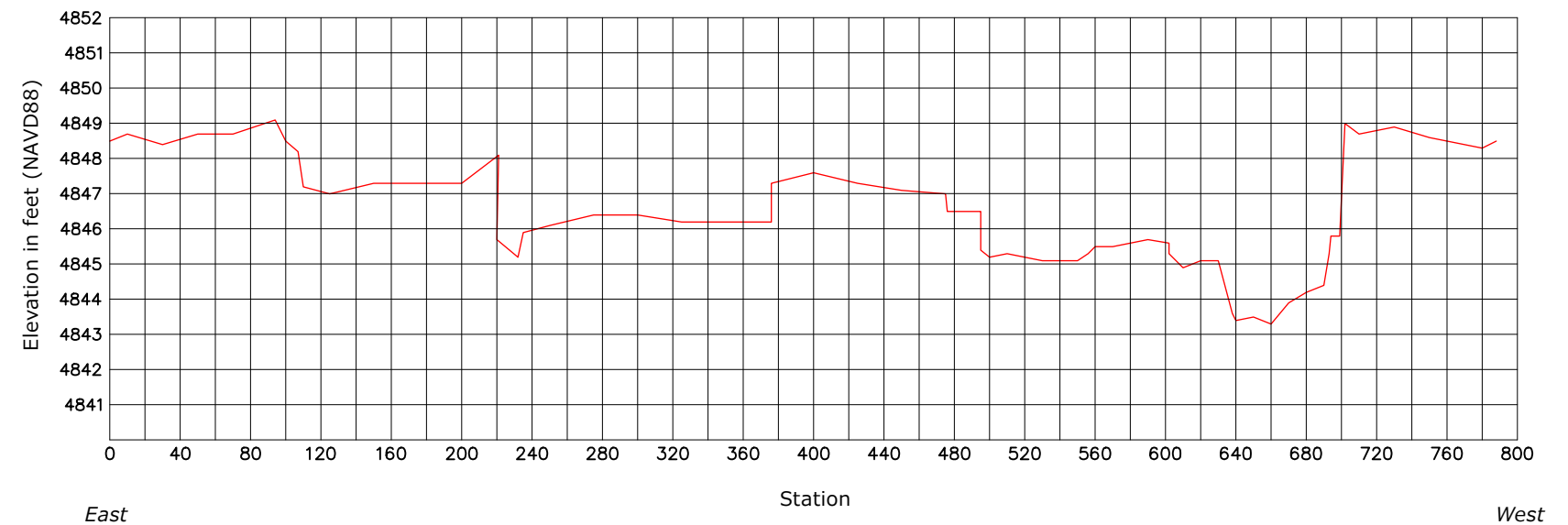
DATUM ELEV
4855.00
GROUP IS-LINES
SECTION 705



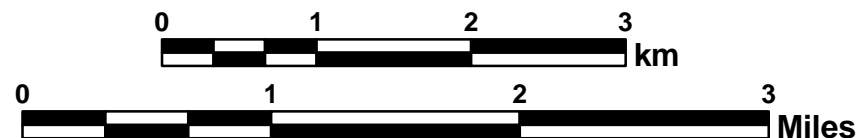
ISLETA LINE IS-748

JUNE 1998

DATUM ELEV
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GROUP IS-LINES
SECTION 748



U.S. Army Corps
of Engineers
Albuquerque District
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Middle Rio Grande Cross Section Surveys

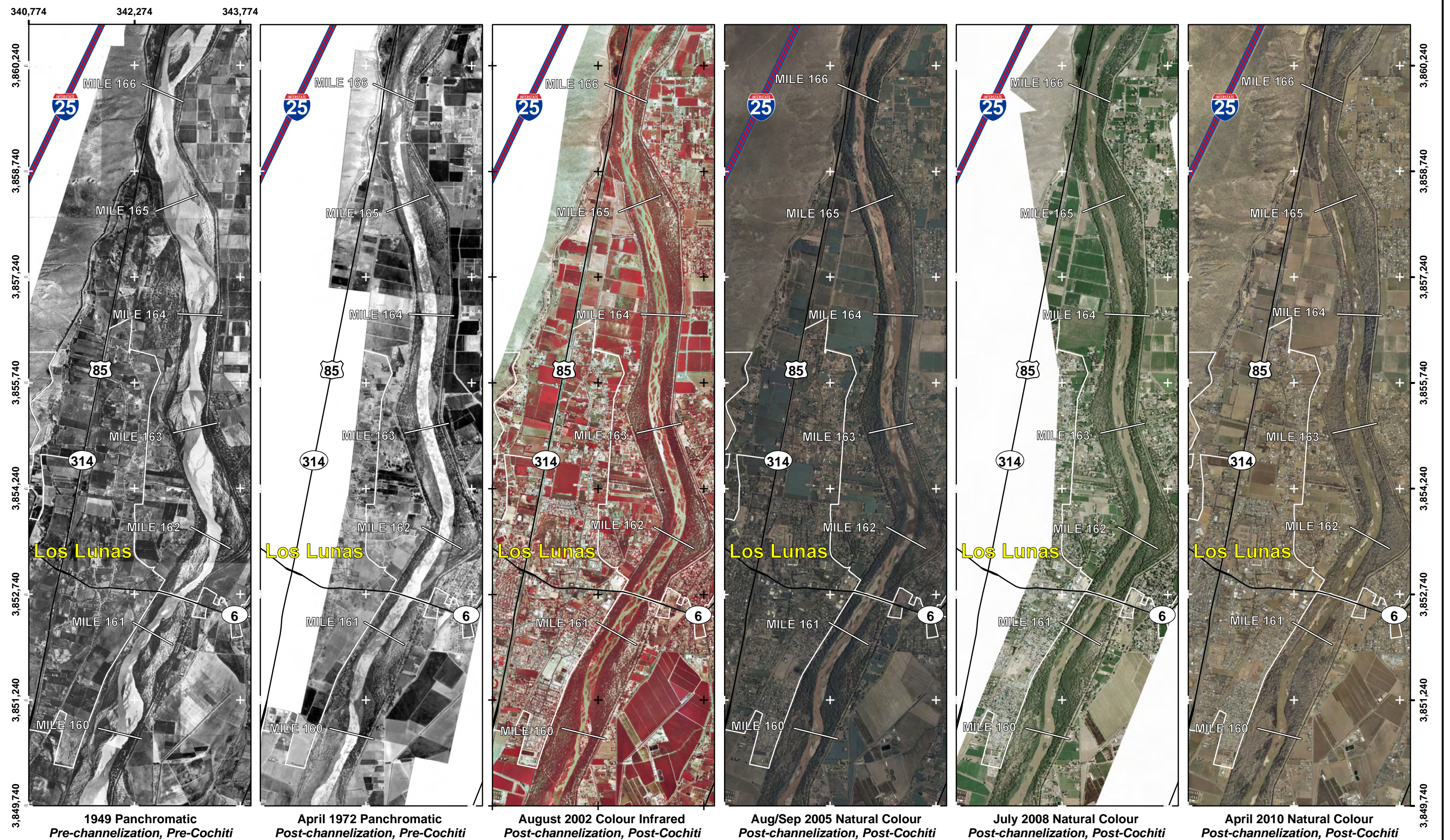
Isleta Reach: RM 166-160

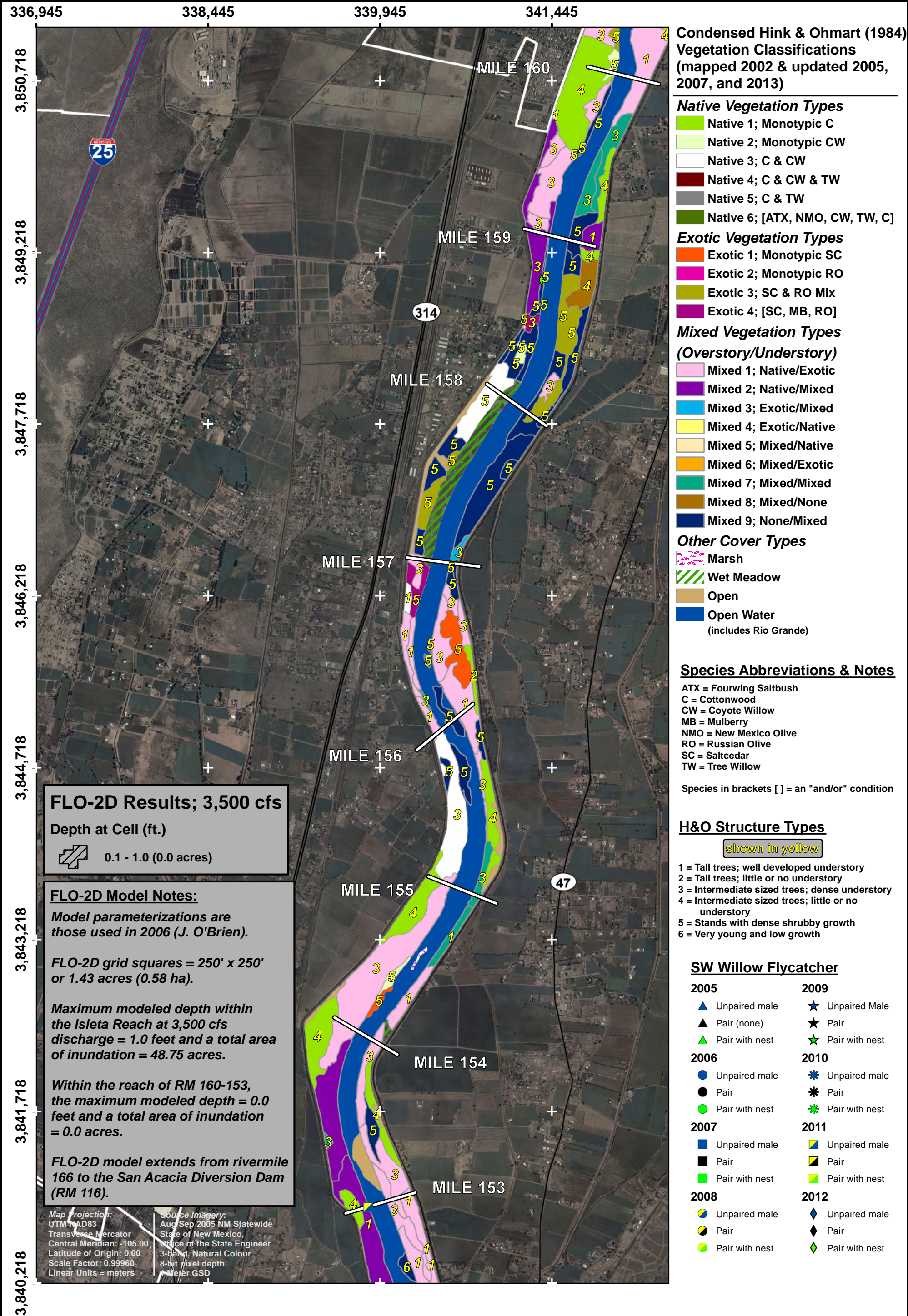
Source Imagery:
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State of New Mexico,
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Page 13 of 63







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Species Abbreviations & Notes

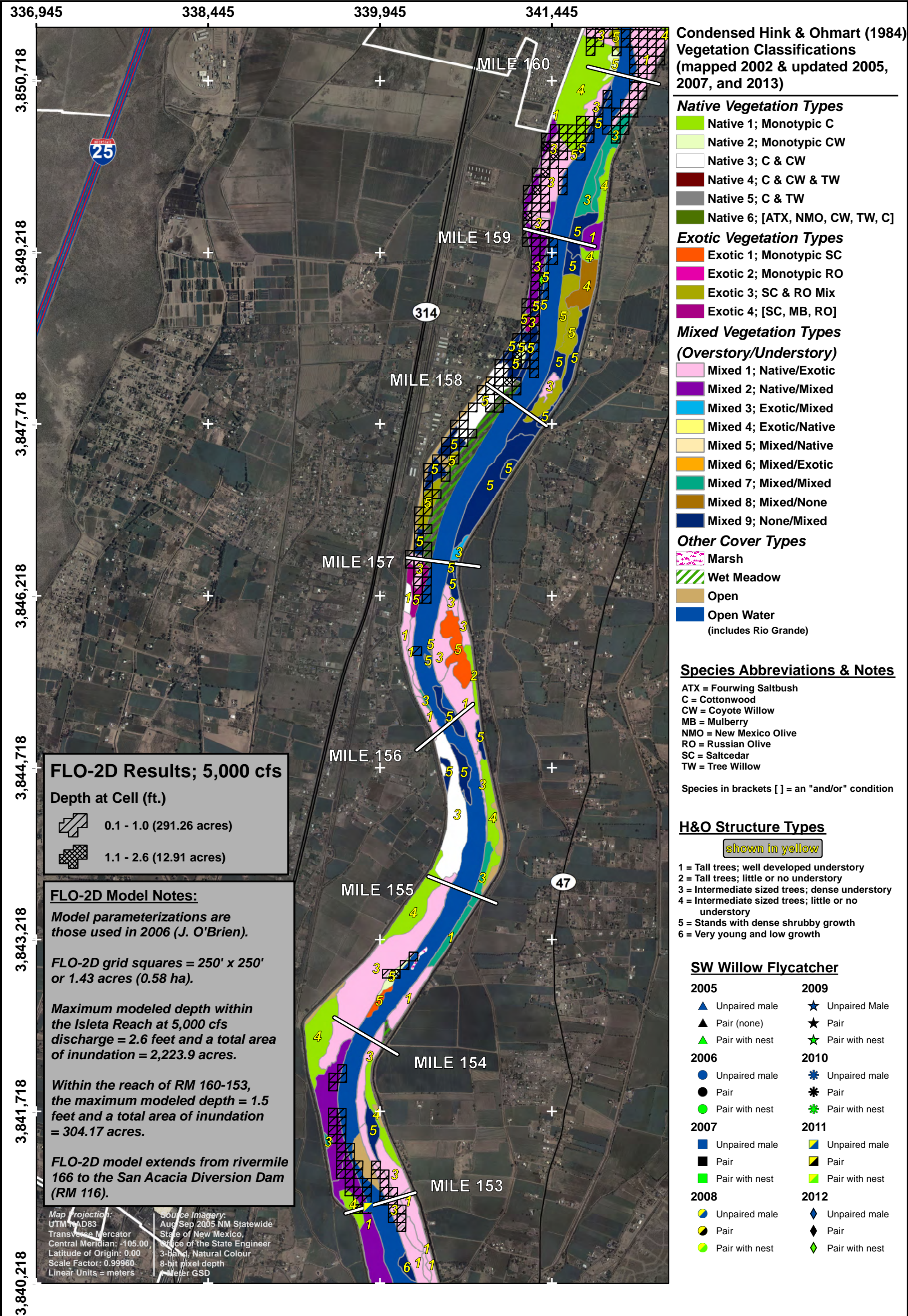
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- Species in brackets [] are an "and/or" condition

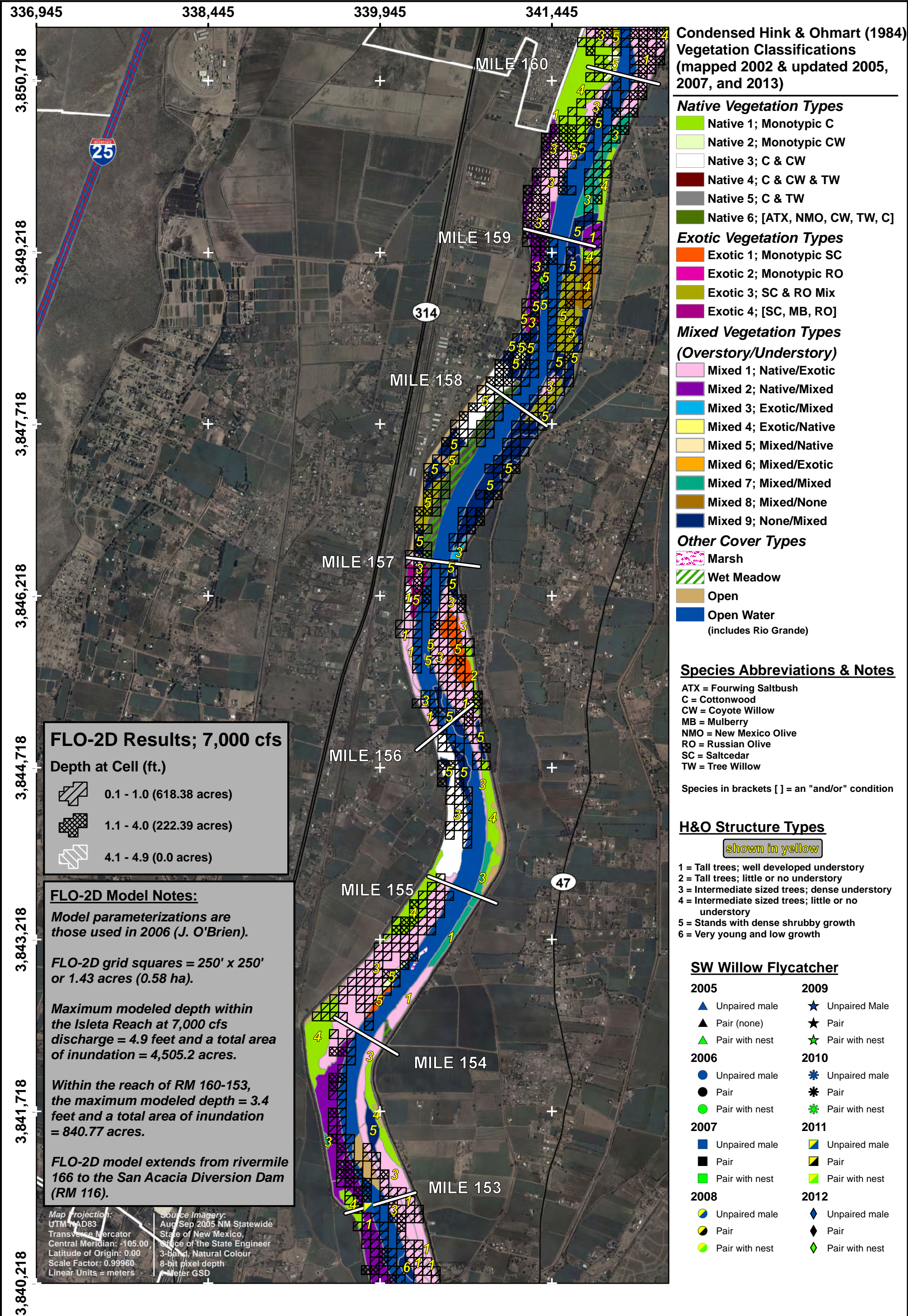
H&O Structure Types

- shown in yellow**
- 1 = Tall trees; well developed understory
 - 2 = Tall trees; little or no understory
 - 3 = Intermediate sized trees; dense understory
 - 4 = Intermediate sized trees; little or no understory
 - 5 = Stands with dense shrubby growth
 - 6 = Very young and low growth

SW Willow Flycatcher

- | 2005 | 2009 |
|------------------|------------------|
| ▲ Unpaired male | ★ Unpaired Male |
| ▲ Pair (none) | ★ Pair |
| ▲ Pair with nest | ★ Pair with nest |
- | 2006 | 2010 |
|------------------|------------------|
| ● Unpaired male | ★ Unpaired male |
| ● Pair | ★ Pair |
| ● Pair with nest | ★ Pair with nest |
- | 2007 | 2011 |
|------------------|------------------|
| ■ Unpaired male | ■ Unpaired male |
| ■ Pair | ■ Pair |
| ■ Pair with nest | ■ Pair with nest |
- | 2008 | 2012 |
|------------------|------------------|
| ● Unpaired male | ◆ Unpaired male |
| ● Pair | ◆ Pair |
| ● Pair with nest | ◆ Pair with nest |





Condensed Hink & Ohmart (1984)
Vegetation Classifications
(mapped 2002 & updated 2005,
2007, and 2013)

Native Vegetation Types

- Native 1; Monotypic C
- Native 2; Monotypic CW
- Native 3; C & CW
- Native 4; C & CW & TW
- Native 5; C & TW
- Native 6; [ATX, NMO, CW, TW, C]

Exotic Vegetation Types

- Exotic 1; Monotypic SC
- Exotic 2; Monotypic RO
- Exotic 3; SC & RO Mix
- Exotic 4; [SC, MB, RO]

**Mixed Vegetation Types
(Overstory/Understory)**

- Mixed 1; Native/Exotic
- Mixed 2; Native/Mixed
- Mixed 3; Exotic/Mixed
- Mixed 4; Exotic/Native
- Mixed 5; Mixed/Native
- Mixed 6; Mixed/Exotic
- Mixed 7; Mixed/Mixed
- Mixed 8; Mixed/None
- Mixed 9; None/Mixed

Other Cover Types

- Marsh
- Wet Meadow
- Open
- Open Water
(includes Rio Grande)

Species Abbreviations & Notes

ATX = Fourwing Saltbush
C = Cottonwood
CW = Coyote Willow
MB = Mulberry
NMO = New Mexico Olive
RO = Russian Olive
SC = Saltcedar
TW = Tree Willow

Species in brackets [] = an "and/or" condition

H&O Structure Types

shown in yellow

- 1 = Tall trees; well developed understory
- 2 = Tall trees; little or no understory
- 3 = Intermediate sized trees; dense understory
- 4 = Intermediate sized trees; little or no understory
- 5 = Stands with dense shrubby growth
- 6 = Very young and low growth

SW Willow Flycatcher

2005	2009
▲ Unpaired male	★ Unpaired Male
▲ Pair (none)	★ Pair
▲ Pair with nest	★ Pair with nest
2006	2010
● Unpaired male	★ Unpaired male
● Pair	★ Pair
● Pair with nest	★ Pair with nest
2007	2011
■ Unpaired male	■ Unpaired male
■ Pair	■ Pair
■ Pair with nest	■ Pair with nest
2008	2012
● Unpaired male	◆ Unpaired male
● Pair	◆ Pair
● Pair with nest	◆ Pair with nest

FLO-2D Results; 7,000 cfs

Depth at Cell (ft.)

- 0.1 - 1.0 (618.38 acres)
- 1.1 - 4.0 (222.39 acres)
- 4.1 - 4.9 (0.0 acres)

FLO-2D Model Notes:

Model parameterizations are those used in 2006 (J. O'Brien).

FLO-2D grid squares = 250' x 250' or 1.43 acres (0.58 ha).

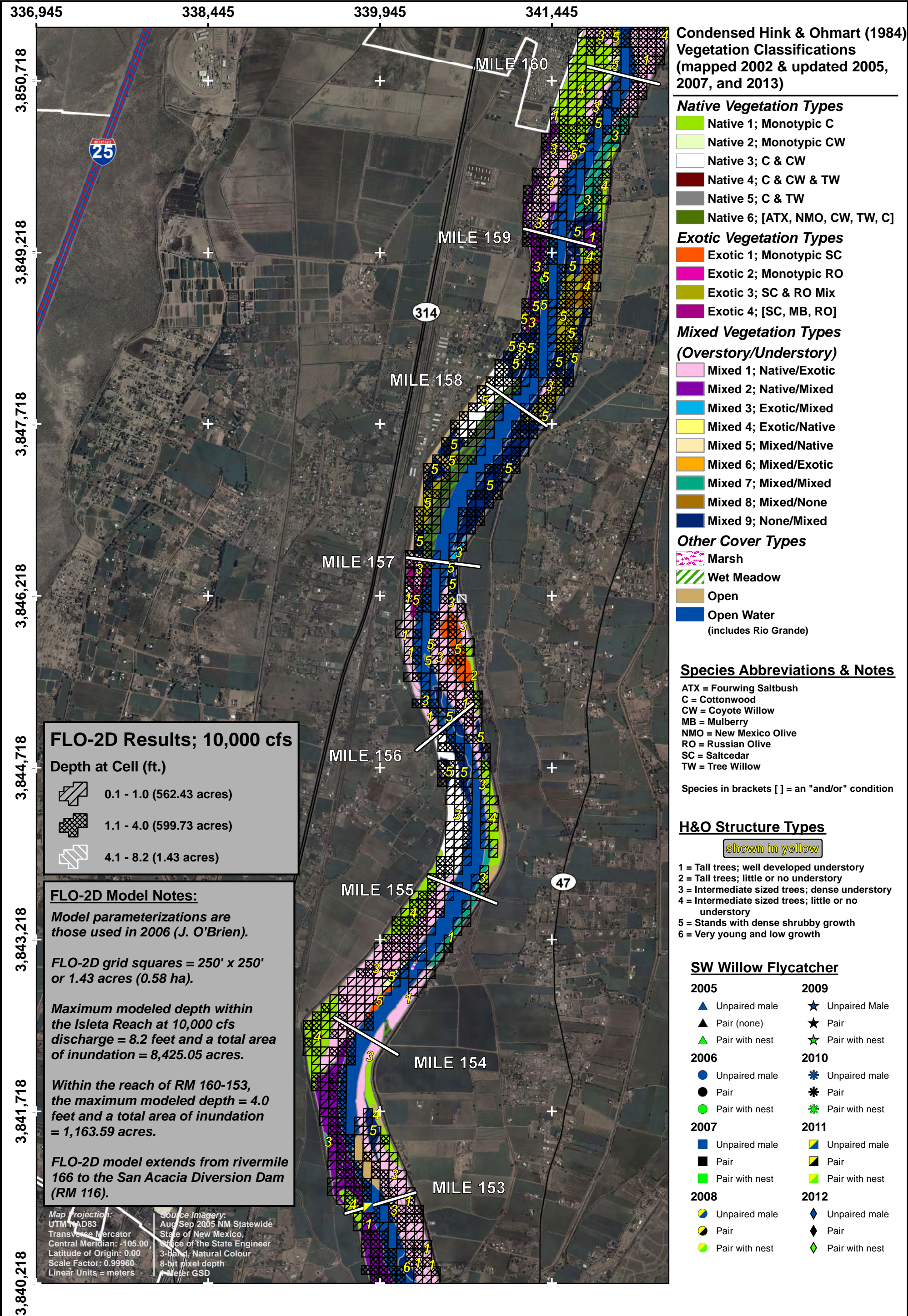
Maximum modeled depth within the Isleta Reach at 7,000 cfs discharge = 4.9 feet and a total area of inundation = 4,505.2 acres.

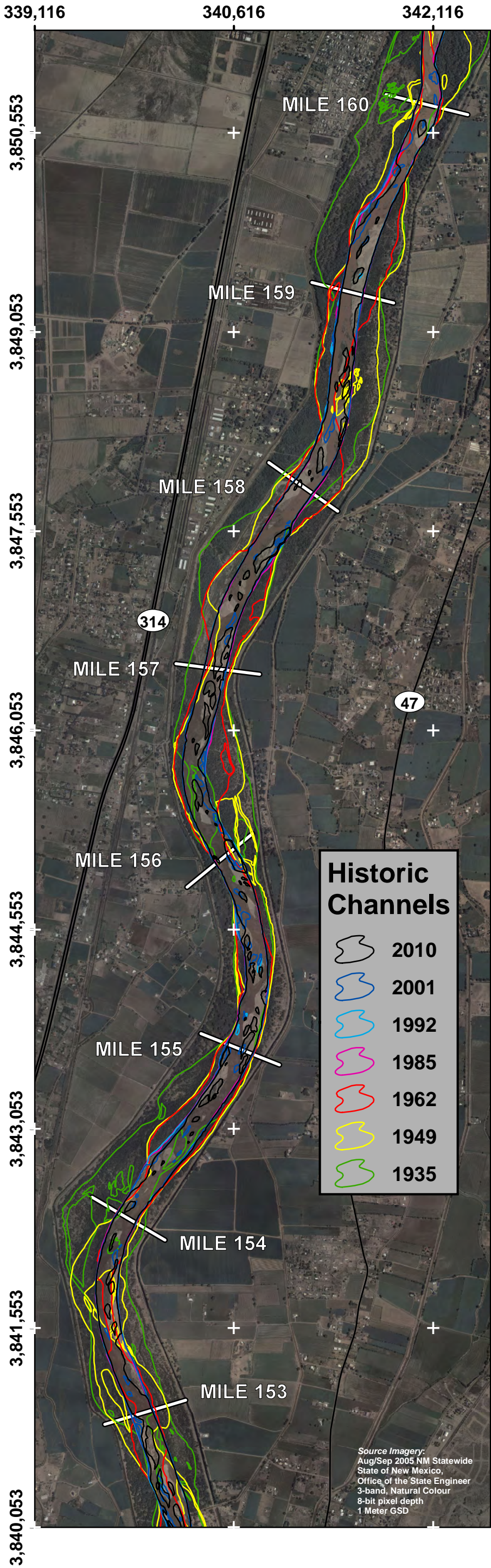
Within the reach of RM 160-153, the maximum modeled depth = 3.4 feet and a total area of inundation = 840.77 acres.

