# 2011 RIVER ATLAS SACRAMENTO RIVER BANK PROTECTION PROJECT









Sacramento River Bank Protection Project

Appendix B To 2011 Erosion Inventory



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February 2012

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#### 1.0 Authorization

The Sacramento River Bank Protection Project (SRBPP) was authorized for the protection of the existing levees and flood control facilities. It was originally authorized by the 86th Congress under the Flood Control Act of 1960, Public Law 86-645, Title II. It is currently authorized by the Water Resource Development Act of 2007. Under the current authorization there are only about 3,000 linear feet available for repairs. An additional 80,000 linear feet will be available at the completion of the Post Authorization Change Report.

#### 2.0 Purpose

This atlas graphically documents the annual erosion reconnaissance of the Sacramento River System. The purpose of the reconnaissance is to maintain and update an inventory of erosion sites, identify new and monitor existing erosion sites, and collect data to prioritize the sites for repair. The erosion reconnaissance is conducted every year to identify new and existing erosion sites within the system. A site is deemed an erosion site if the erosion is into the projection of the levee slope. Personnel from various sections of the US Army Corps of Engineers collected photos with a GPS camera and data using a Trimble XH with GPS and GIS capabilities.

#### 3.0 Project Background

The annual erosion inventory started in 1997, following the large flood event in the winter of 1996 and 1997. This flood event caused a levee failure and numerous flood fighting efforts throughout the Sacramento River System. The original goal of the inventory was to identify the weak spots in the levee system and repair them. However, concerns for the environment and endangered species limited the repair work to mainly emergency work (PL84-99) and local maintenance efforts. Under the SRBPP project, one site on the Sacramento River and a few sites on the American River were repaired between 1997 and 2006.

In February 2006, after high flows in the rivers of the Sacramento Valley, the governor of California declared a state of emergency for the Central Valley levees. In the following years, all the sites that were defined as "critical" in the 2005 inventory were repaired. Repairs have continued every year since and over 100 sites have been repaired since the declaration through the combined efforts of the US Army Corps of Engineers (USACE) and the California Department of Water Resources (DWR).

While sites are currently being repaired, more sites enter the erosion inventory every year. The number of sites in need of repair far exceeds the number of sites that can be repaired each year. Due to this, a ranking system was developed to help determine which sites should be considered the highest priority for repair. See **Appendix A**.

Aerial atlases of the Sacramento River System have been produced since 1980, and hand drawn maps date back to the 1930s. Atlases documenting the annual erosion inventory started in 2002 and have grown and improved to this current version. A new atlas was produced every year to graphically document the erosion sites within the Sacramento River System.

#### 4.0 Reconnaissance Team and Inventoried Levees

There are two parts to the erosion inventory; these two parts are typically referred to as the "annual erosion inventory" and the "extended erosion inventory". The annual erosion inventory includes the levees of the SRFCS that are inspected every year. This includes the reaches that convey flow through the SRFCS on an annual basis. The

extended inventory is only conducted after high flow events or a minimum of once every five years. The extended erosion inventory includes reaches of the SRFCS that either convey seasonal flow or do not typically convey flow on an annual basis, such as the bypasses.

The 2011 reconnaissance included both the annual inventory and the extended inventory. The extended inventory was conducted on August 1 - 12, and the annual inventory was conducted on September 19 - 30. The inspection was conducted by the engineering division, and included team members from Hydraulic Analysis, GIS, Soil Design, Civil Design, and Levee Safety.

The majority of the inventory was conducted by boat for optimal viewing of the channel banks and levees. However, some of the channels did not contain enough flow to boat and they were inventoried by vehicle. **Figures 2** and **3** of the main report and the bottom right identifier on the map plates in this Appendix show the levees that are inspected annually and those inspected during the extended inventory. The figures also show the levee sections that we were unable to inspect due to access limitations or on-going construction activities.

### 5.0 Data Collection and Methodologies

The erosion data was captured using Trimble GeoXH with ArcPAD 10.0. Data from the previous annual survey was loaded onto the units as well as some other background information such as levee centerlines, river miles and previous revetments.

For existing erosion sites, identified in previous years, the team would check the site limits of the erosion for comparison with the previously identified site limits. If the erosion had extended upstream or downstream, the site geometry would be extended to reflect the length of current erosion and a field note would be added. Then, with the use of drop down ArcPAD menus, the data collector asked a series of questions to the rest of the PDT members, such as type of erosion, erosion factors observed, vegetation observed, etc. For a complete listing of site attributes, refer to Appendix A. Some sites had status changes, such as a minor erosion site that changed into a full erosion site. If this was the case, then a field not was entered stating such.

For newly observed erosion sites, a GPS data point was collected at the approximate start of the erosion site and a second GPS data point was collected at the downstream limit. Alternatively, the GPS data collector would draw a line on the GPS using background data as an approximation of start and stop points. The latter collection method was used only when the boat could not get close to the erosion site in question or when the GPS data collector could not physically walk to the start/stop points for the sites that were inventoried by vehicle. All of the data attributes were filled in by the GPS operator with advisement from the accompanying PDT members.

Once the data was collected, the data was exported to a geodatabase and serves as the master erosion database for the SRBPP Project. The primary purposes of the dataset are to tentatively select sites for bank protection and monitor previously indentified erosion sites.

As the sites fall out of the erosion inventory by being repaired, they are moved into a revetment database (shown as repaired sites within this inventory atlas) for a running inventory of system revetments for mapping and query analysis. The database is not a complete inventory of all revetments to the system but is expanding as new-old data is discovered and added to the database.

#### LEGEND 6.0

**River Miles:** This dataset came from USGS markers on 1:24K TOPO Quads. Note: Some river markers do not follow the current channel but are still used in this report to maintain consistency with how river markers have been reported throughout the life of the SRBPP project.

Levee Miles: A subset of levee miles from the National Levee Database. These markers are to be used to identify erosion where River Miles do not exist. This is a secondary system for marking locations of levee data.

**Critical Erosion**: A site that is an imminent threat to the integrity of the flood control system and of highest priority for repair.

**Erosion**: A site that is at risk of an erosional failure during flood and/or normal flow conditions.

**Under Construction**: A site in which either a repair is under way or a contract has been awarded and the construction should begin shortly. This site will likely move to the repaired list in the next year's inventory.

Legend

River Miles

Levee Miles

Erosion

Repaired

Critical Erosion

SRBPP Levees

New Erosion (2011)

Under Construction

Reclamation District

Maintenance Areas Levee Districts

New Erosion: A site identified this year as at risk of an erosional failure during flood and/or normal flow conditions.

**Repaired:** A site that was previously an erosion site that has since been repaired and is listed in the revetment inventory.

SRBPP Levees: The SRBPP Levees come from the National Levee Database levee centerlines and represent all project levees within the Sacramento River Bank Protection Project extent.

Reclamation District: Areas shown to represent the Bureau of Reclamation Districts that are responsible reclaiming and/or maintaining land that is threatened by permanent or temporary flooding for agricultural, residential, commercial, or industrial use.

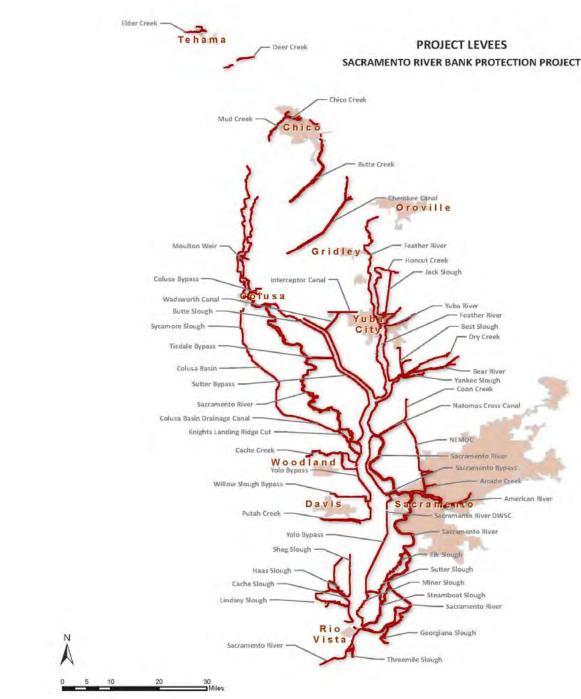
Maintenance Areas: Areas shown to represent DWR maintenance areas. These areas were organized in the interest with complying with Federal requirements and are maintained by DWR maintenance yards.

Levee Districts: Areas shown to represent Levee Districts, which are like Reclamation Districts but are only concerned with flood protection, not water supply as well.

#### 7.0 River Location Naming Convention

Erosion and repaired sites are identified and labeled with the abbreviated waterway and river mile (or levee mile when river mile does not exist) and bank designation. This is known as the River Code.

An example of the naming convention would be: SAC 50.6 R This translates to: Sacramento River, River Mile 50.6, Right Bank. Note: The site label is in the map plates is colored to represent the site type.

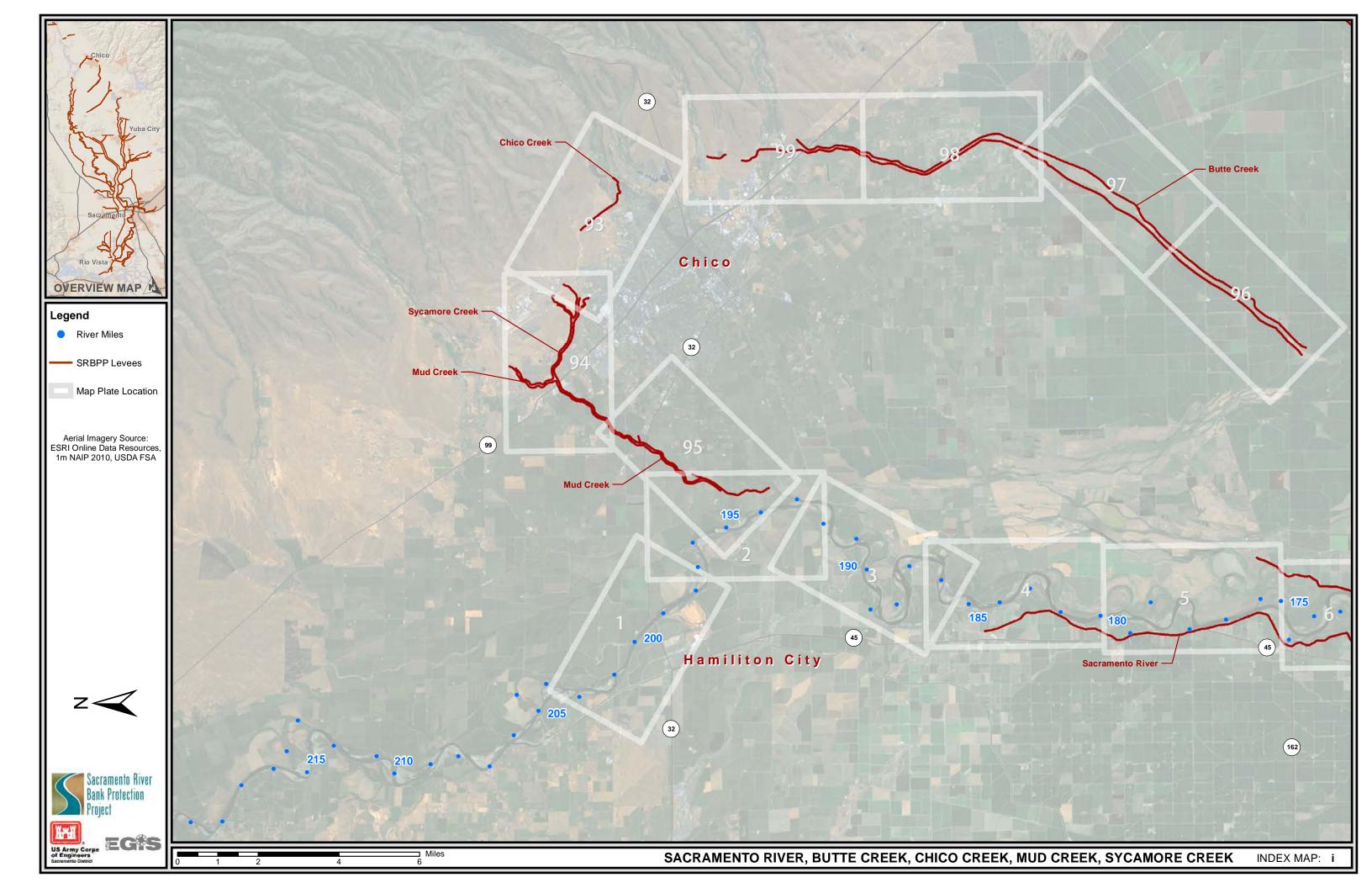


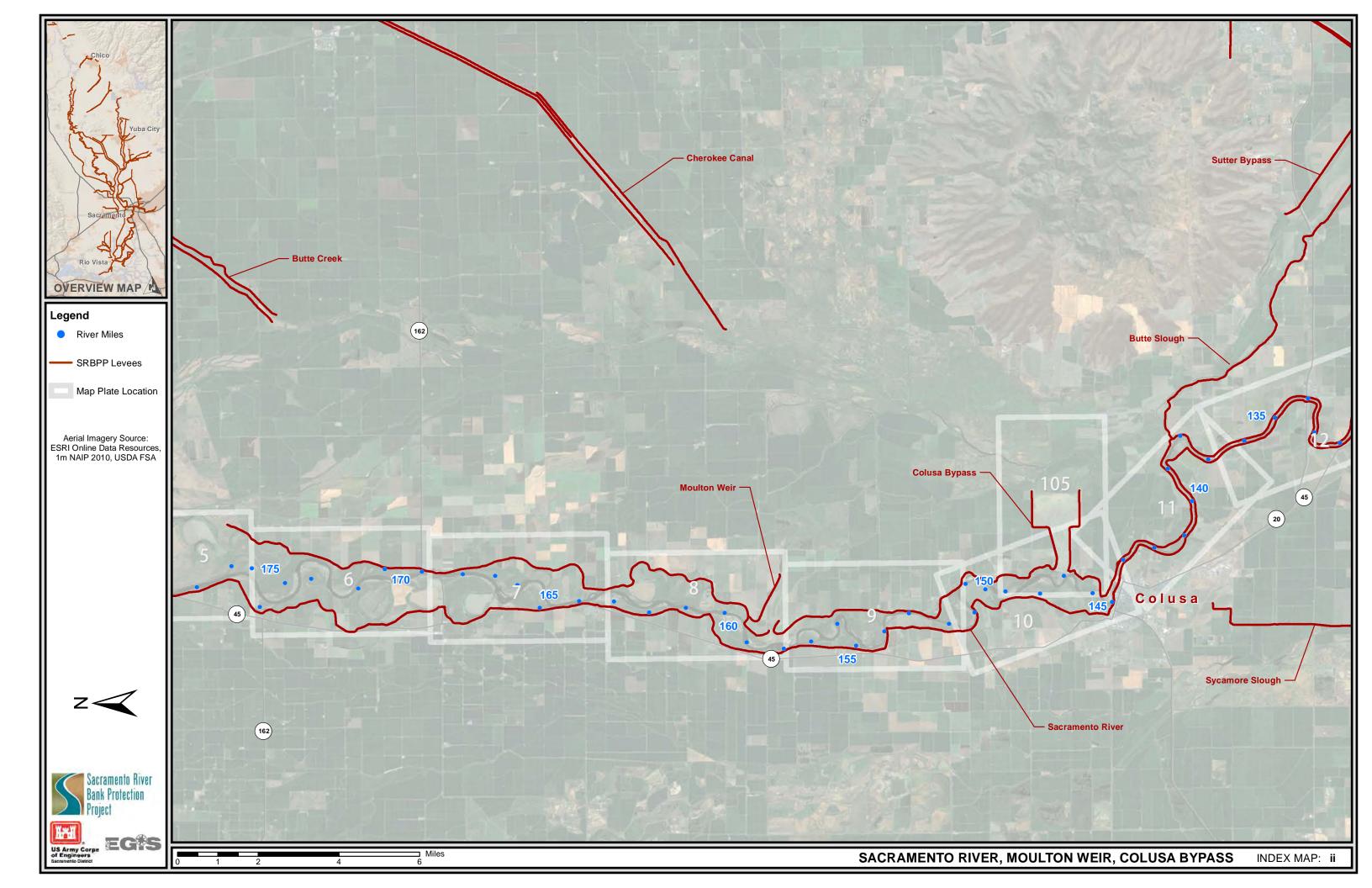
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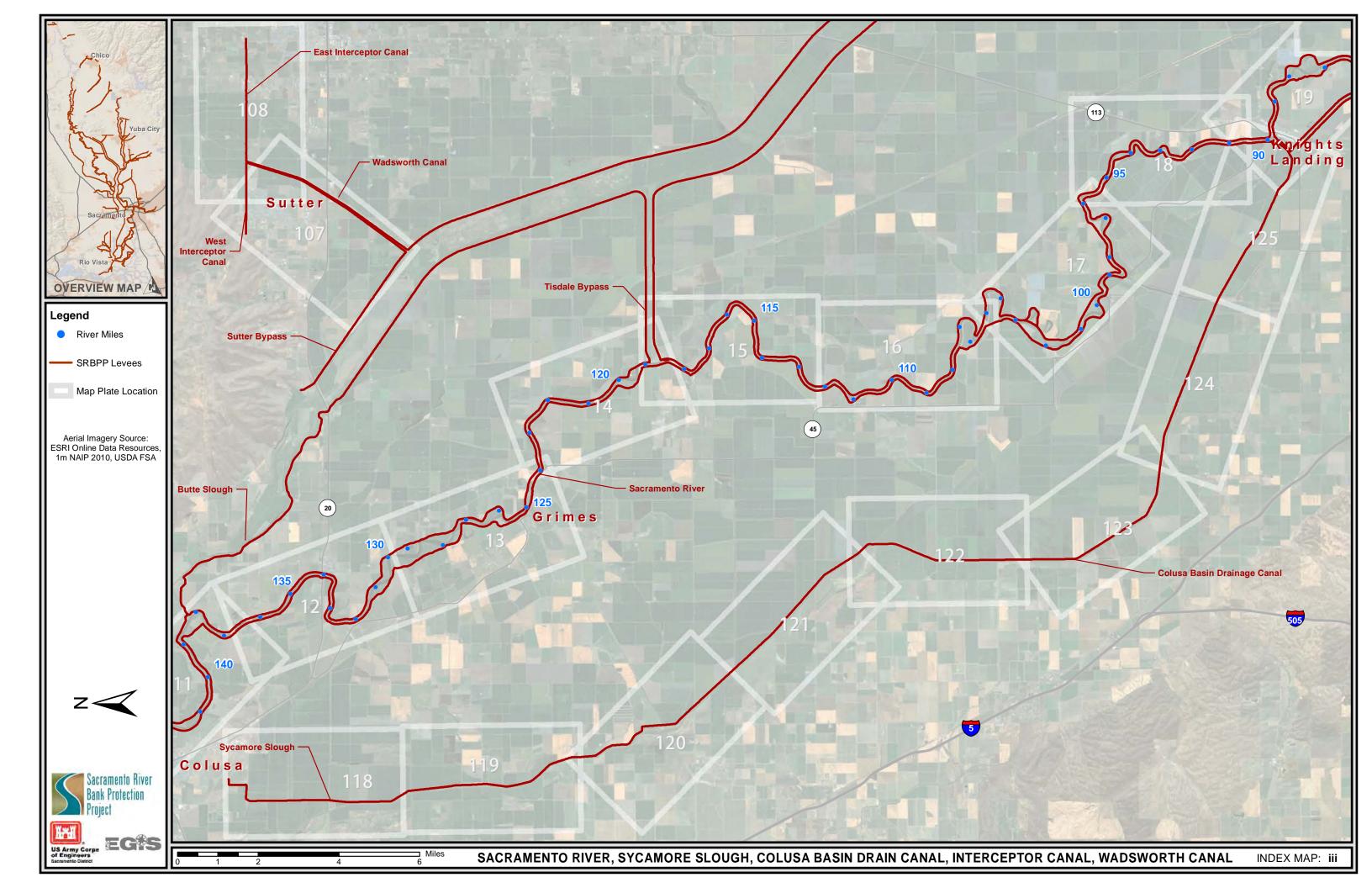
Waterway; River Code - Index Maps; Plate Maps