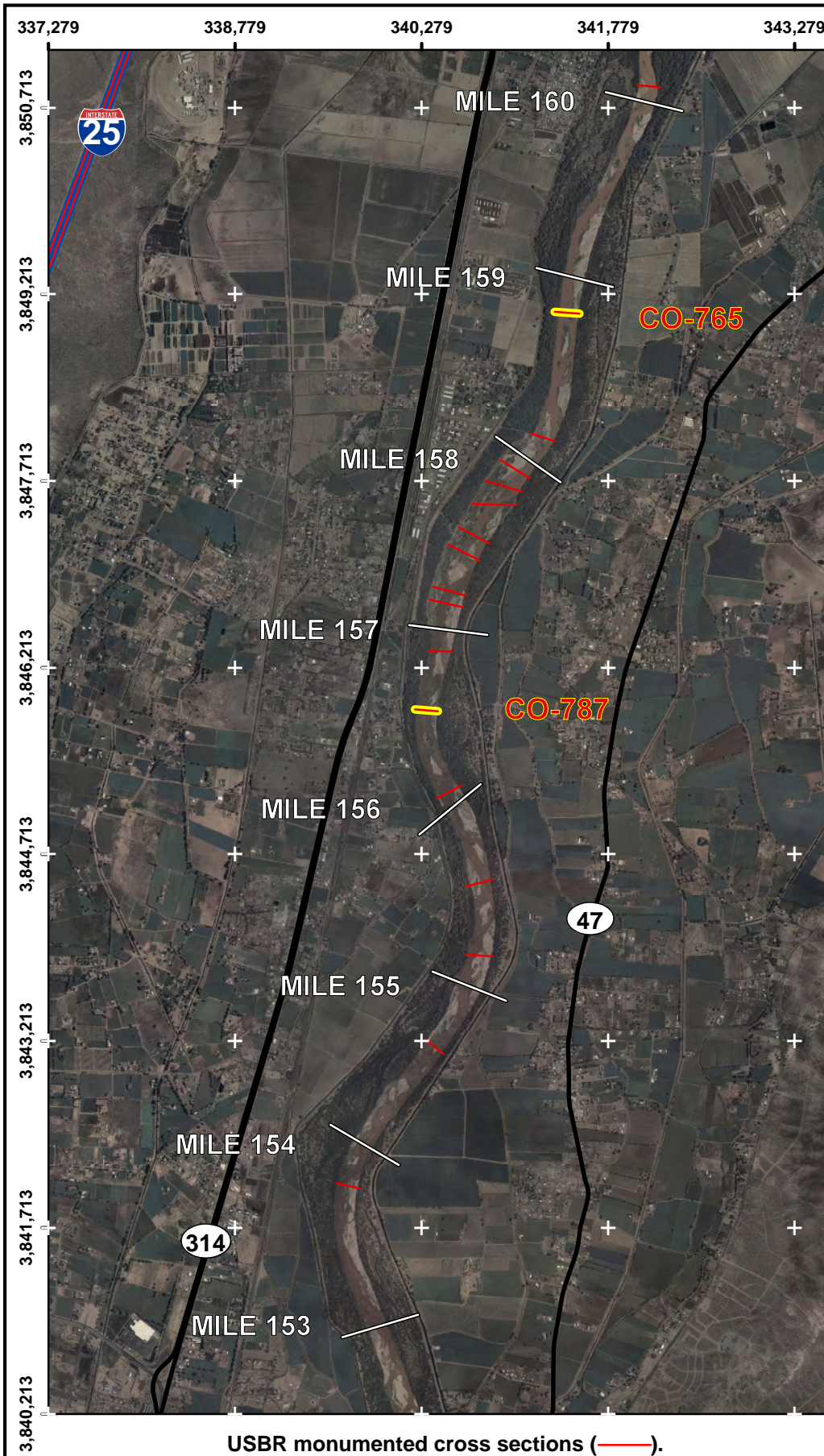
FLO-2D model extends from rivermile 166 to the San Acacia Diversion Dam (RM 116).

Map projection: UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

Source Imagery: Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-Band, Natural Colour
8-bit pixel depth
Meter GSD





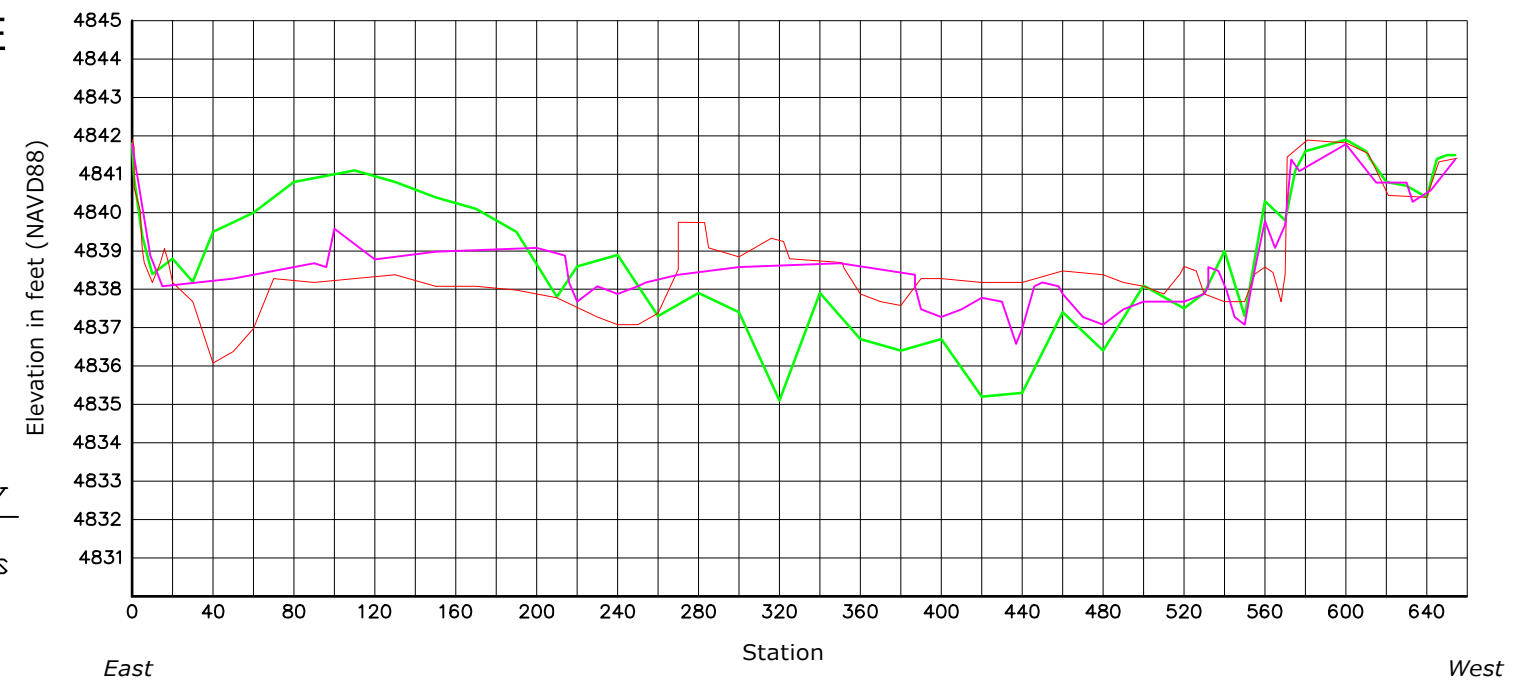


USBR monumented cross sections (—).

COCHITI LINE CO-765

JUNE 2005
JANUARY 2002
AUGUST 1998

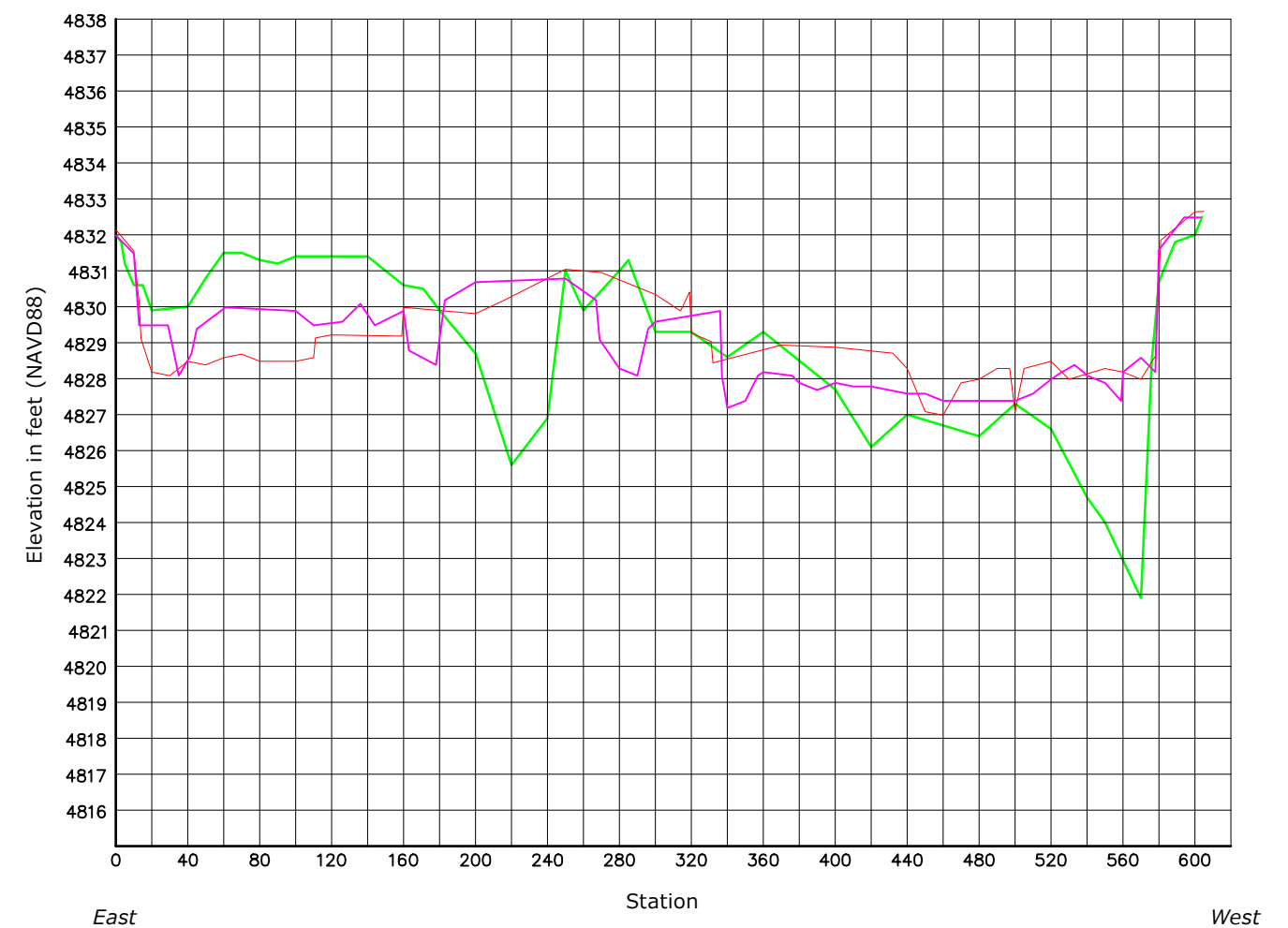
DATUM ELEV
4830.00
GROUP CO-LINES
SECTION 765



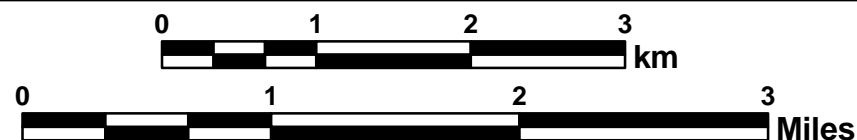
COCHITI LINE CO-787

JUNE 2005
JANUARY 2002
AUGUST 1998

DATUM ELEV
4815.00
GROUP CO-LINES
SECTION 787



U.S. Army Corps
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Albuquerque District
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Middle Rio Grande Cross Section Surveys

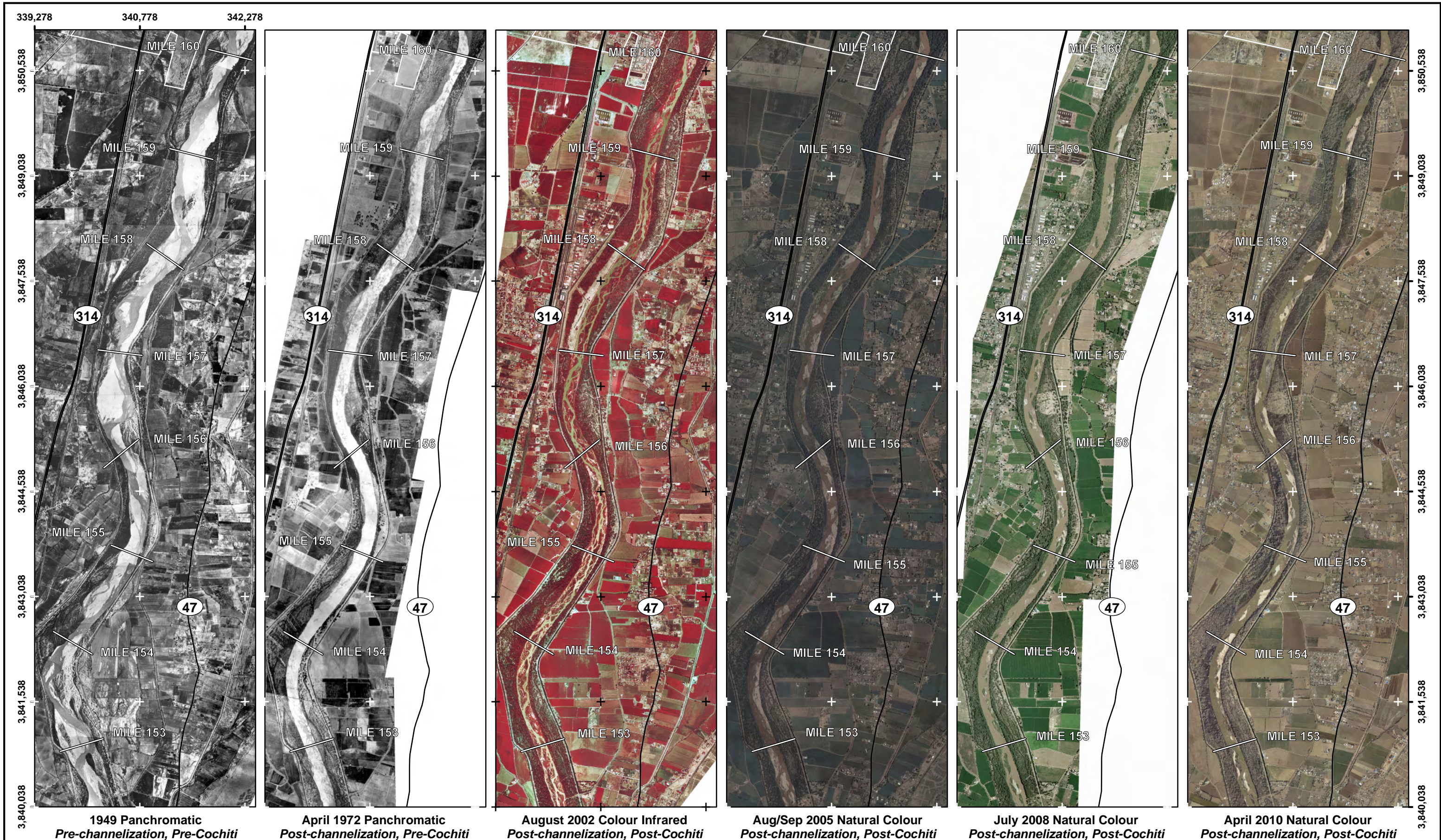
Isleta Reach: RM 160-153

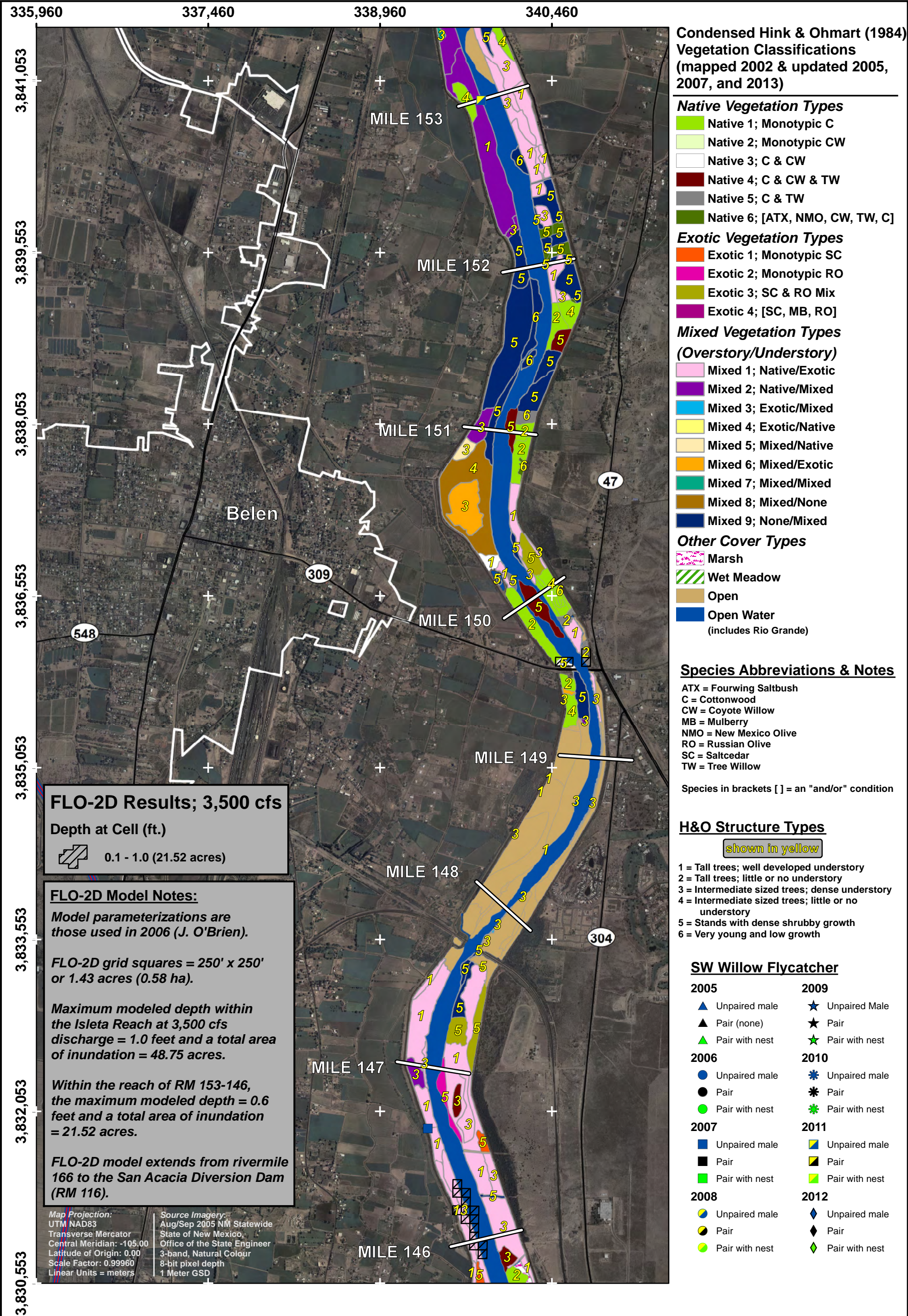
Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD

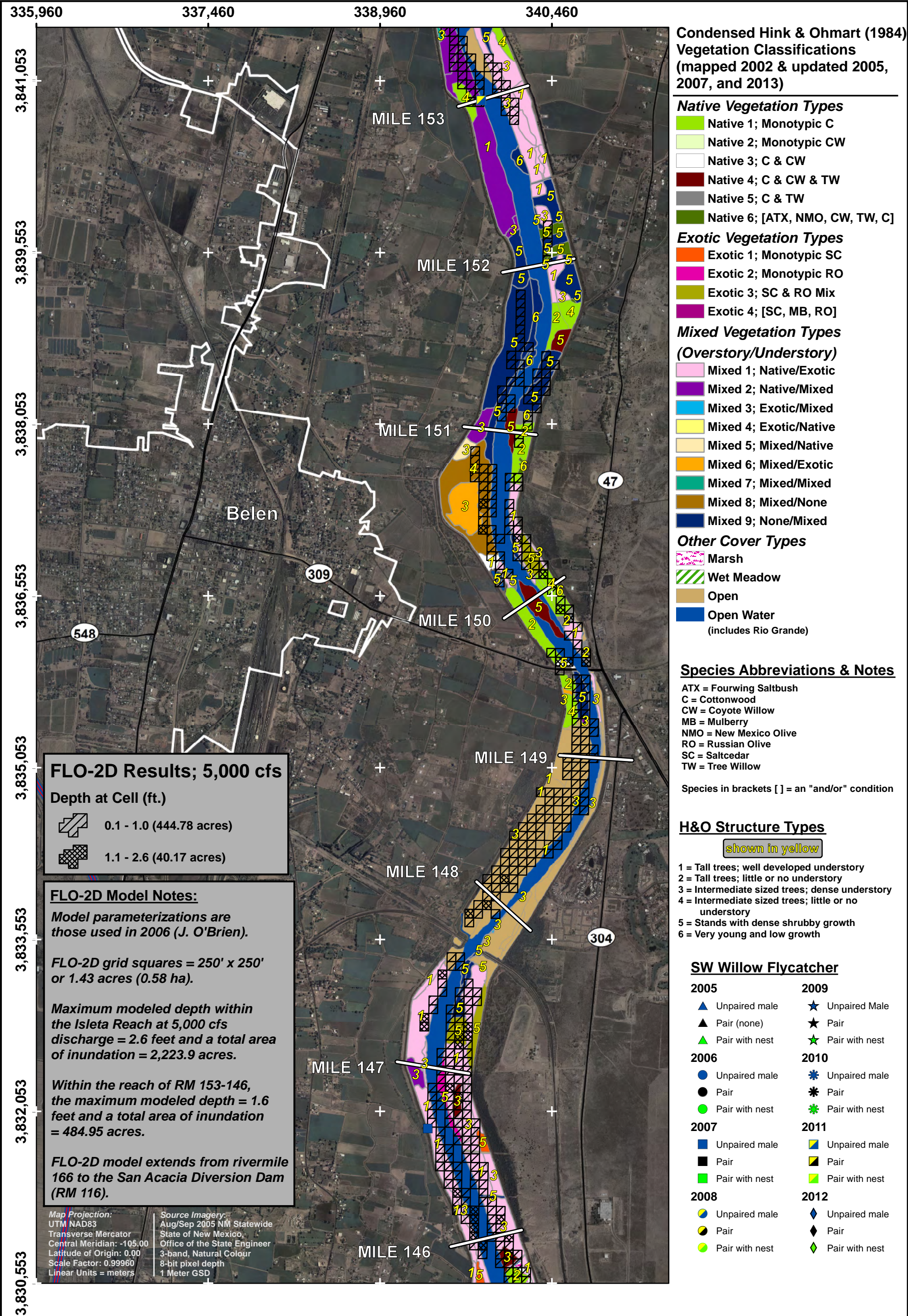
Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

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Condensed Hink & Ohmart (1984)
Vegetation Classifications
(mapped 2002 & updated 2005,
2007, and 2013)

- Native Vegetation Types**
- Native 1; Monotypic C
 - Native 2; Monotypic CW
 - Native 3; C & CW
 - Native 4; C & CW & TW
 - Native 5; C & TW
 - Native 6; [ATX, NMO, CW, TW, C]
- Exotic Vegetation Types**
- Exotic 1; Monotypic SC
 - Exotic 2; Monotypic RO
 - Exotic 3; SC & RO Mix
 - Exotic 4; [SC, MB, RO]
- Mixed Vegetation Types (Overstory/Understory)**
- Mixed 1; Native/Exotic
 - Mixed 2; Native/Mixed
 - Mixed 3; Exotic/Mixed
 - Mixed 4; Exotic/Native
 - Mixed 5; Mixed/Native
 - Mixed 6; Mixed/Exotic
 - Mixed 7; Mixed/Mixed
 - Mixed 8; Mixed/None
 - Mixed 9; None/Mixed
- Other Cover Types**
- Marsh
 - Wet Meadow
 - Open
 - Open Water (includes Rio Grande)

Species Abbreviations & Notes

ATX = Fourwing Saltbush
C = Cottonwood
CW = Coyote Willow
MB = Mulberry
NMO = New Mexico Olive
RO = Russian Olive
SC = Saltcedar
TW = Tree Willow

Species in brackets [] = an "and/or" condition

H&O Structure Types

shown in yellow

1 = Tall trees; well developed understory
2 = Tall trees; little or no understory
3 = Intermediate sized trees; dense understory
4 = Intermediate sized trees; little or no understory
5 = Stands with dense shrubby growth
6 = Very young and low growth

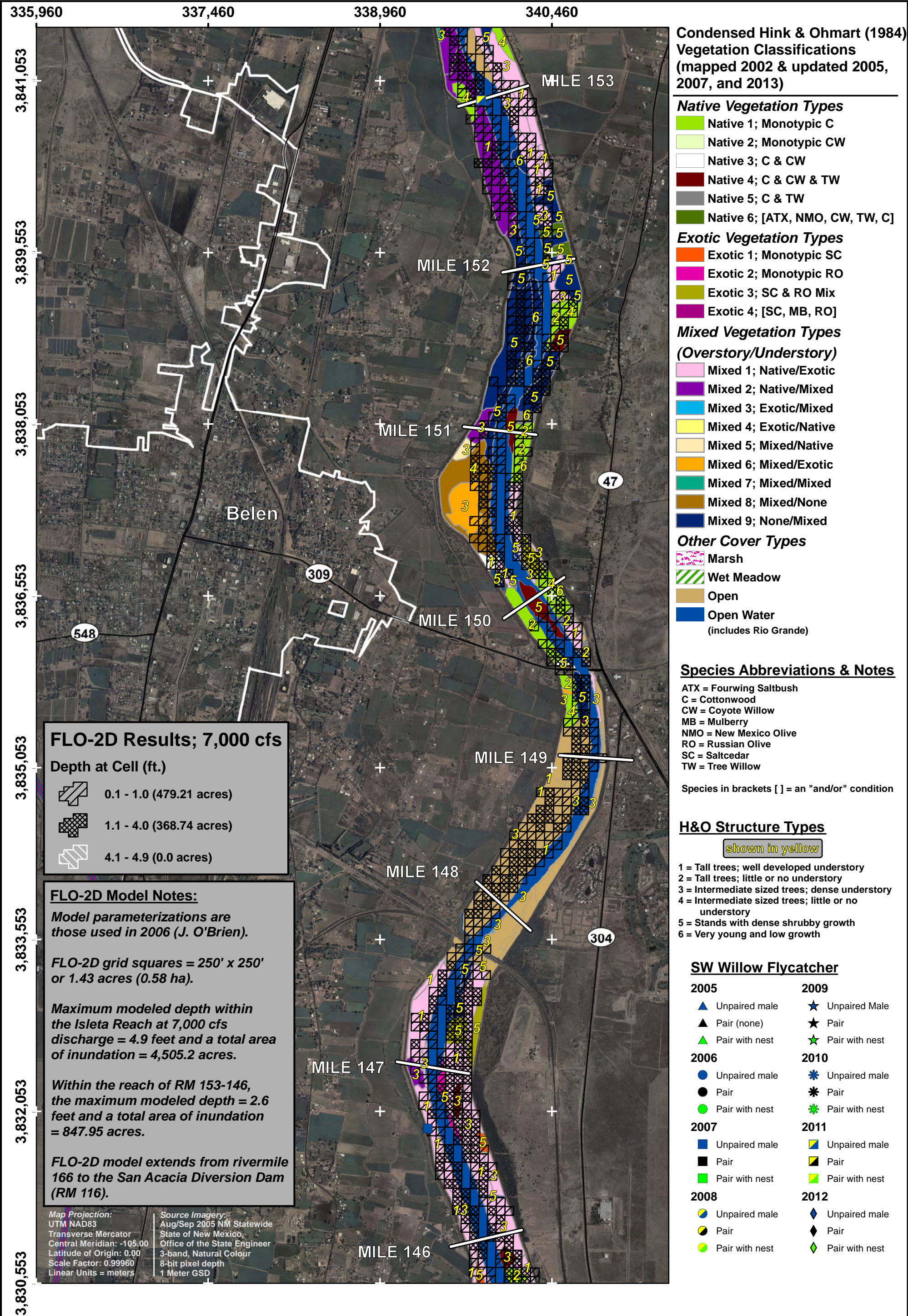
SW Willow Flycatcher

2005	2009
▲ Unpaired male	★ Unpaired Male
▲ Pair (none)	★ Pair
▲ Pair with nest	★ Pair with nest

2006	2010
● Unpaired male	★ Unpaired male
● Pair	★ Pair
● Pair with nest	★ Pair with nest

2007	2011
■ Unpaired male	■ Unpaired male
■ Pair	■ Pair
■ Pair with nest	■ Pair with nest

2008	2012
● Unpaired male	◆ Unpaired male
● Pair	◆ Pair
● Pair with nest	◆ Pair with nest



Condensed Hink & Ohmart (1984)
Vegetation Classifications
(mapped 2002 & updated 2005,
2007, and 2013)

Native Vegetation Types

- Native 1; Monotypic C
- Native 2; Monotypic CW
- Native 3; C & CW
- Native 4; C & CW & TW
- Native 5; C & TW
- Native 6; [ATX, NMO, CW, TW, C]

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- Exotic 2; Monotypic RO
- Exotic 3; SC & RO Mix
- Exotic 4; [SC, MB, RO]

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- Mixed 3; Exotic/Mixed
- Mixed 4; Exotic/Native
- Mixed 5; Mixed/Native
- Mixed 6; Mixed/Exotic
- Mixed 7; Mixed/Mixed
- Mixed 8; Mixed/None
- Mixed 9; None/Mixed

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- Wet Meadow
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- Open Water
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RO = Russian Olive
SC = Saltcedar
TW = Tree Willow

Species in brackets [] are an "and/or" condition

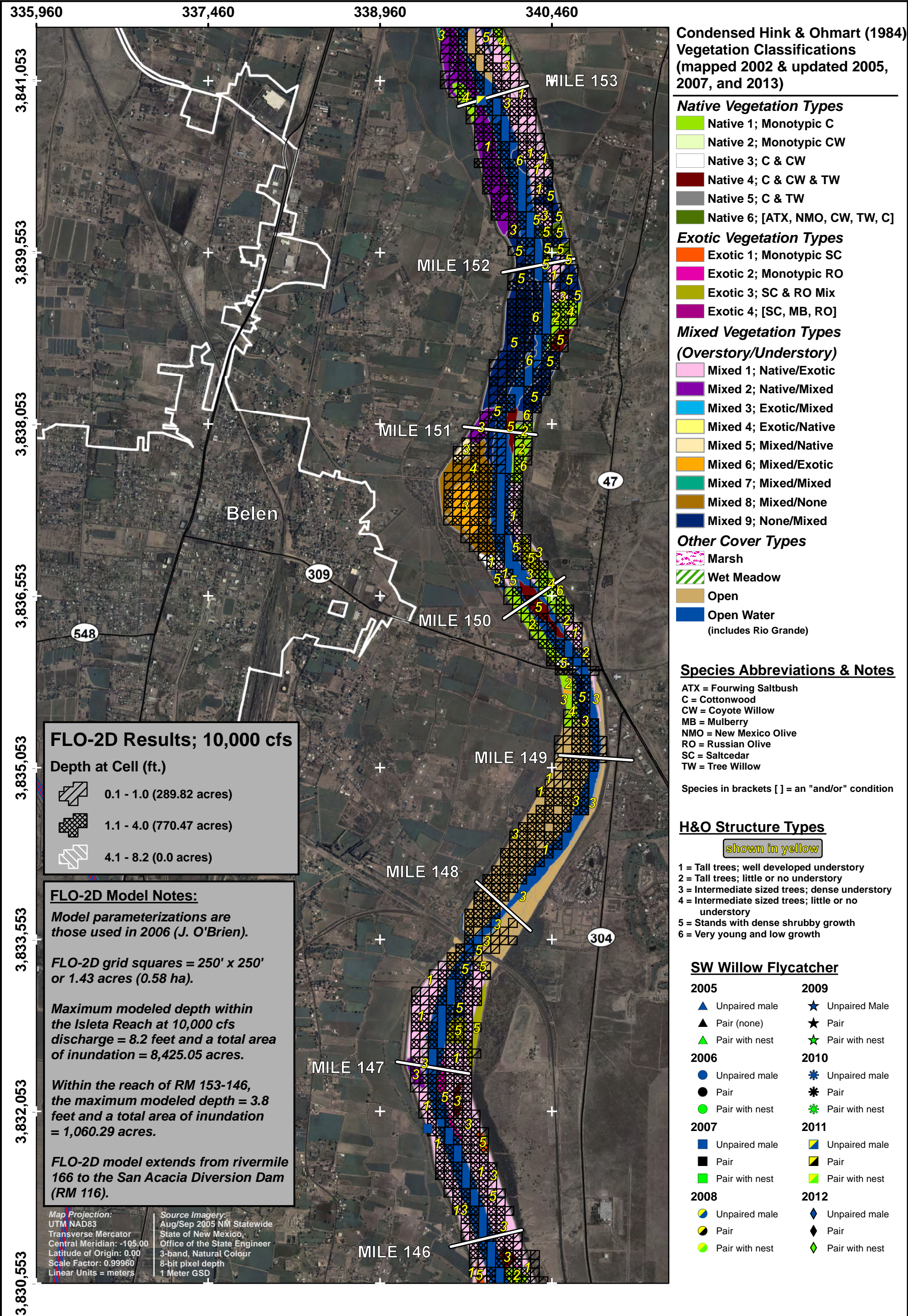
H&O Structure Types

shown in yellow

- 1 = Tall trees; well developed understory
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- 3 = Intermediate sized trees; dense understory
- 4 = Intermediate sized trees; little or no understory
- 5 = Stands with dense shrubby growth
- 6 = Very young and low growth

SW Willow Flycatcher

2005	2009
▲ Unpaired male	★ Unpaired Male
▲ Pair (none)	★ Pair
▲ Pair with nest	★ Pair with nest
2006	2010
● Unpaired male	★ Unpaired male
● Pair	★ Pair
● Pair with nest	★ Pair with nest
2007	2011
■ Unpaired male	■ Unpaired male
■ Pair	■ Pair
■ Pair with nest	■ Pair with nest
2008	2012
● Unpaired male	◆ Unpaired male
● Pair	◆ Pair
● Pair with nest	◆ Pair with nest



Condensed Hink & Ohmart (1984)
Vegetation Classifications
(mapped 2002 & updated 2005,
2007, and 2013)

- Native Vegetation Types**
- Native 1; Monotypic C
 - Native 2; Monotypic CW
 - Native 3; C & CW
 - Native 4; C & CW & TW
 - Native 5; C & TW
 - Native 6; [ATX, NMO, CW, TW, C]

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- Exotic 1; Monotypic SC
 - Exotic 2; Monotypic RO
 - Exotic 3; SC & RO Mix
 - Exotic 4; [SC, MB, RO]

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(Overstory/Understory)**
- Mixed 1; Native/Exotic
 - Mixed 2; Native/Mixed
 - Mixed 3; Exotic/Mixed
 - Mixed 4; Exotic/Native
 - Mixed 5; Mixed/Native
 - Mixed 6; Mixed/Exotic
 - Mixed 7; Mixed/Mixed
 - Mixed 8; Mixed/None
 - Mixed 9; None/Mixed

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- Marsh
 - Wet Meadow
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 - 6 = Very young and low growth

SW Willow Flycatcher

- | 2005 | 2009 |
|------------------|------------------|
| ▲ Unpaired male | ★ Unpaired Male |
| ▲ Pair (none) | ★ Pair |
| ▲ Pair with nest | ★ Pair with nest |
| 2006 | 2010 |
| ● Unpaired male | ★ Unpaired male |
| ● Pair | ★ Pair |
| ● Pair with nest | ★ Pair with nest |
| 2007 | 2011 |
| ■ Unpaired male | ■ Unpaired male |
| ■ Pair | ■ Pair |
| ■ Pair with nest | ■ Pair with nest |
| 2008 | 2012 |
| ● Unpaired male | ◆ Unpaired male |
| ● Pair | ◆ Pair |
| ● Pair with nest | ◆ Pair with nest |

FLO-2D Results; 10,000 cfs

Depth at Cell (ft.)

- 0.1 - 1.0 (289.82 acres)
- 1.1 - 4.0 (770.47 acres)
- 4.1 - 8.2 (0.0 acres)

FLO-2D Model Notes:

Model parameterizations are those used in 2006 (J. O'Brien).

FLO-2D grid squares = 250' x 250' or 1.43 acres (0.58 ha).

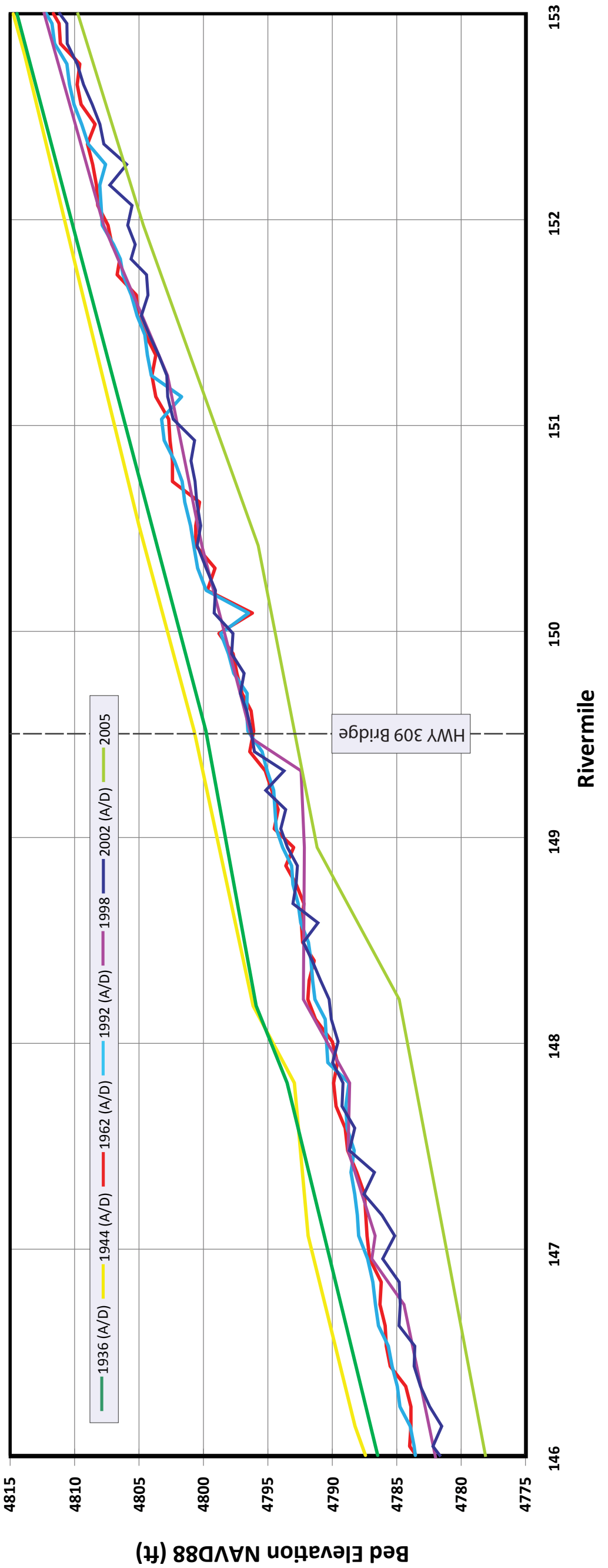
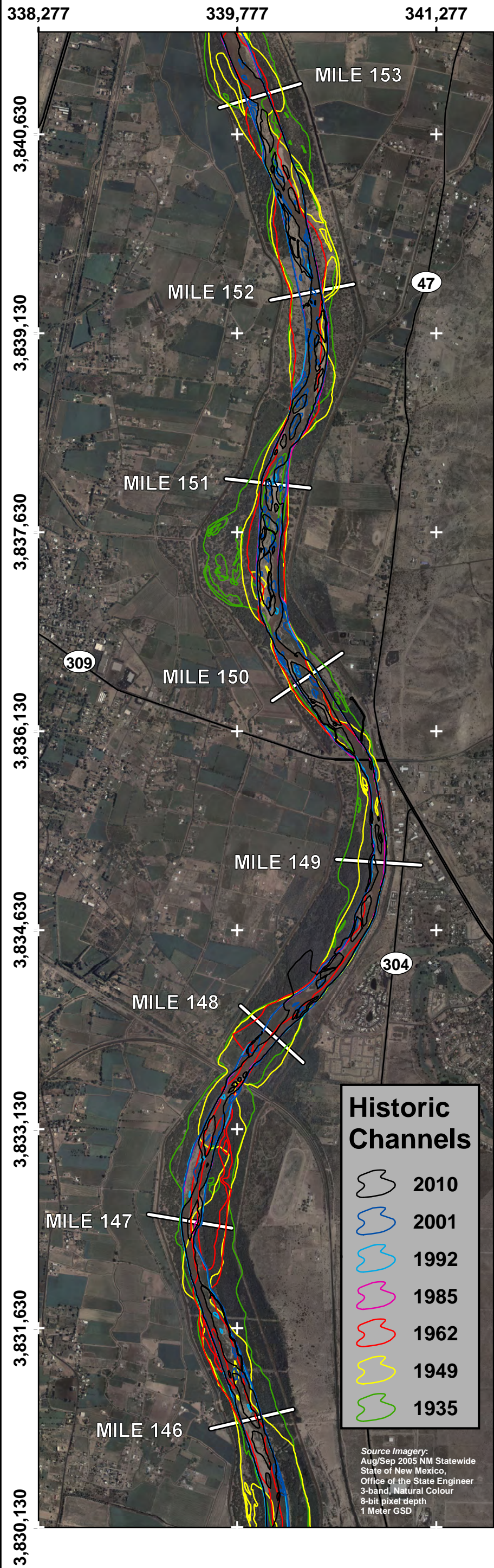
Maximum modeled depth within the Isleta Reach at 10,000 cfs discharge = 8.2 feet and a total area of inundation = 8,425.05 acres.

Within the reach of RM 153-146, the maximum modeled depth = 3.8 feet and a total area of inundation = 1,060.29 acres.

FLO-2D model extends from rivermile 166 to the San Acacia Diversion Dam (RM 116).

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD

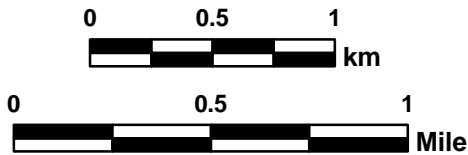


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Middle Rio Grande Channel Width & Profiles 1935/36-2010

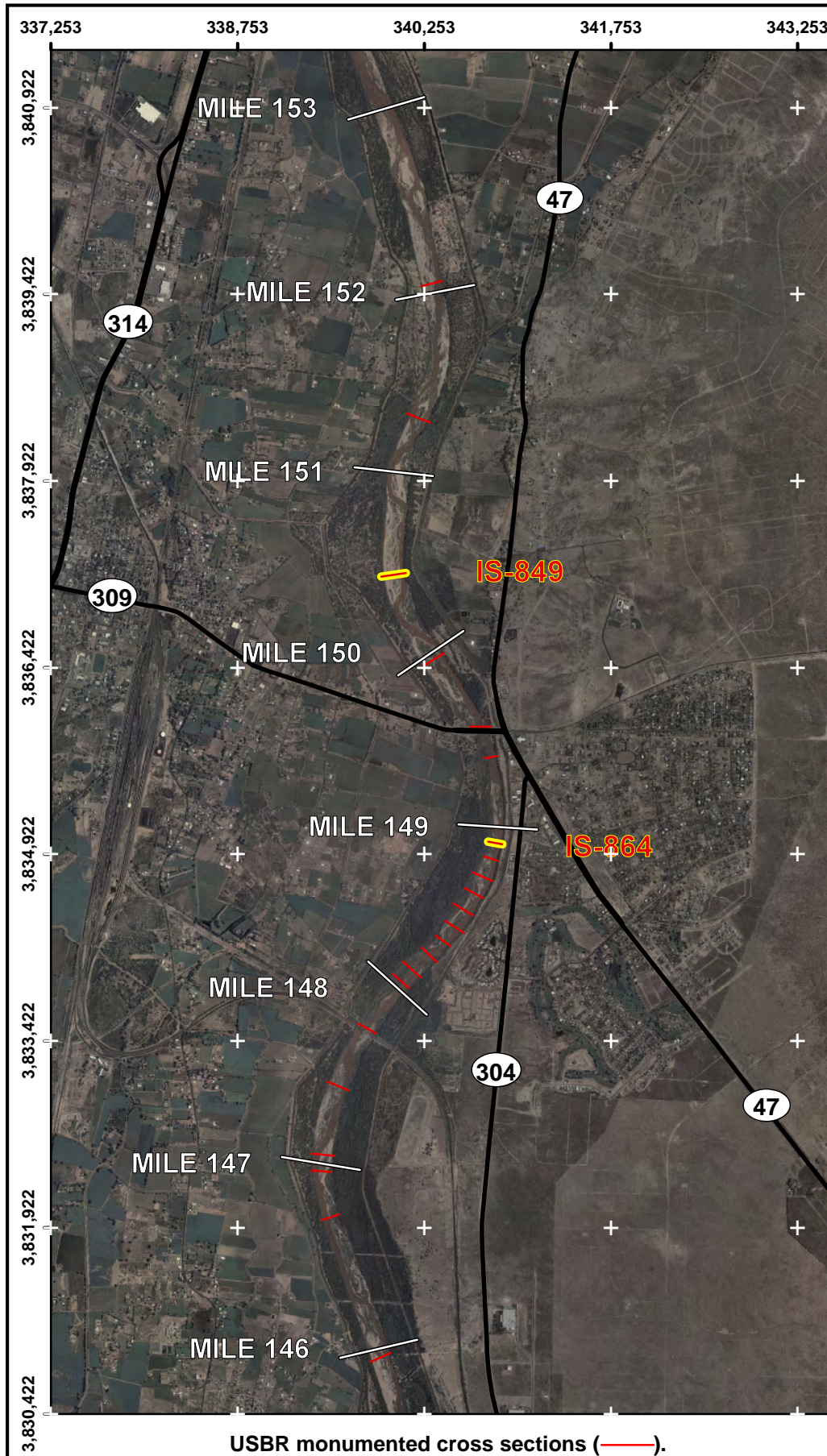
Isleta Reach: RM 153-146



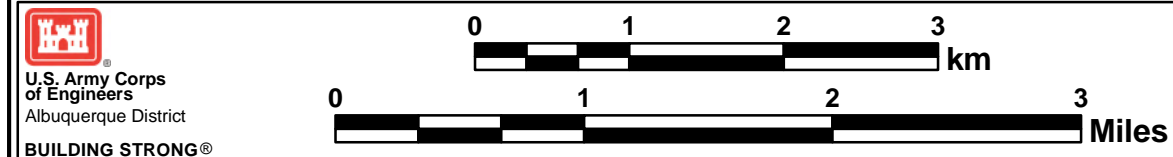
Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

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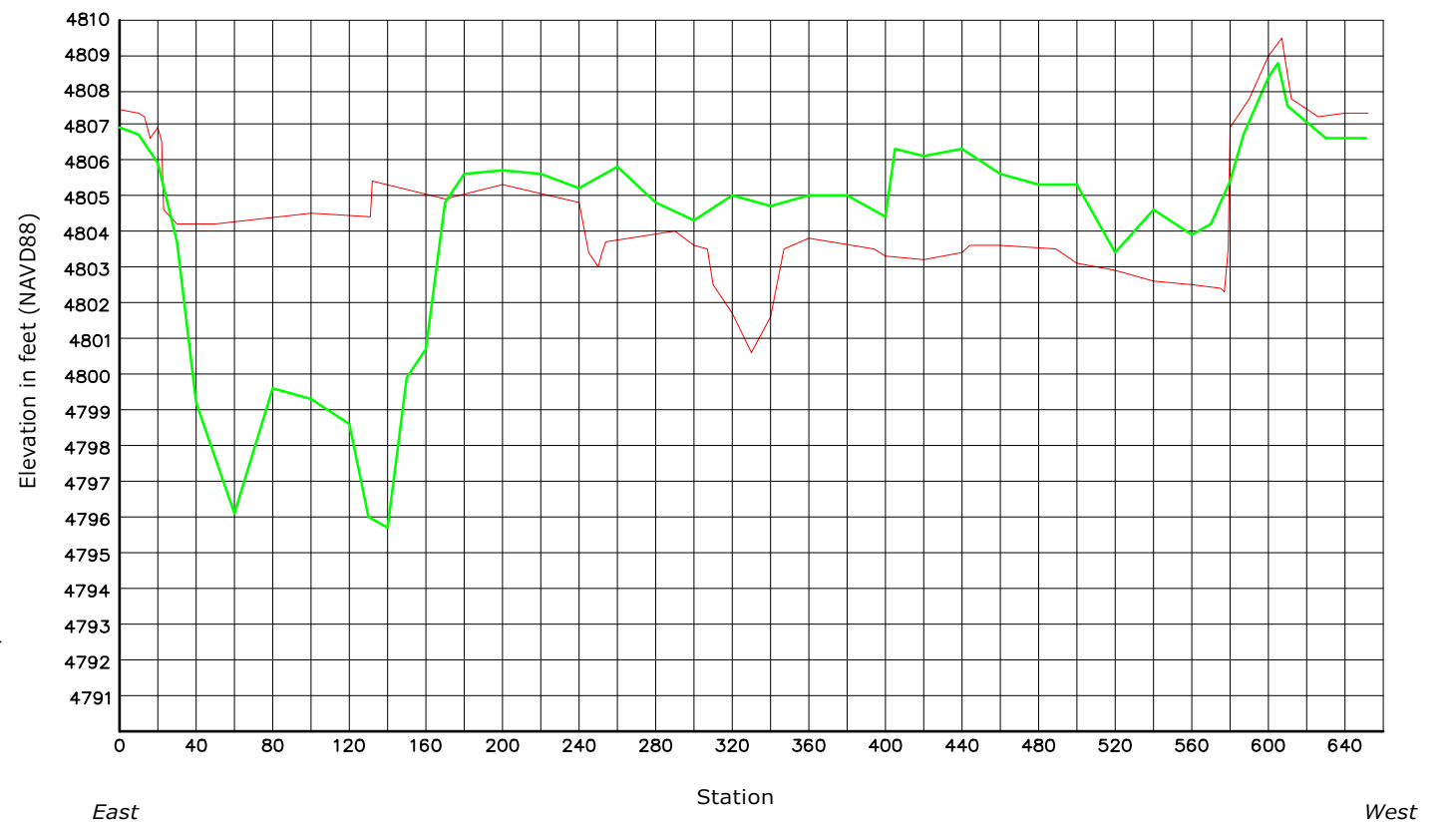
USBR monumented cross sections (—).



ISLETA LINE IS-849

JUNE 2005
JUNE 1998

DATUM ELEV
4790.00
GROUP IS-LINES
SECTION 849



ISLETA LINE IS-864

JUNE 2005
JUNE 1998

DATUM ELEV
4785.00
GROUP IS-LINES
SECTION 864

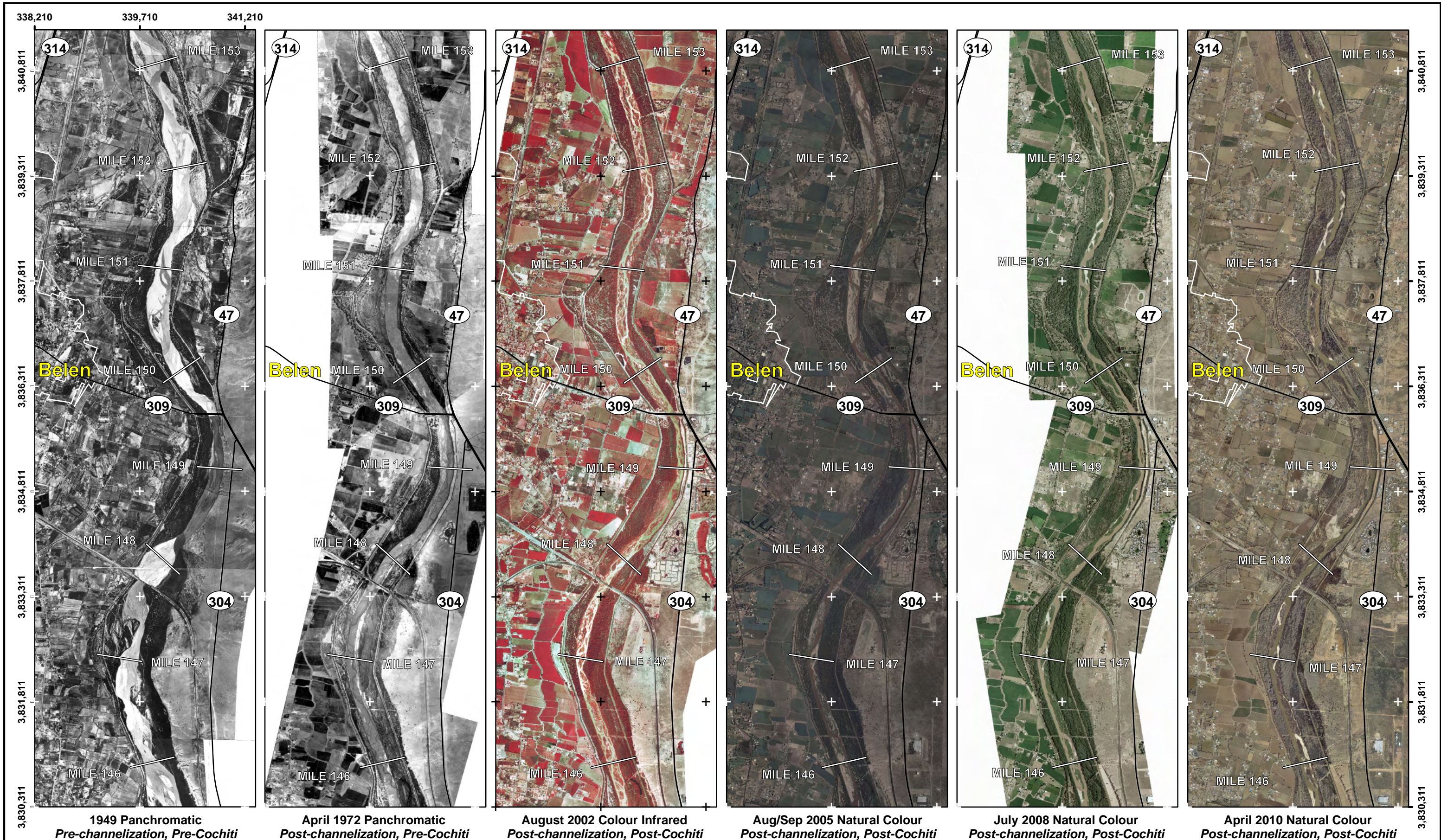


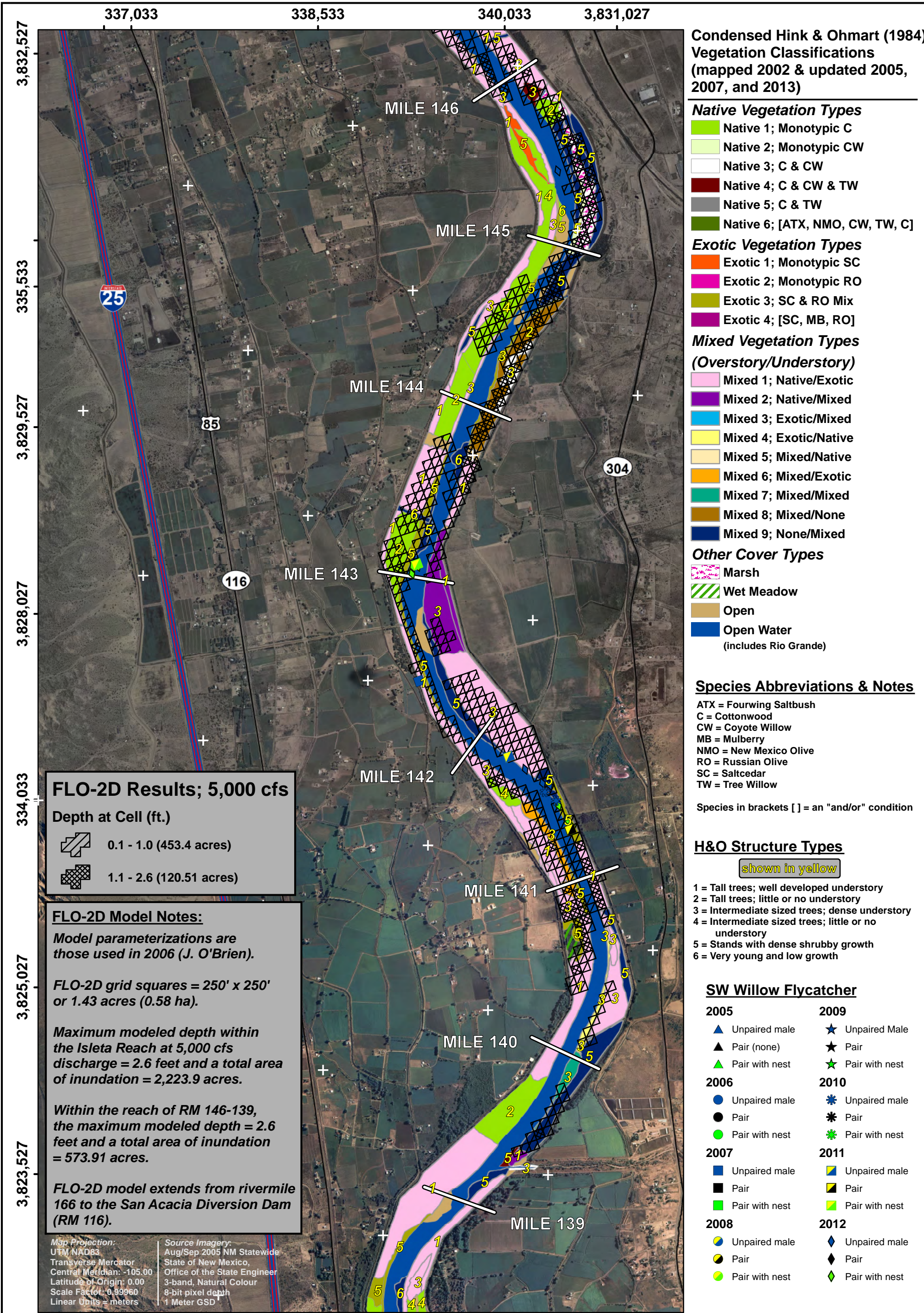
Middle Rio Grande Cross Section Surveys

Isleta Reach: RM 153-146

Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters





U.S. Army Corps
of Engineers
Albuquerque District

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Middle Rio Grande Vegetation Mapping,
FLO-2D Model Output, and SWFL Detections
Isleta Reach: Rivermile 146-139