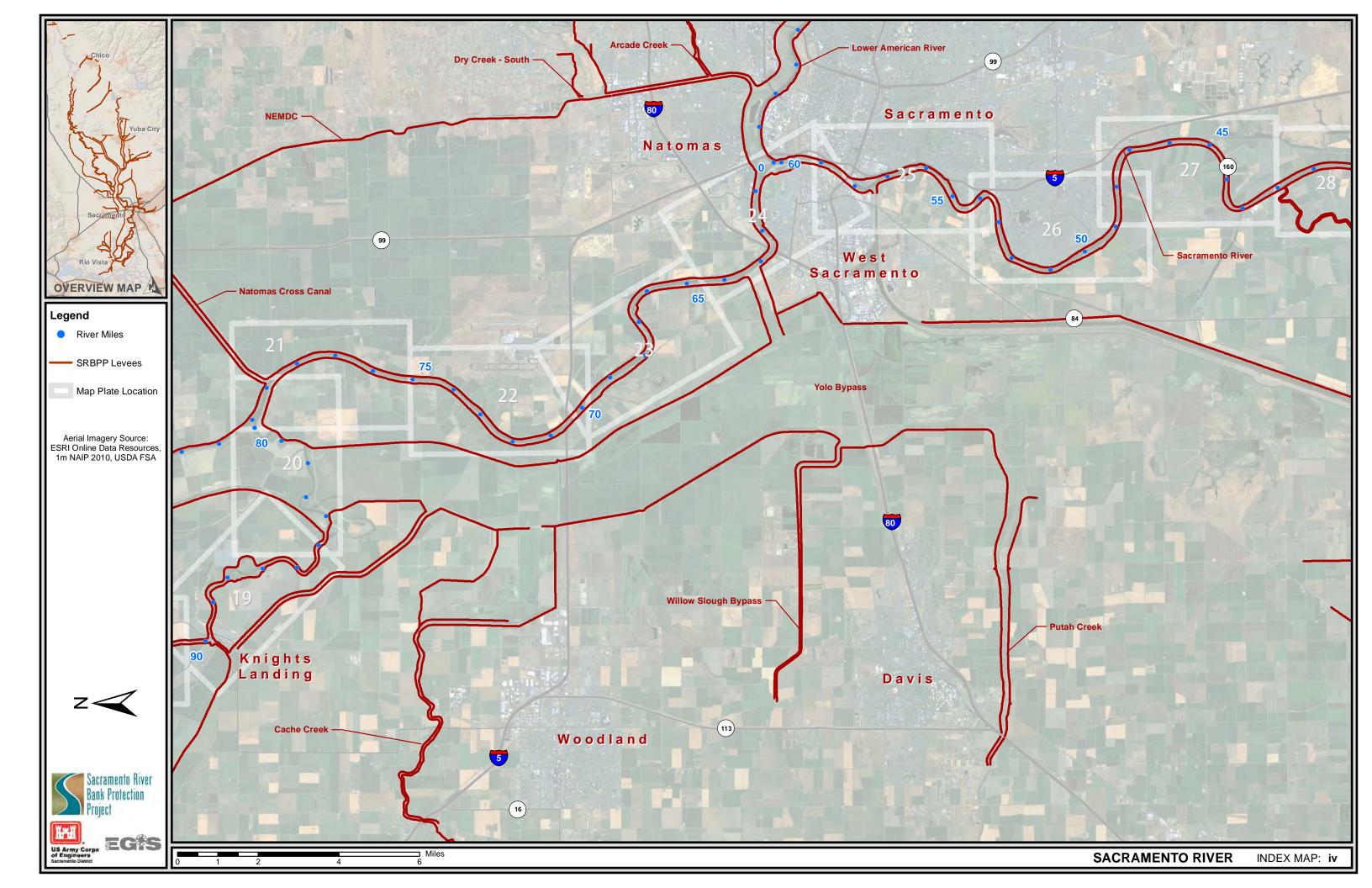
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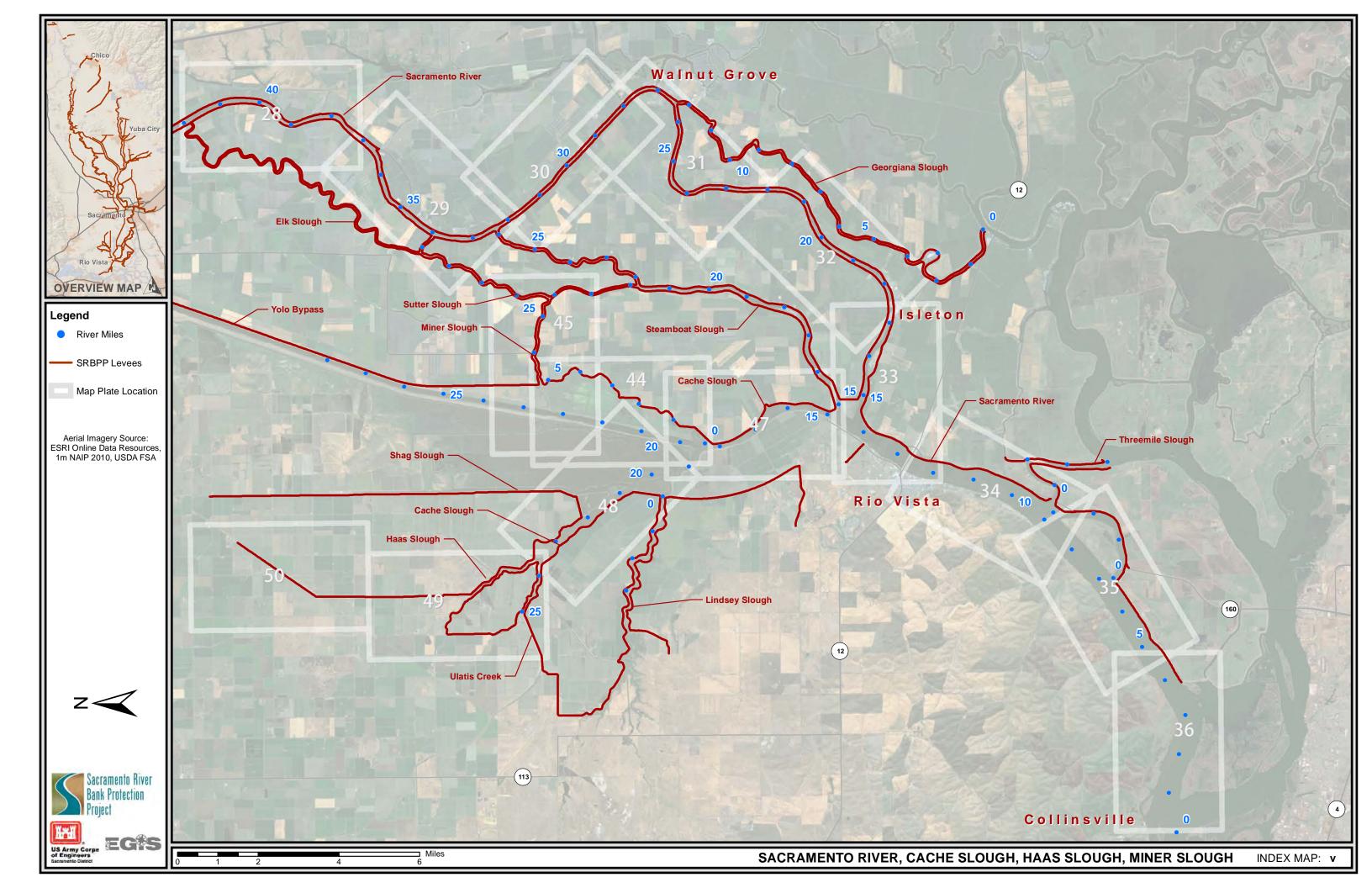
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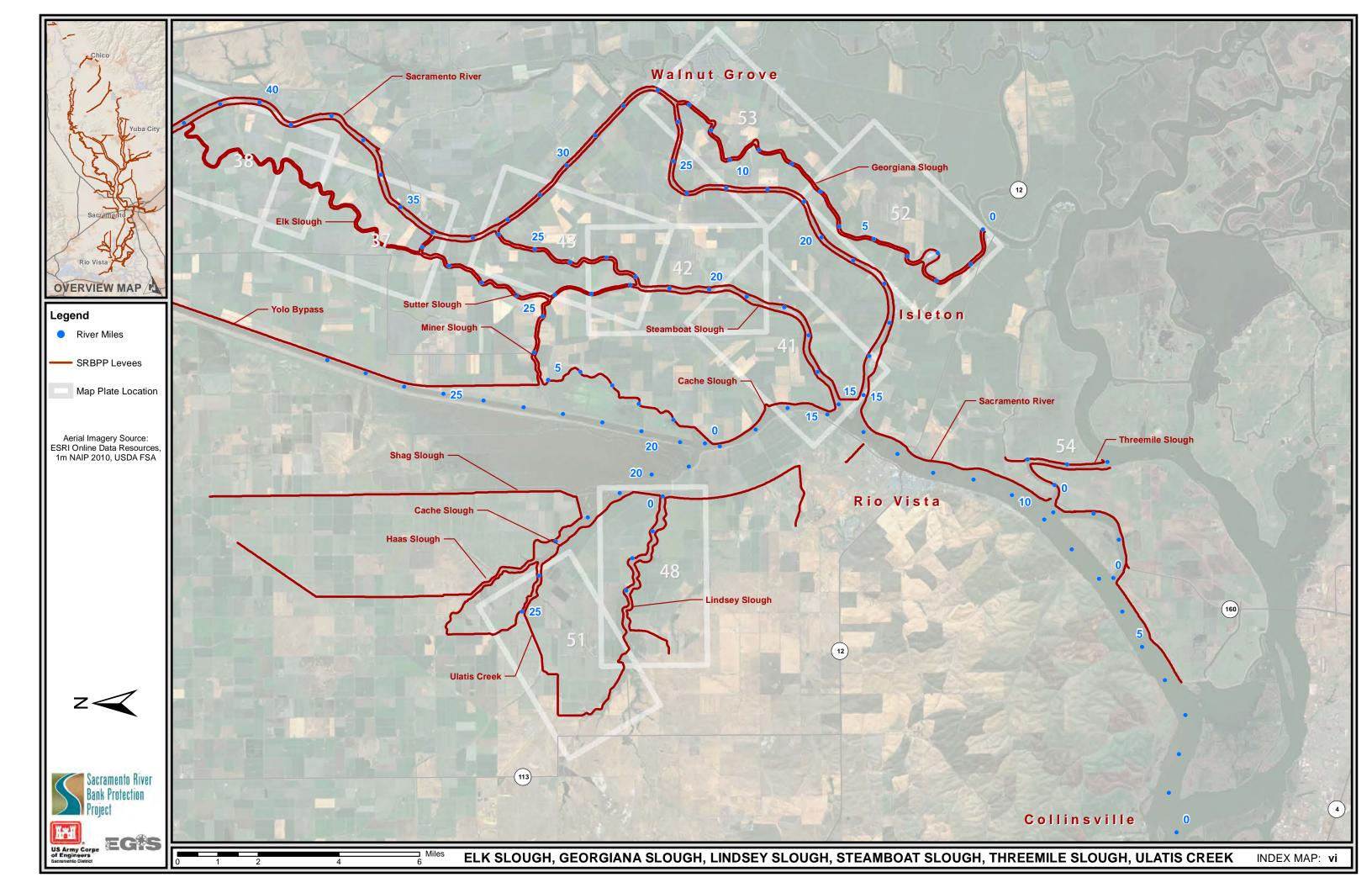