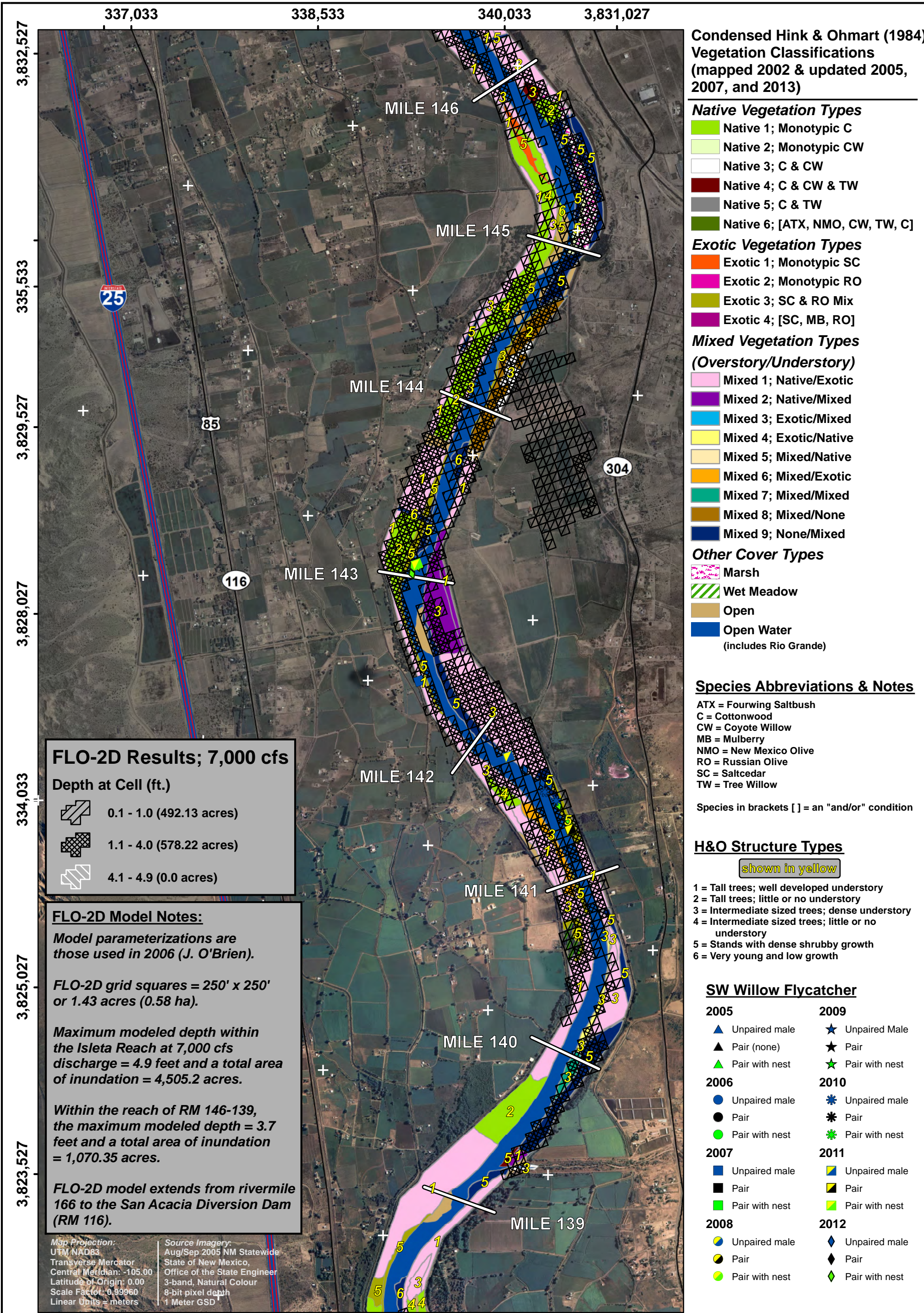


0 0.5 1
km

0 0.5 1
Mile

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Albuquerque District

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Middle Rio Grande Vegetation Mapping,
FLO-2D Model Output, and SWFL Detections
Isleta Reach: Rivermile 146-139

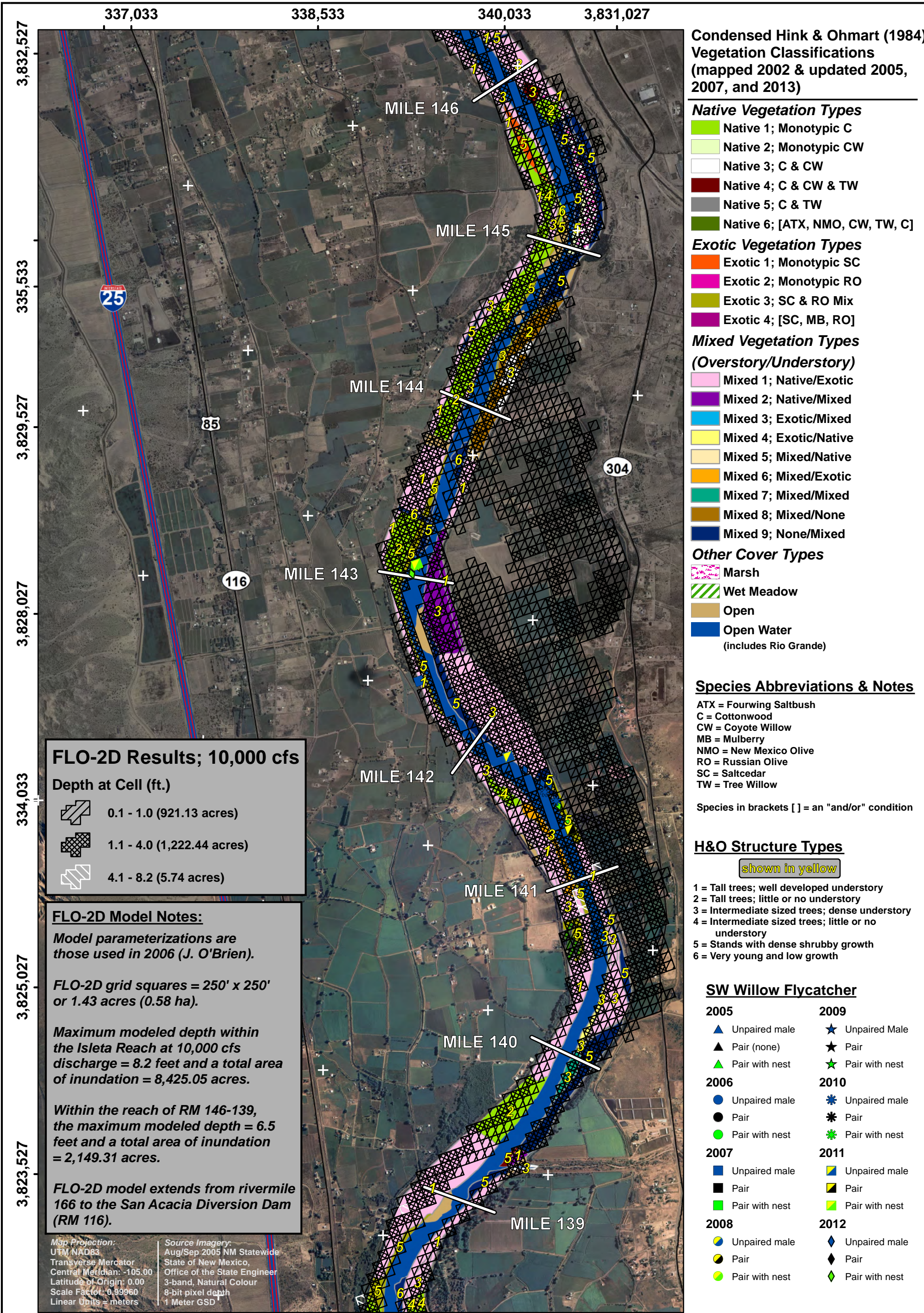


0 0.5 1
km

0 0.5 1
Mile

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Albuquerque District

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Middle Rio Grande Vegetation Mapping,
FLO-2D Model Output, and SWFL Detections
Isleta Reach: Rivermile 146-139

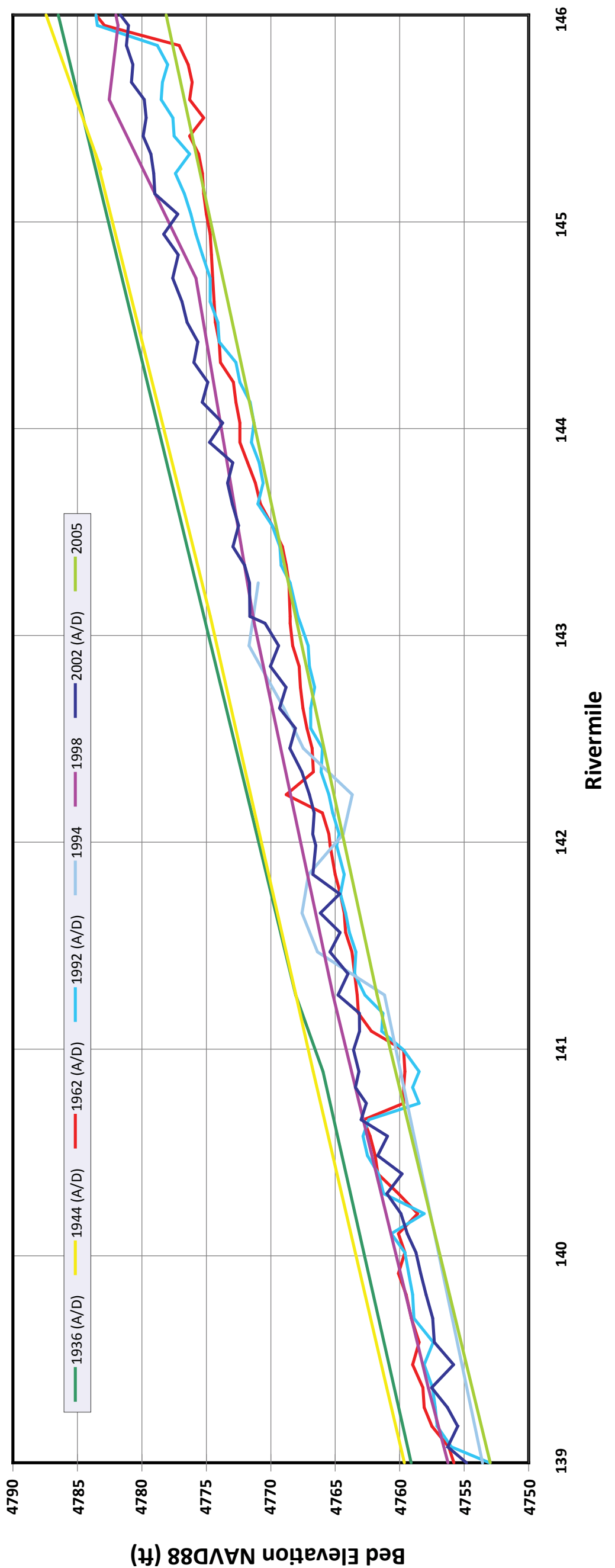
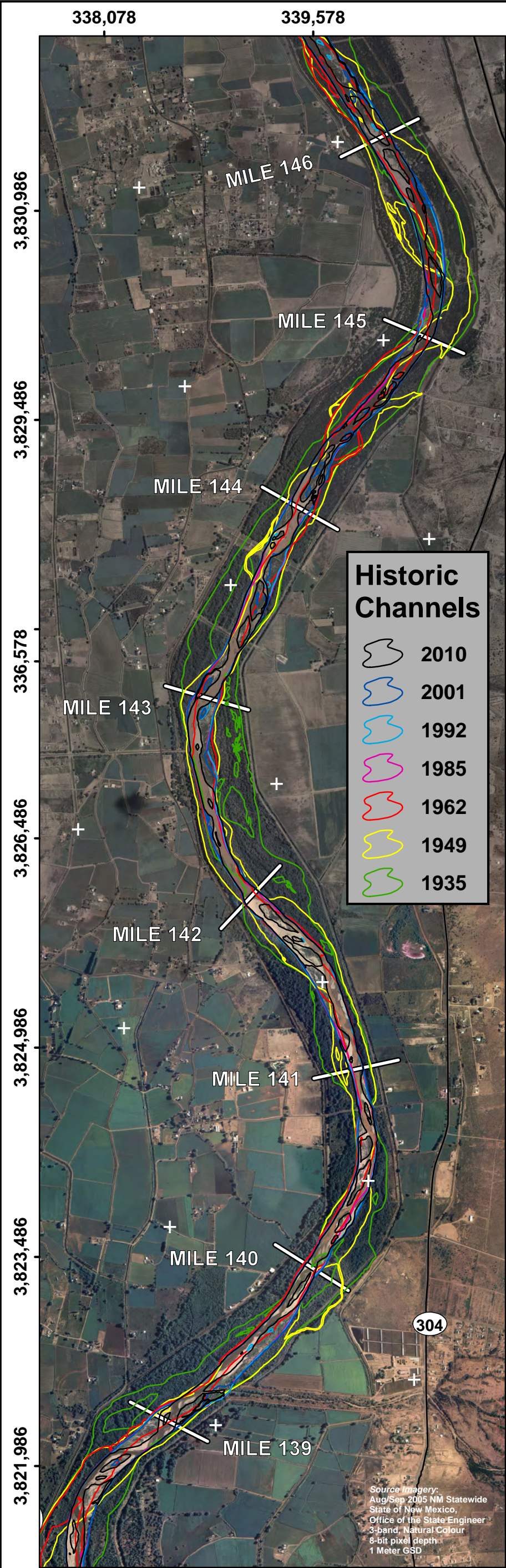


0 0.5 1
km

0 0.5 1
Mile

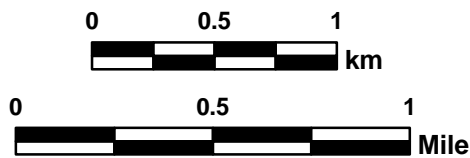
Page 32 of 63





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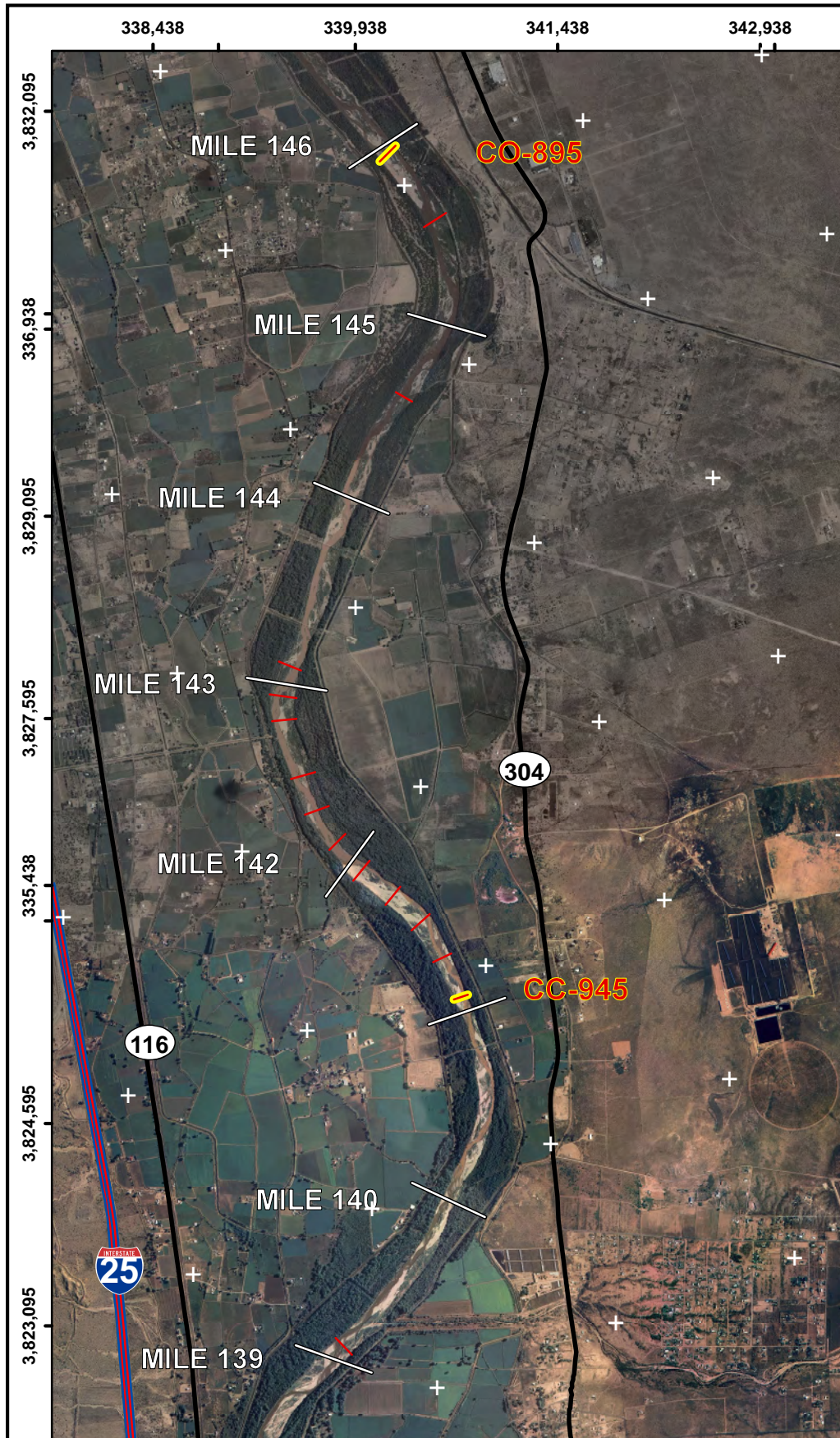
**Middle Rio Grande Channel
Width & Profiles 1935/36-2010**
Isleta Reach: RM 146-139



Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

Page 33 of 63



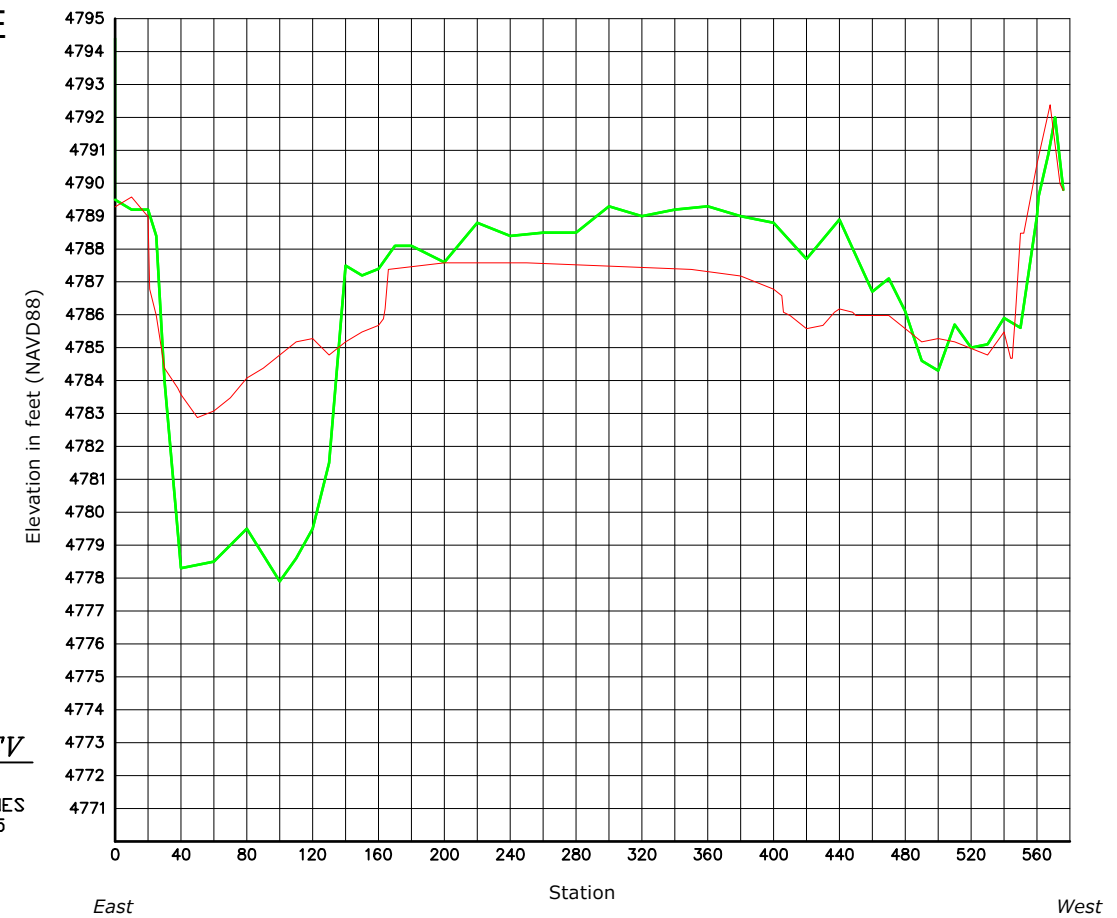


USBR monumented cross sections (—).

COCHITI LINE CO-895

JUNE 2005
AUGUST 1998

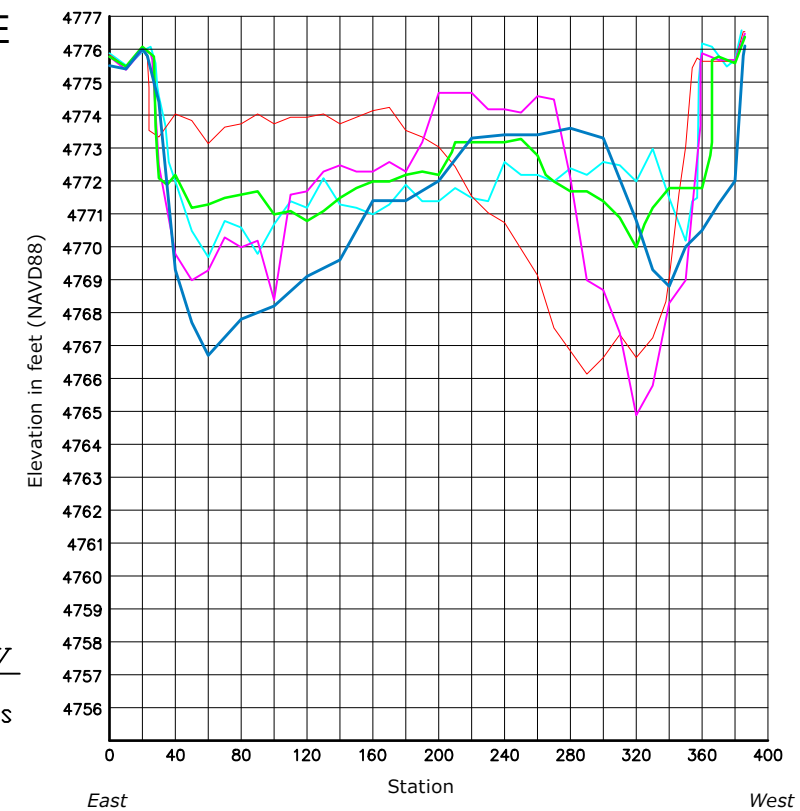
DATUM ELEV
4770.00
GROUP CO-LINES
SECTION 895



CASA COLORADO LINE CC-945

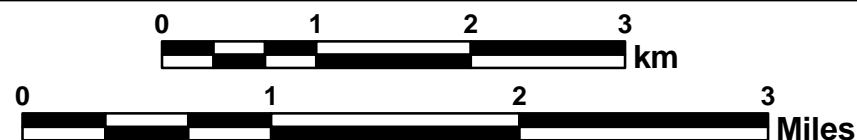
JUNE 2005
MARCH 1996
JUNE 1995
JUNE 1993
JUNE 1991

DATUM ELEV
4755.00
GROUP CC-LINES
SECTION 945



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Albuquerque District

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Middle Rio Grande Cross Section Surveys

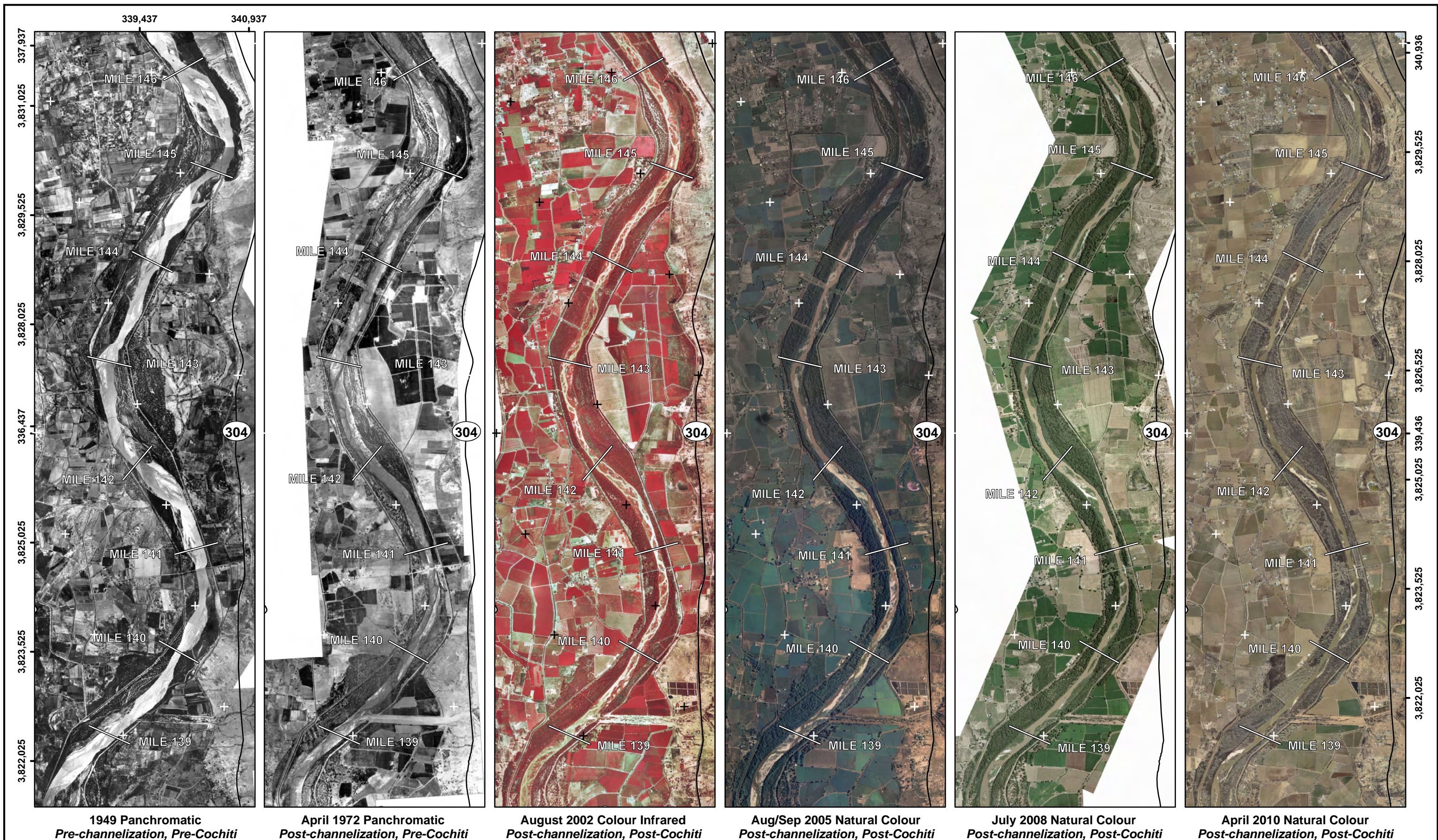
Isleta Reach: RM 146-139

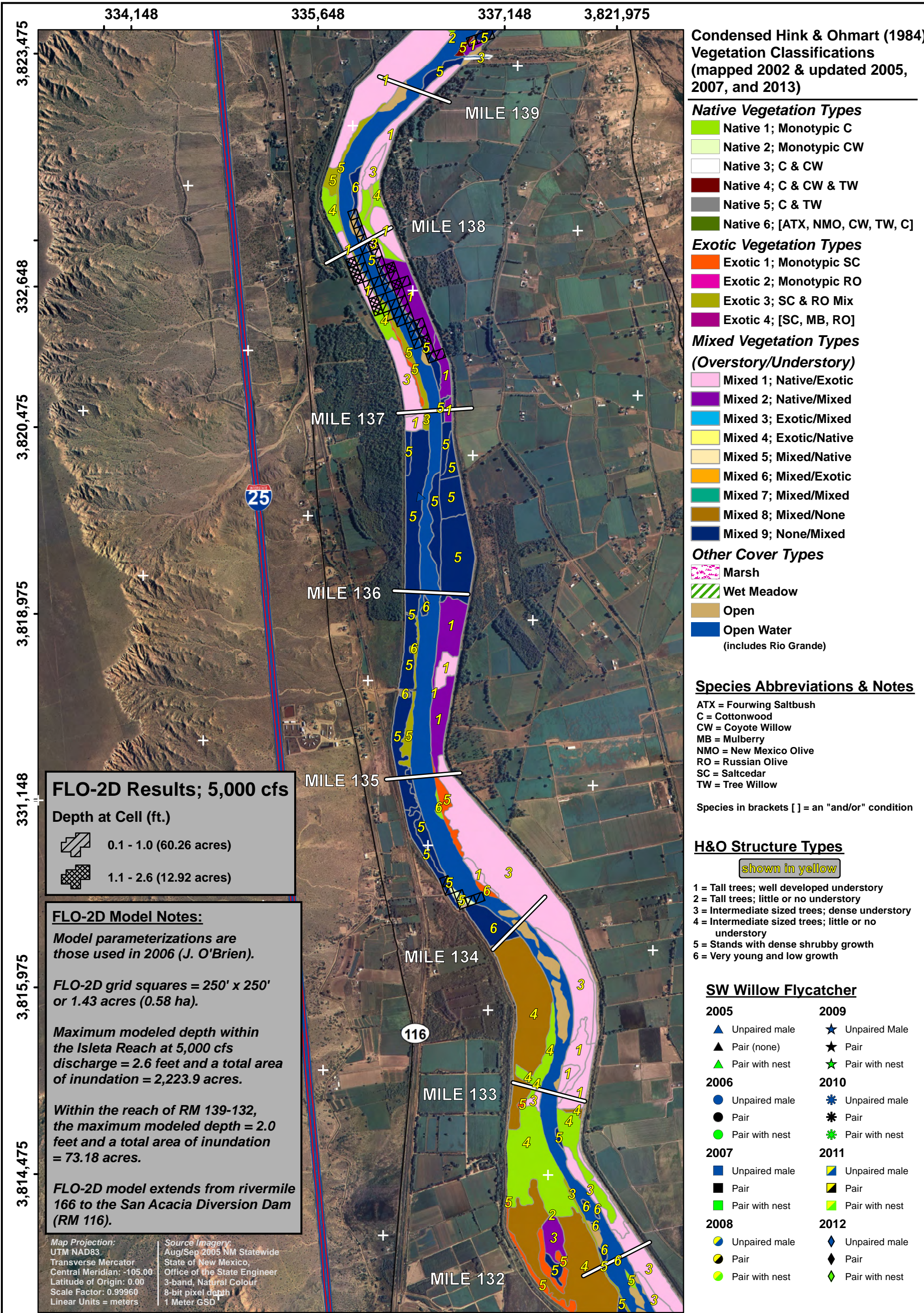
Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