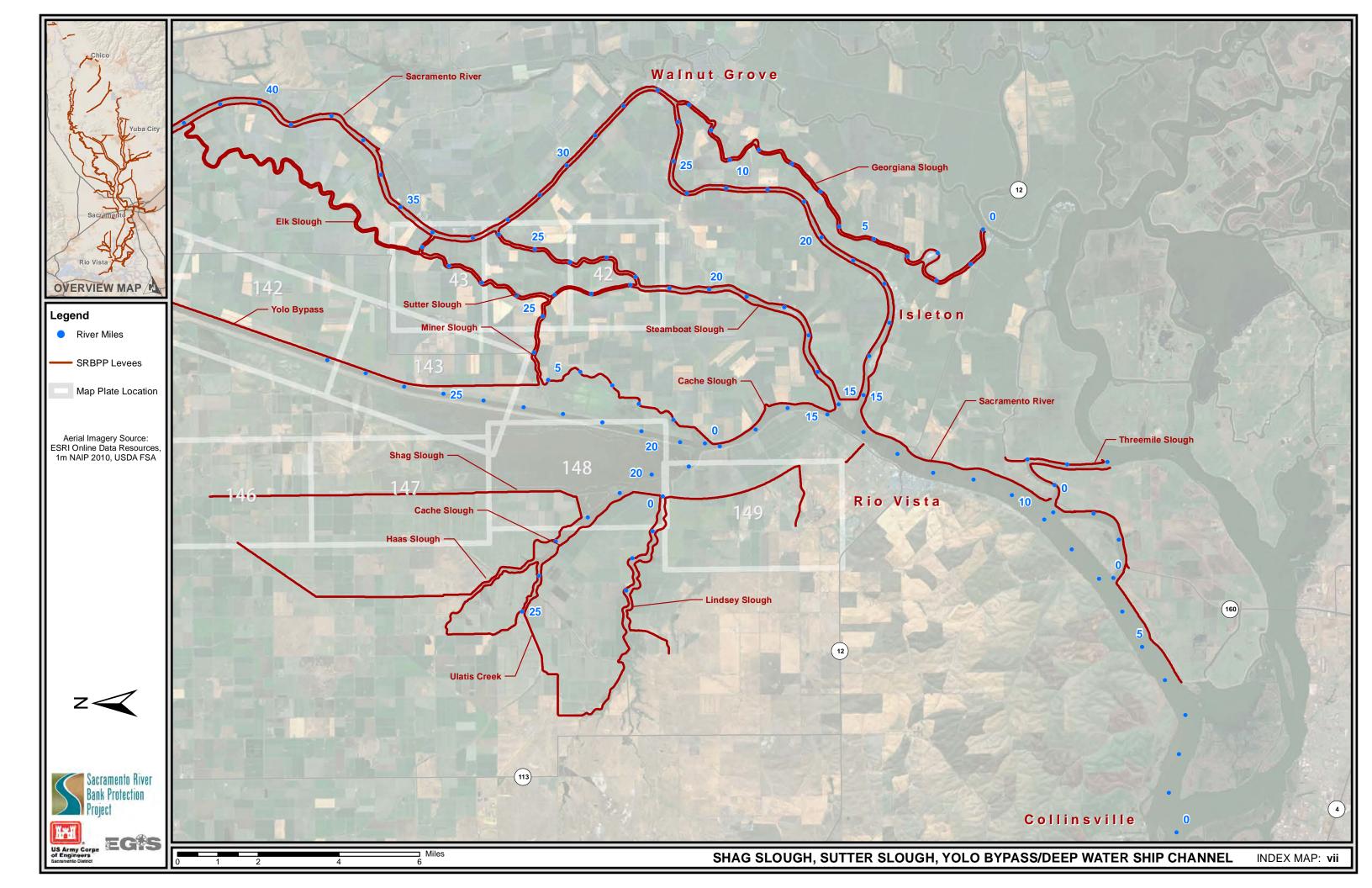


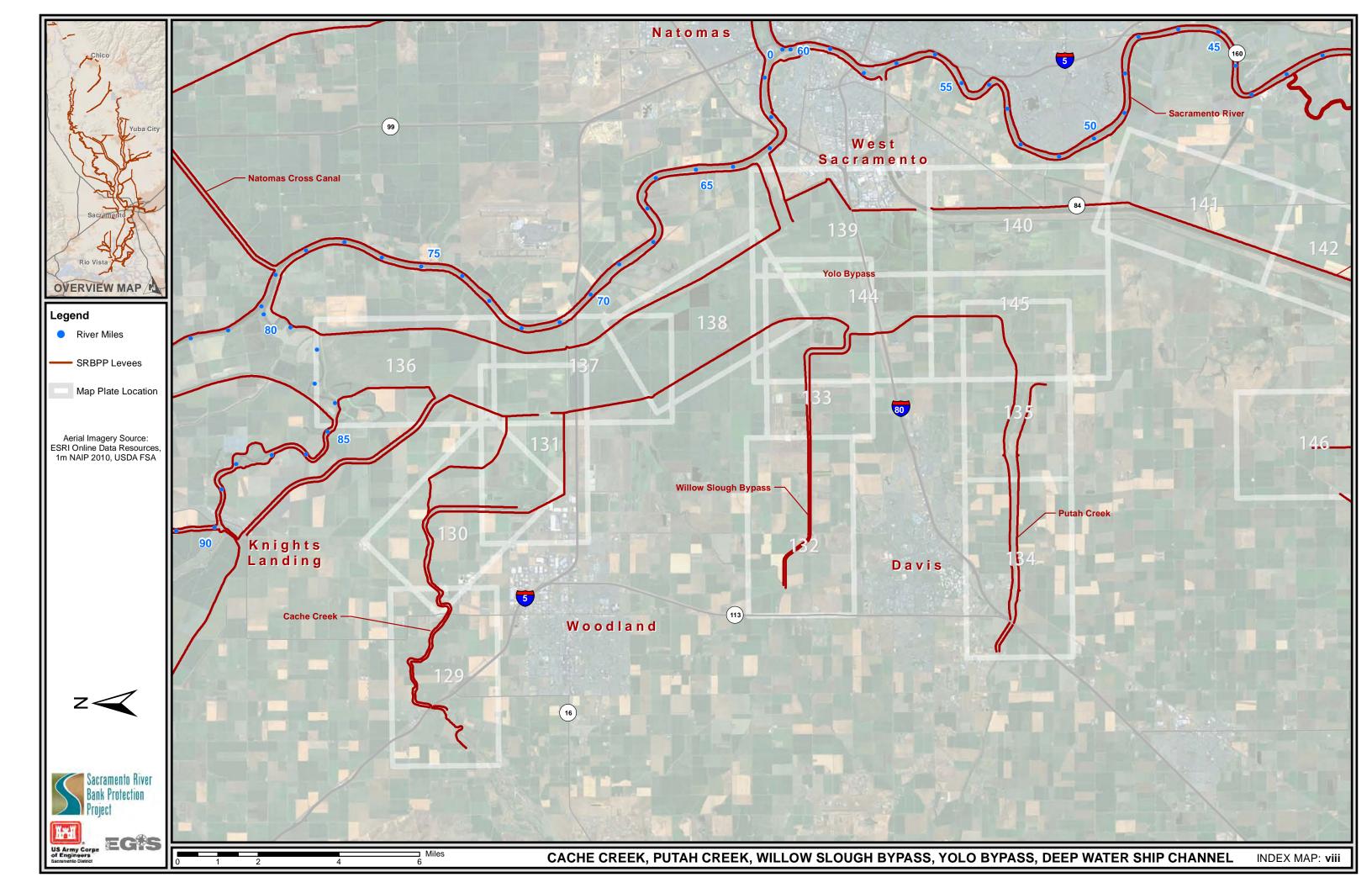


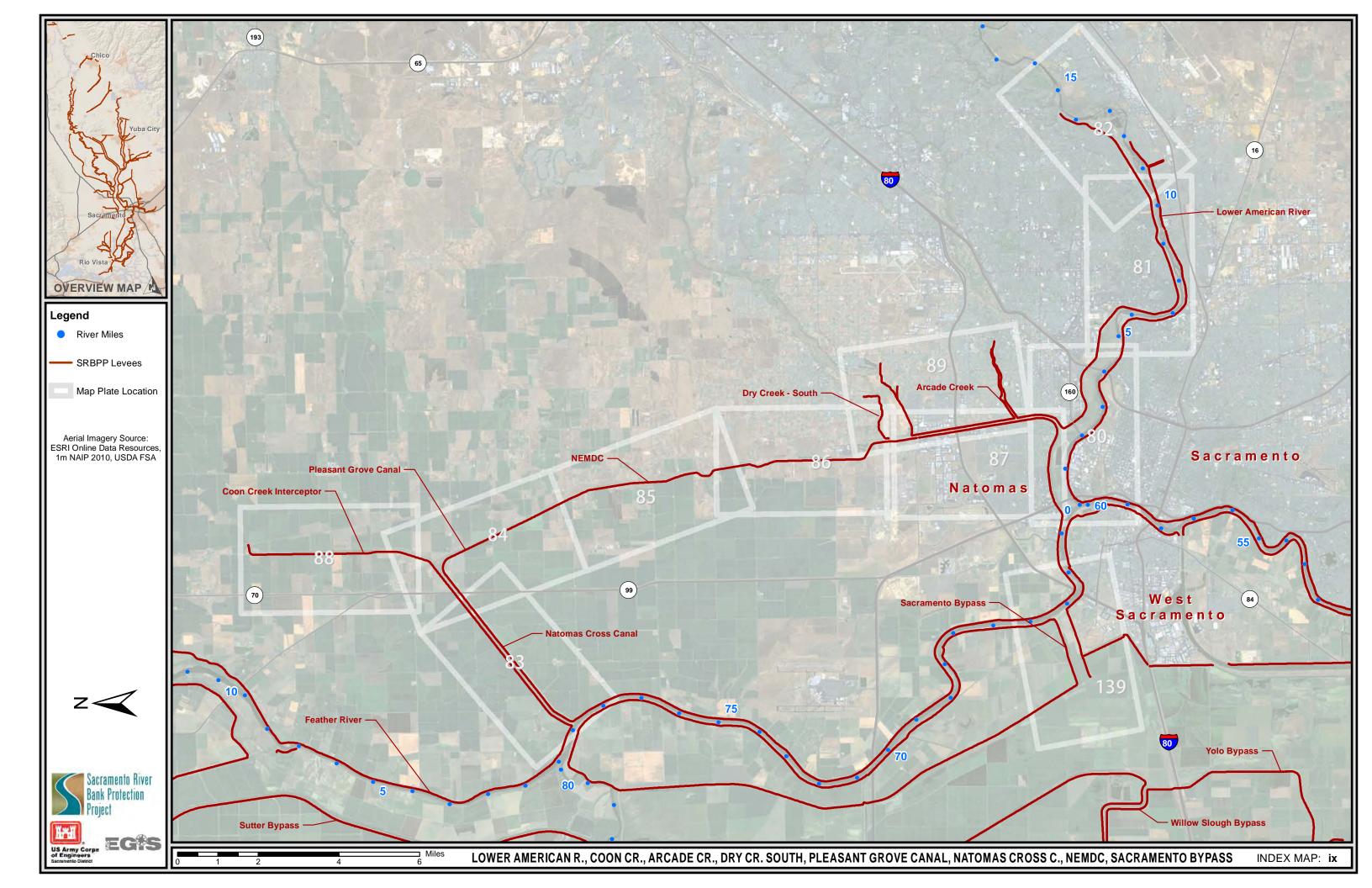


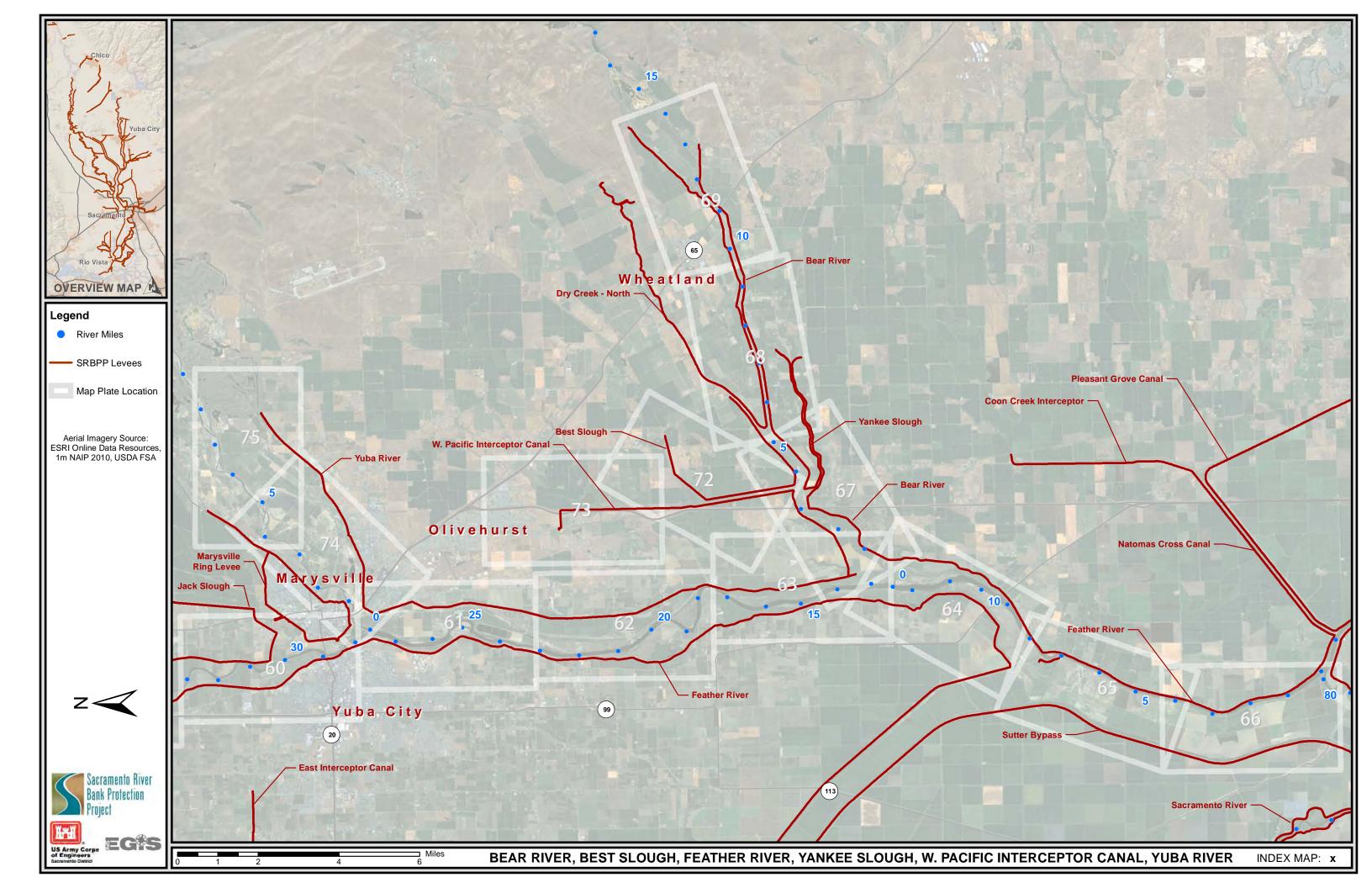


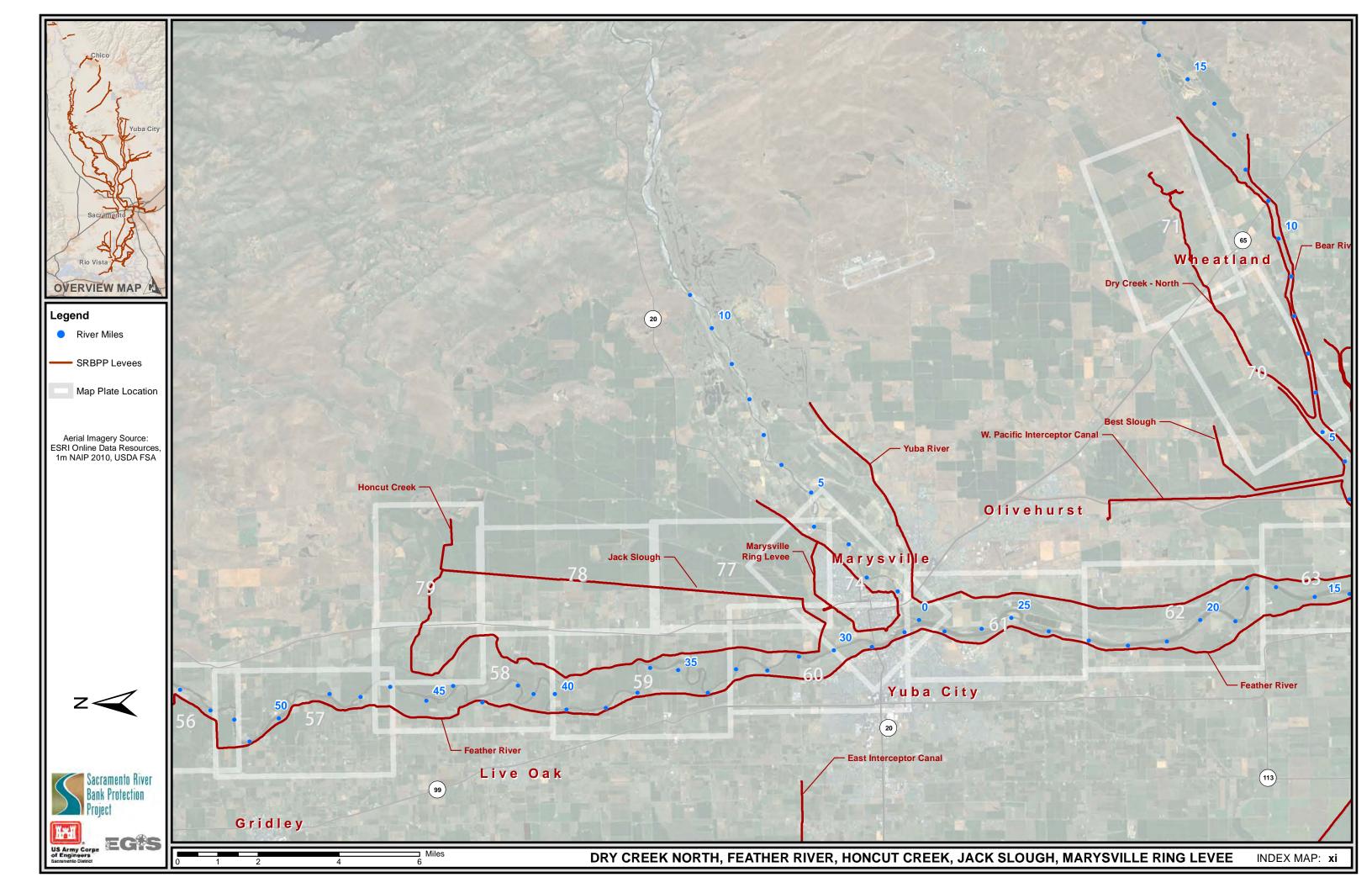


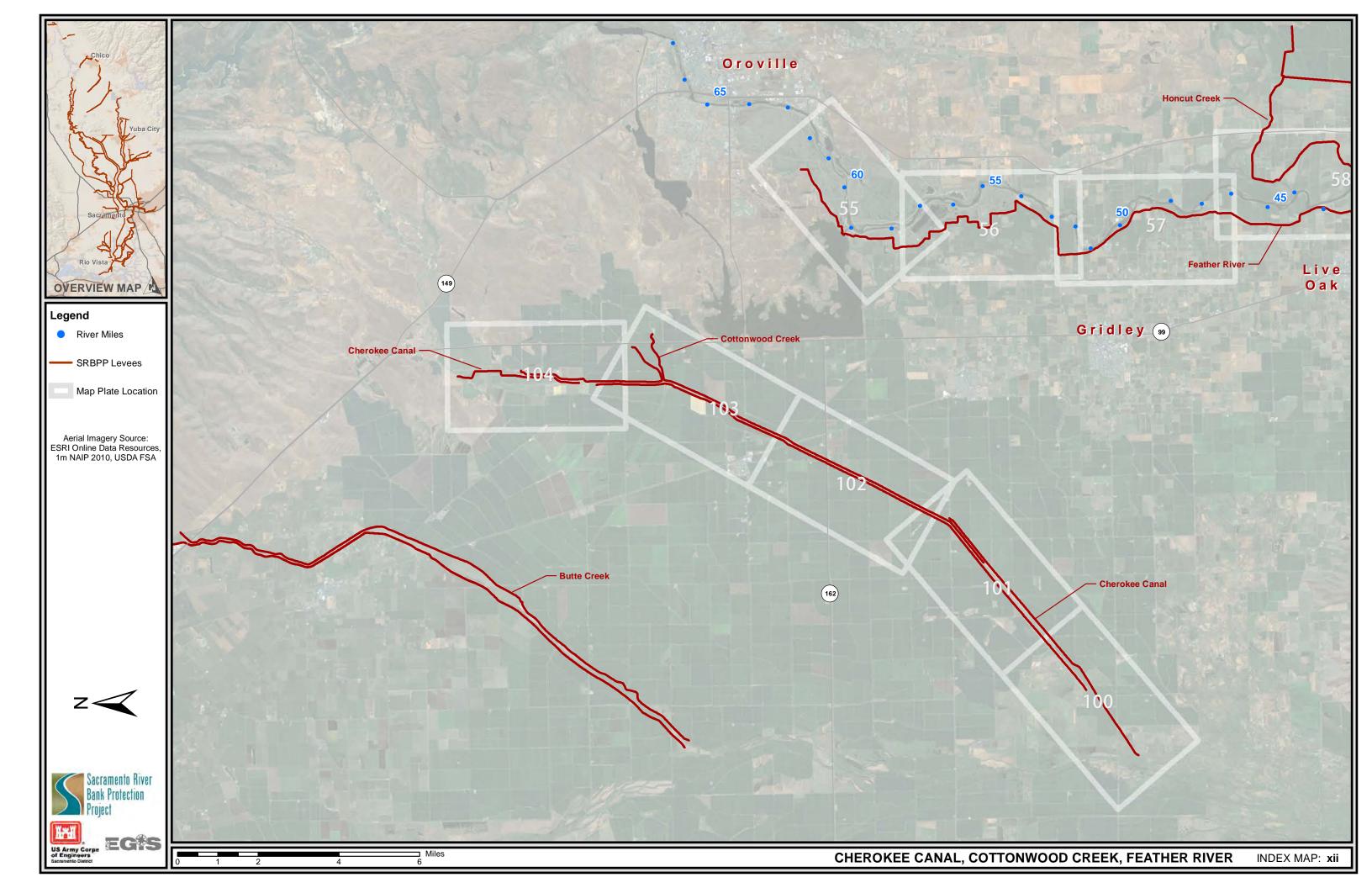


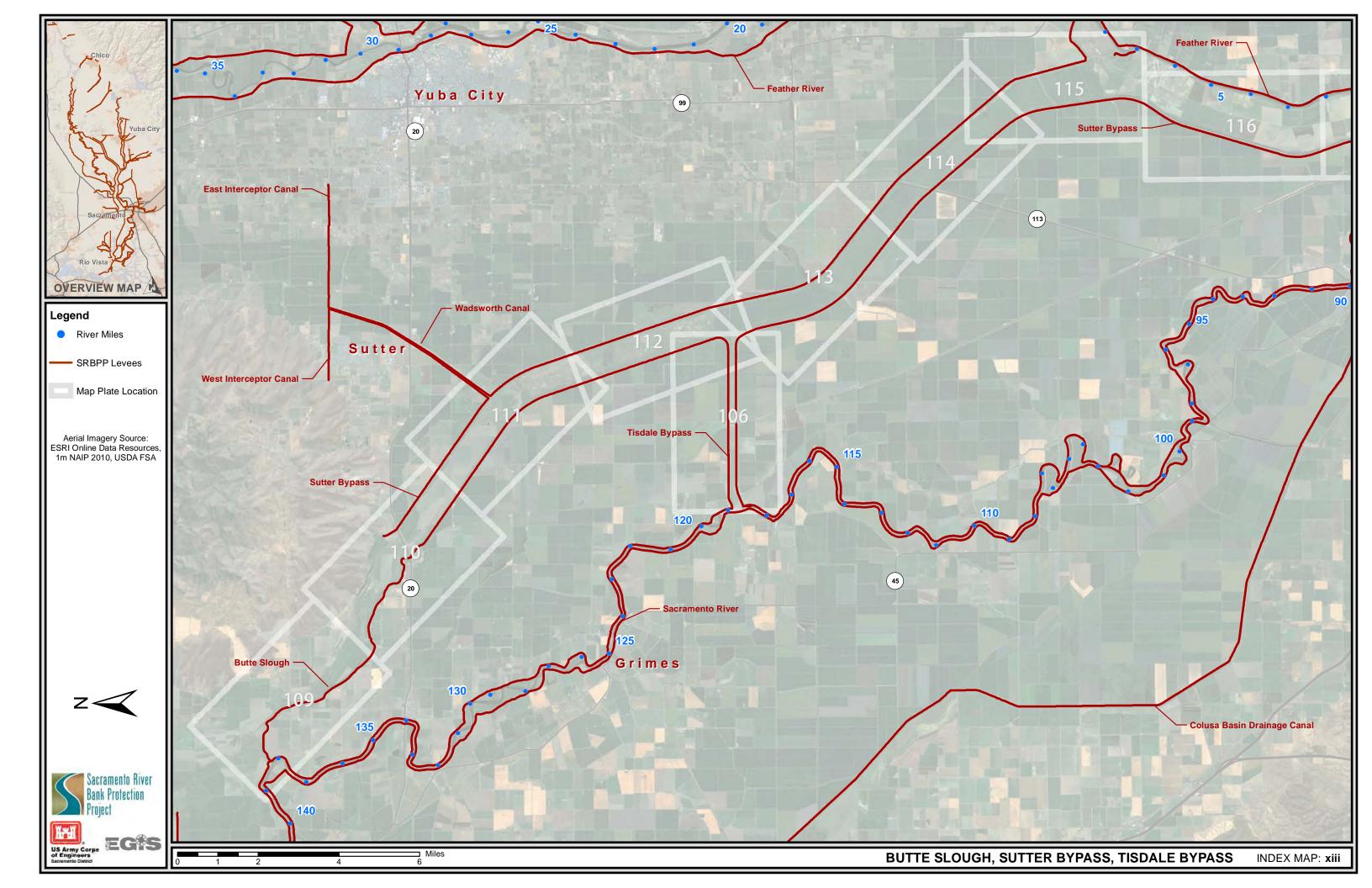