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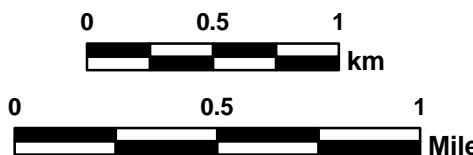




U.S. Army Corps
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Albuquerque District

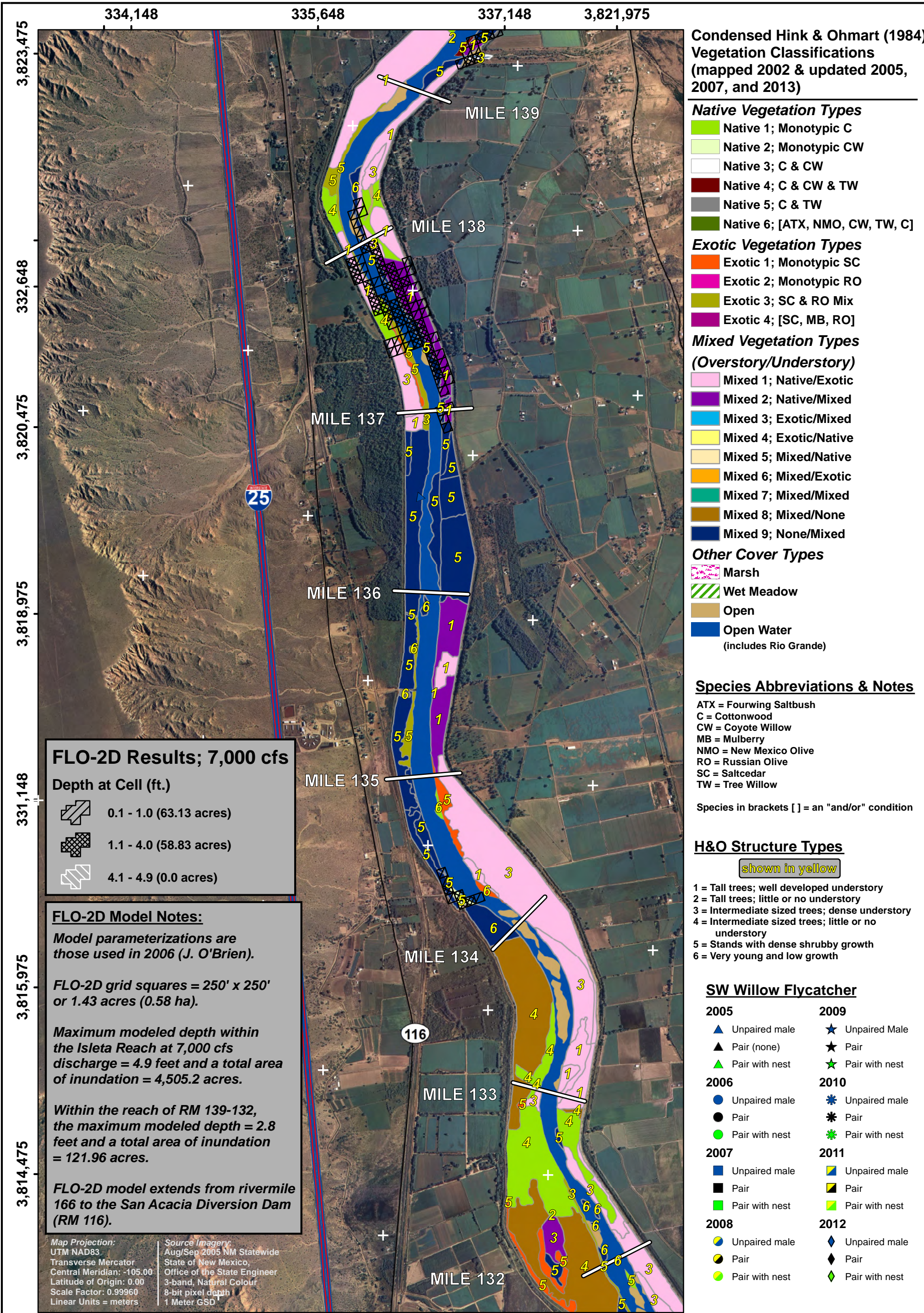
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Middle Rio Grande Vegetation Mapping,
FLO-2D Model Output, and SWFL Detections
Isleta Reach: Rivermile 139-132



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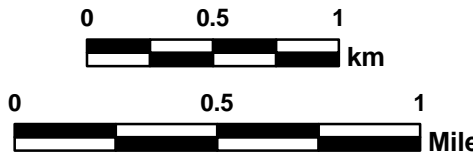




U.S. Army Corps
of Engineers
Albuquerque District

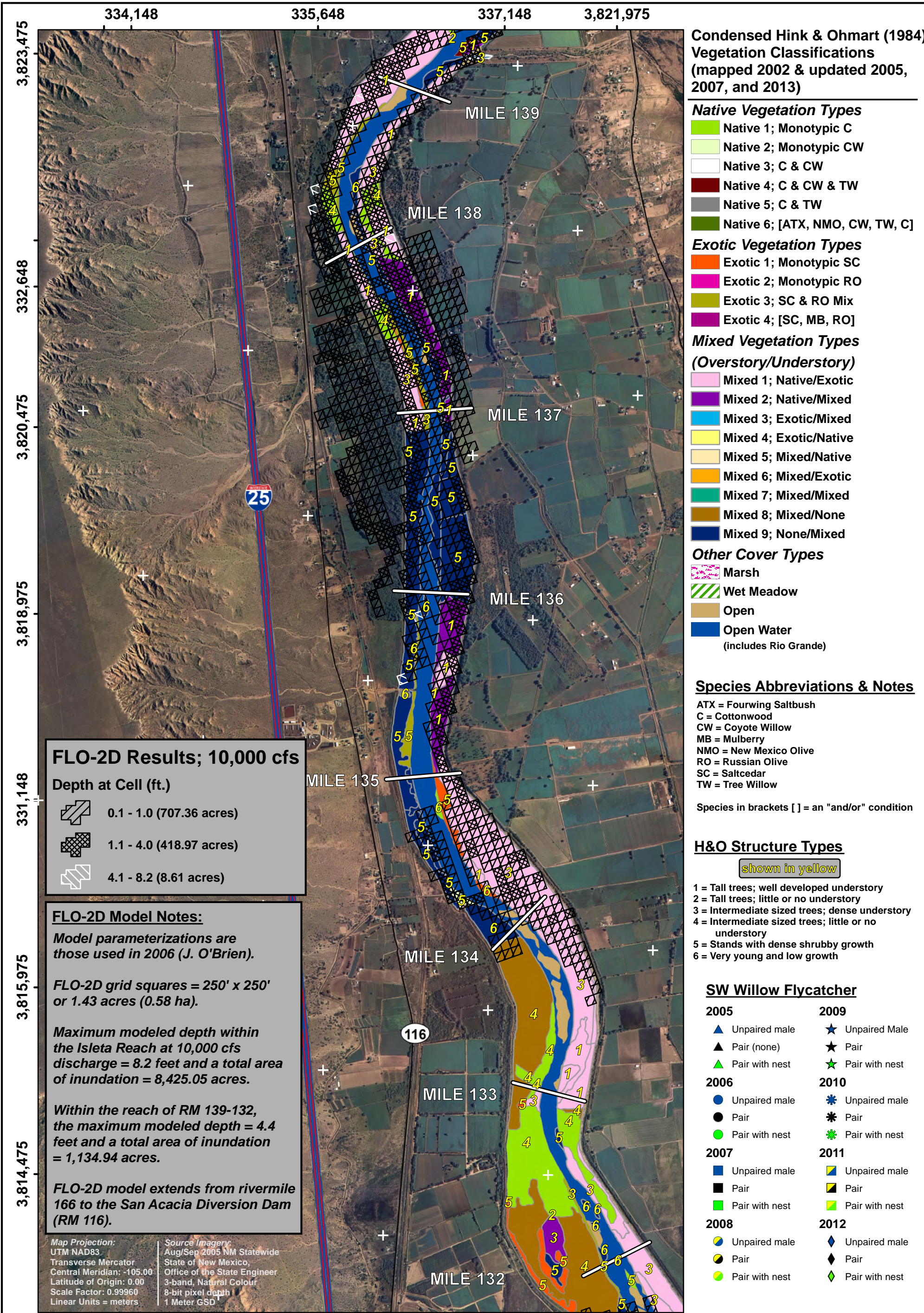
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Middle Rio Grande Vegetation Mapping,
FLO-2D Model Output, and SWFL Detections
Isleta Reach: Rivermile 139-132



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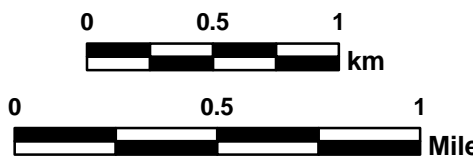




U.S. Army Corps
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Albuquerque District

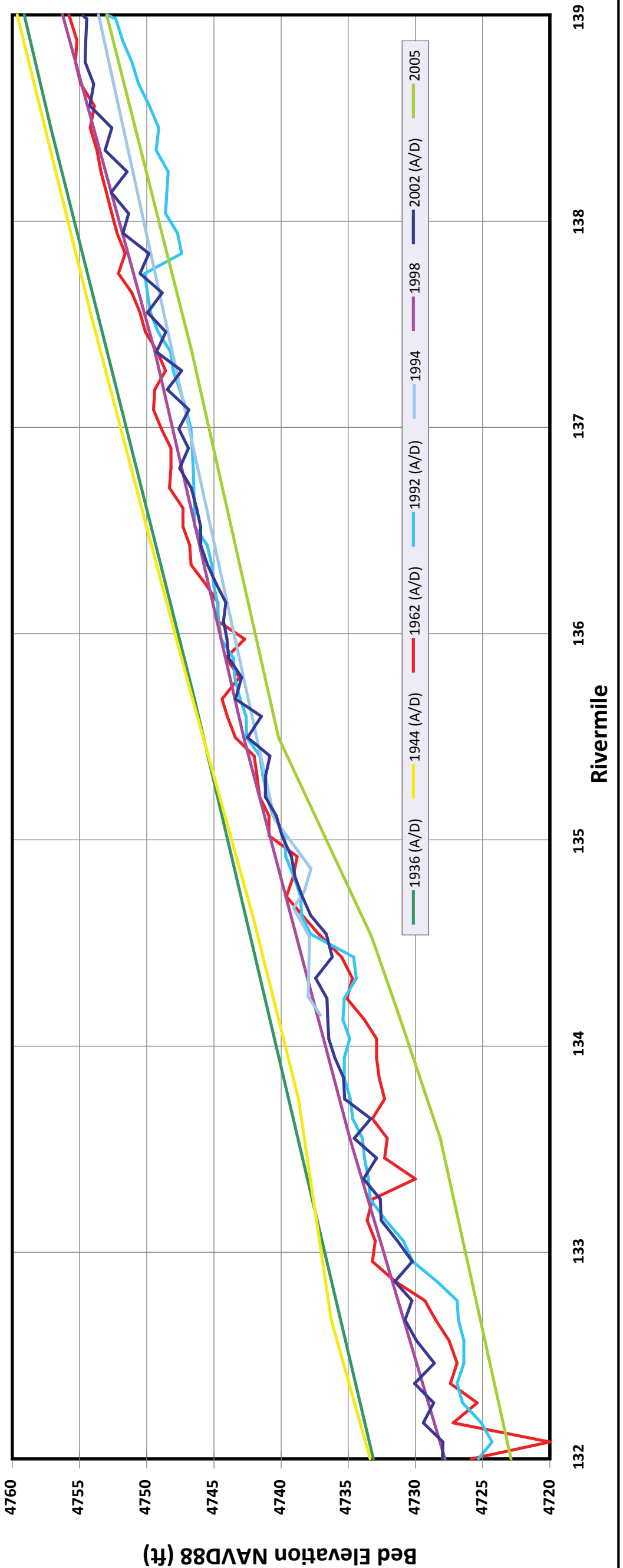
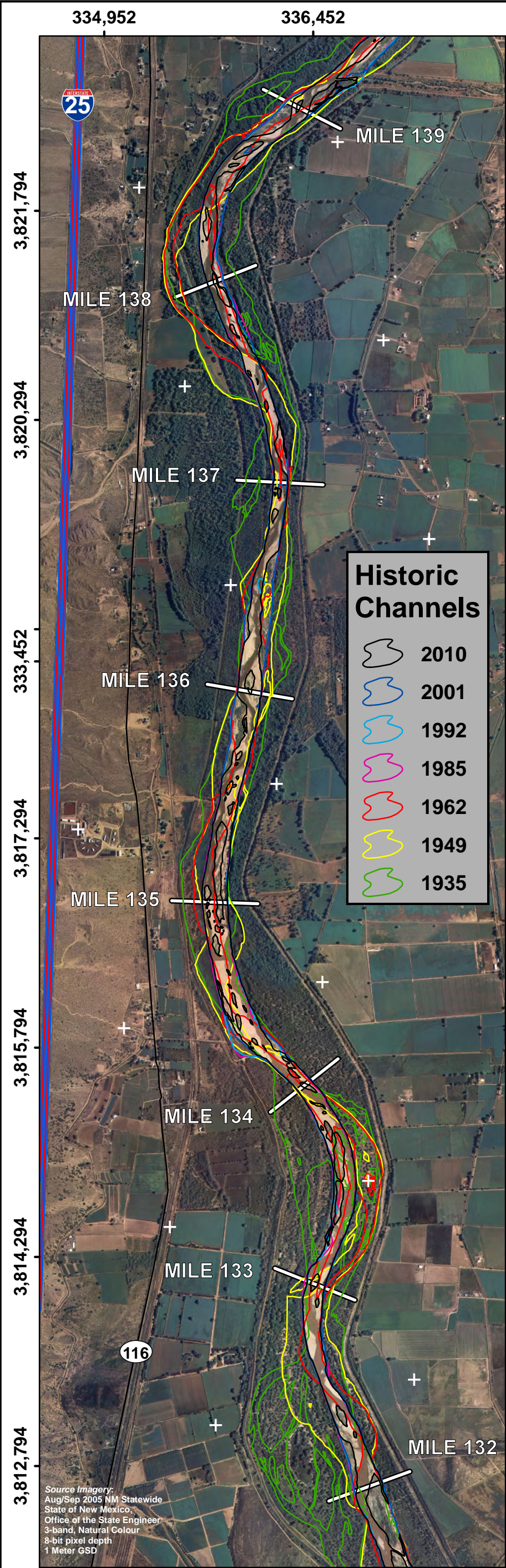
BUILDING STRONG®

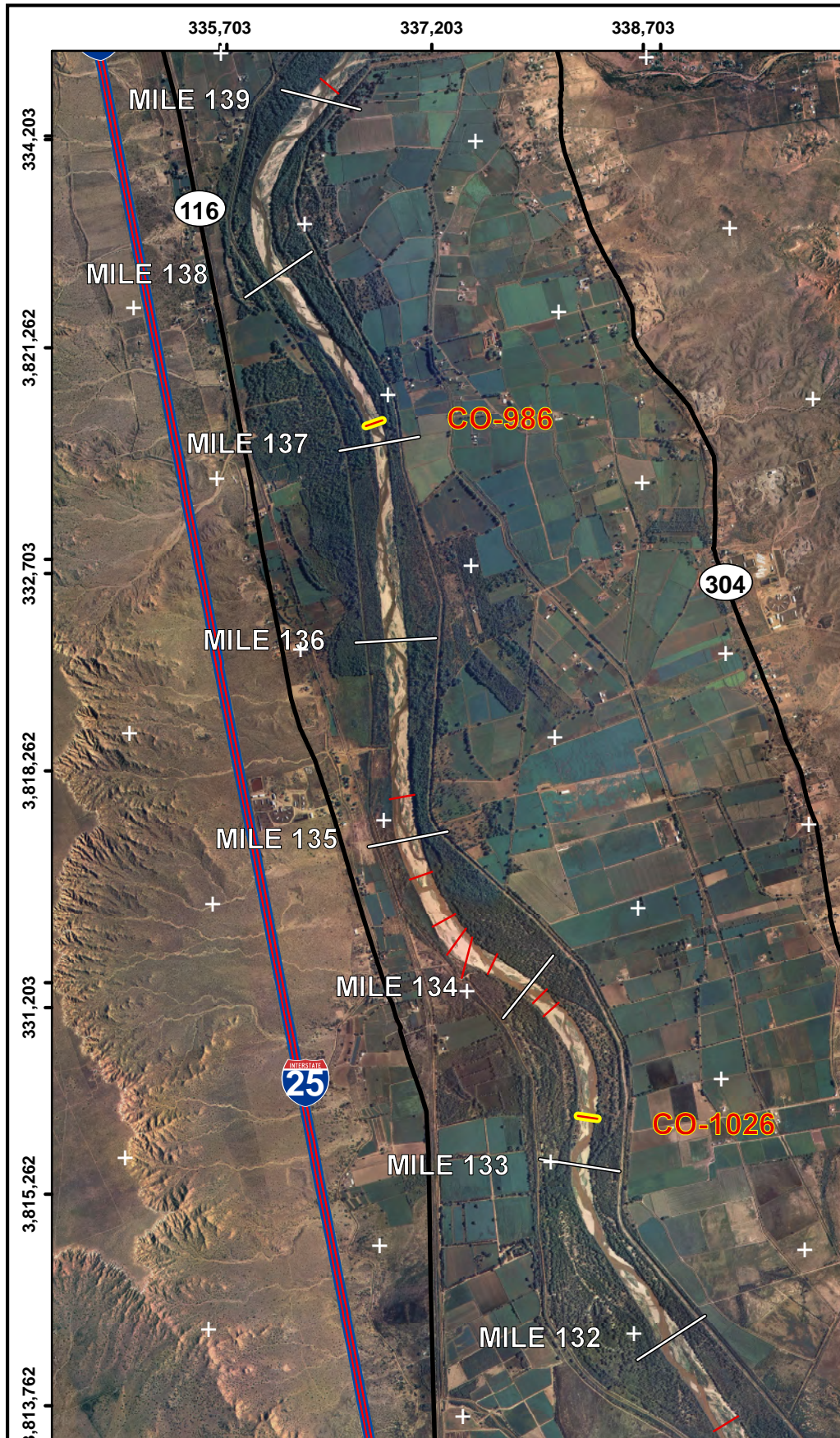
Middle Rio Grande Vegetation Mapping,
FLO-2D Model Output, and SWFL Detections
Isleta Reach: Rivermile 139-132



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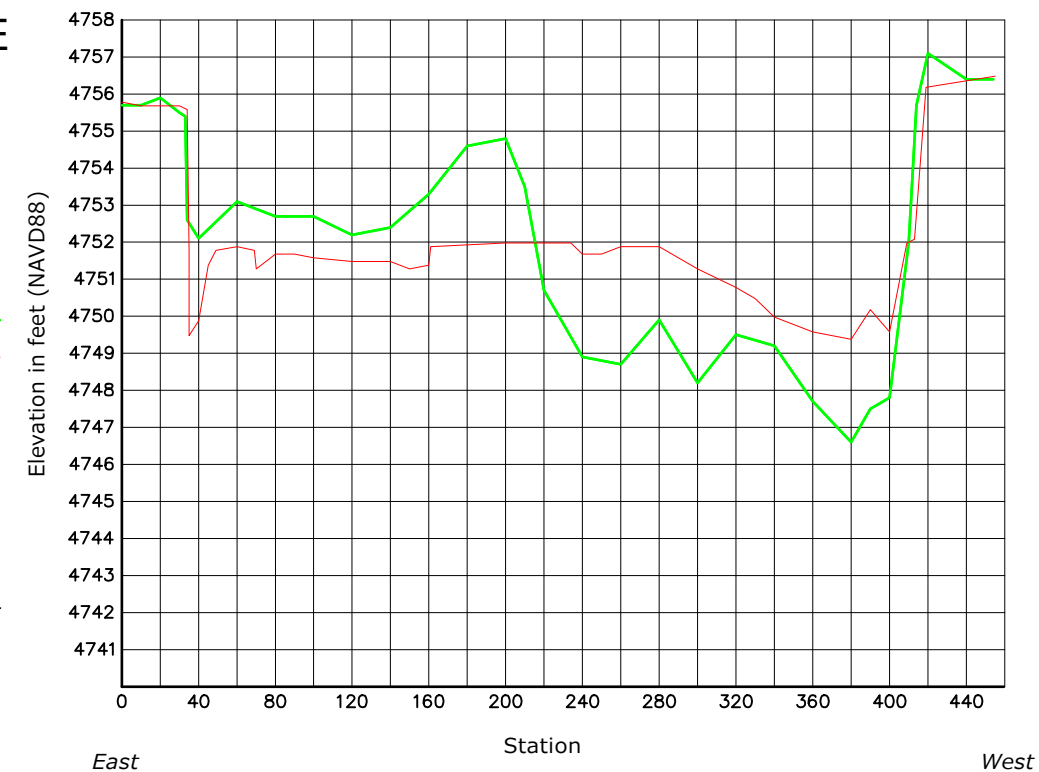


USBR monumented cross sections (—).

COCHITI LINE CO-986

JUNE 2005
AUGUST 1998

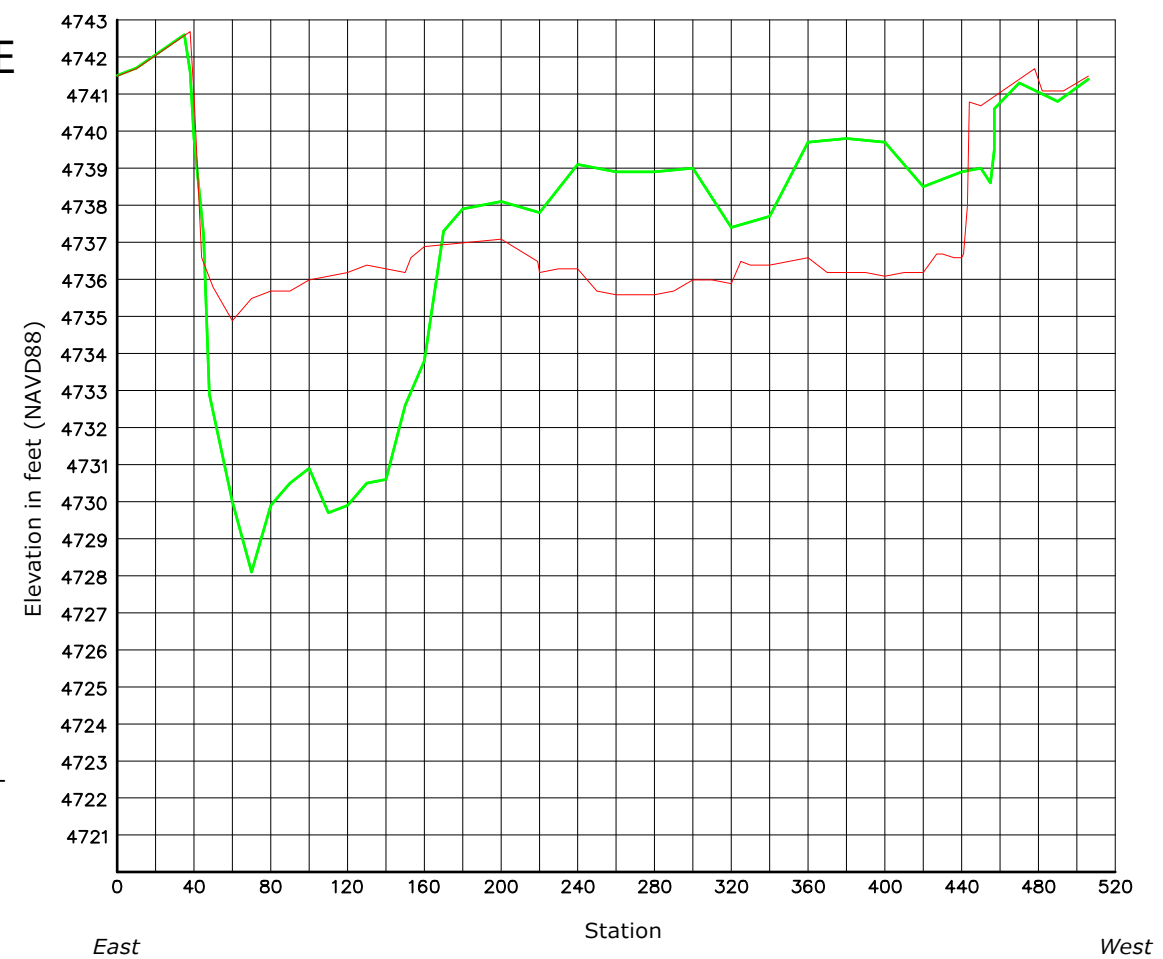
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GROUP CO-LINES
SECTION 986