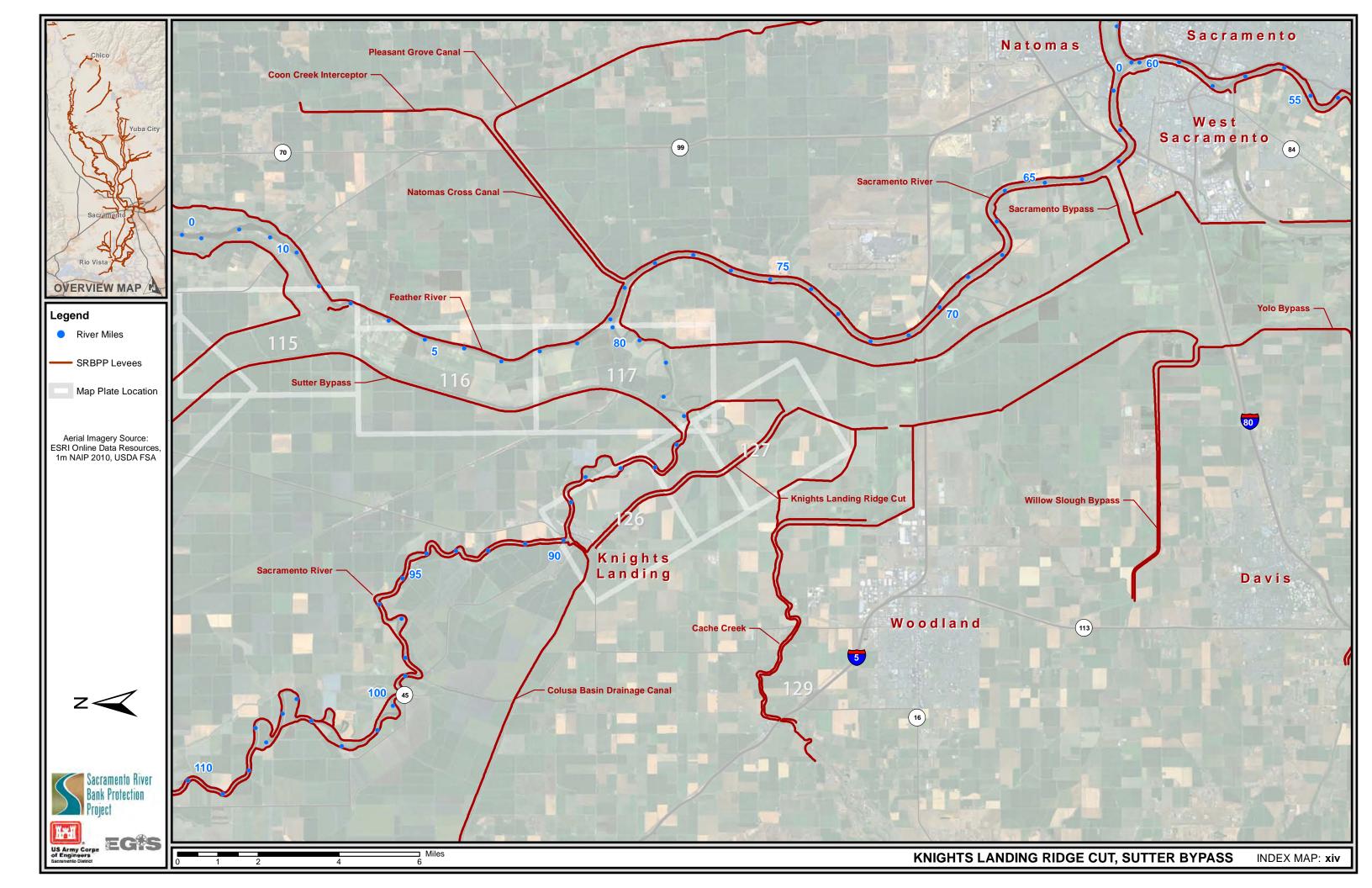


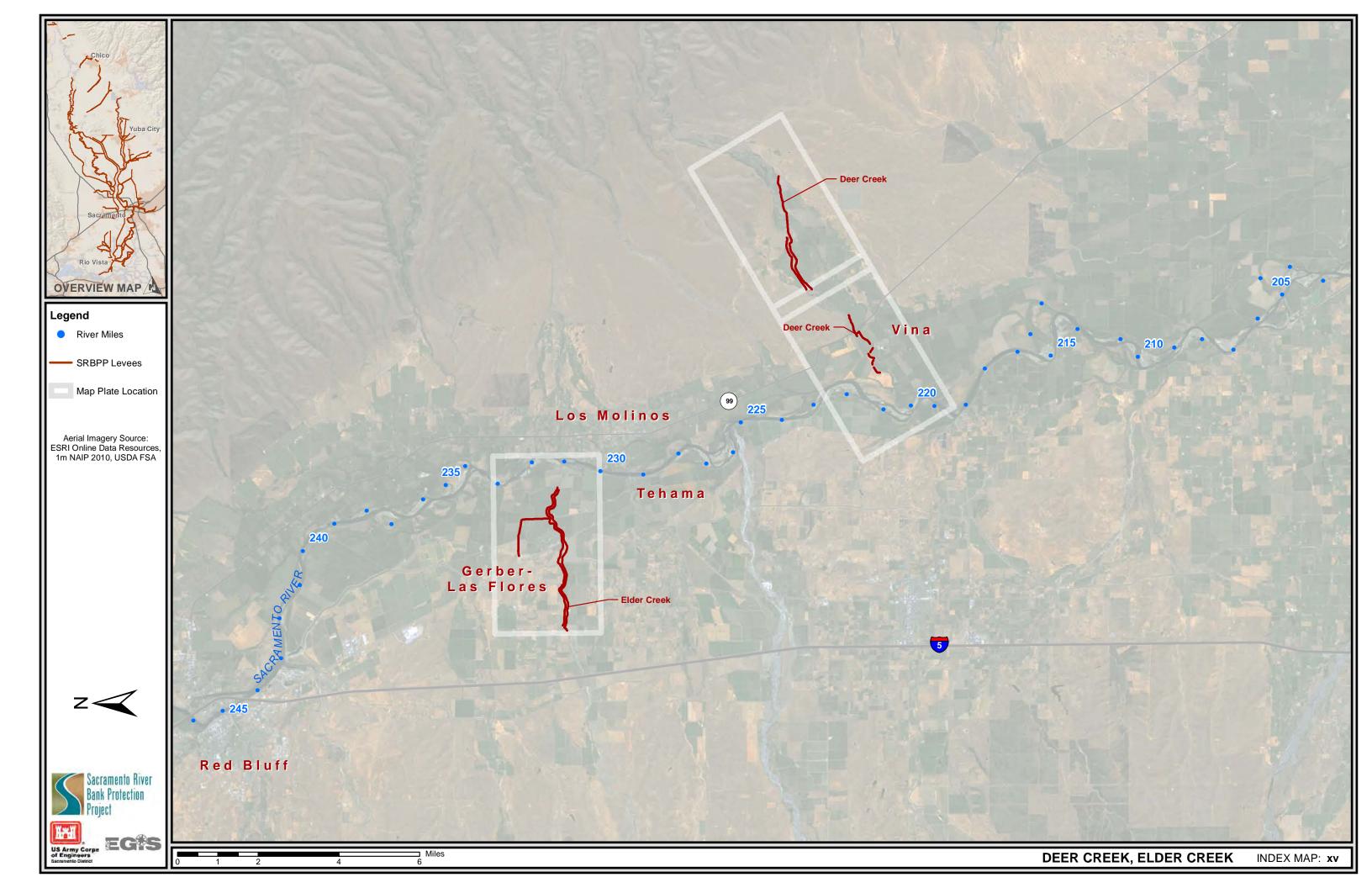


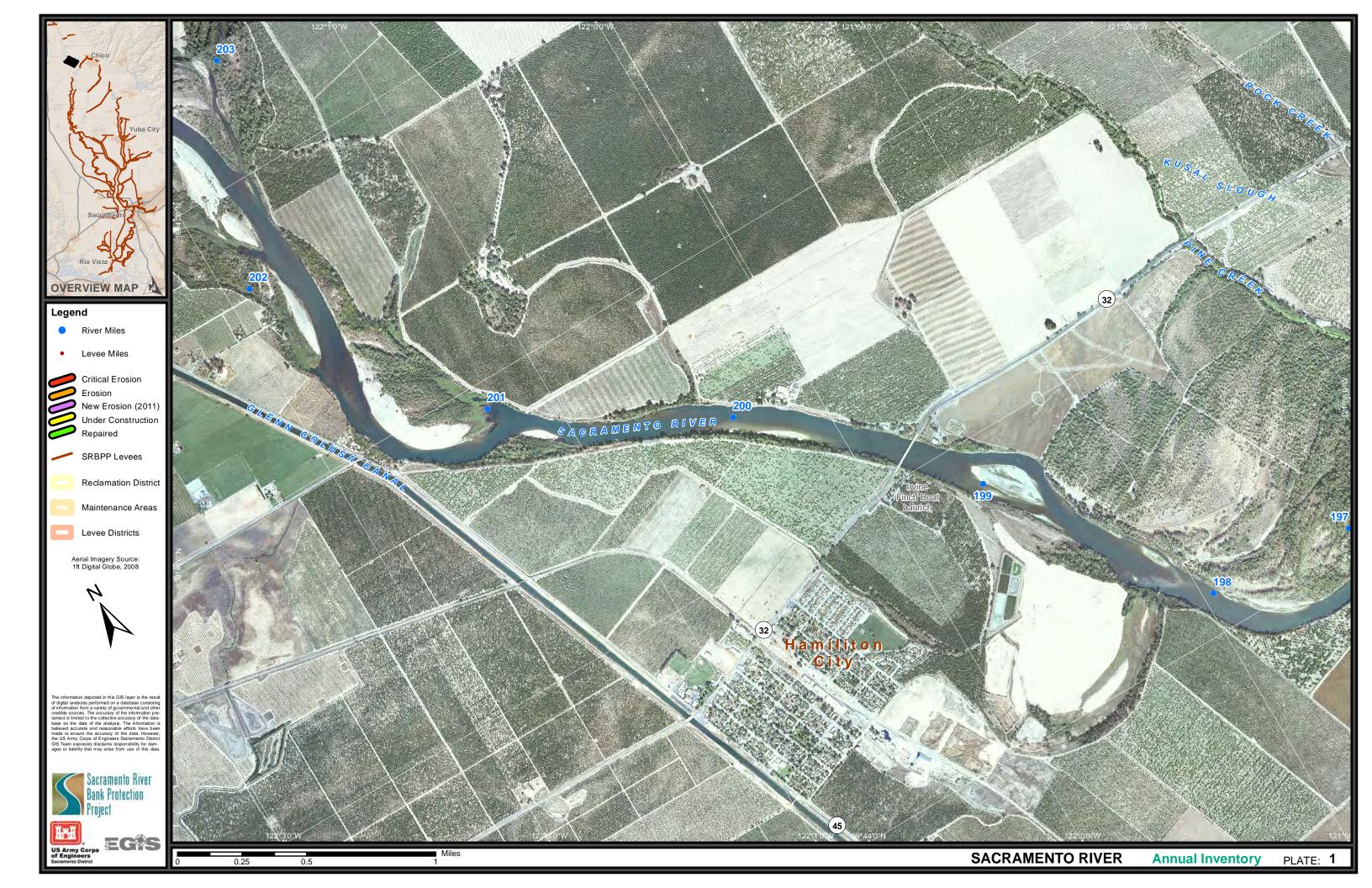


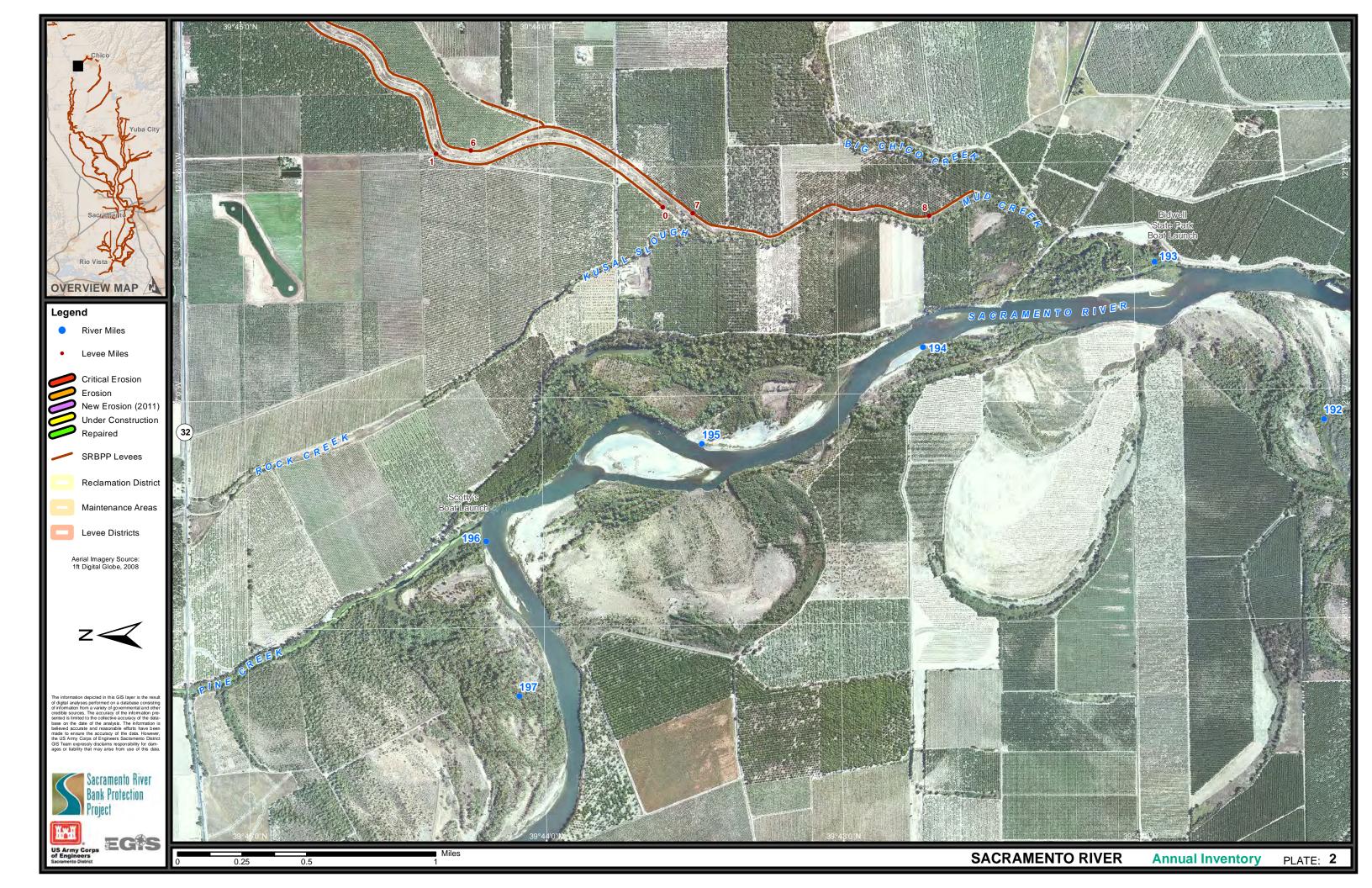


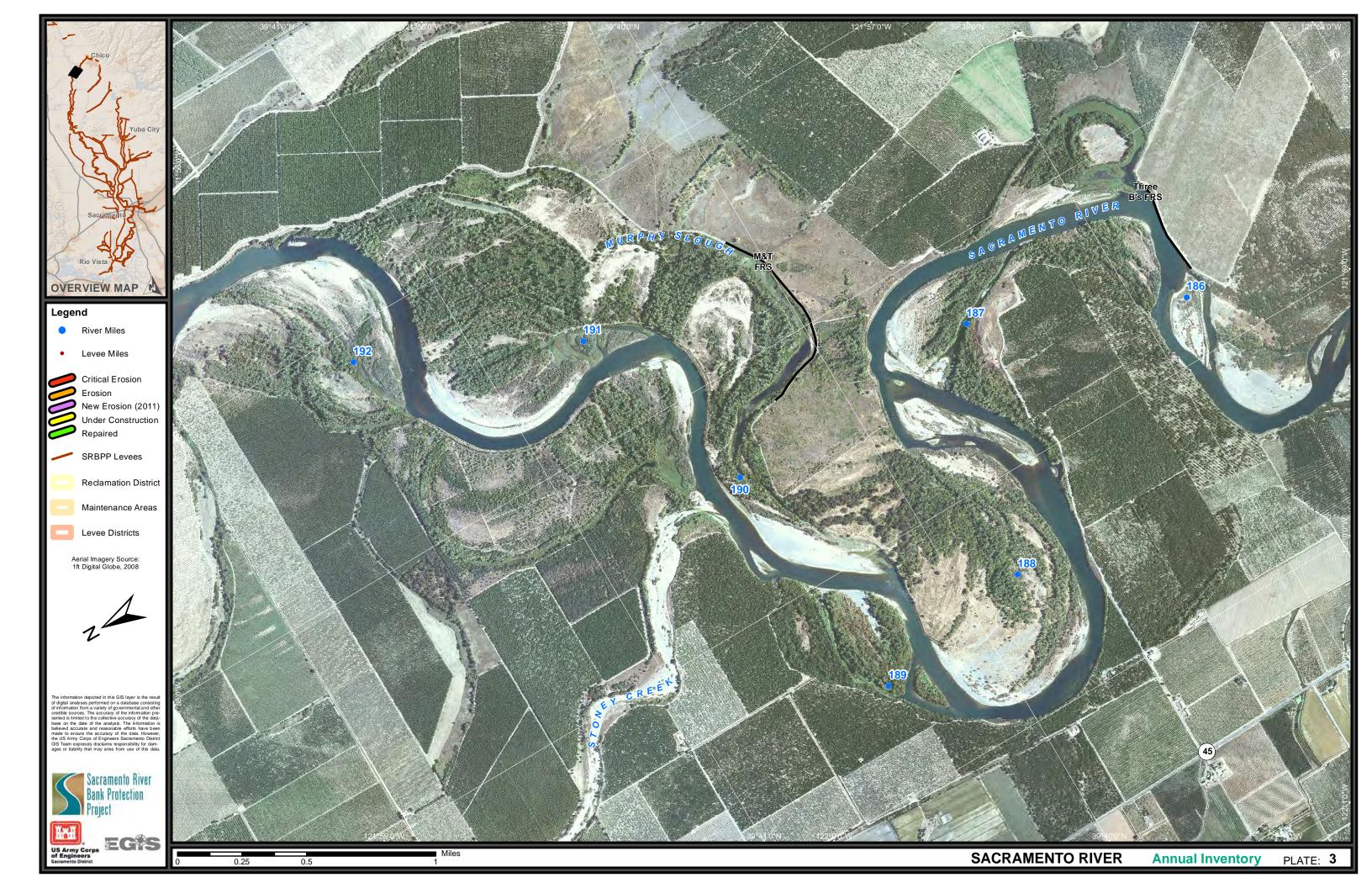


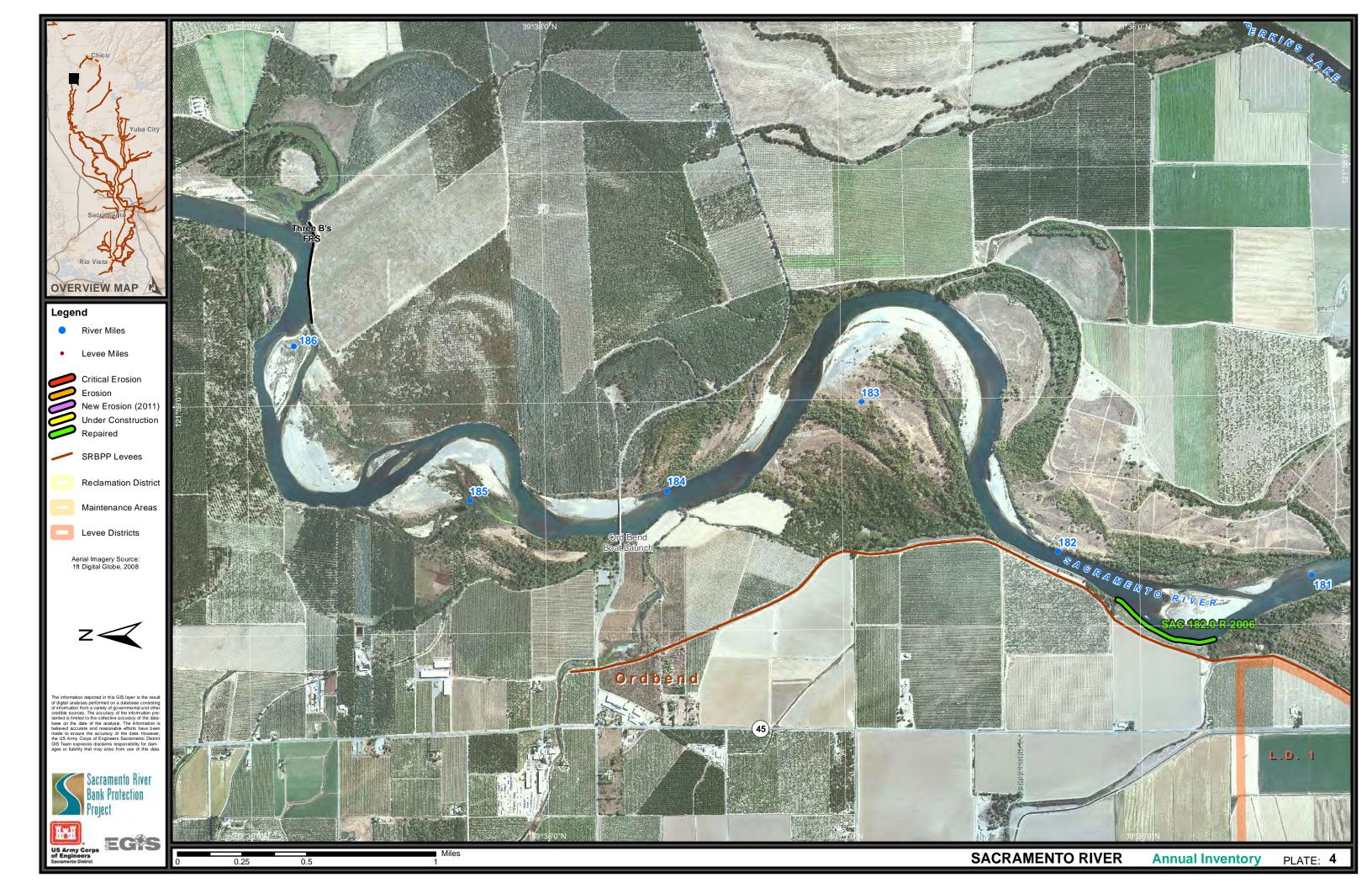


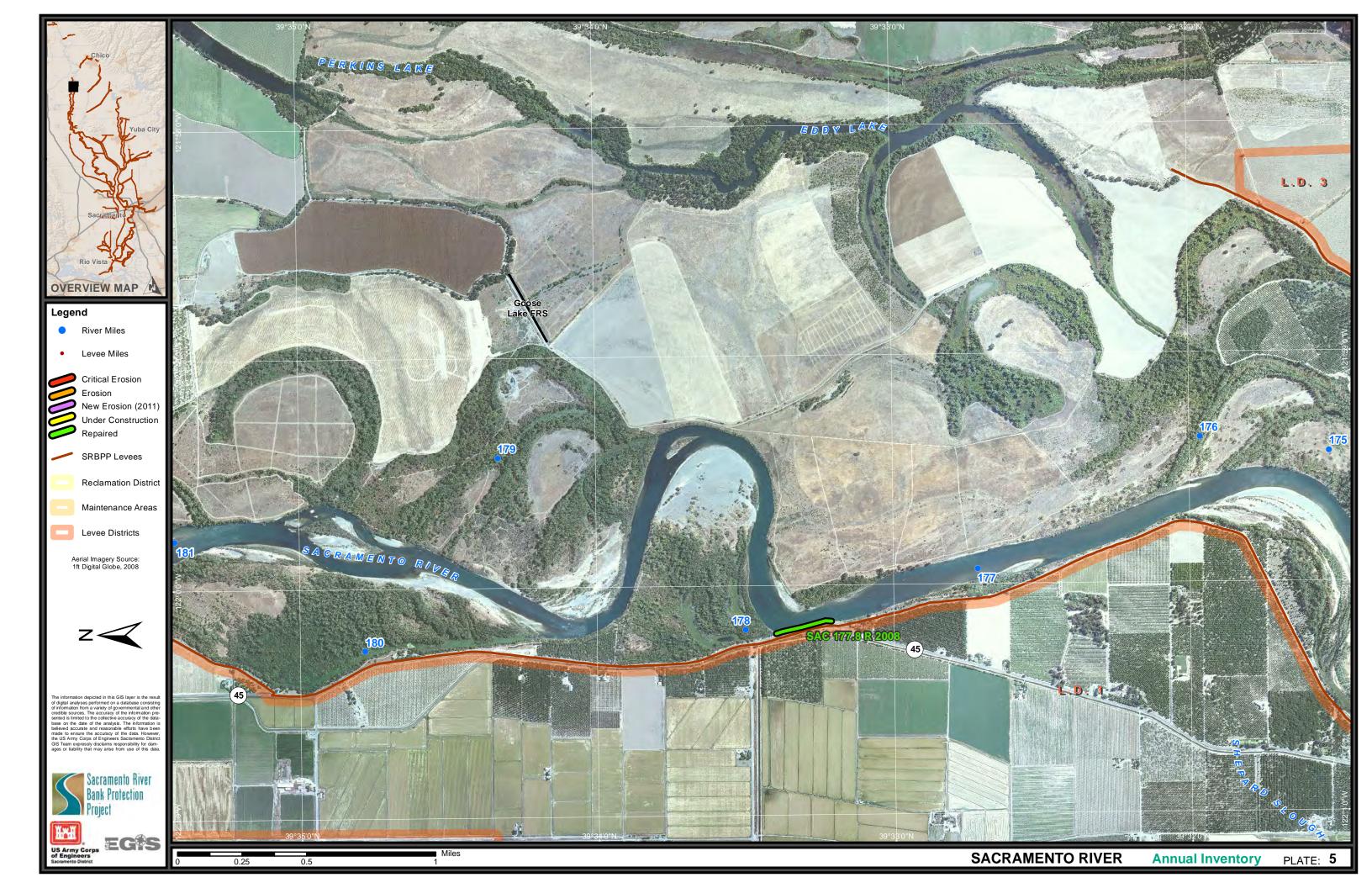


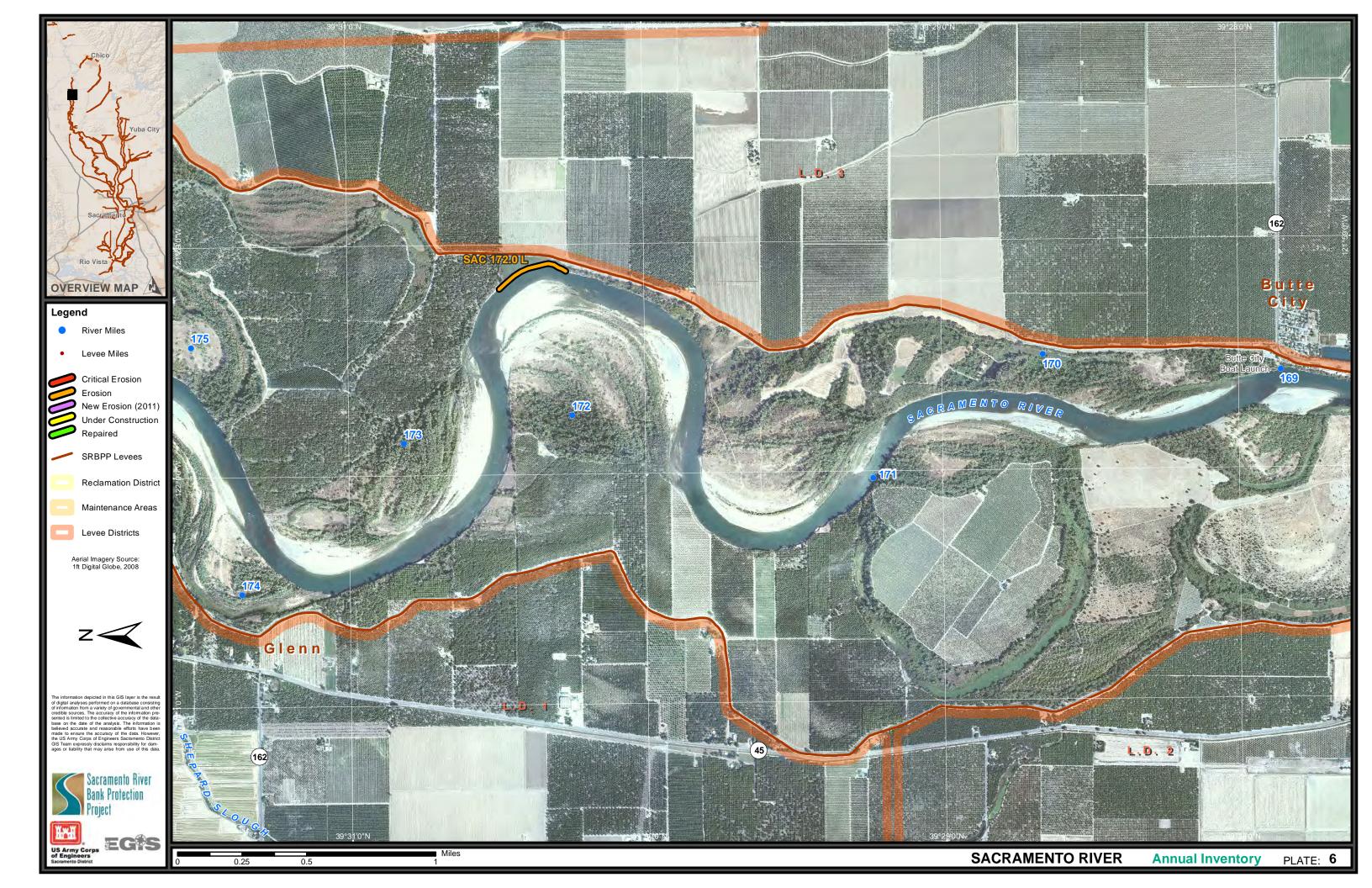


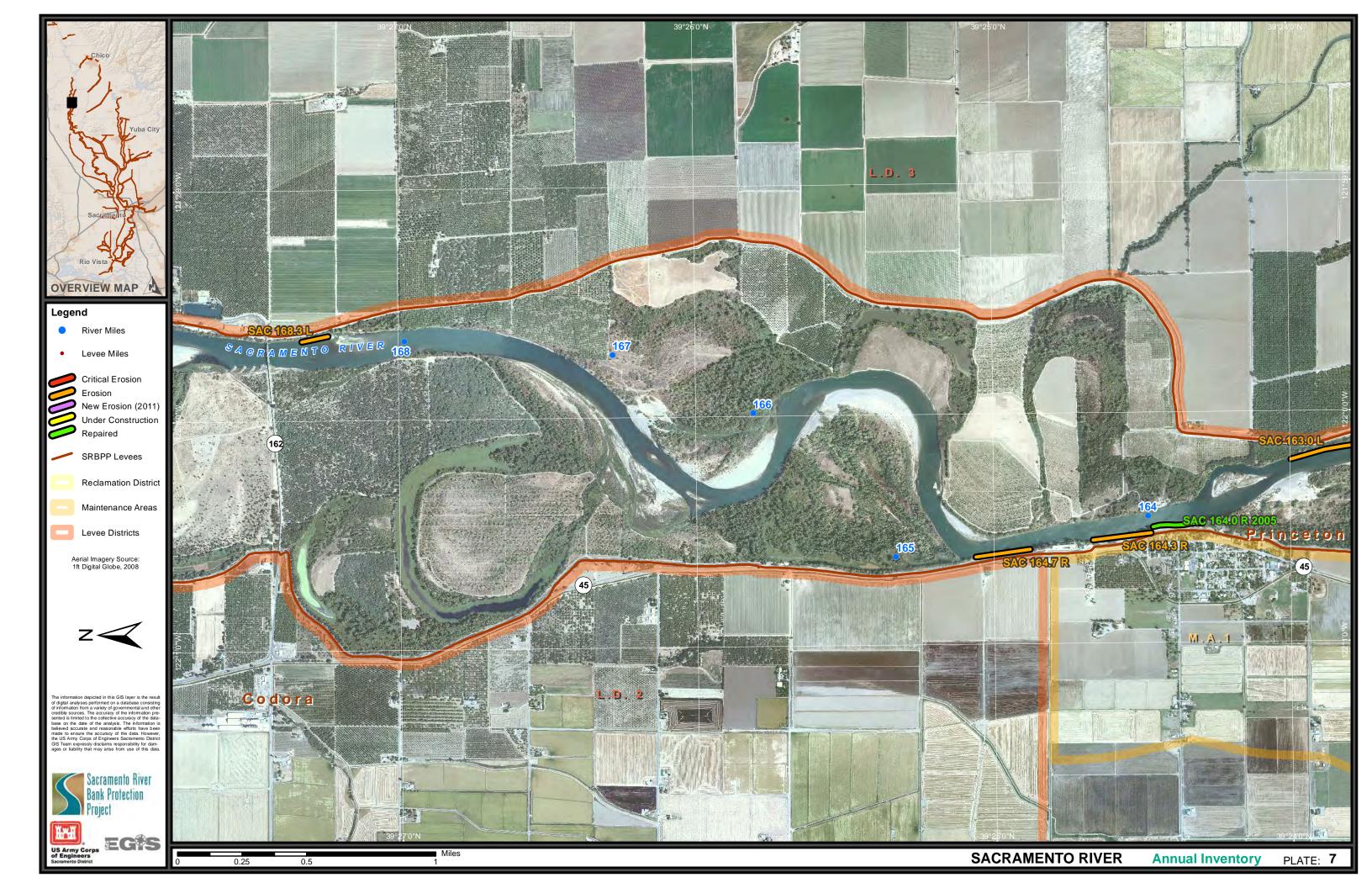


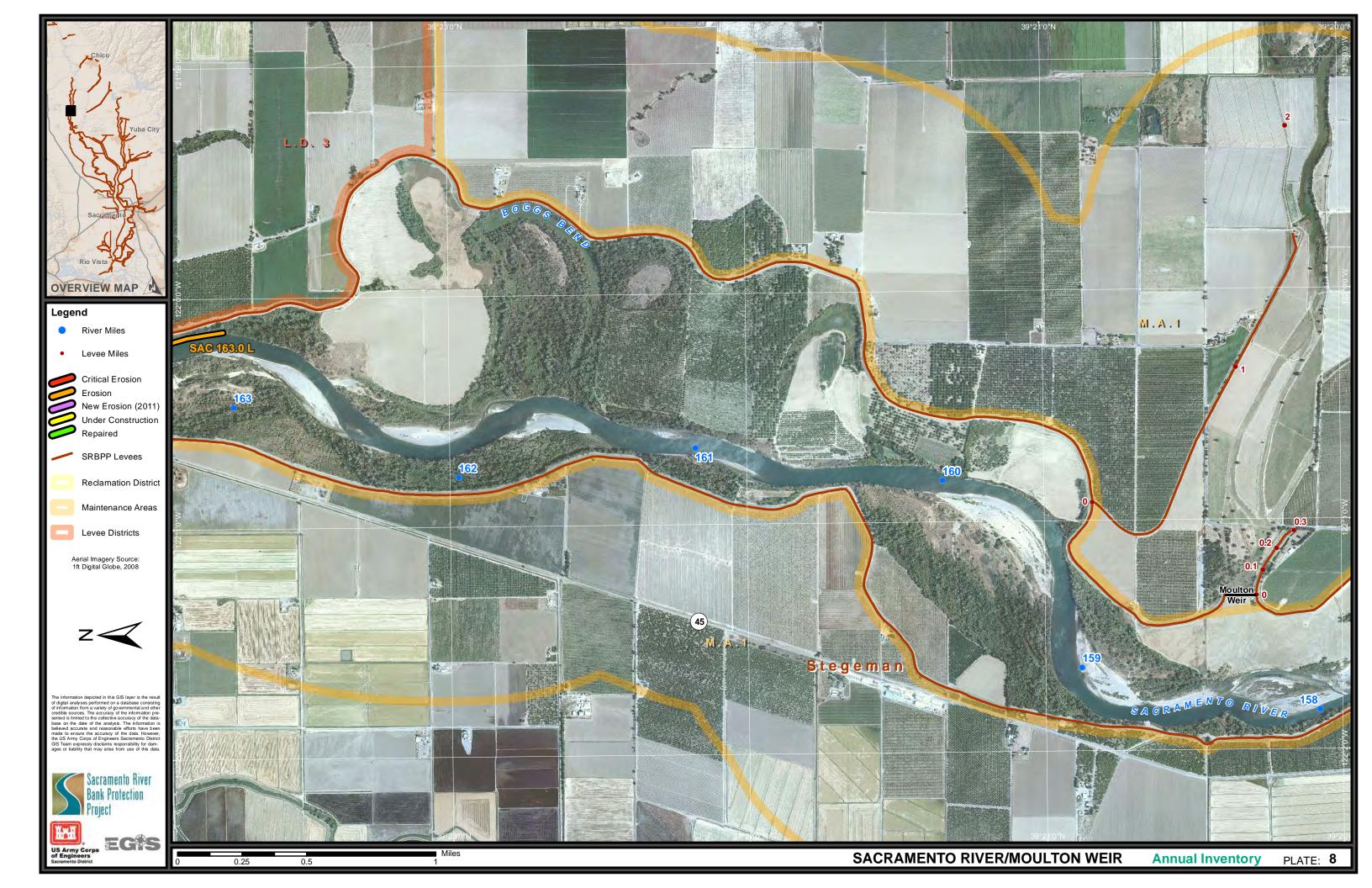


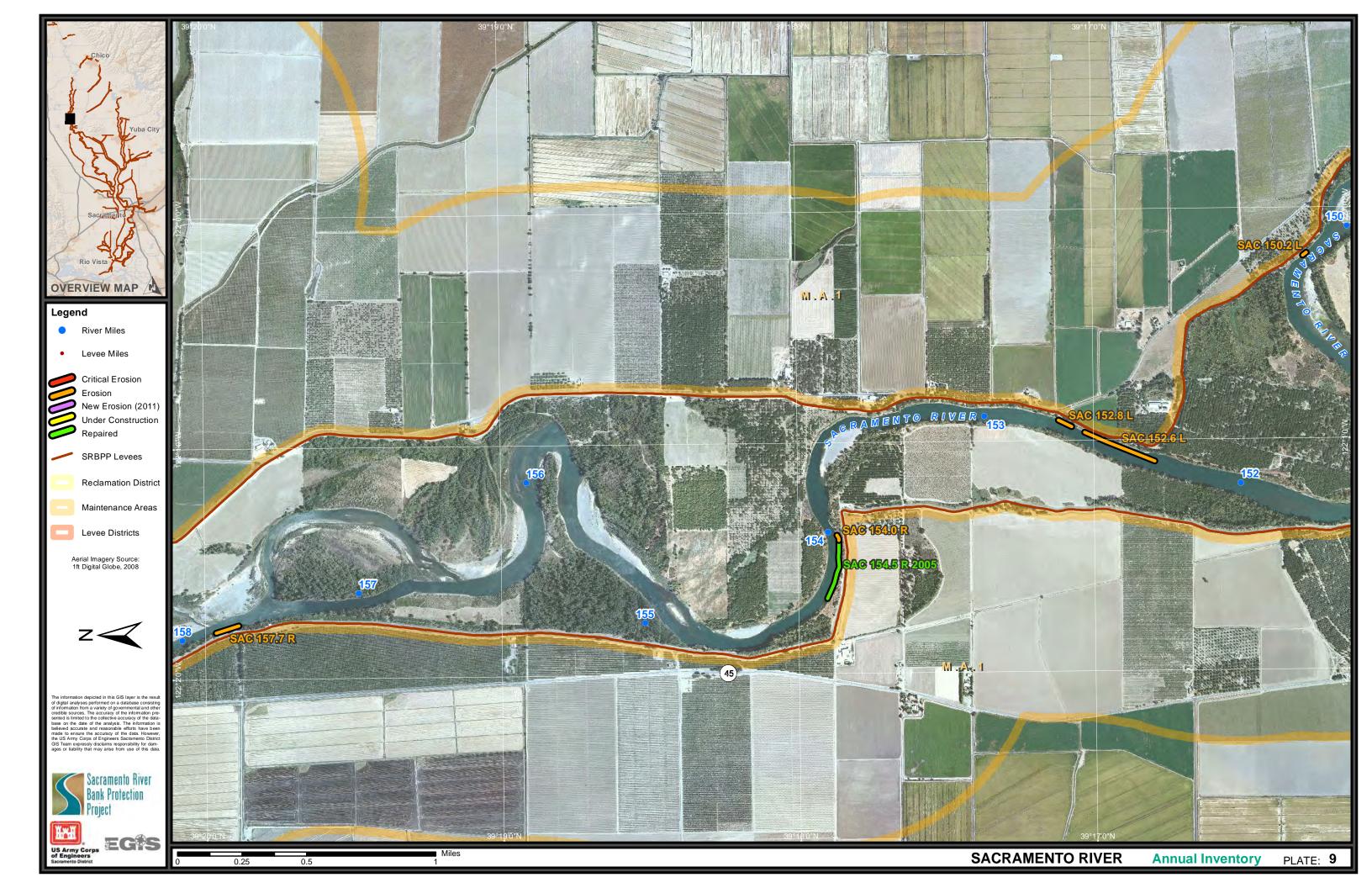


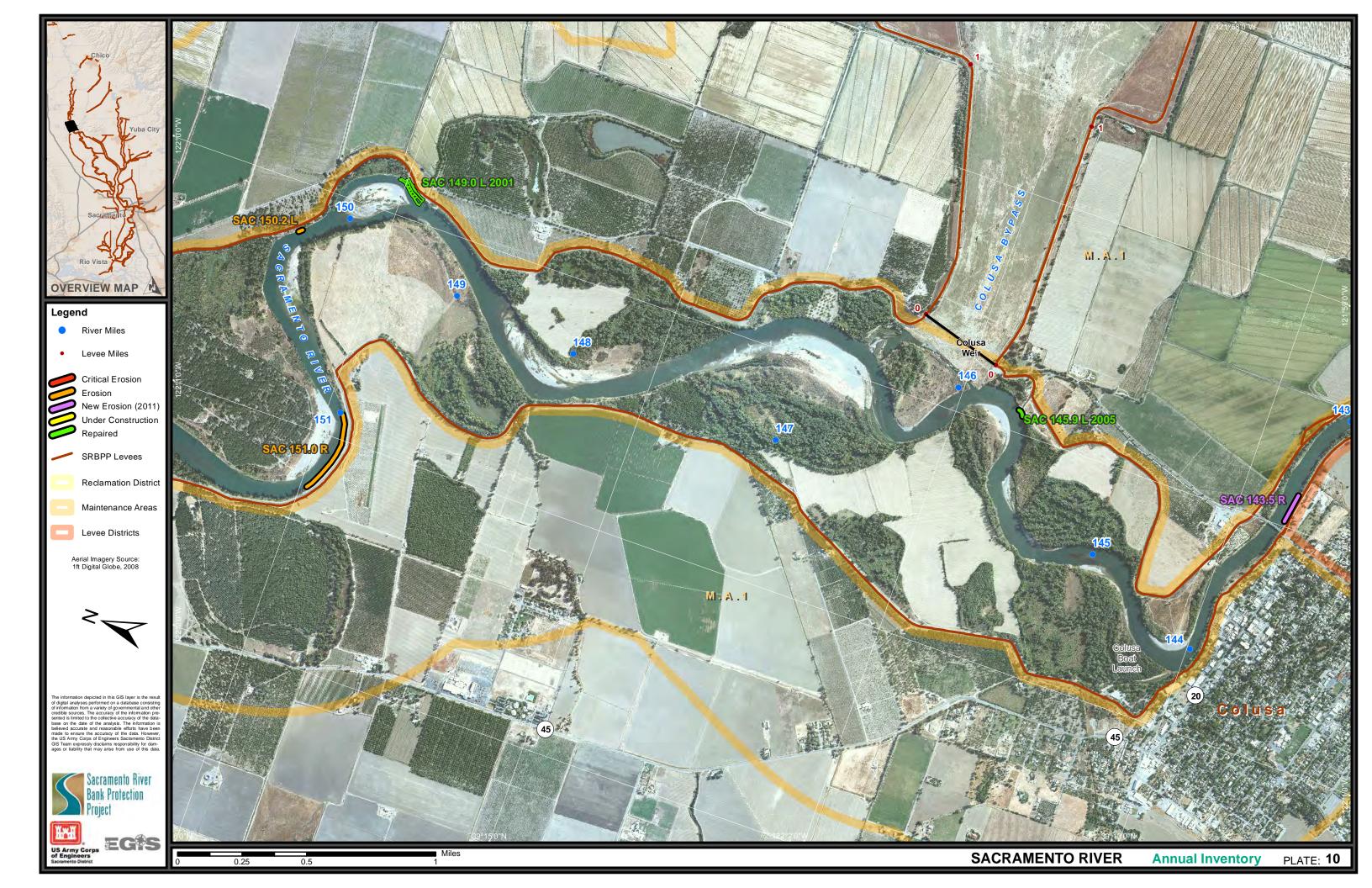


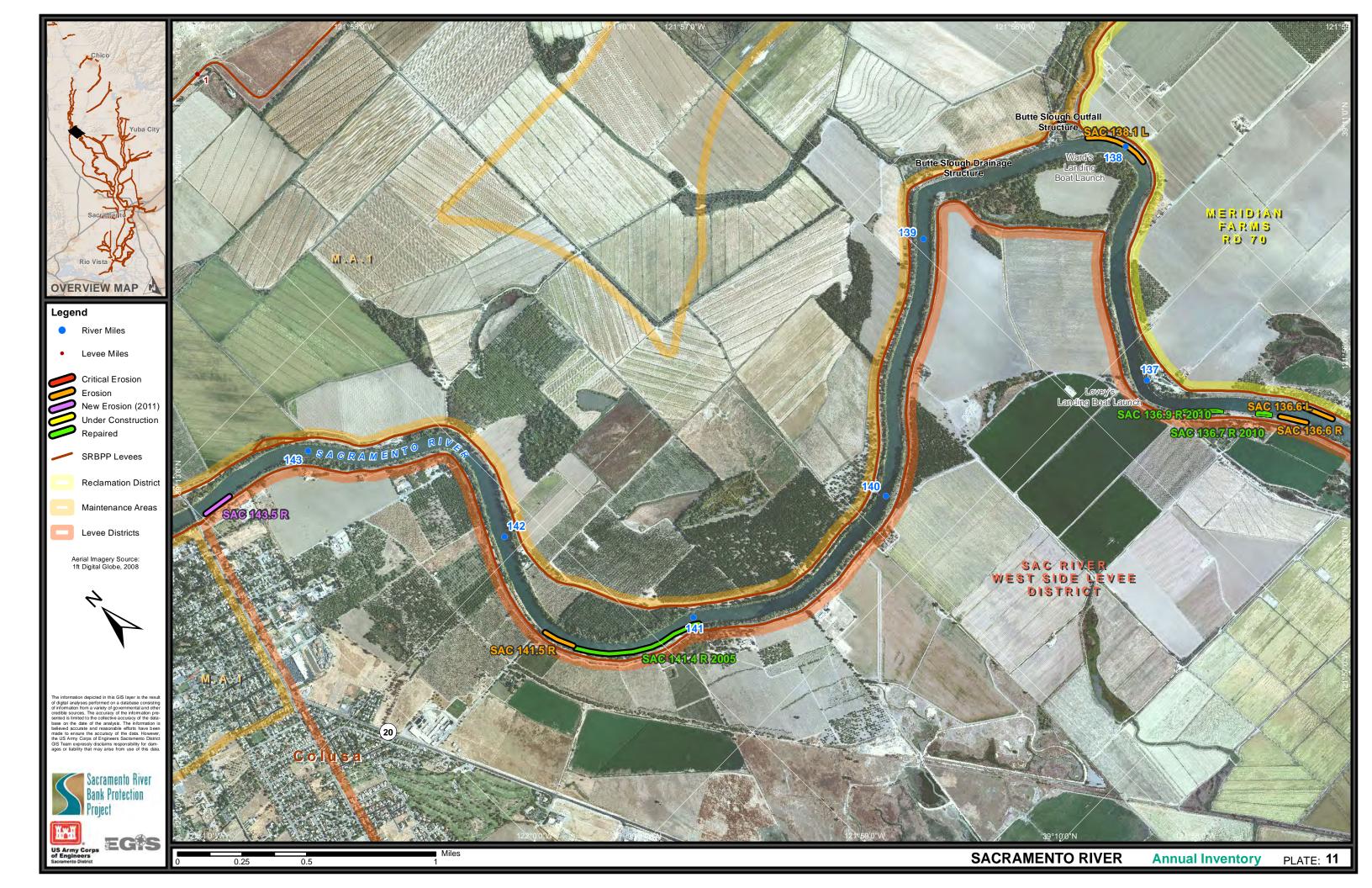


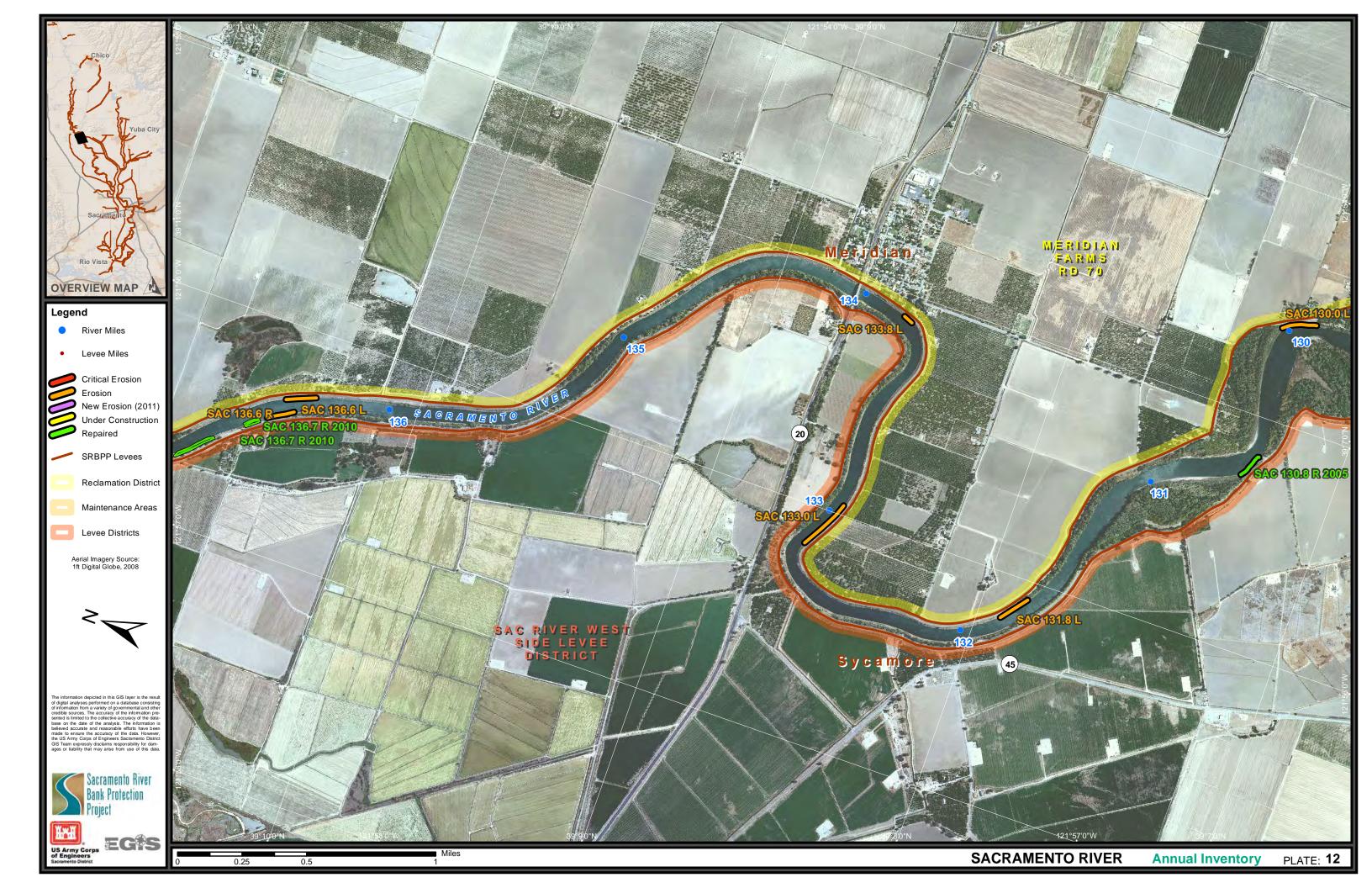