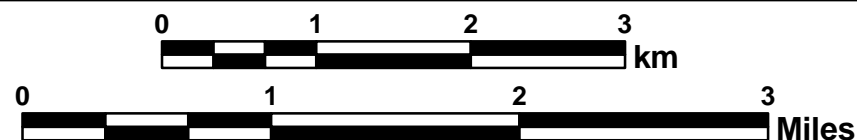
COCHITI LINE CO-1026

JUNE 2005
AUGUST 1998

DATUM ELEV
4720.00
GROUP CO-LINES
SECTION 1026



U.S. Army Corps
of Engineers
Albuquerque District
BUILDING STRONG®



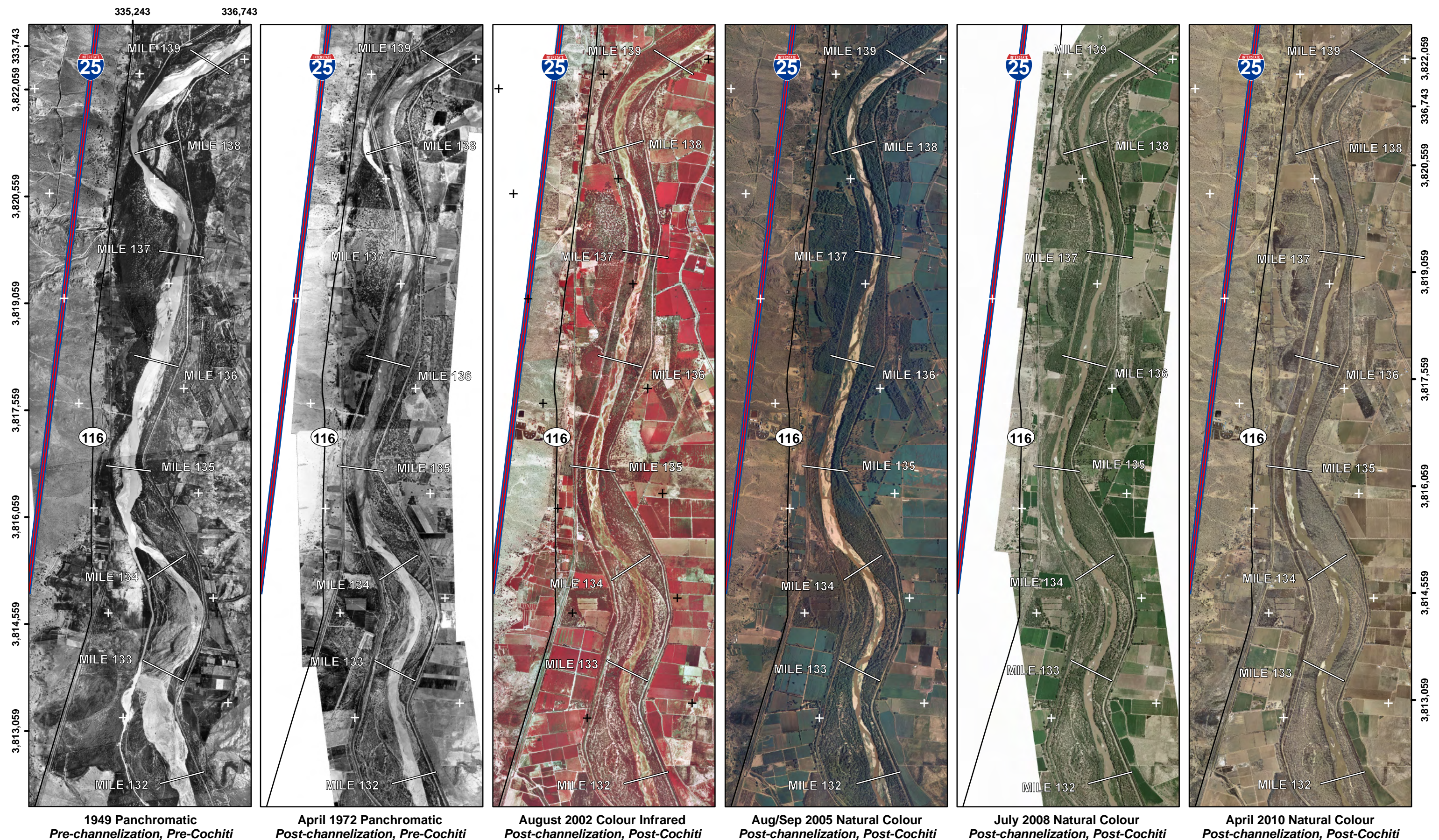
Middle Rio Grande Cross Section Surveys Isleta Reach: RM 139-132

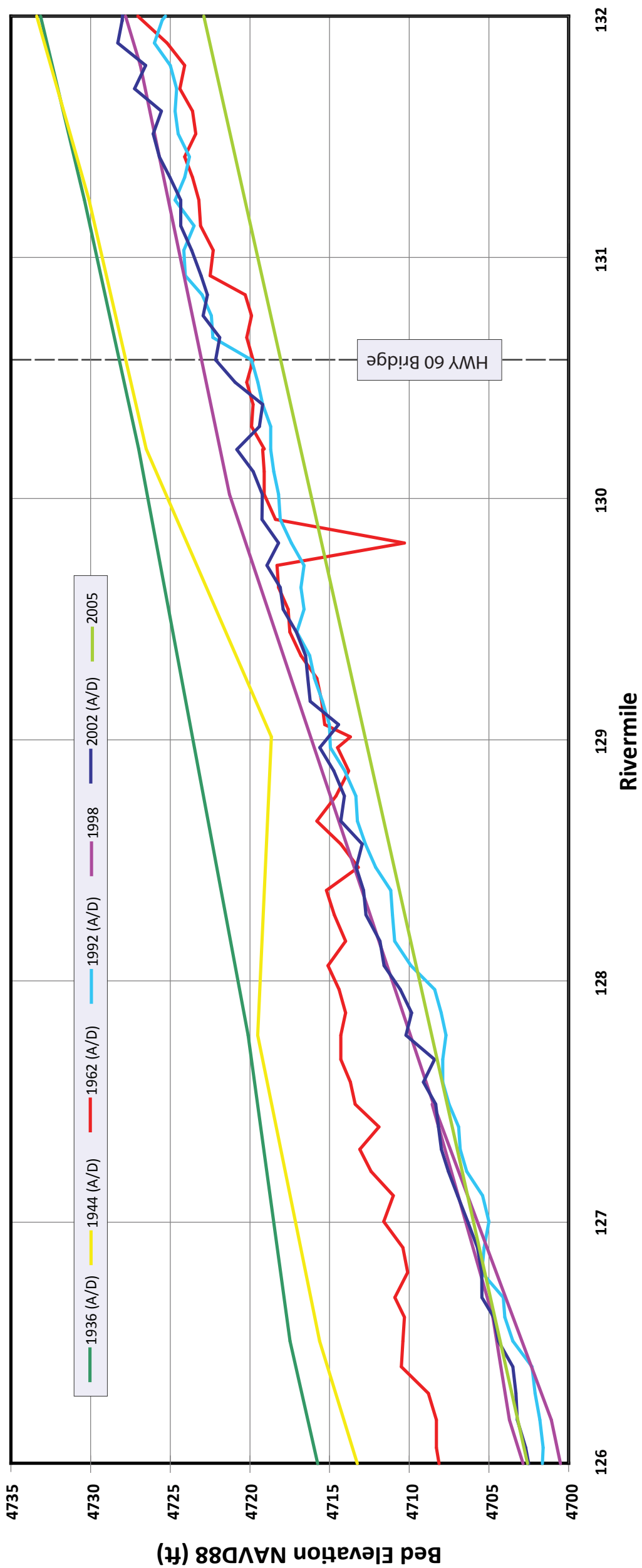
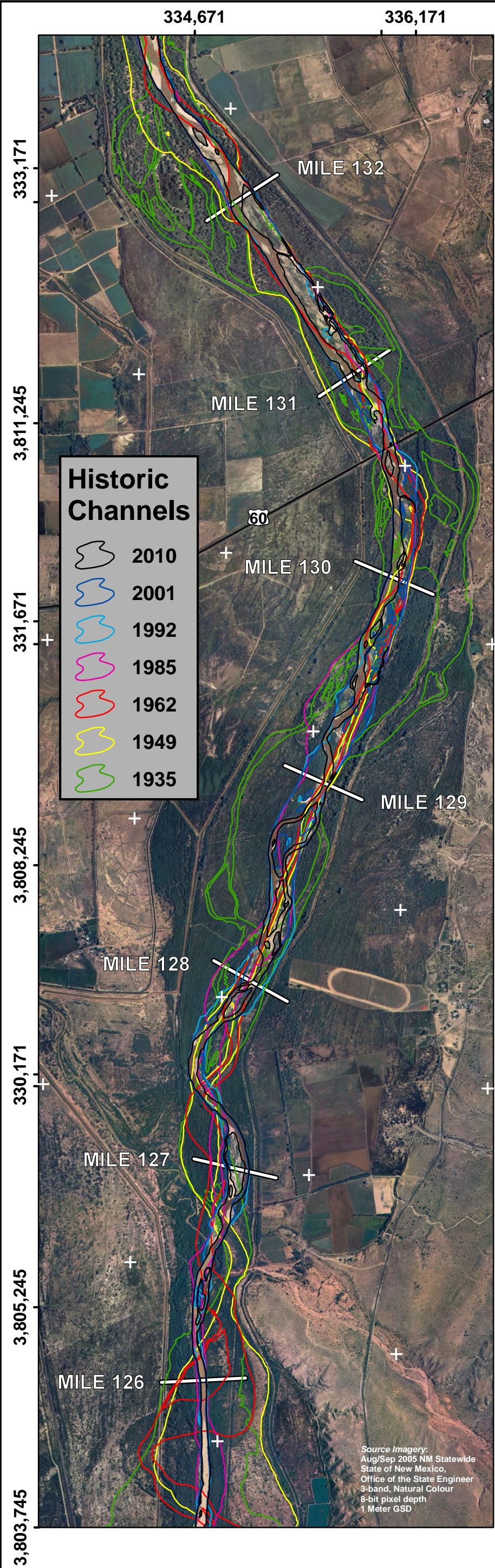
Source Imagery:
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State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD

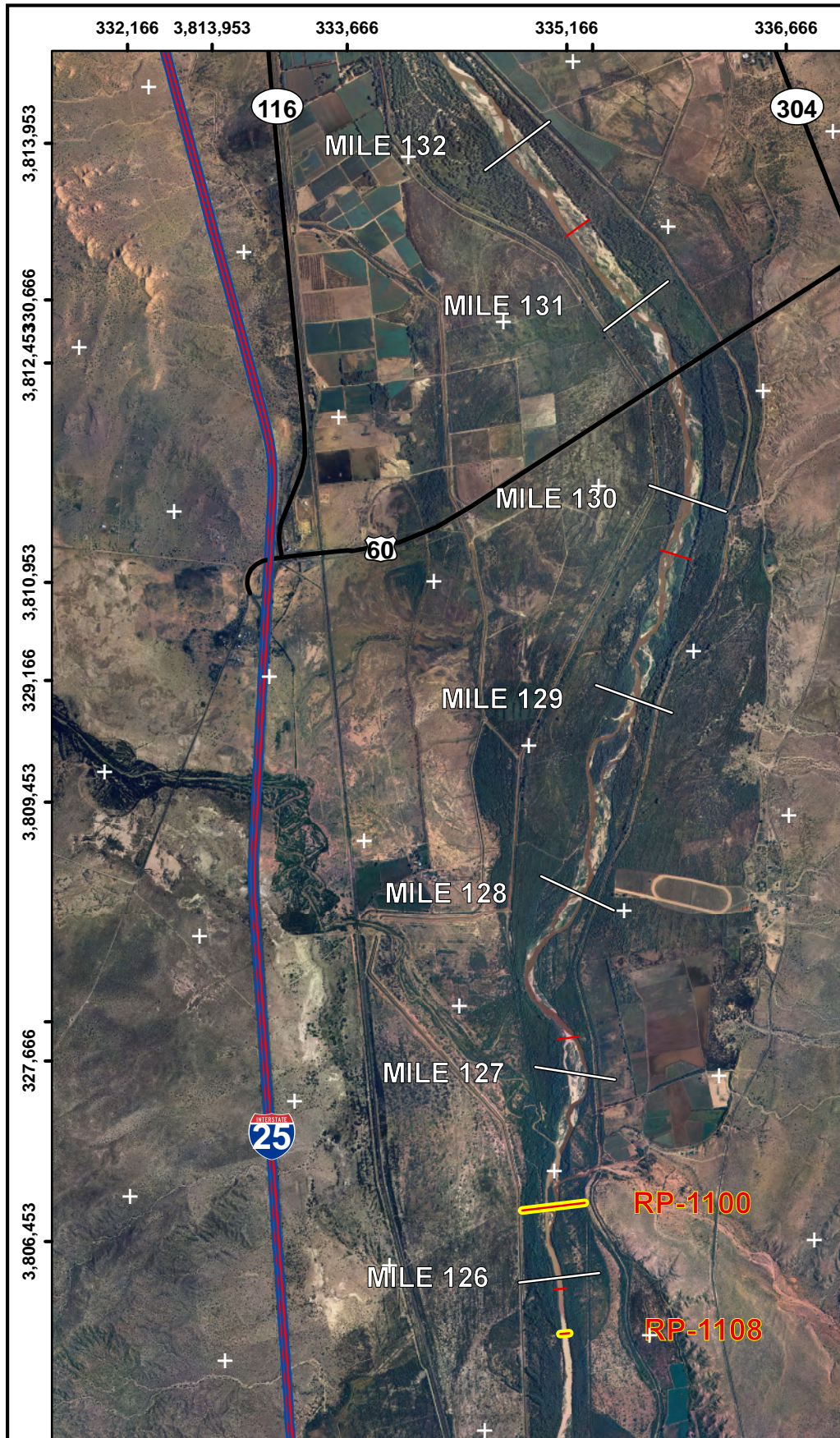
Map Projection:
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Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

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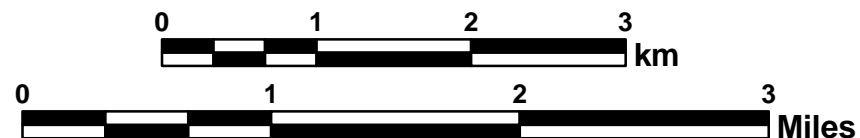








USBR monumented cross sections (—).



RIO PUERCO LINE RP-1100

MARCH 2012 —
 SEPTEMBER 2000 —

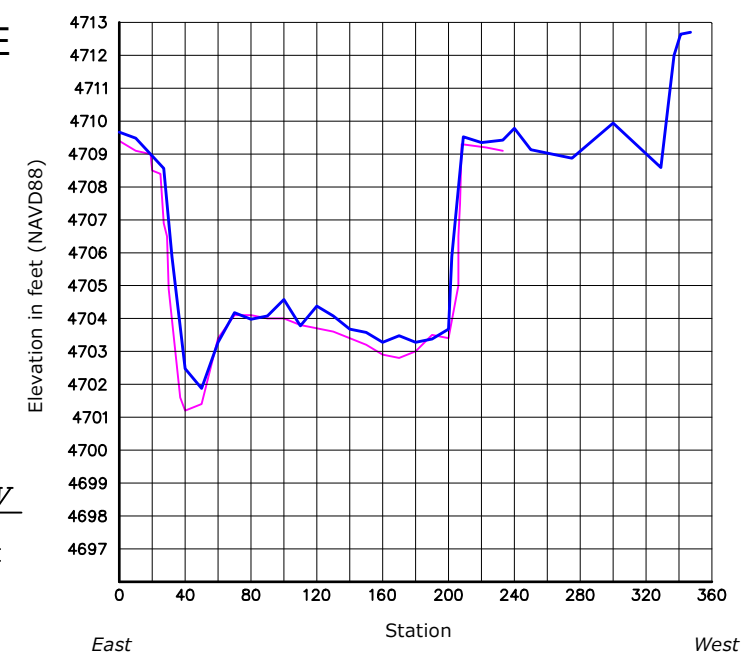
DATUM ELEV
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 GROUP RP-LINE
 SECTION 1100



RIO PUERCO LINE RP-1108

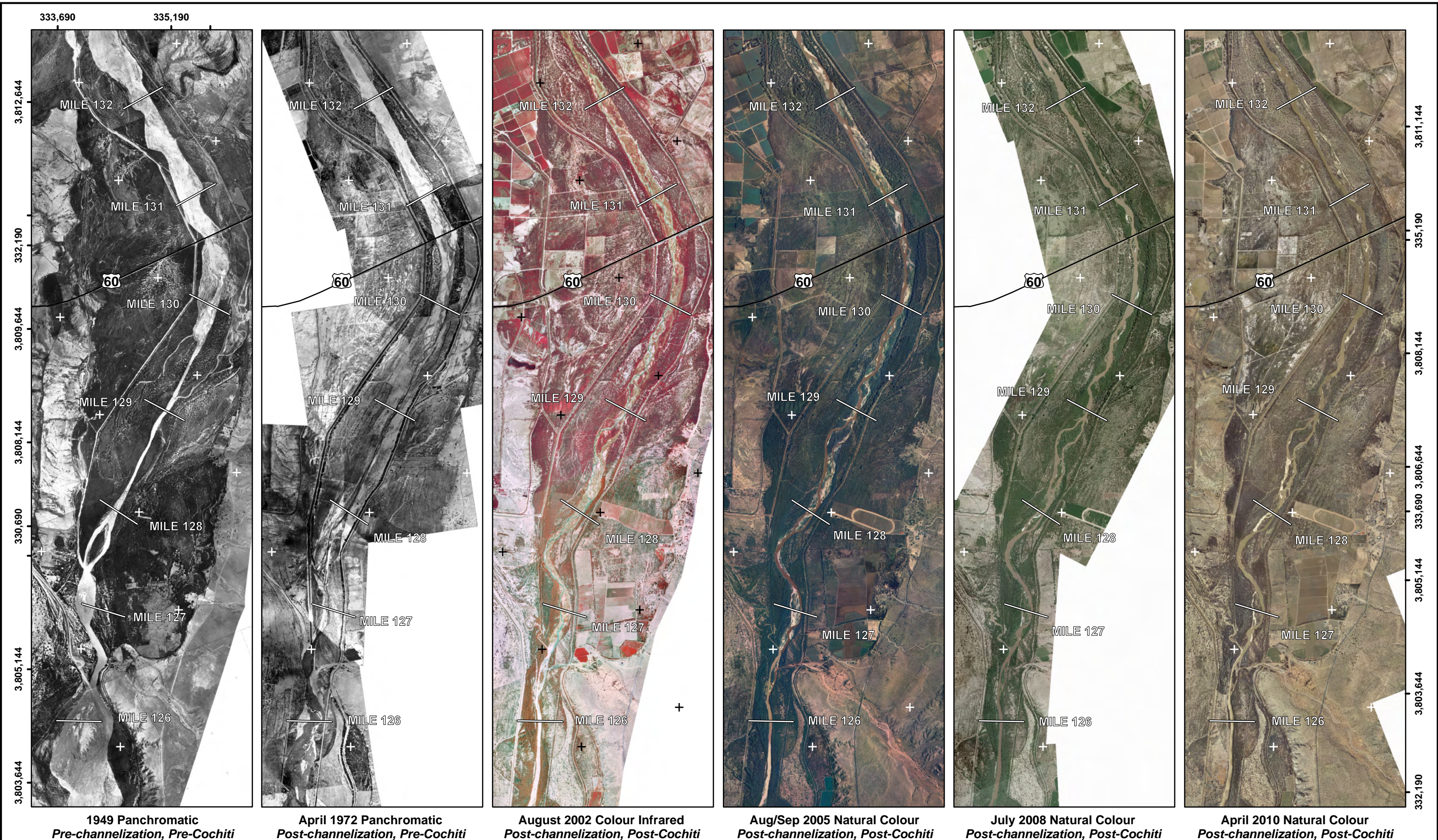
MARCH 2012 —
 SEPTEMBER 2000 —

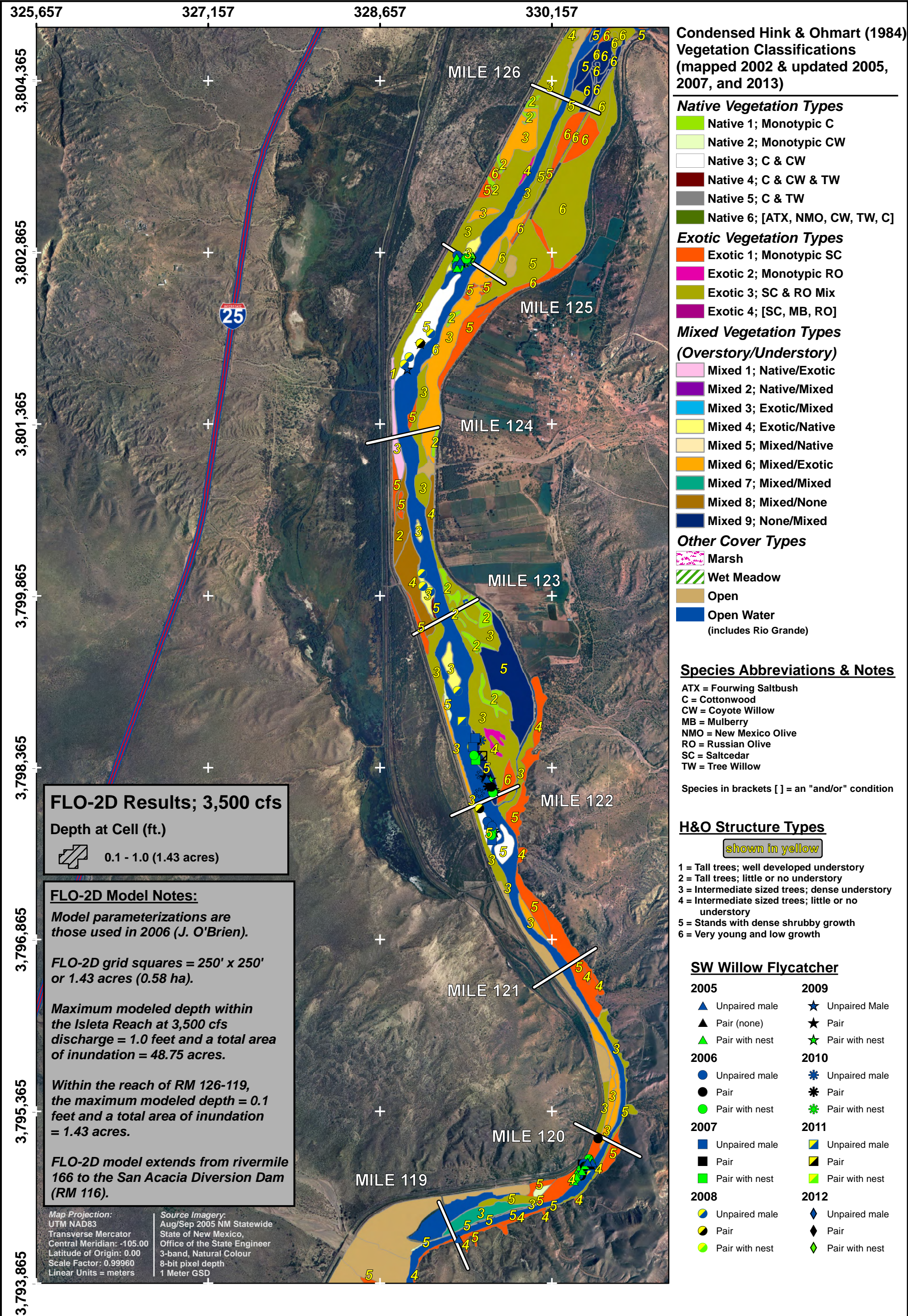
DATUM ELEV
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 GROUP RP-LINE
 SECTION 1108



Middle Rio Grande Cross Section Surveys

Isleta Reach: RM 132-126





Condensed Hink & Ohmart (1984)
Vegetation Classifications
(mapped 2002 & updated 2005,
2007, and 2013)

- Native Vegetation Types**
- Native 1; Monotypic C
 - Native 2; Monotypic CW
 - Native 3; C & CW
 - Native 4; C & CW & TW
 - Native 5; C & TW
 - Native 6; [ATX, NMO, CW, TW, C]

- Exotic Vegetation Types**
- Exotic 1; Monotypic SC
 - Exotic 2; Monotypic RO
 - Exotic 3; SC & RO Mix
 - Exotic 4; [SC, MB, RO]

- Mixed Vegetation Types
(Overstory/Understory)**
- Mixed 1; Native/Exotic
 - Mixed 2; Native/Mixed
 - Mixed 3; Exotic/Mixed
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 - Mixed 5; Mixed/Native
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 - Mixed 7; Mixed/Mixed
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 - Mixed 9; None/Mixed

- Other Cover Types**
- Marsh
 - Wet Meadow
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 - Open Water
(includes Rio Grande)

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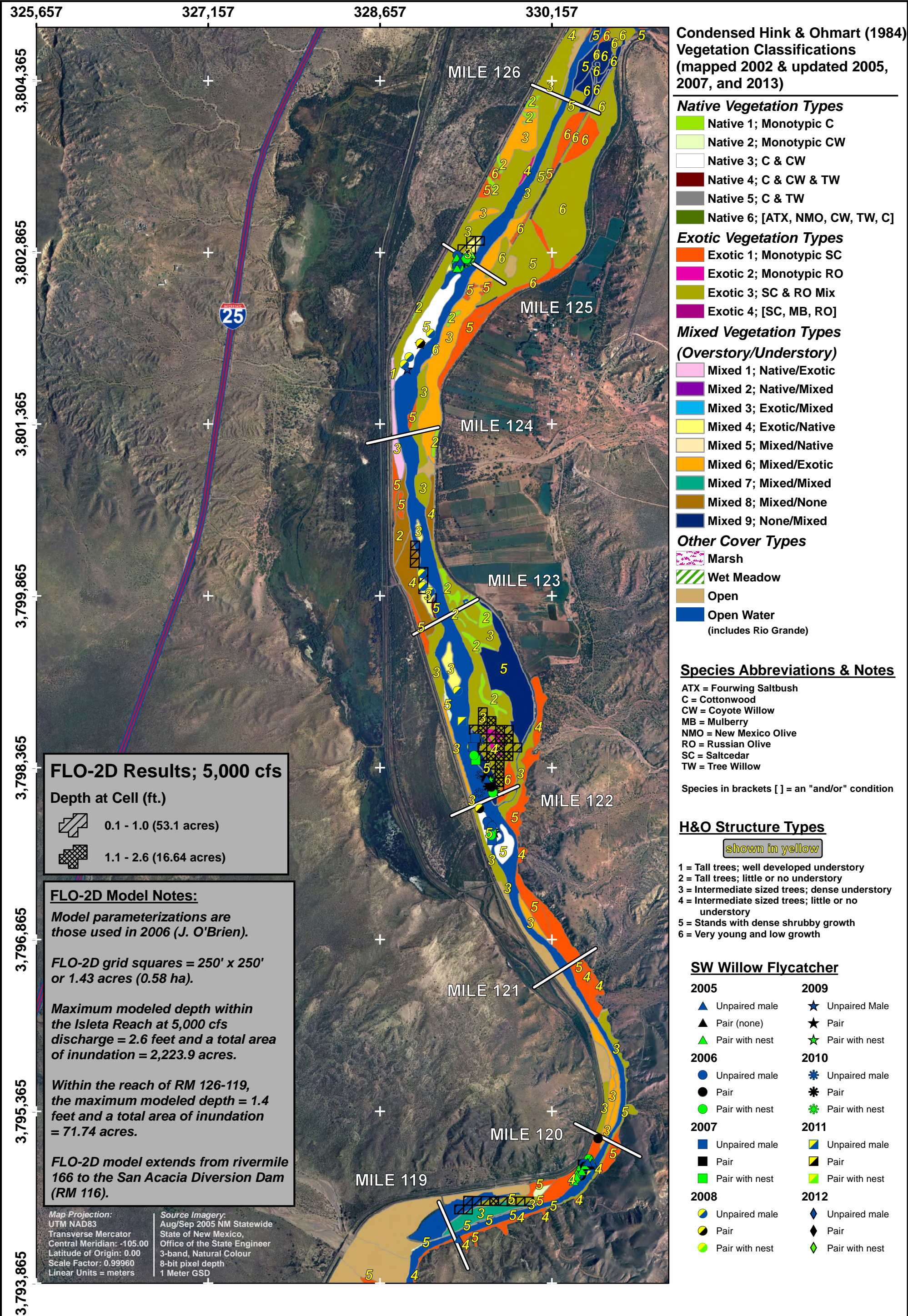
Species in brackets [] = an "and/or" condition

H&O Structure Types

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 - 6 = Very young and low growth

SW Willow Flycatcher

- | 2005 | 2009 |
|------------------|------------------|
| ▲ Unpaired male | ★ Unpaired Male |
| ▲ Pair (none) | ★ Pair |
| ▲ Pair with nest | ★ Pair with nest |
| 2006 | 2010 |
| ● Unpaired male | ★ Unpaired male |
| ● Pair | ★ Pair |
| ● Pair with nest | ★ Pair with nest |
| 2007 | 2011 |
| ■ Unpaired male | ■ Unpaired male |
| ■ Pair | ■ Pair |
| ■ Pair with nest | ■ Pair with nest |
| 2008 | 2012 |
| ● Unpaired male | ◆ Unpaired male |
| ● Pair | ◆ Pair |
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- | | |
|------------------|------------------|
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| ■ Pair | ■ Pair |
| ■ Pair with nest | ■ Pair with nest |
| 2008 | 2012 |
| ● Unpaired male | ◆ Unpaired male |
| ● Pair | ◆ Pair |
| ● Pair with nest | ◆ Pair with nest |

FLO-2D Results; 5,000 cfs

Depth at Cell (ft.)