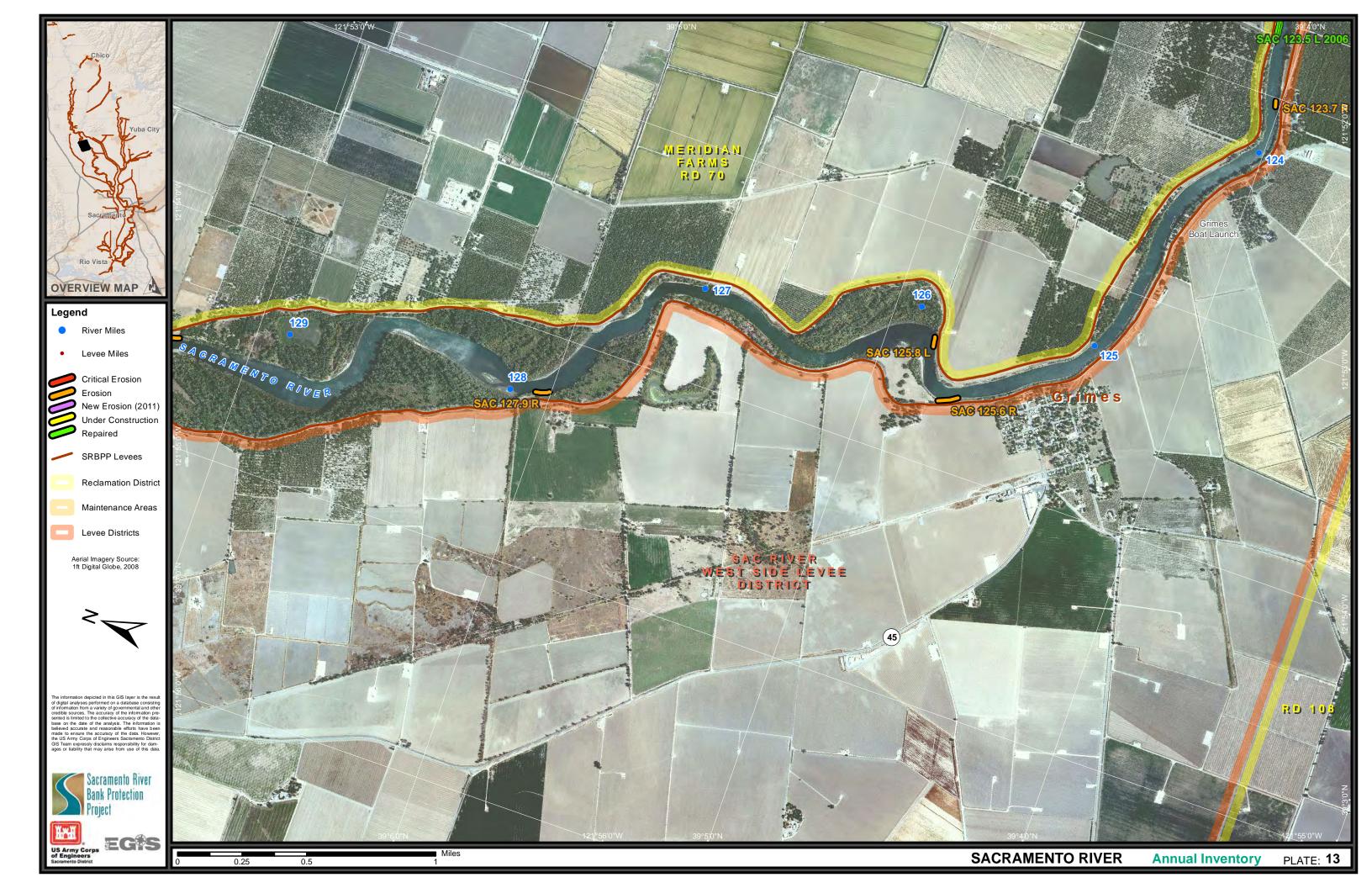


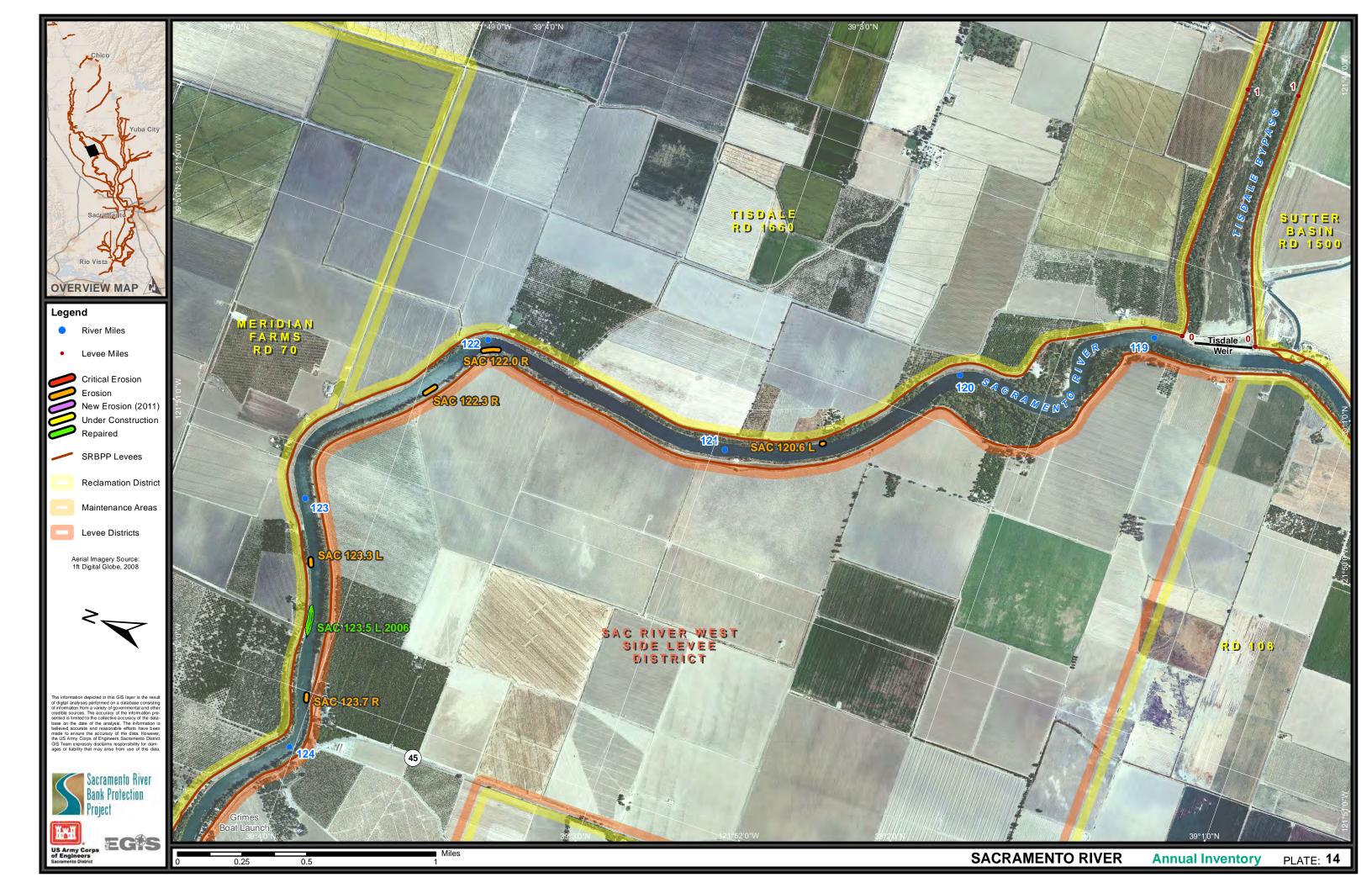


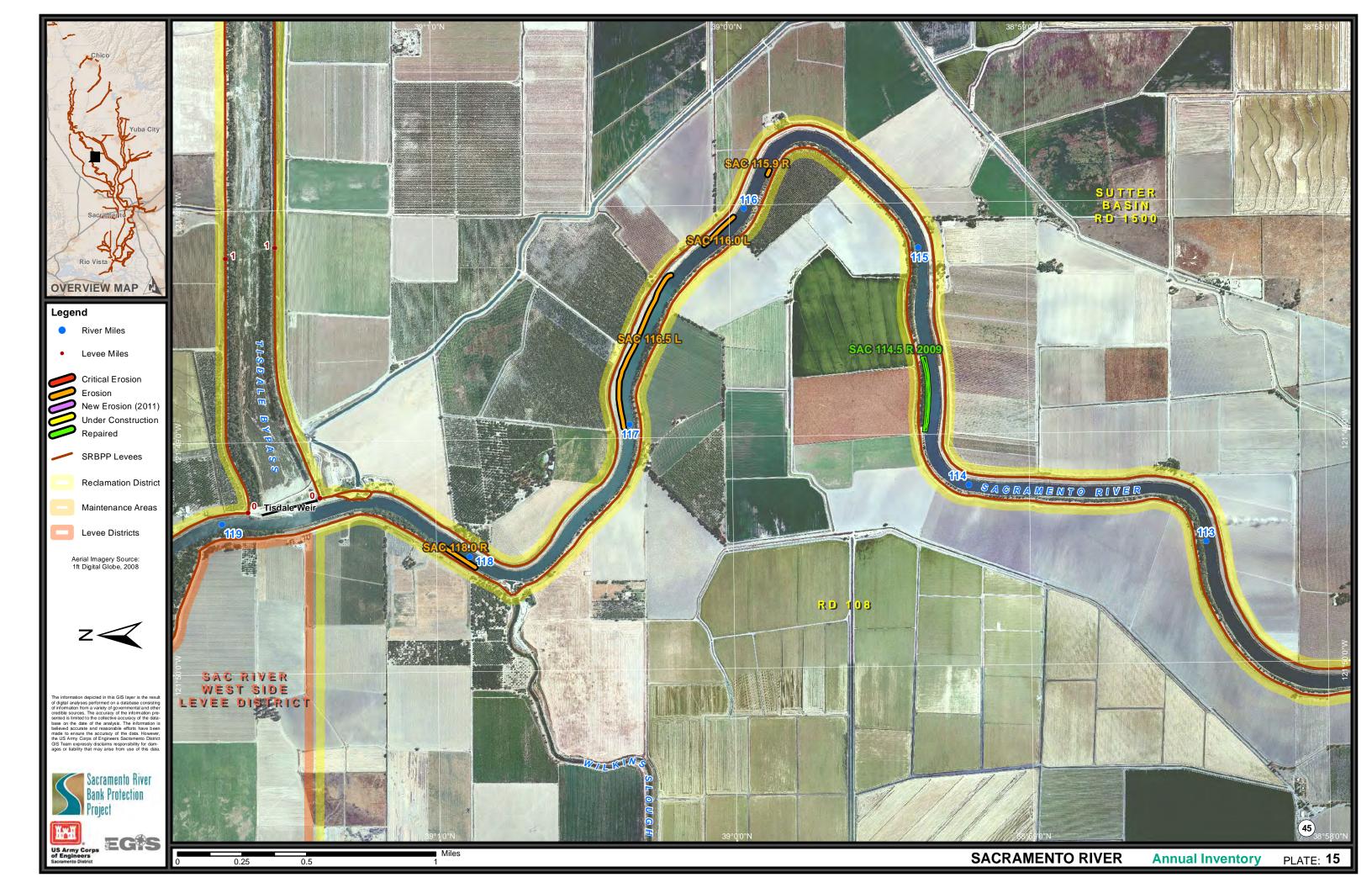


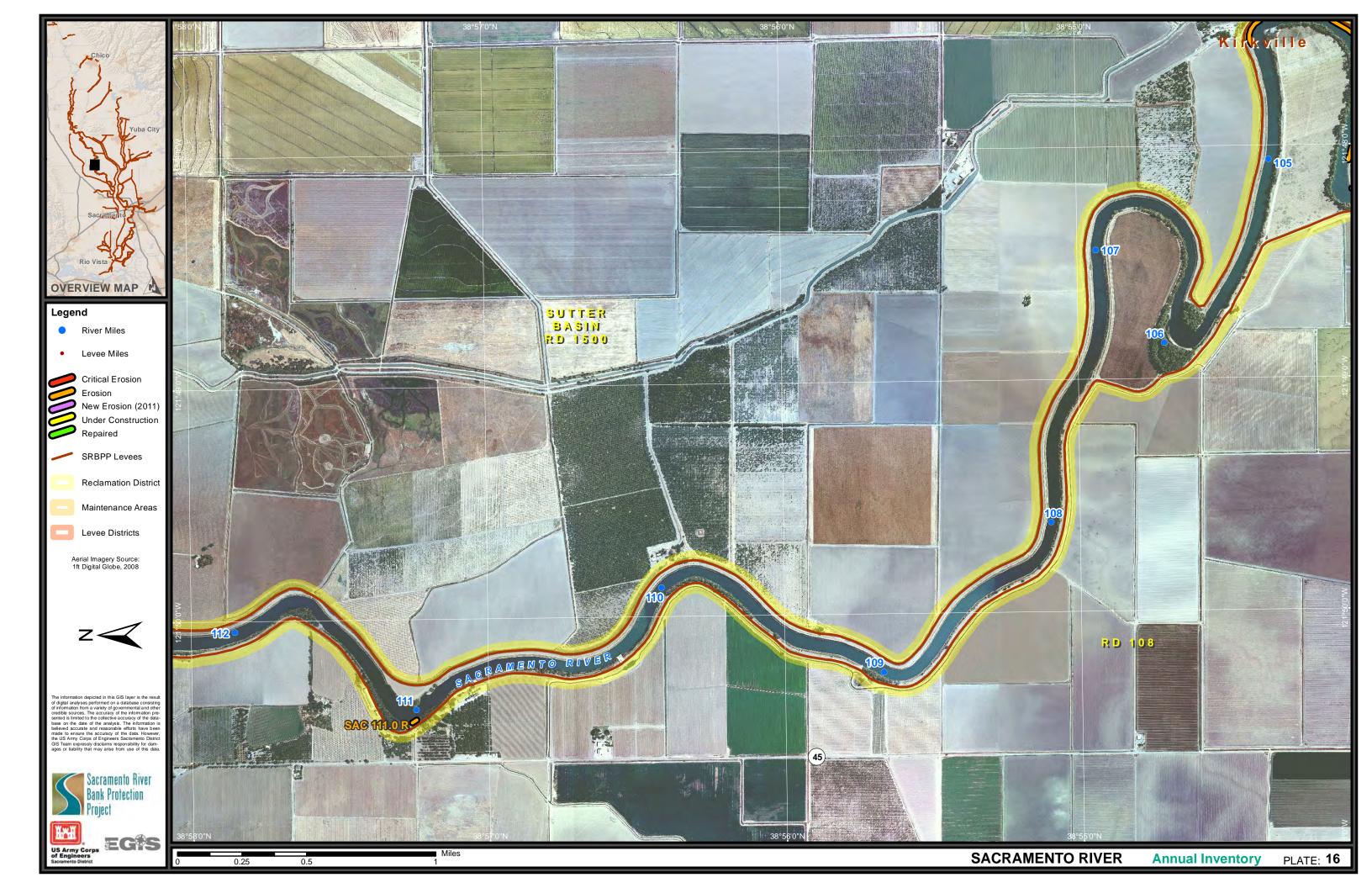


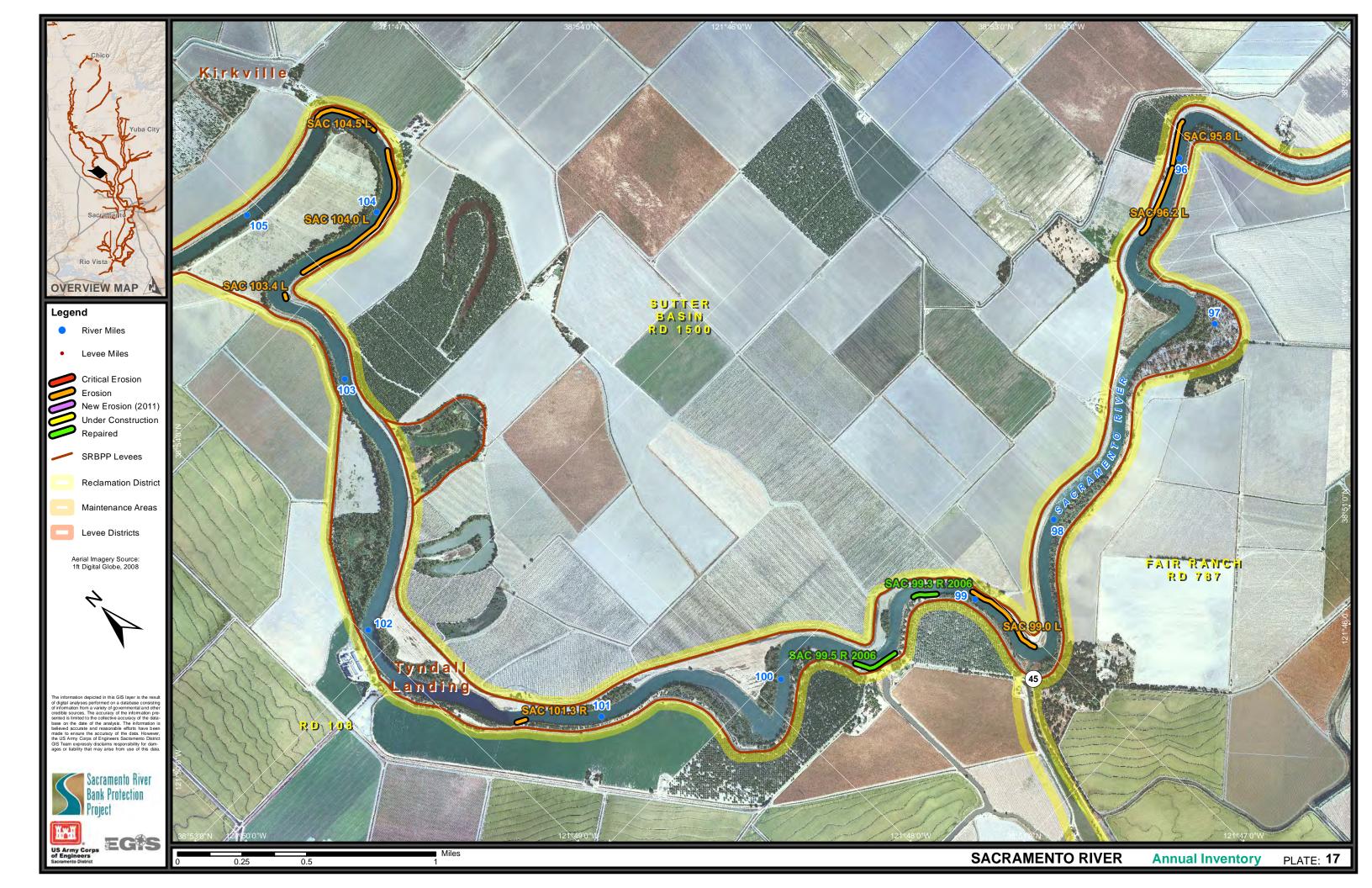


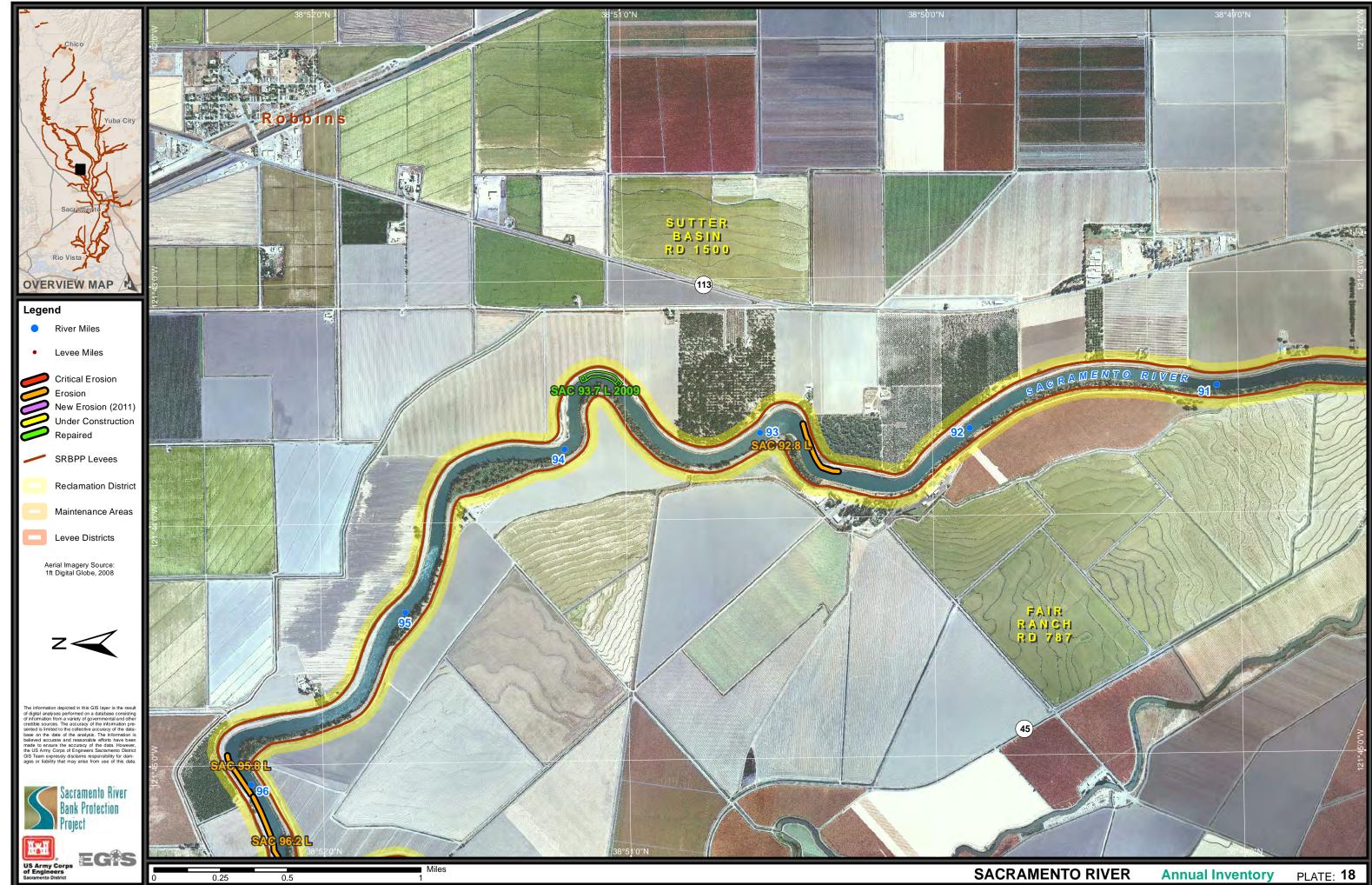


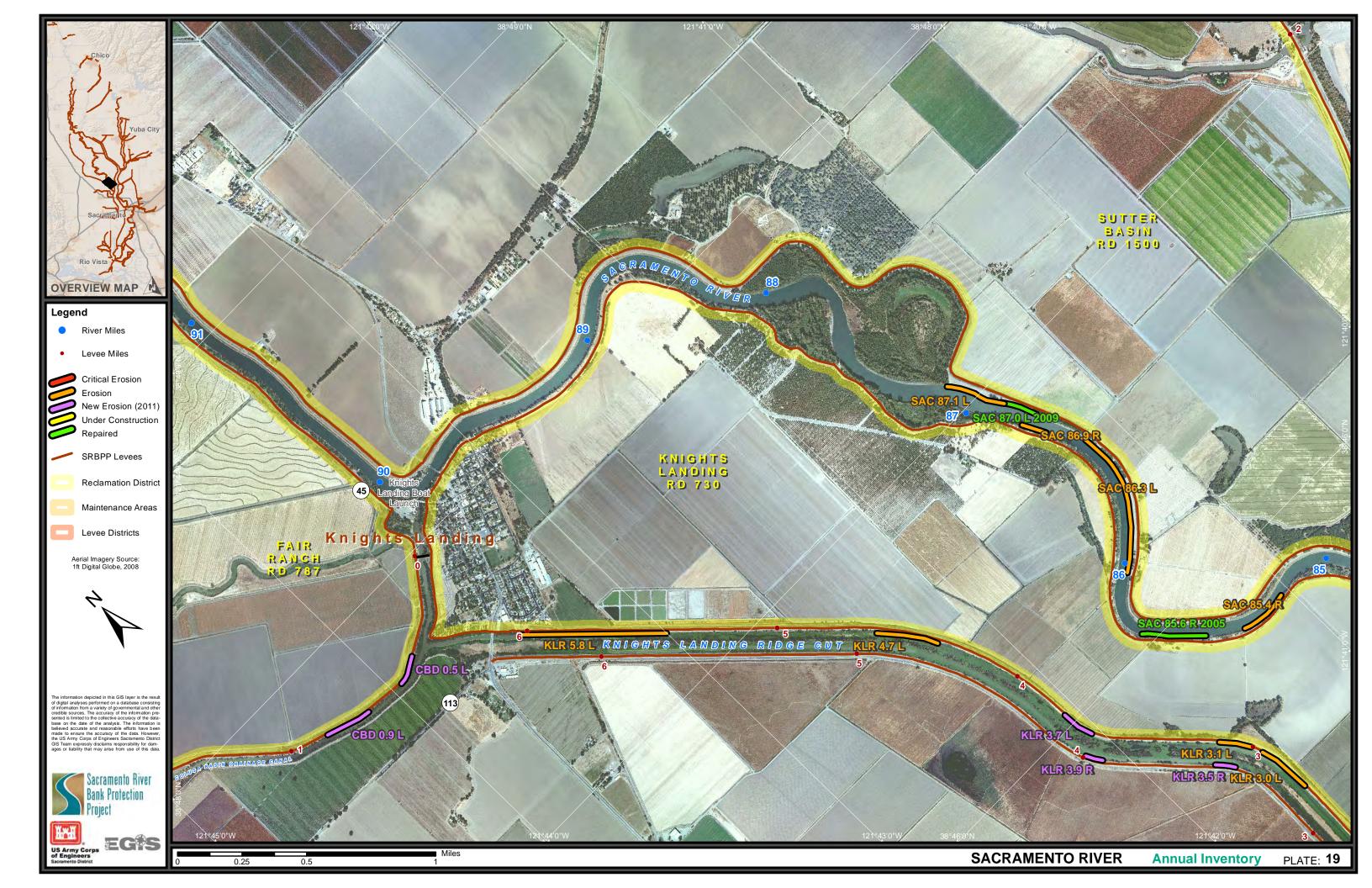


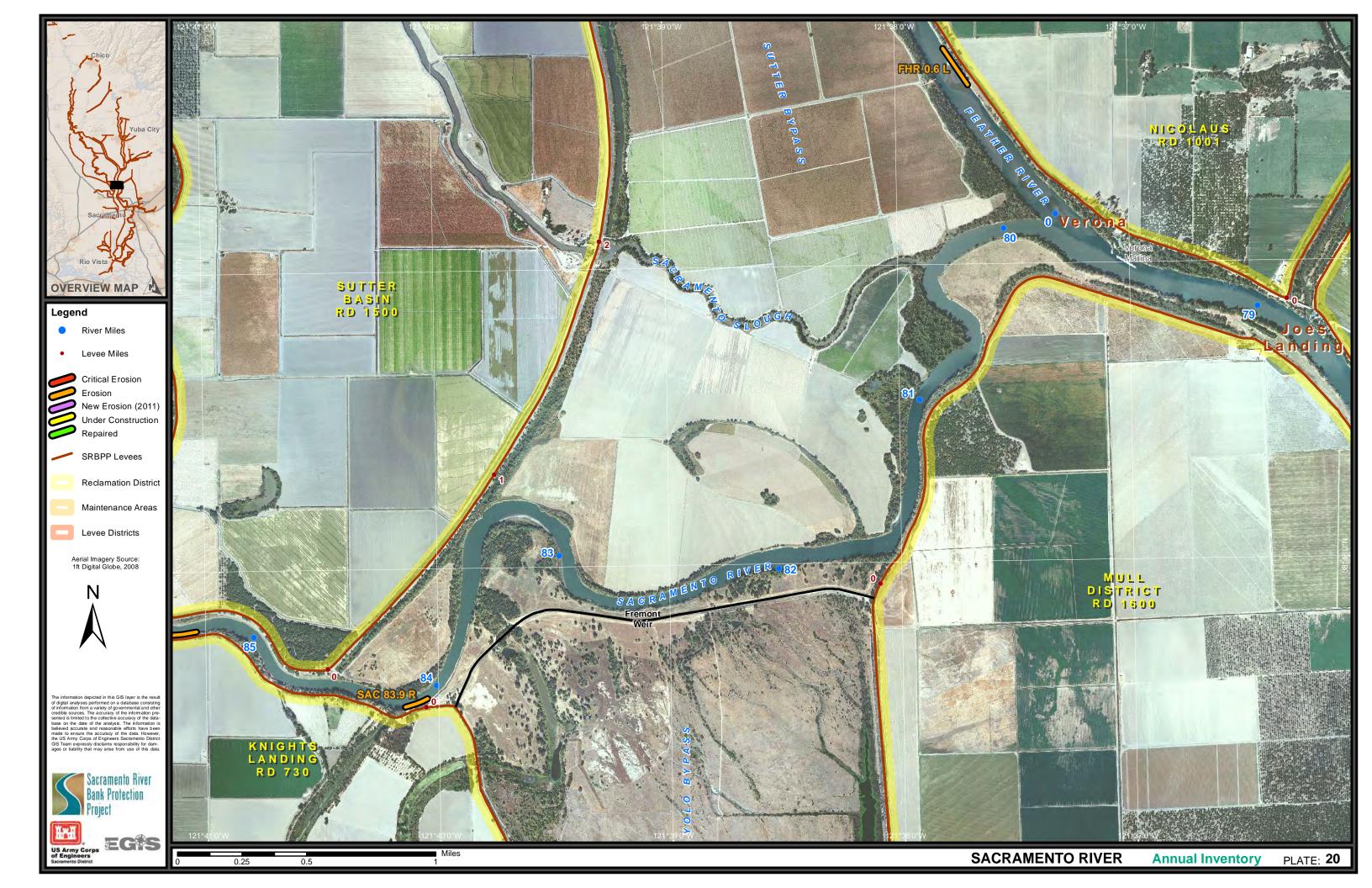


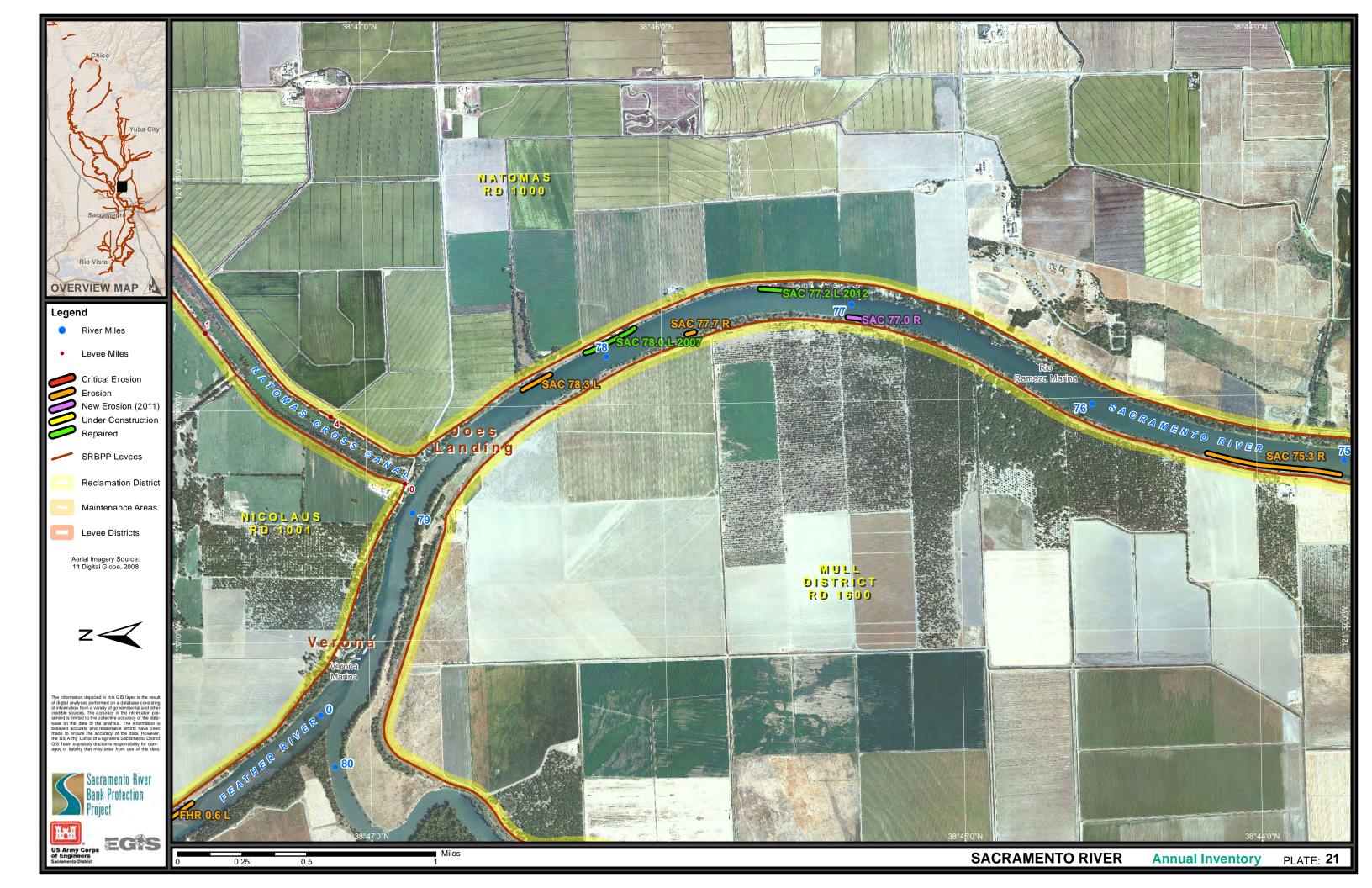


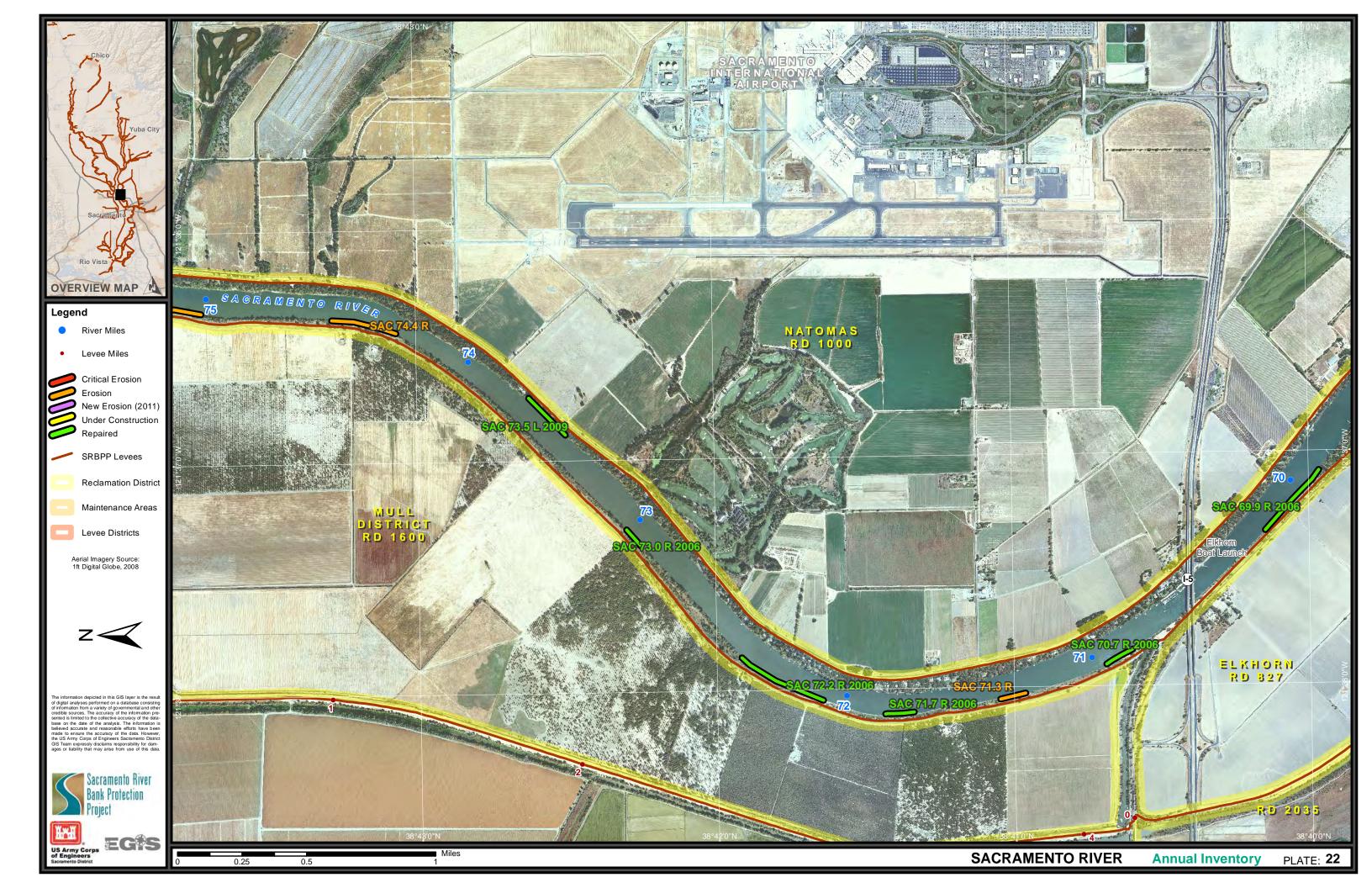


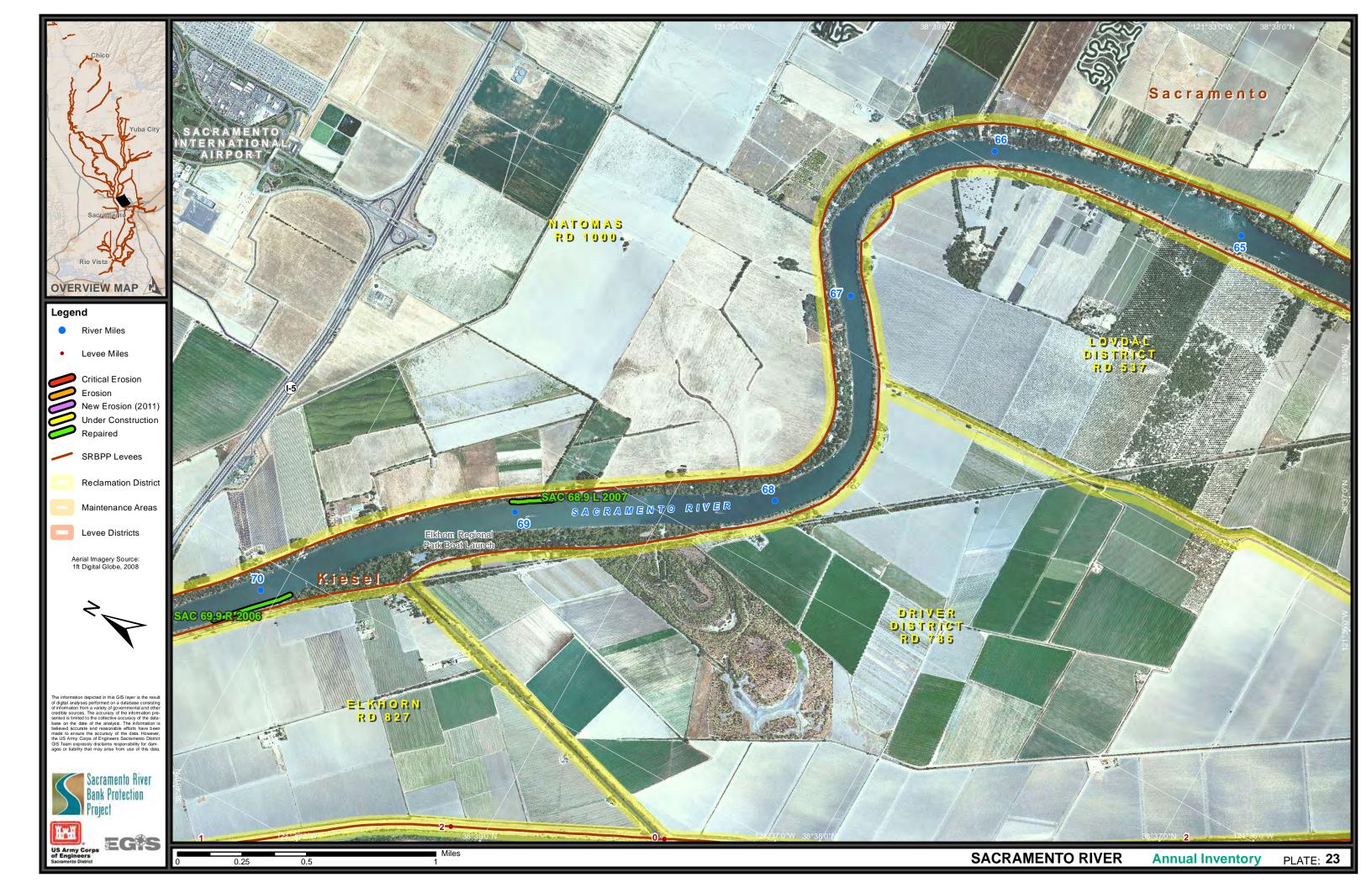


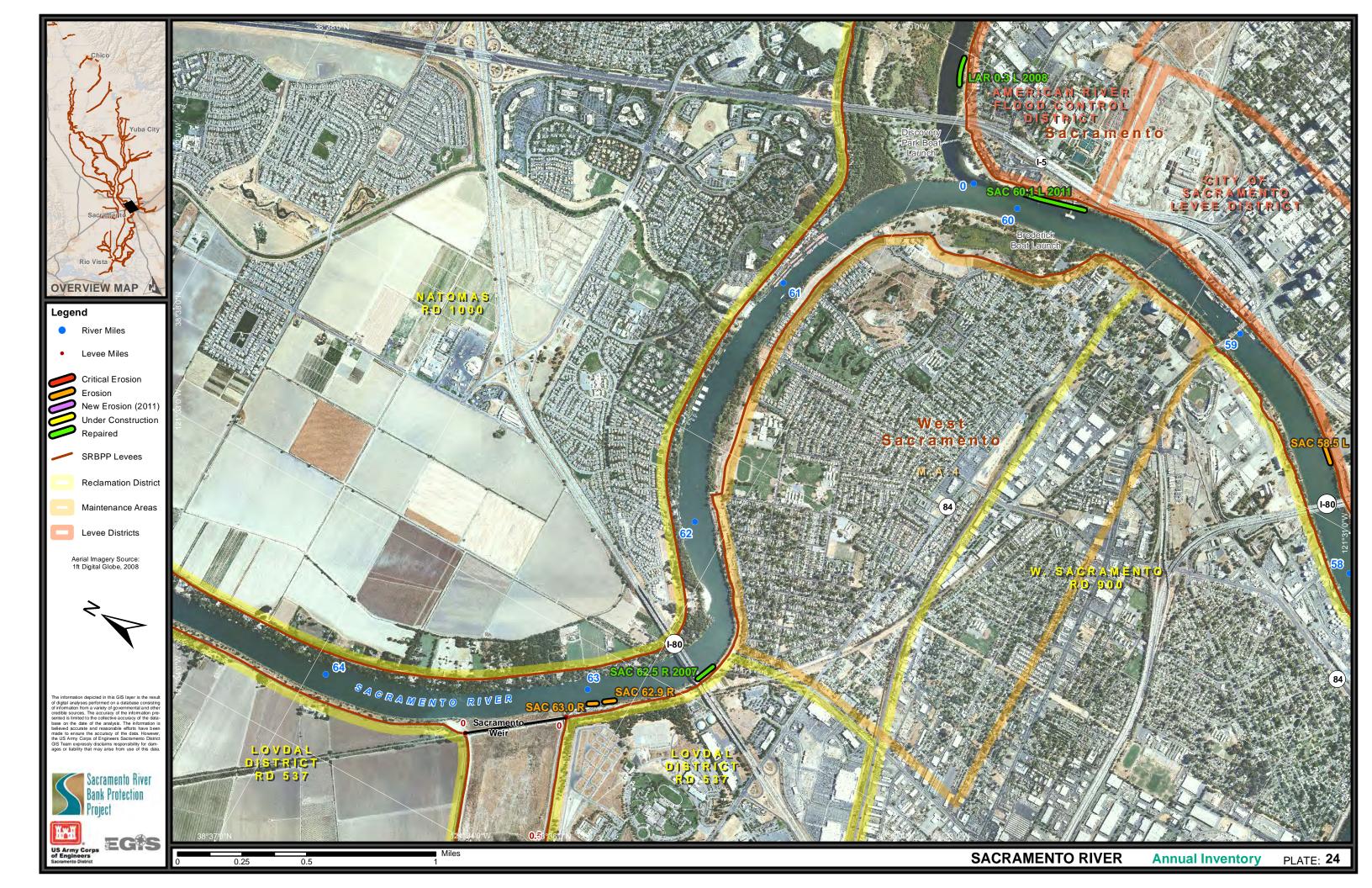


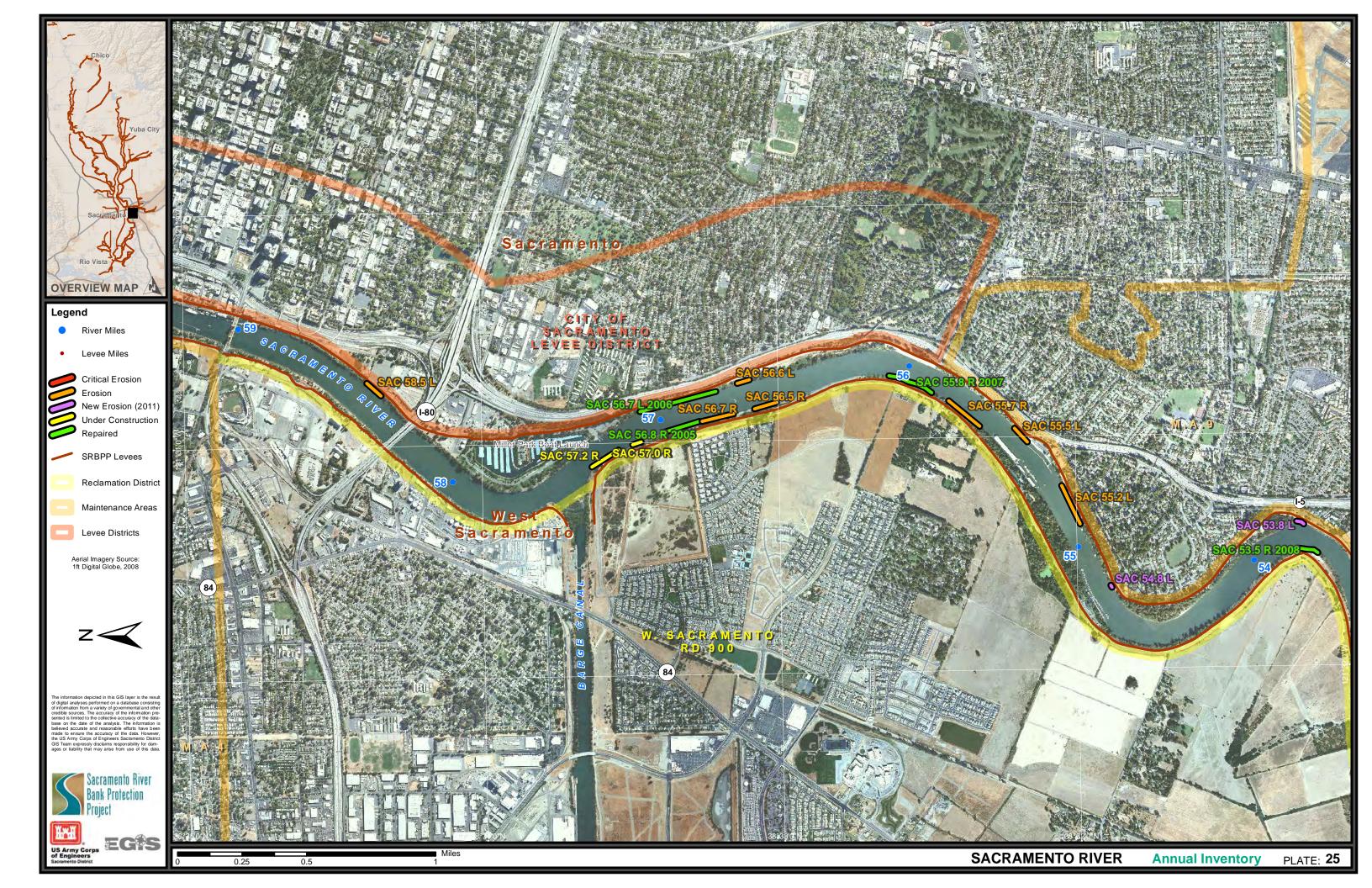