- 0.1 - 1.0 (53.1 acres)
- 1.1 - 2.6 (16.64 acres)

FLO-2D Model Notes:

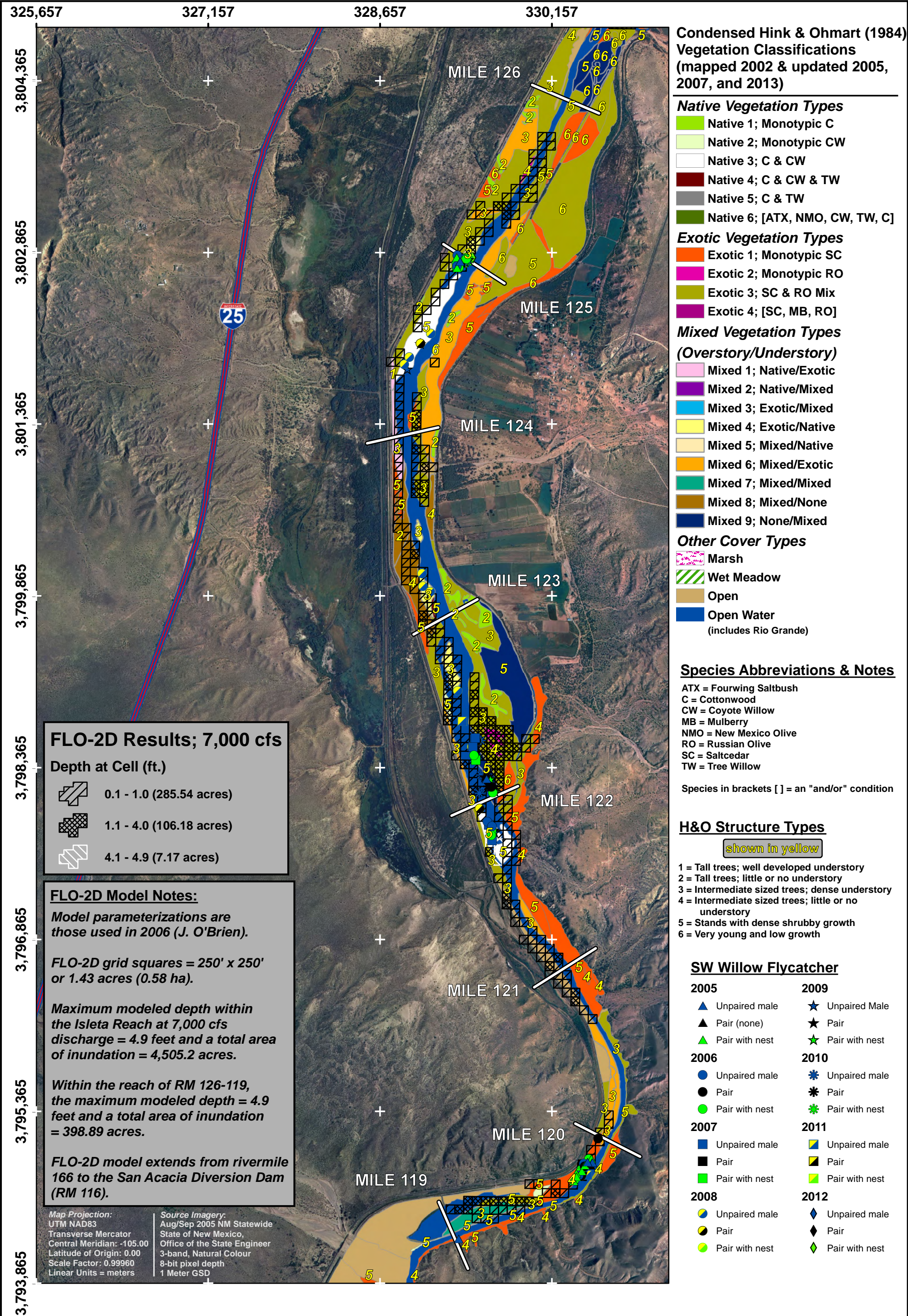
Model parameterizations are those used in 2006 (J. O'Brien).

FLO-2D grid squares = 250' x 250' or 1.43 acres (0.58 ha).

Maximum modeled depth within the Isleta Reach at 5,000 cfs discharge = 2.6 feet and a total area of inundation = 2,223.9 acres.

Within the reach of RM 126-119, the maximum modeled depth = 1.4 feet and a total area of inundation = 71.74 acres.

FLO-2D model extends from rivermile 166 to the San Acacia Diversion Dam (RM 116).



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SW Willow Flycatcher

- | 2005 | 2009 |
|------------------|------------------|
| ▲ Unpaired male | ★ Unpaired Male |
| ▲ Pair (none) | ★ Pair |
| ▲ Pair with nest | ★ Pair with nest |
| 2006 | 2010 |
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| ● Pair | ★ Pair |
| ● Pair with nest | ★ Pair with nest |
| 2007 | 2011 |
| ■ Unpaired male | ■ Unpaired male |
| ■ Pair | ■ Pair |
| ■ Pair with nest | ■ Pair with nest |
| 2008 | 2012 |
| ● Unpaired male | ◆ Unpaired male |
| ● Pair | ◆ Pair |
| ● Pair with nest | ◆ Pair with nest |

FLO-2D Results; 7,000 cfs

- Depth at Cell (ft.)**
- 0.1 - 1.0 (285.54 acres)
 - 1.1 - 4.0 (106.18 acres)
 - 4.1 - 4.9 (7.17 acres)

FLO-2D Model Notes:

Model parameterizations are those used in 2006 (J. O'Brien).

FLO-2D grid squares = 250' x 250' or 1.43 acres (0.58 ha).

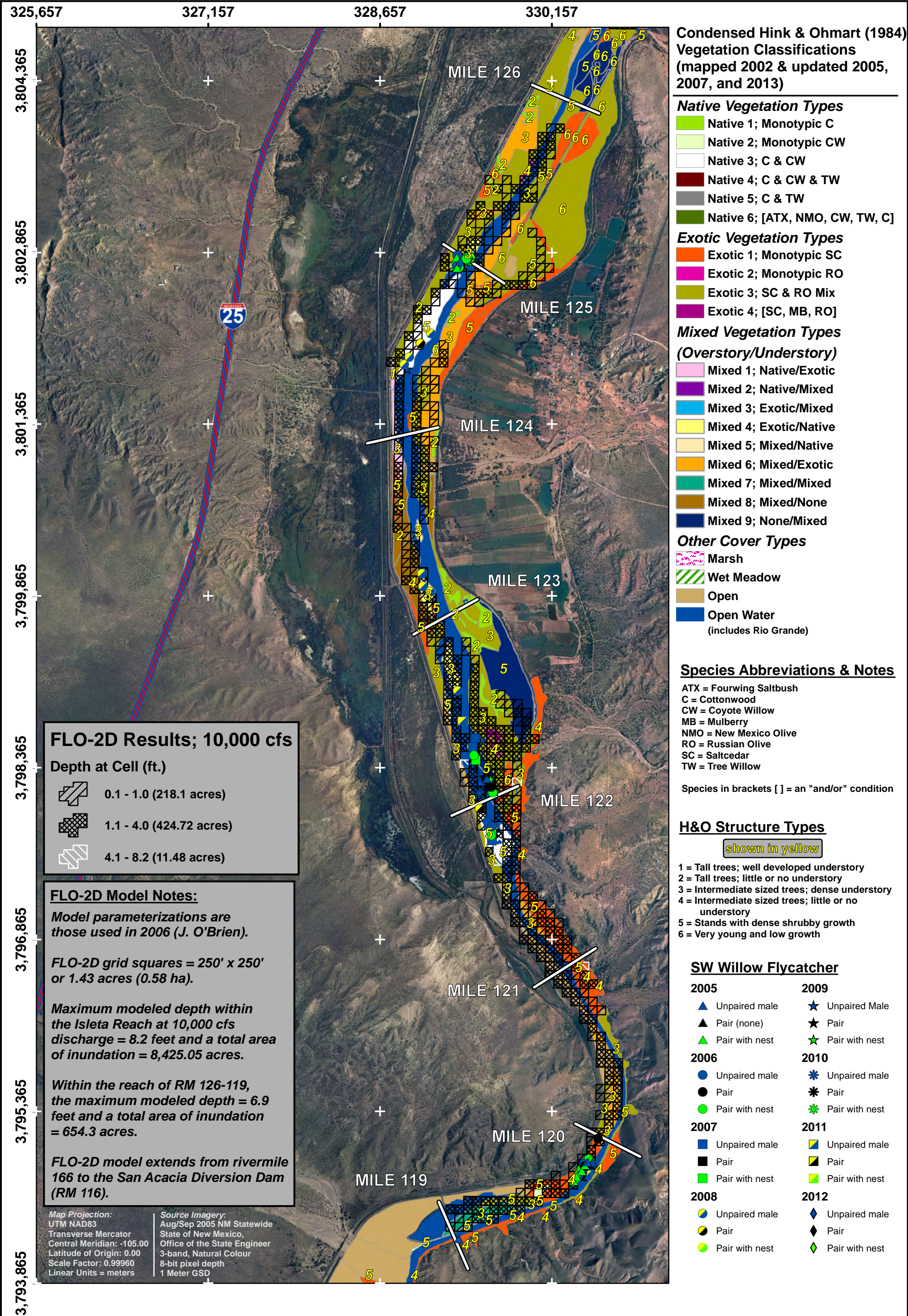
Maximum modeled depth within the Isleta Reach at 7,000 cfs discharge = 4.9 feet and a total area of inundation = 4,505.2 acres.

Within the reach of RM 126-119, the maximum modeled depth = 4.9 feet and a total area of inundation = 398.89 acres.

FLO-2D model extends from rivermile 166 to the San Acacia Diversion Dam (RM 116).

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD



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- Native 5; C & TW
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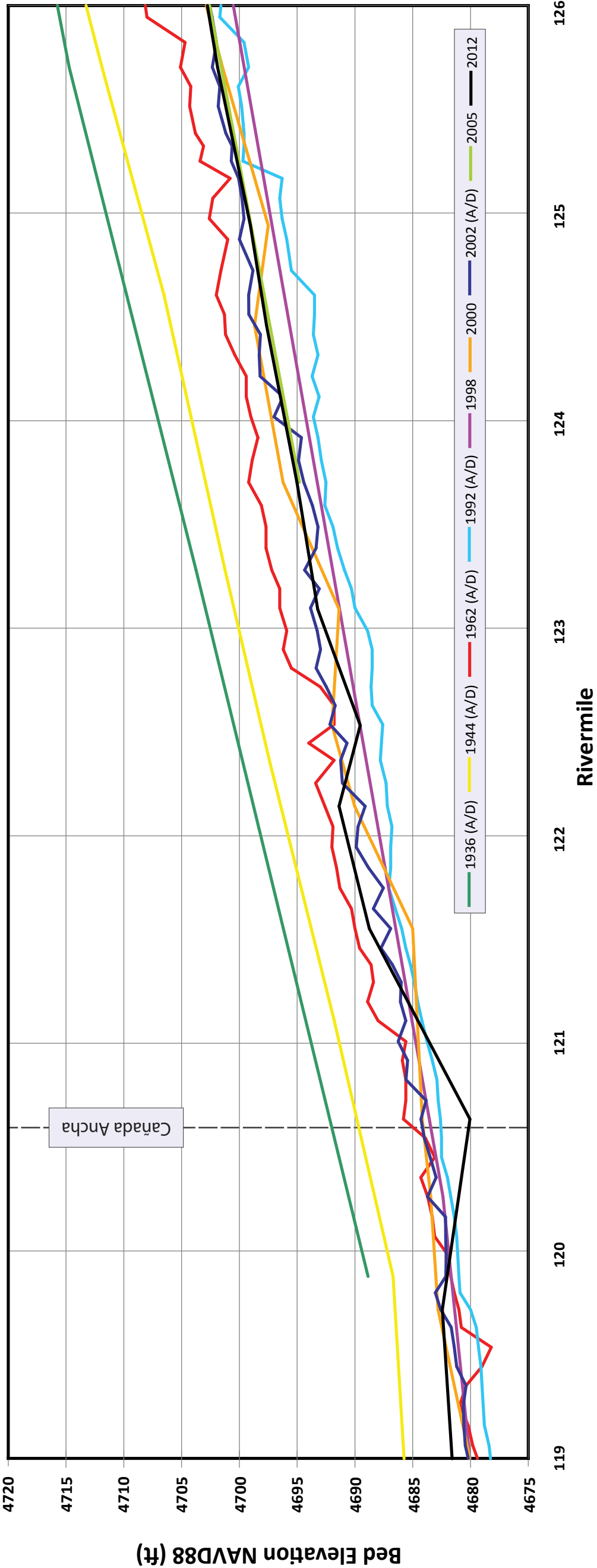
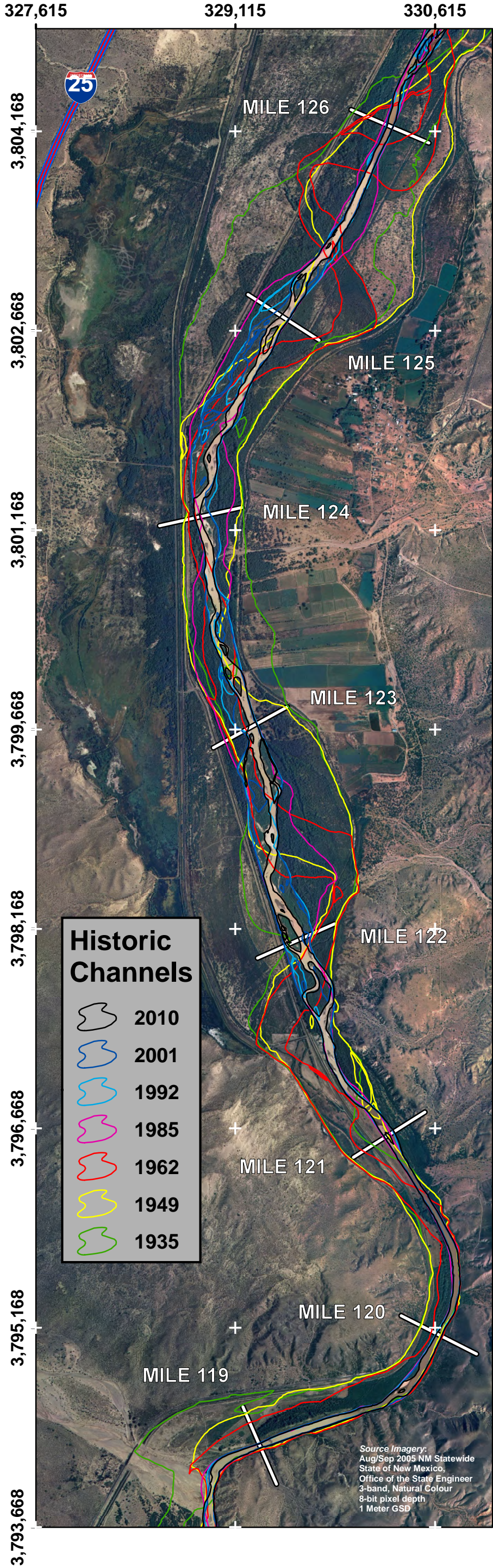
H&O Structure Types

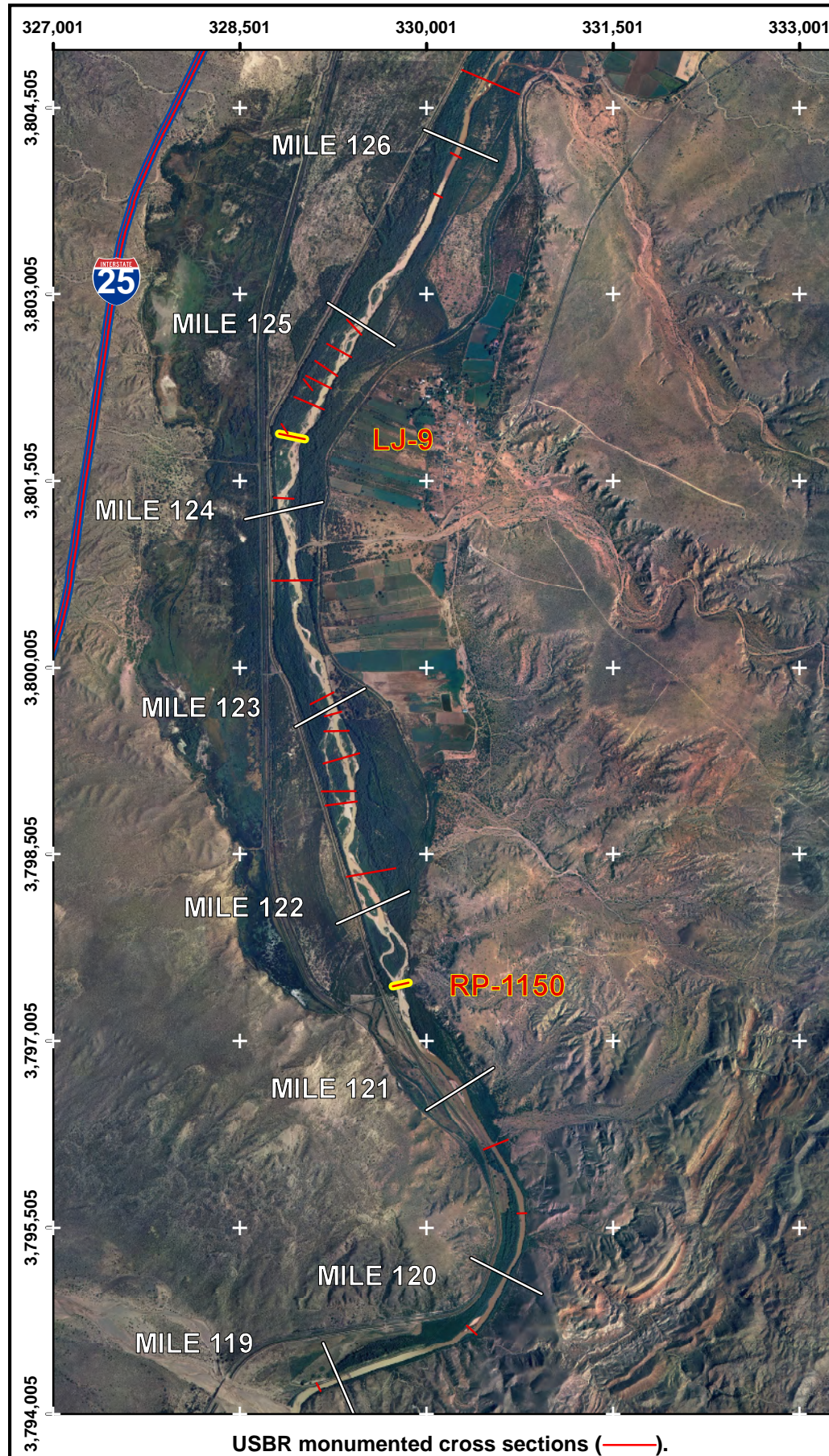
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▲ Pair with nest	★ Pair with nest
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● Pair	★ Pair
● Pair with nest	★ Pair with nest
2007	2011
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■ Pair	■ Pair
■ Pair with nest	■ Pair with nest
2008	2012
● Unpaired male	◆ Unpaired male
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● Pair with nest	◆ Pair with nest



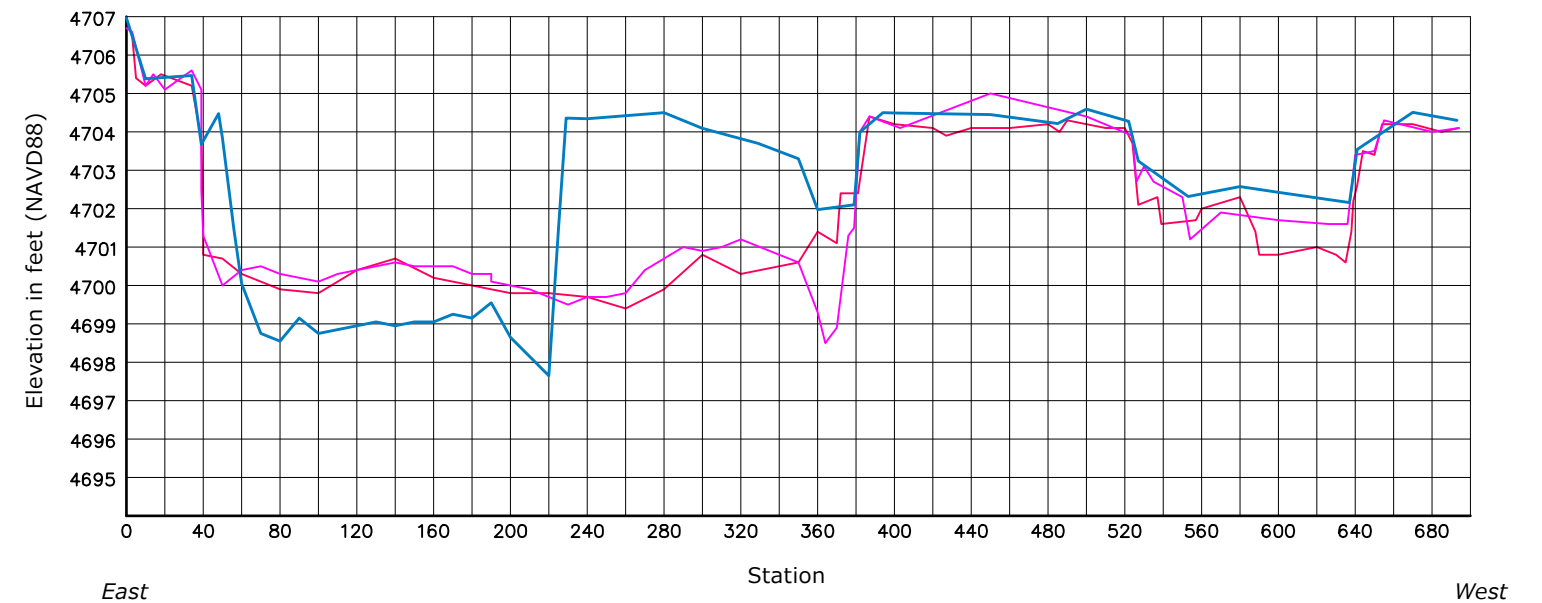


USBR monumented cross sections (—).

LA JOYA LINE LJ-9

MARCH 2012
SEPTEMBER 2000
DECEMBER 1998

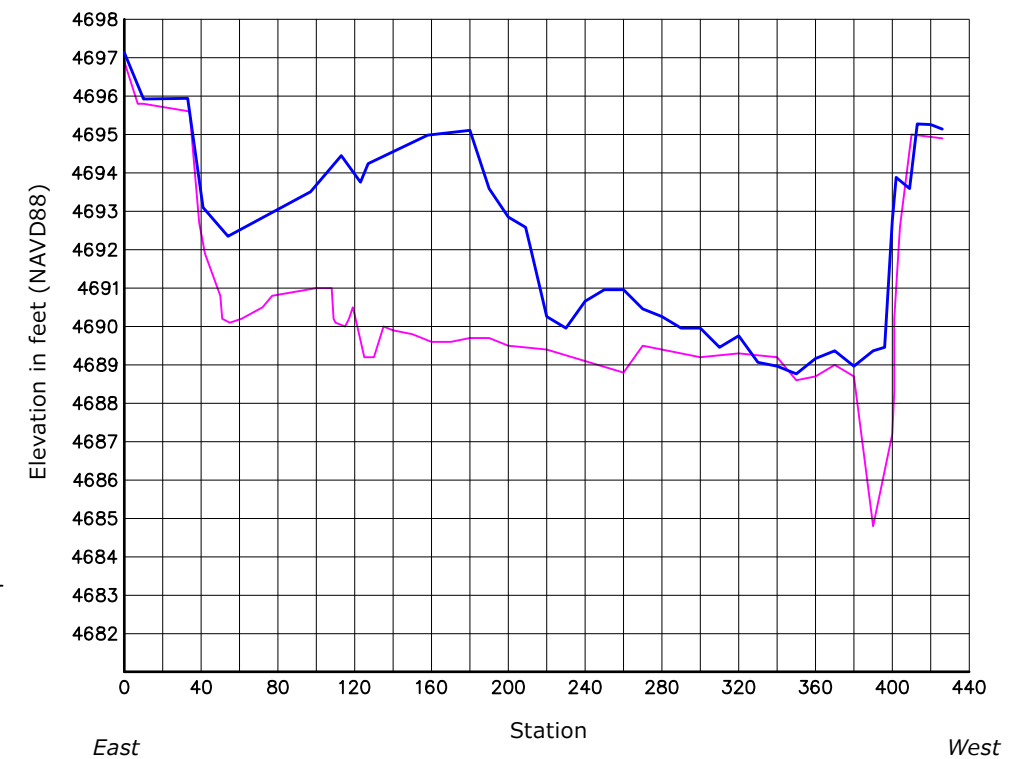
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GROUP LJ-LINE
SECTION 9



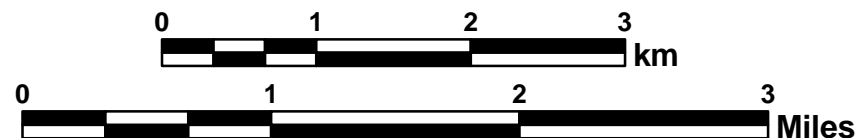
RIO PUERCO LINE RP-1150

MARCH 2012
SEPTEMBER 2000

DATUM ELEV
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GROUP RP-LINES
SECTION 1150



U.S. Army Corps
of Engineers
Albuquerque District
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Middle Rio Grande Cross Section Surveys

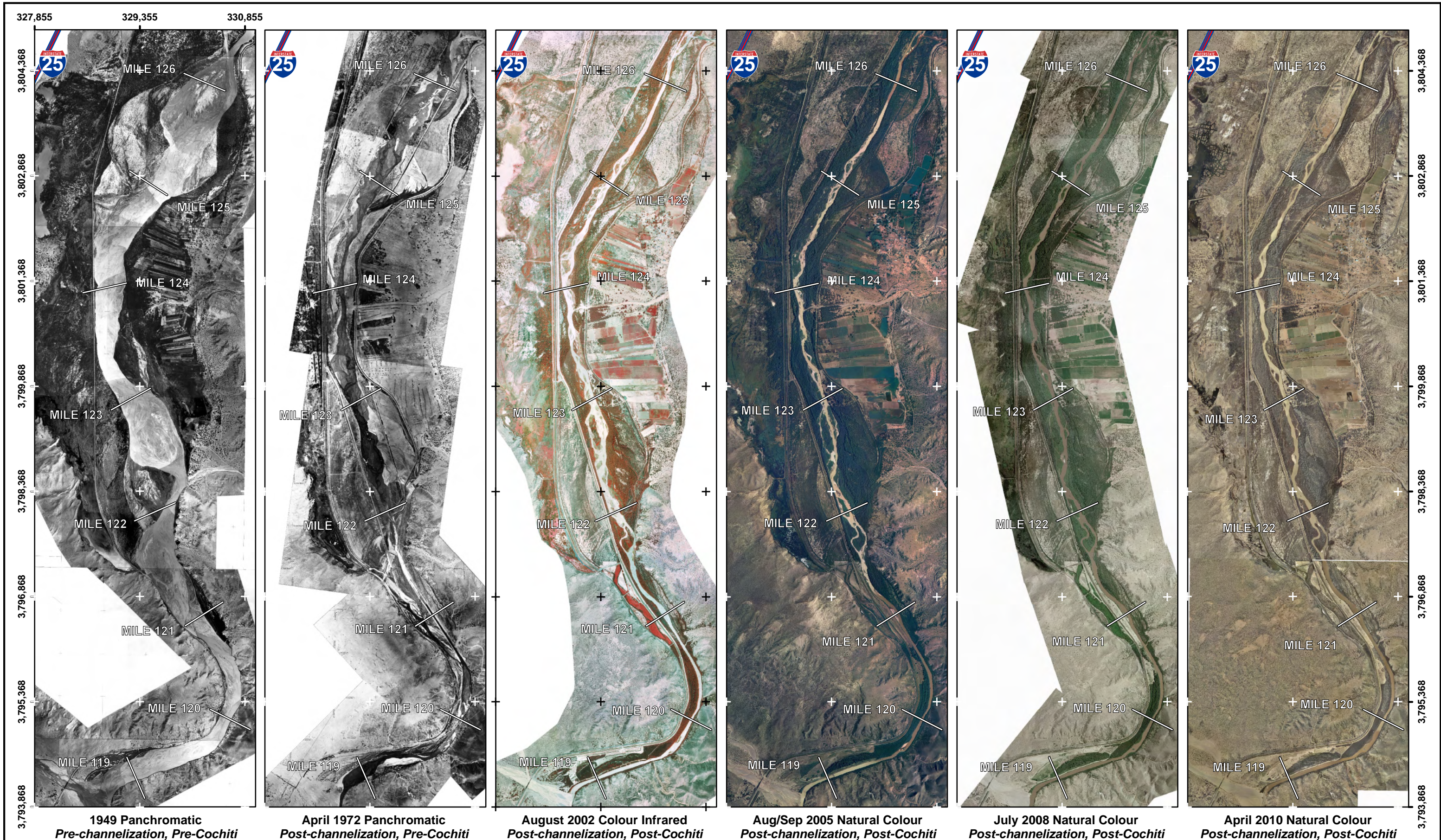
Isleta Reach: RM 126-119

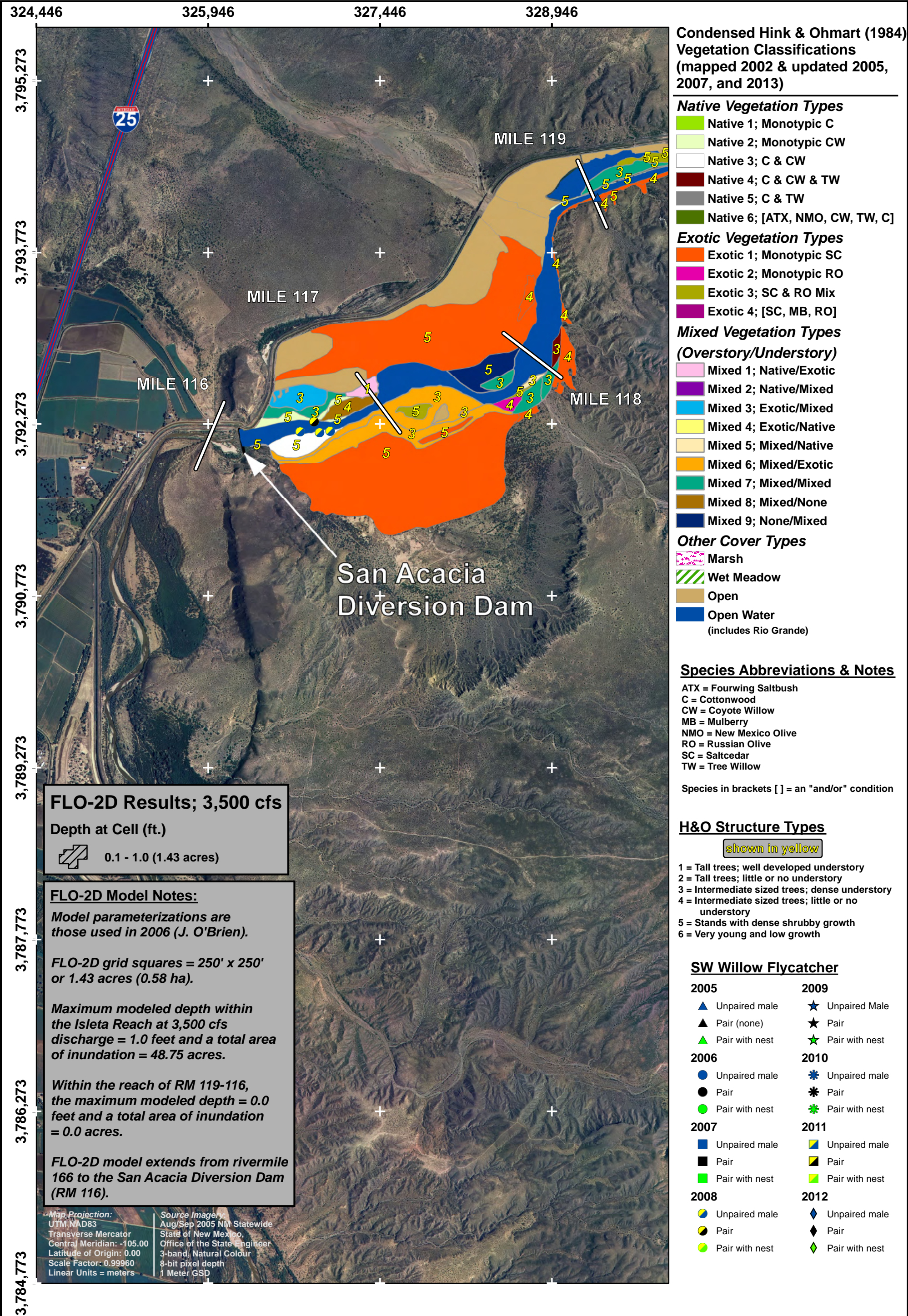
Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
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1 Meter GSD

Map Projection:
UTM NAD83
Transverse Mercator
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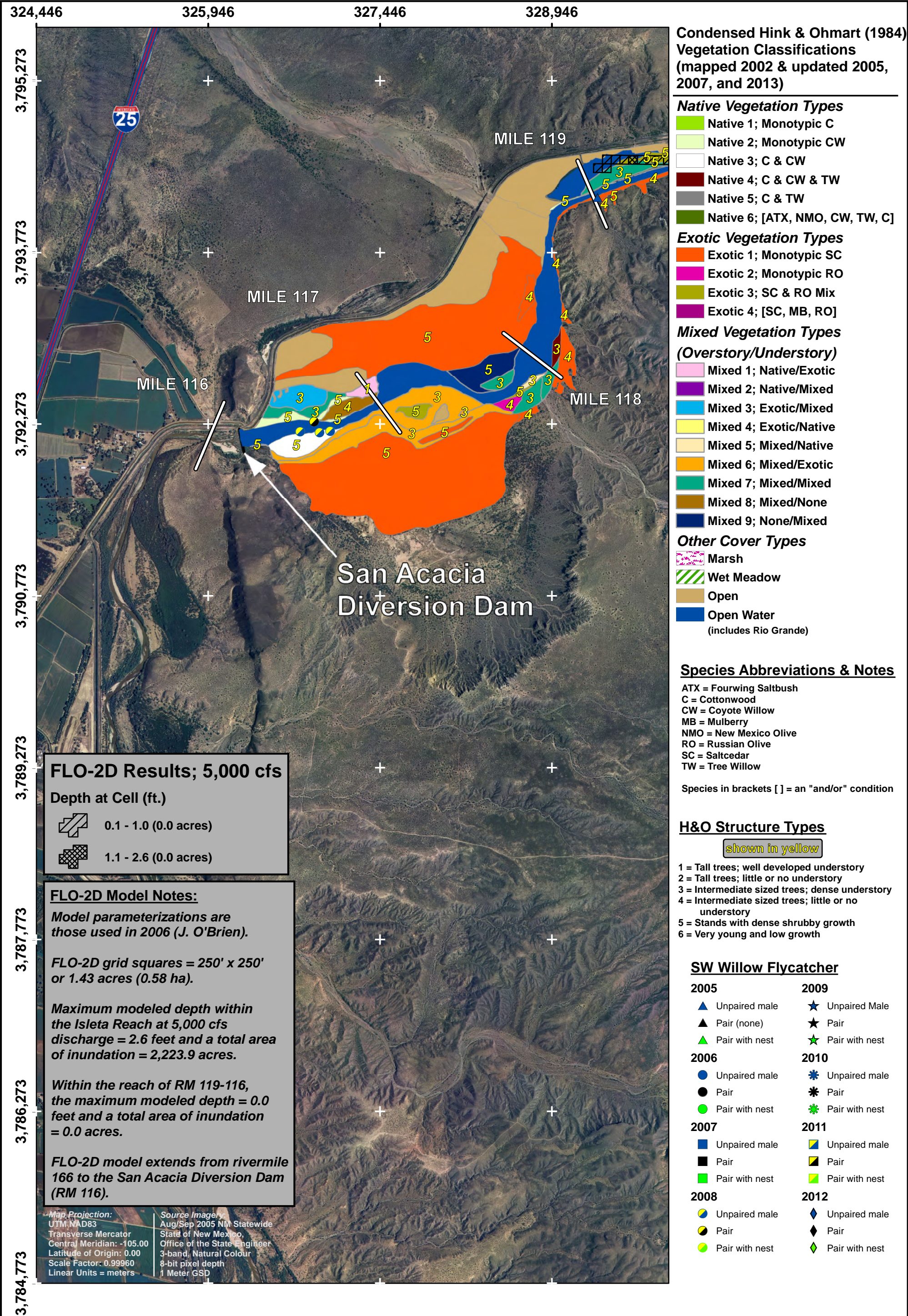
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2006	2010
● Unpaired male	★ Unpaired male
● Pair	★ Pair
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2007	2011
■ Unpaired male	■ Unpaired male
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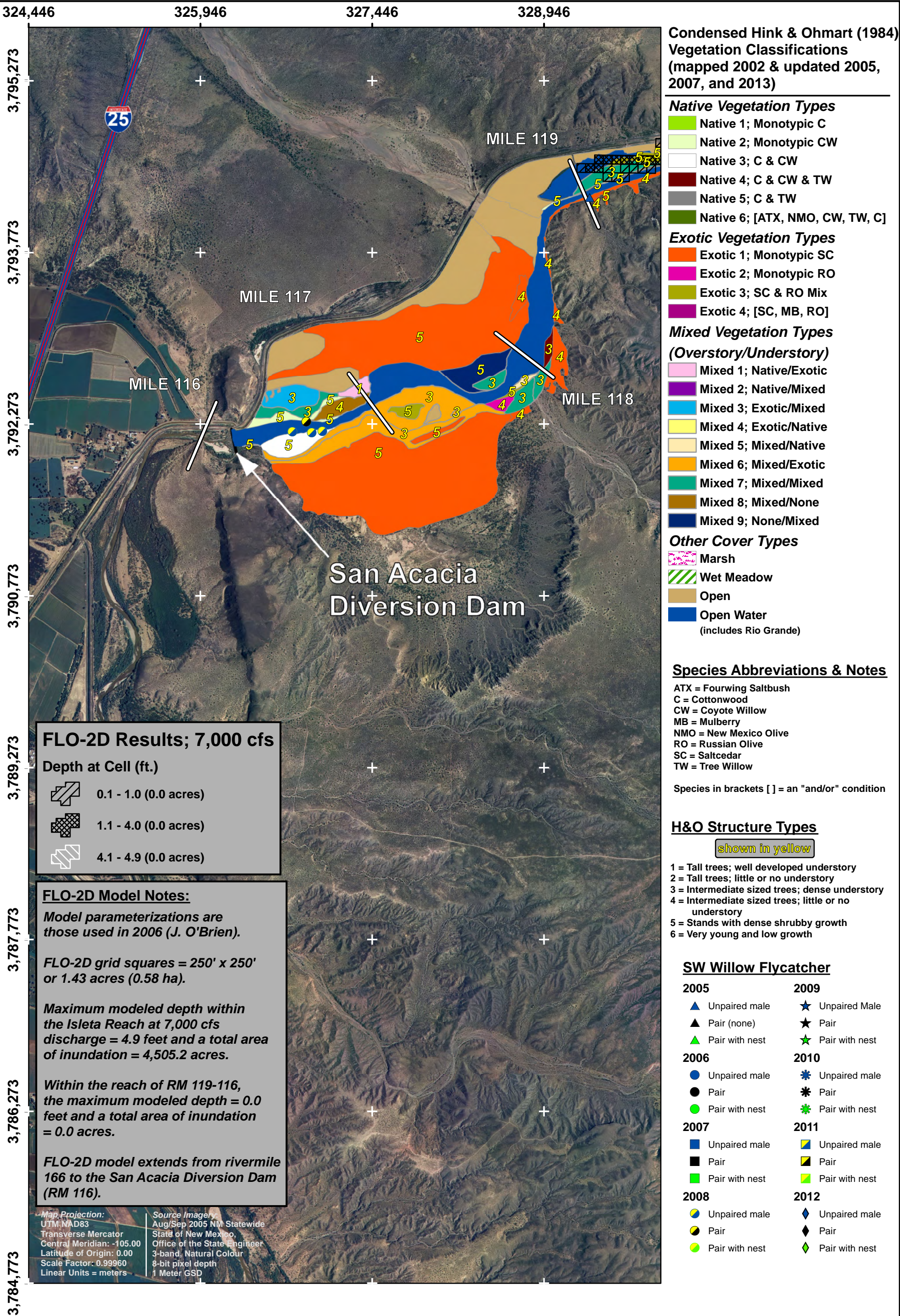
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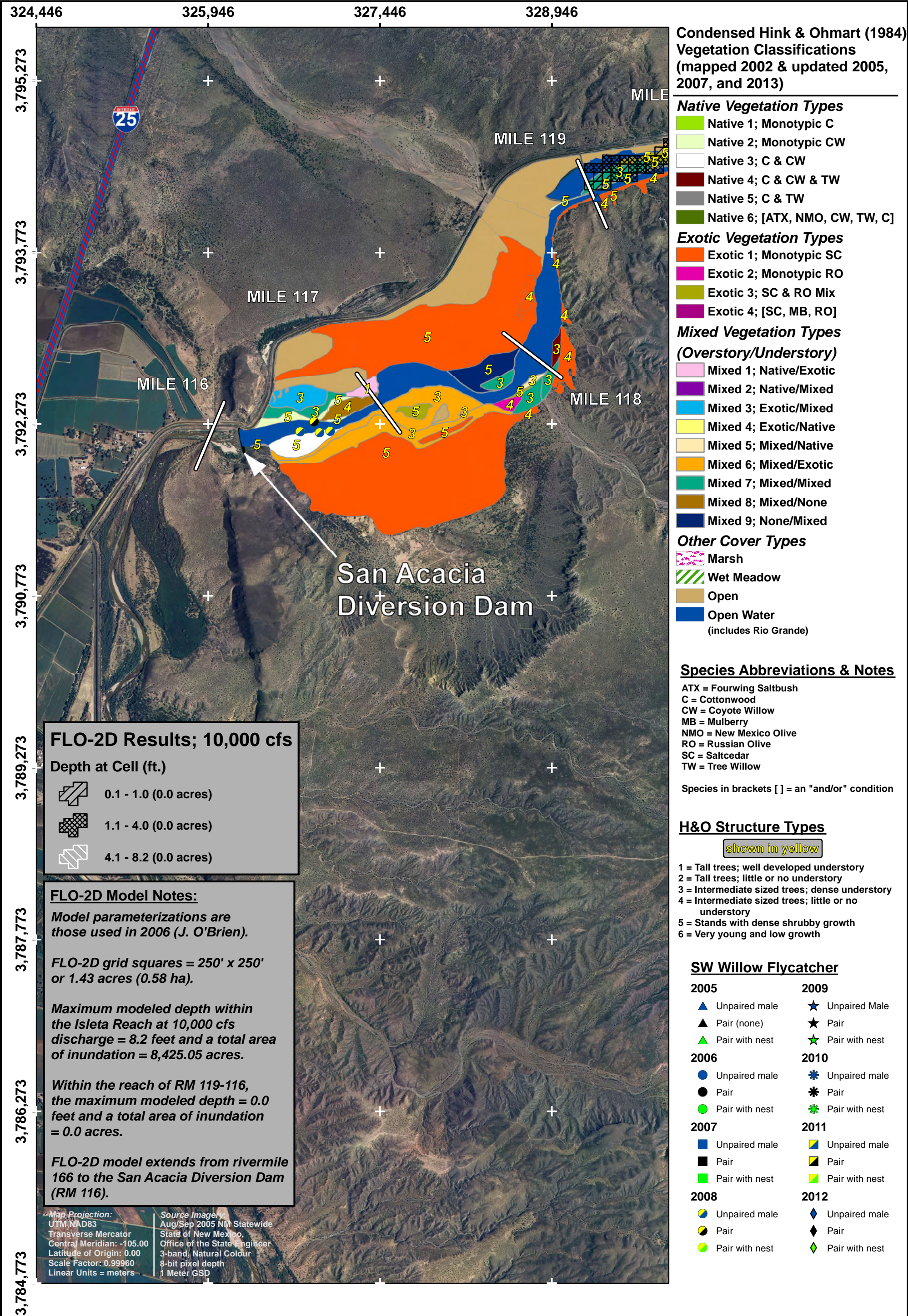
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TW = Tree Willow

Species in brackets [] = an "and/or" condition

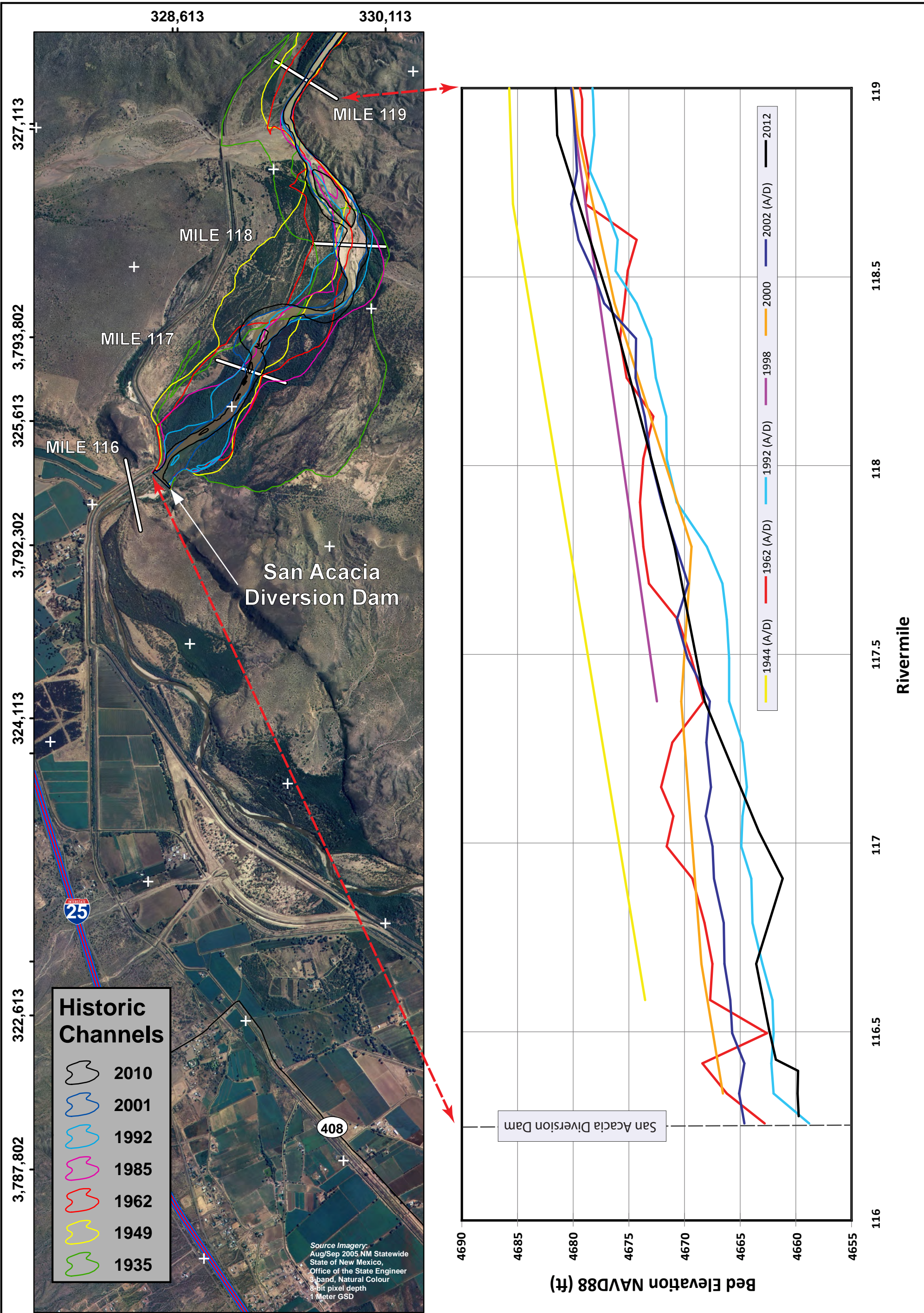
H&O Structure Types

shown in yellow

- 1 = Tall trees; well developed understory
- 2 = Tall trees; little or no understory
- 3 = Intermediate sized trees; dense understory
- 4 = Intermediate sized trees; little or no understory
- 5 = Stands with dense shrubby growth
- 6 = Very young and low growth

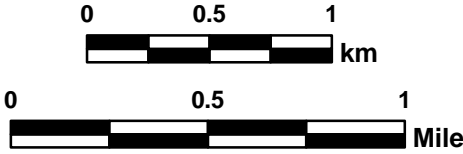
SW Willow Flycatcher

2005	2009
▲ Unpaired male	★ Unpaired Male
▲ Pair (none)	★ Pair
▲ Pair with nest	★ Pair with nest
2006	2010
● Unpaired male	★ Unpaired male
● Pair	★ Pair
● Pair with nest	★ Pair with nest
2007	2011
■ Unpaired male	■ Unpaired male
■ Pair	■ Pair
■ Pair with nest	■ Pair with nest
2008	2012
● Unpaired male	◆ Unpaired male
● Pair	◆ Pair
● Pair with nest	◆ Pair with nest



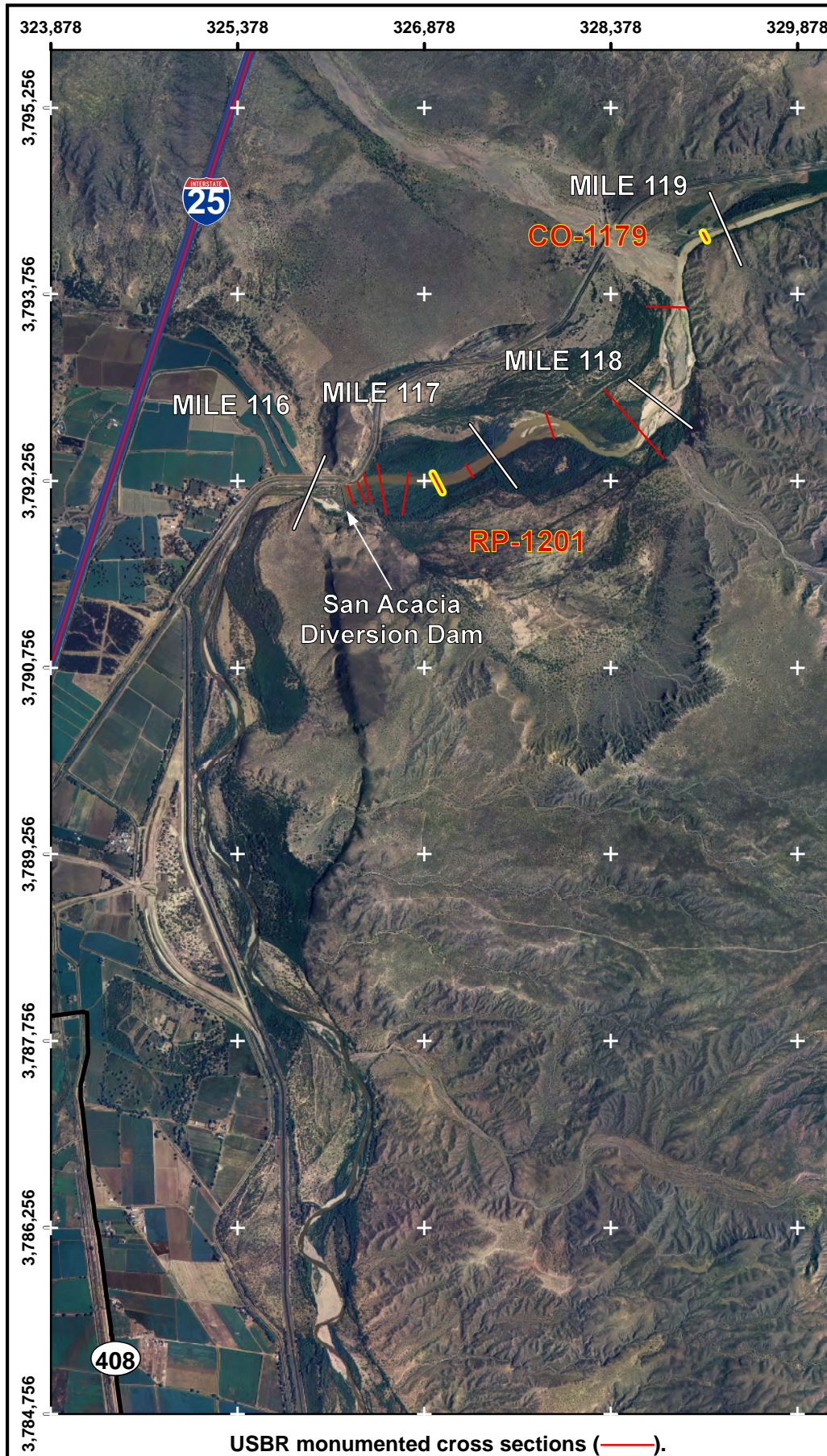
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Albuquerque District
BUILDING STRONG®

**Middle Rio Grande Channel
Width & Profiles 1935/36-2010**
Isleta Reach: RM 119-116



Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

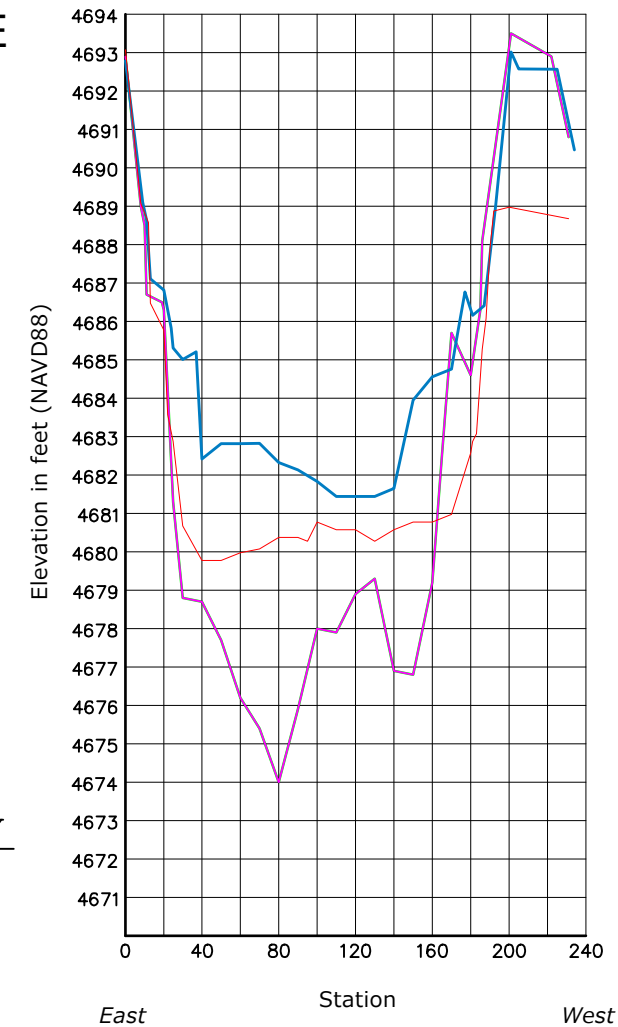




COCHITI LINE CO-1179

MARCH 2012
SEPTEMBER 2000
AUGUST 1998

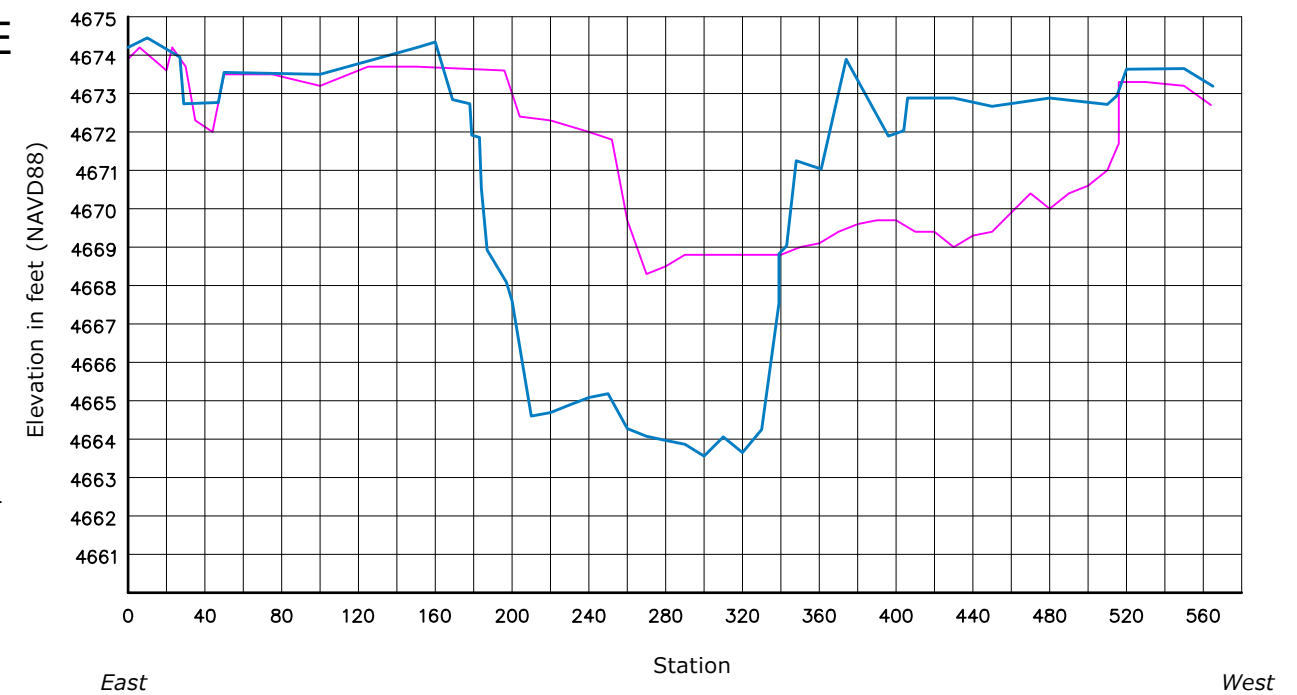
DATUM ELEV
4670.00
GROUP CO-LINE
SECTION 1179



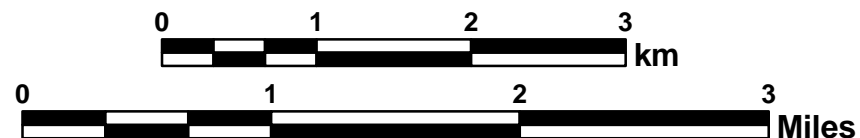
RIO PUERCO LINE RP-1201

MARCH 2012
SEPTEMBER 2000

DATUM ELEV
4660.00
GROUP RP-LINE
SECTION 1201



U.S. Army Corps
of Engineers
Albuquerque District
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Middle Rio Grande Cross Section Surveys Isleta Reach: RM 119-116

Source Imagery:
Aug/Sep 2005 NM Statewide
State of New Mexico,
Office of the State Engineer
3-band, Natural Colour
8-bit pixel depth
1 Meter GSD

Map Projection:
UTM NAD83
Transverse Mercator
Central Meridian: -105.00
Latitude of Origin: 0.00
Scale Factor: 0.99960
Linear Units = meters

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