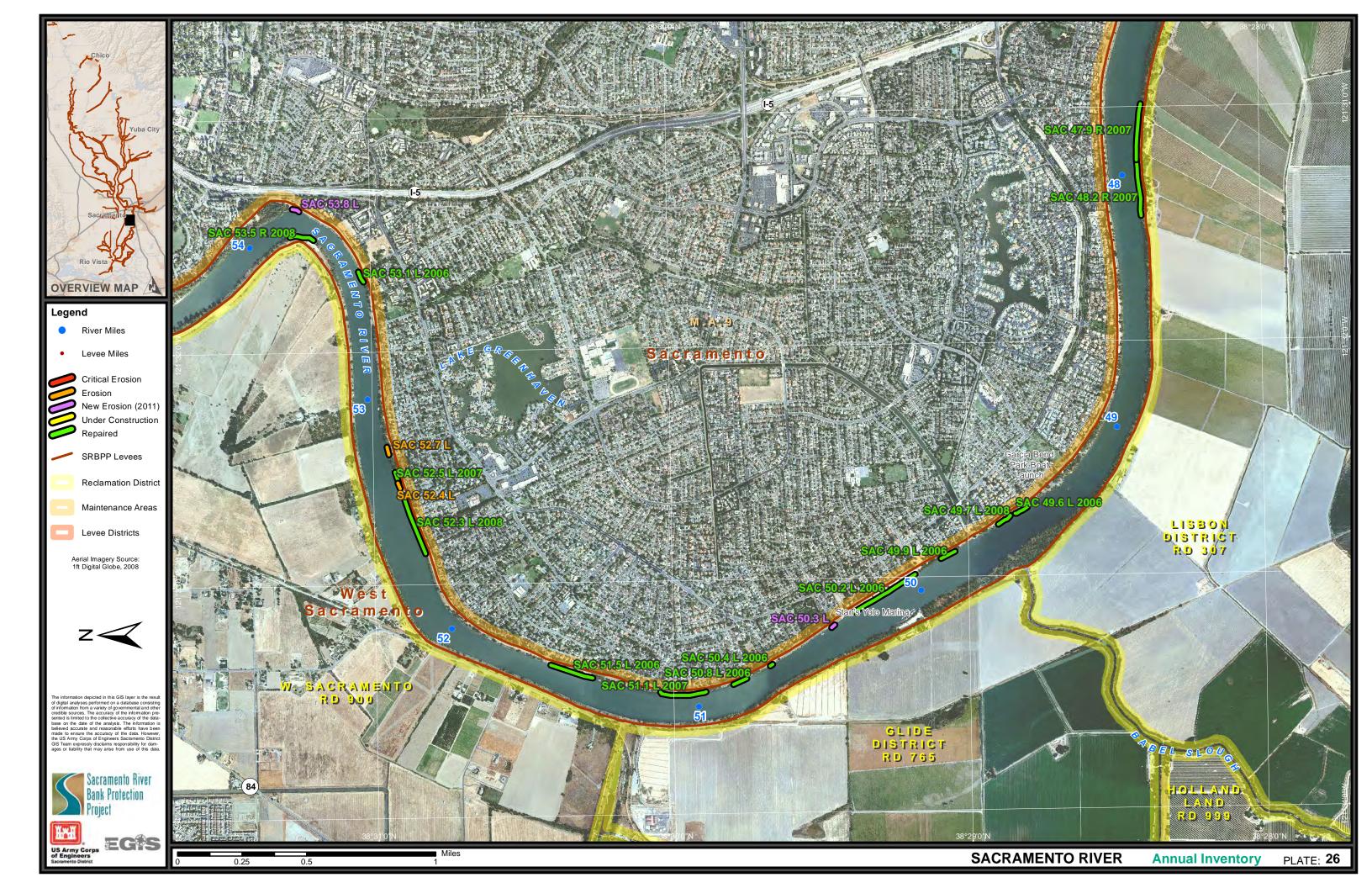


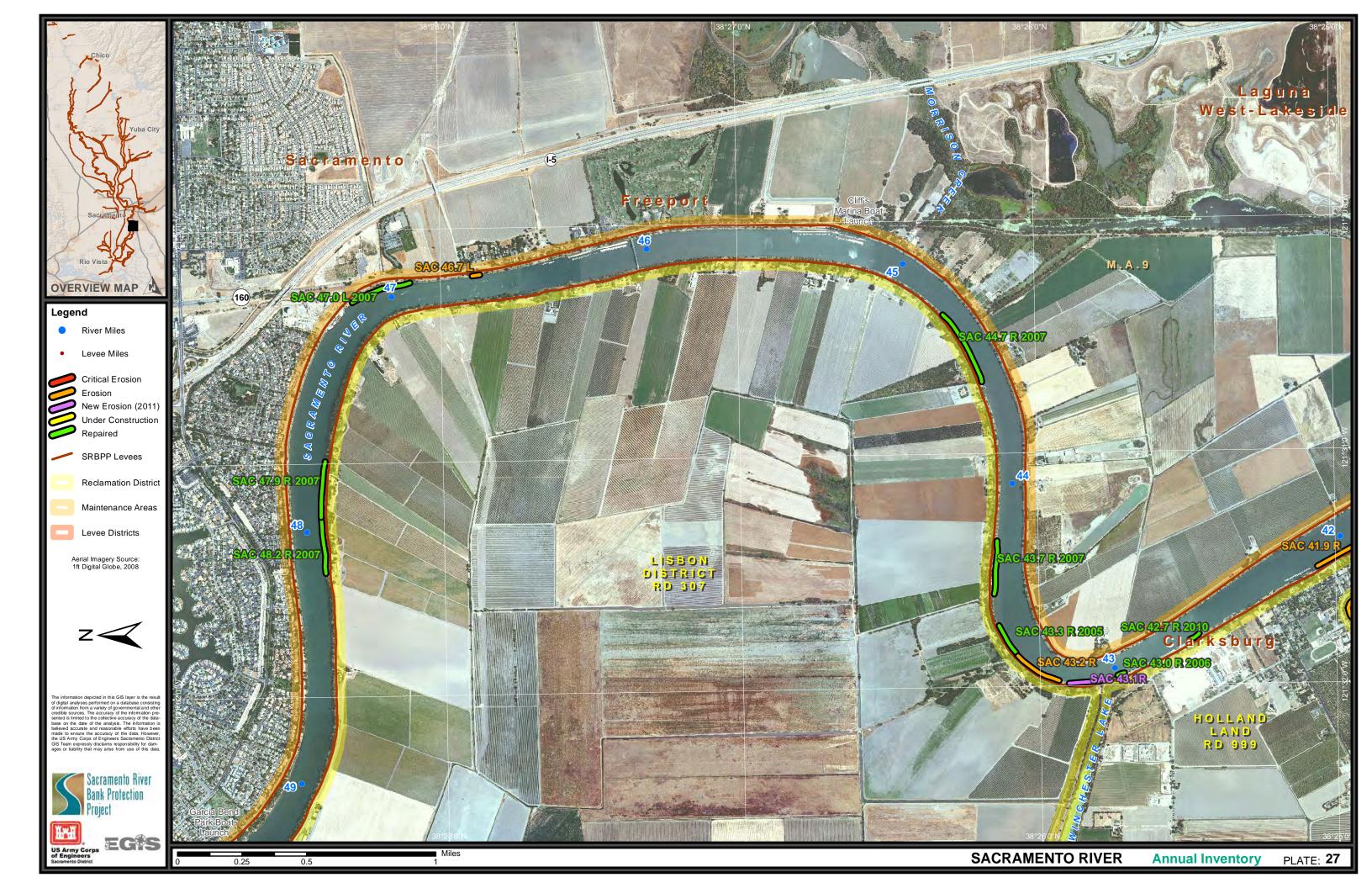


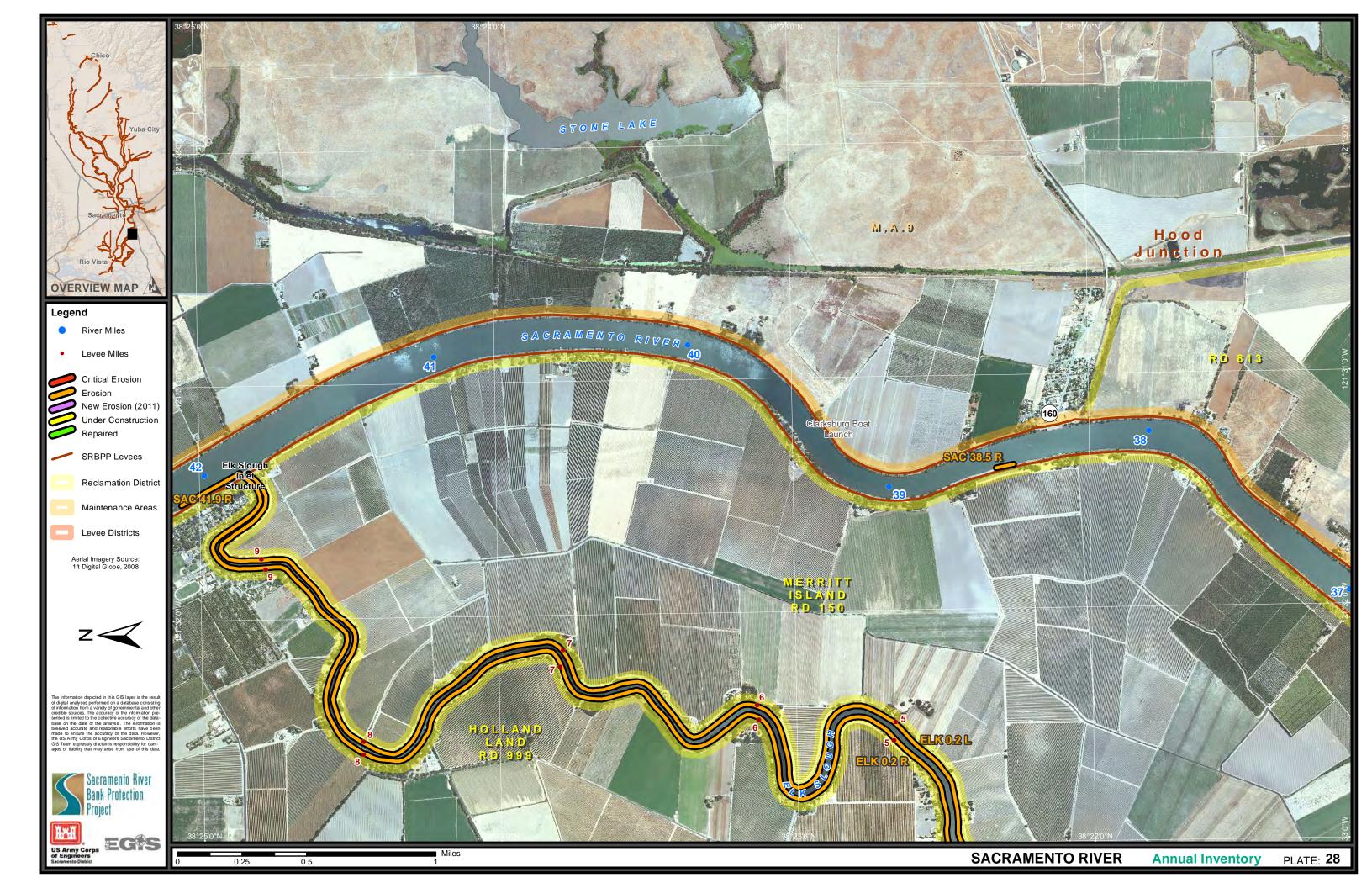


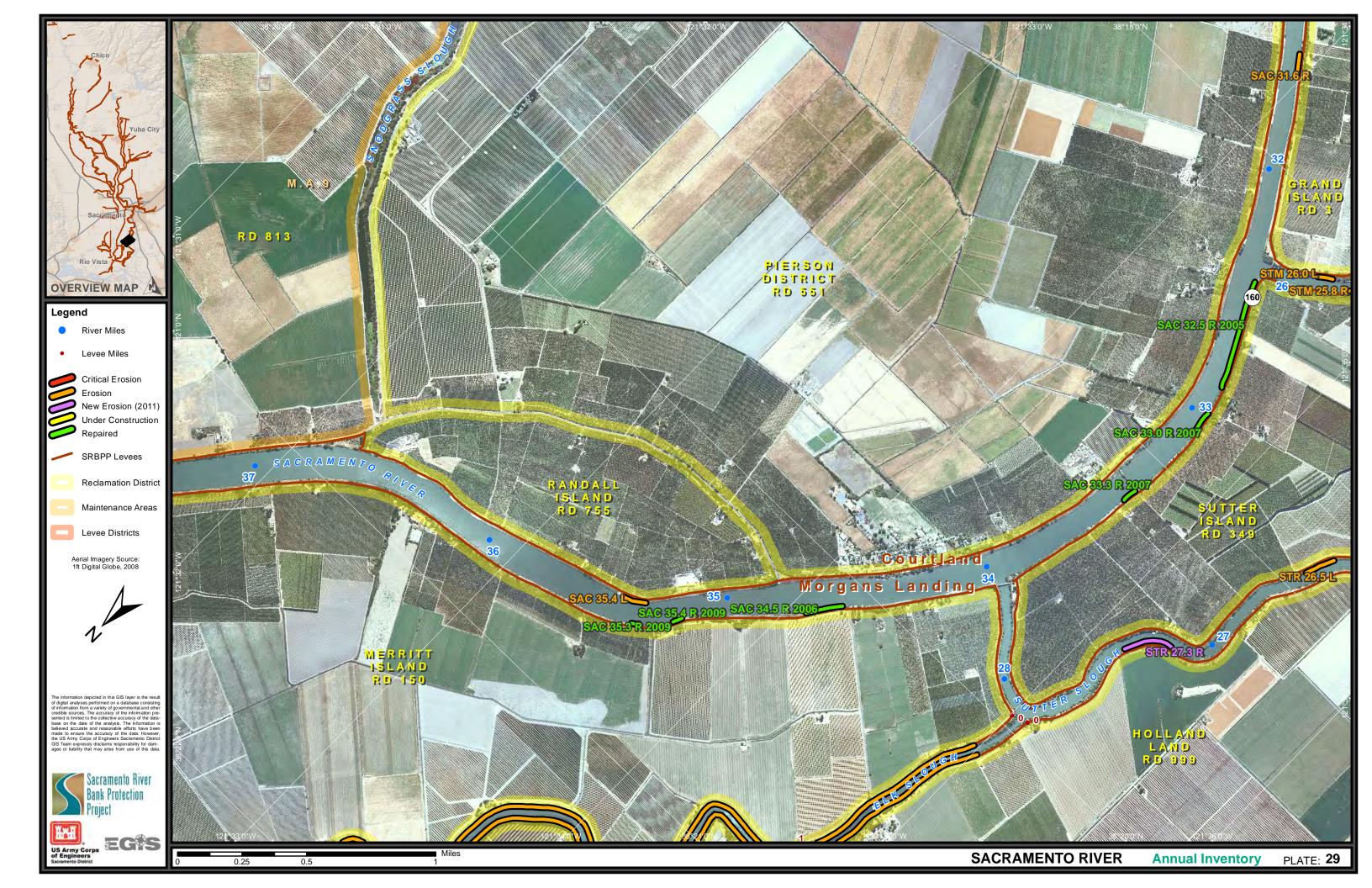




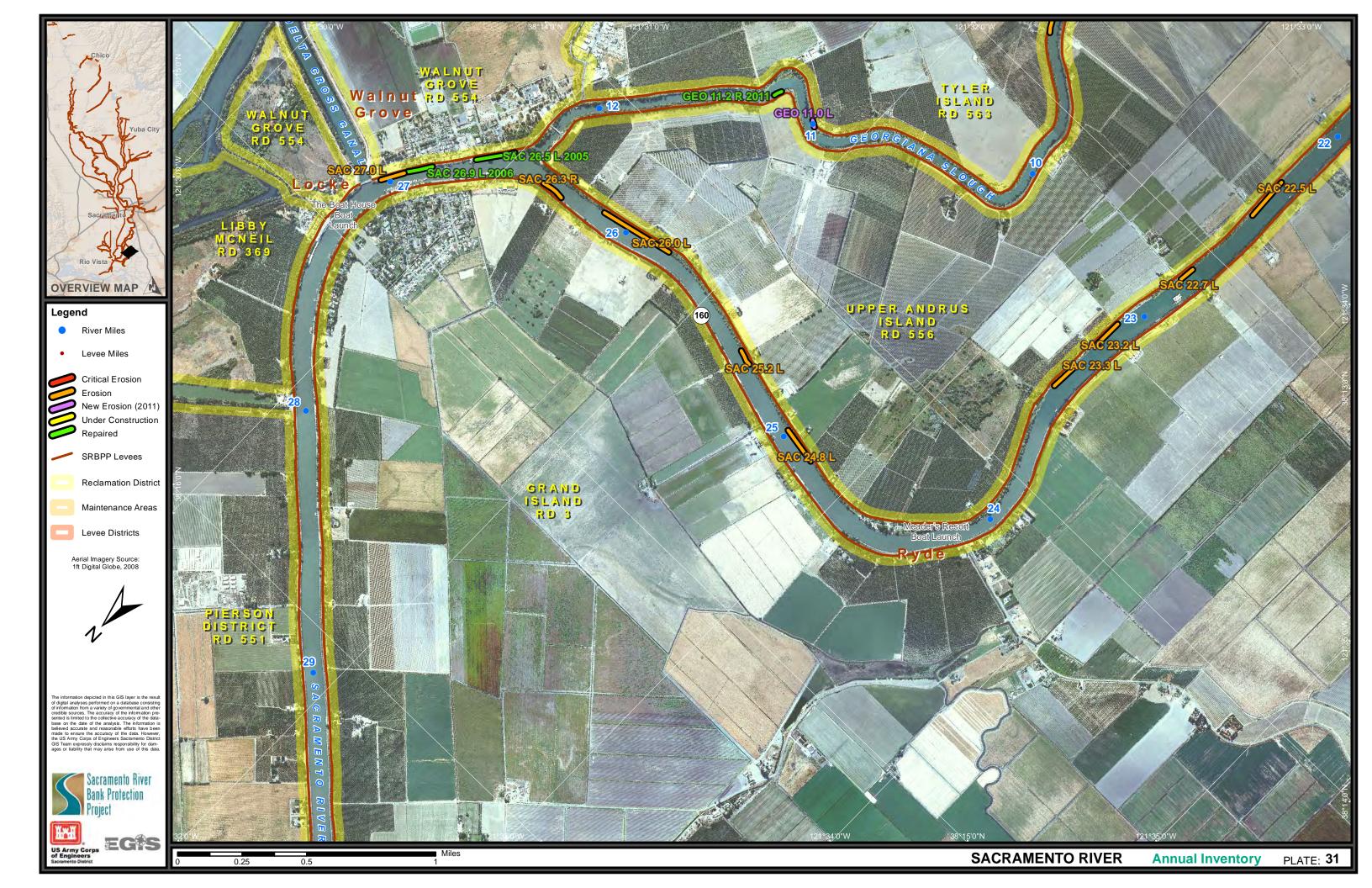


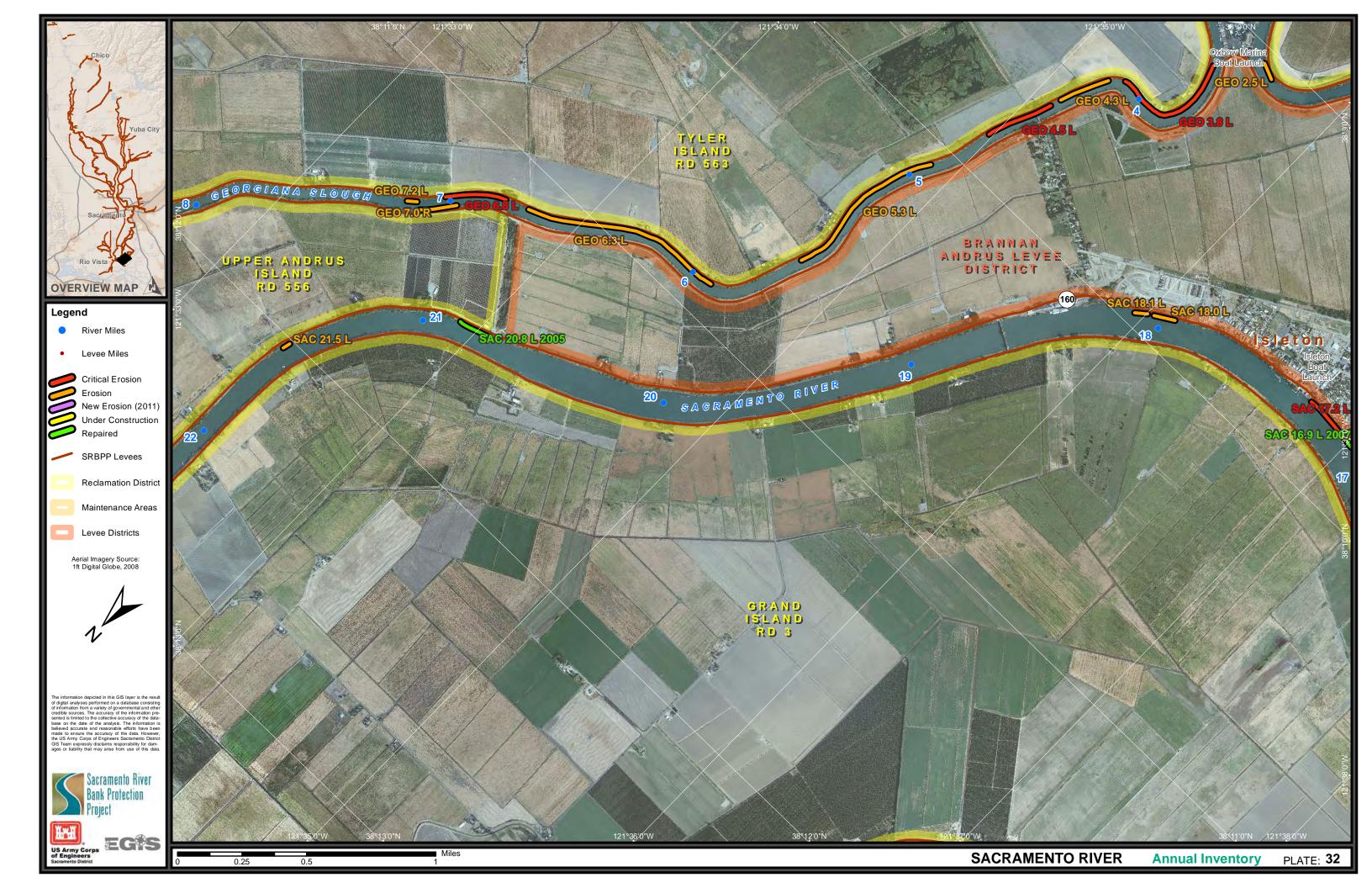


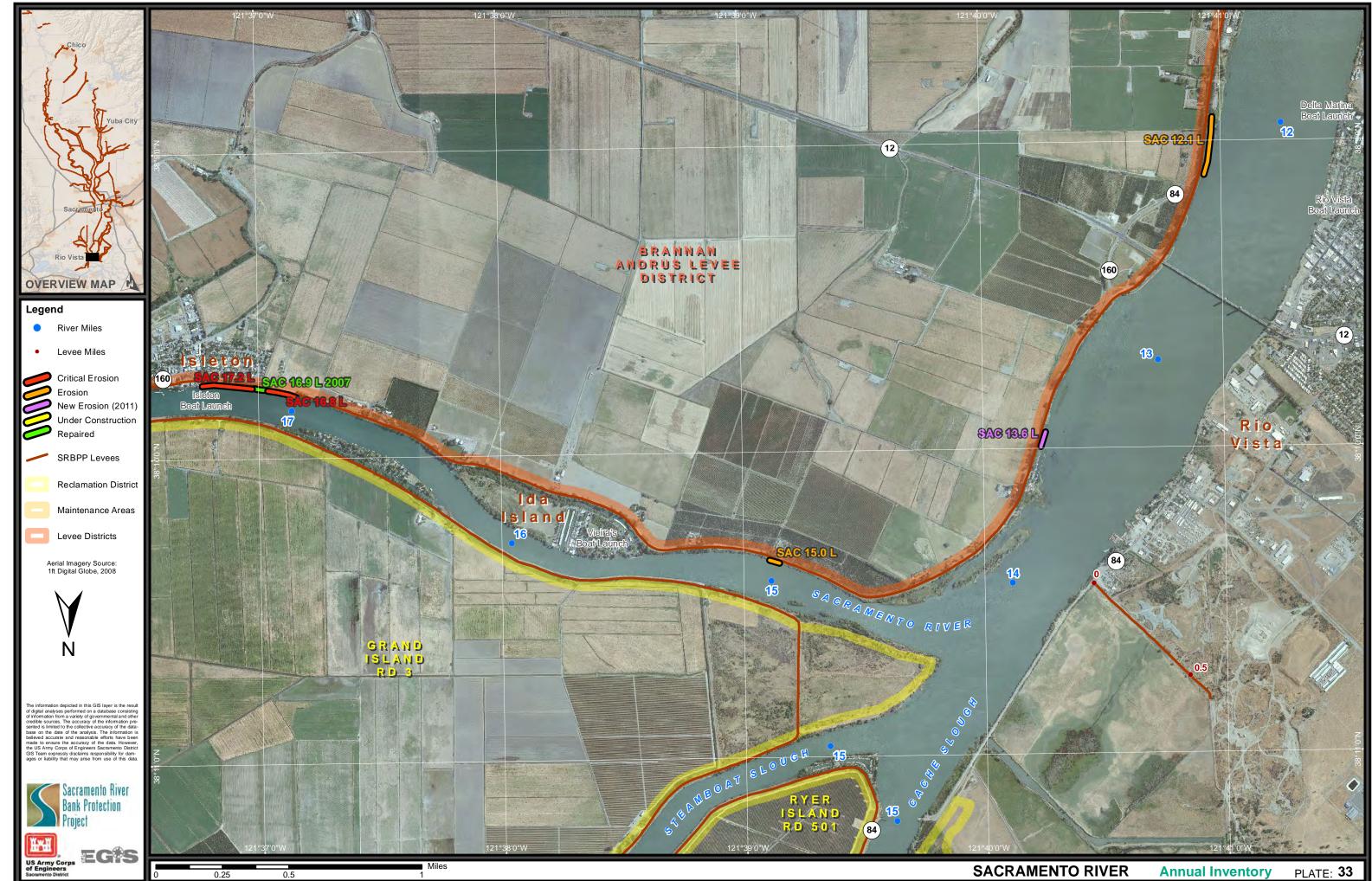


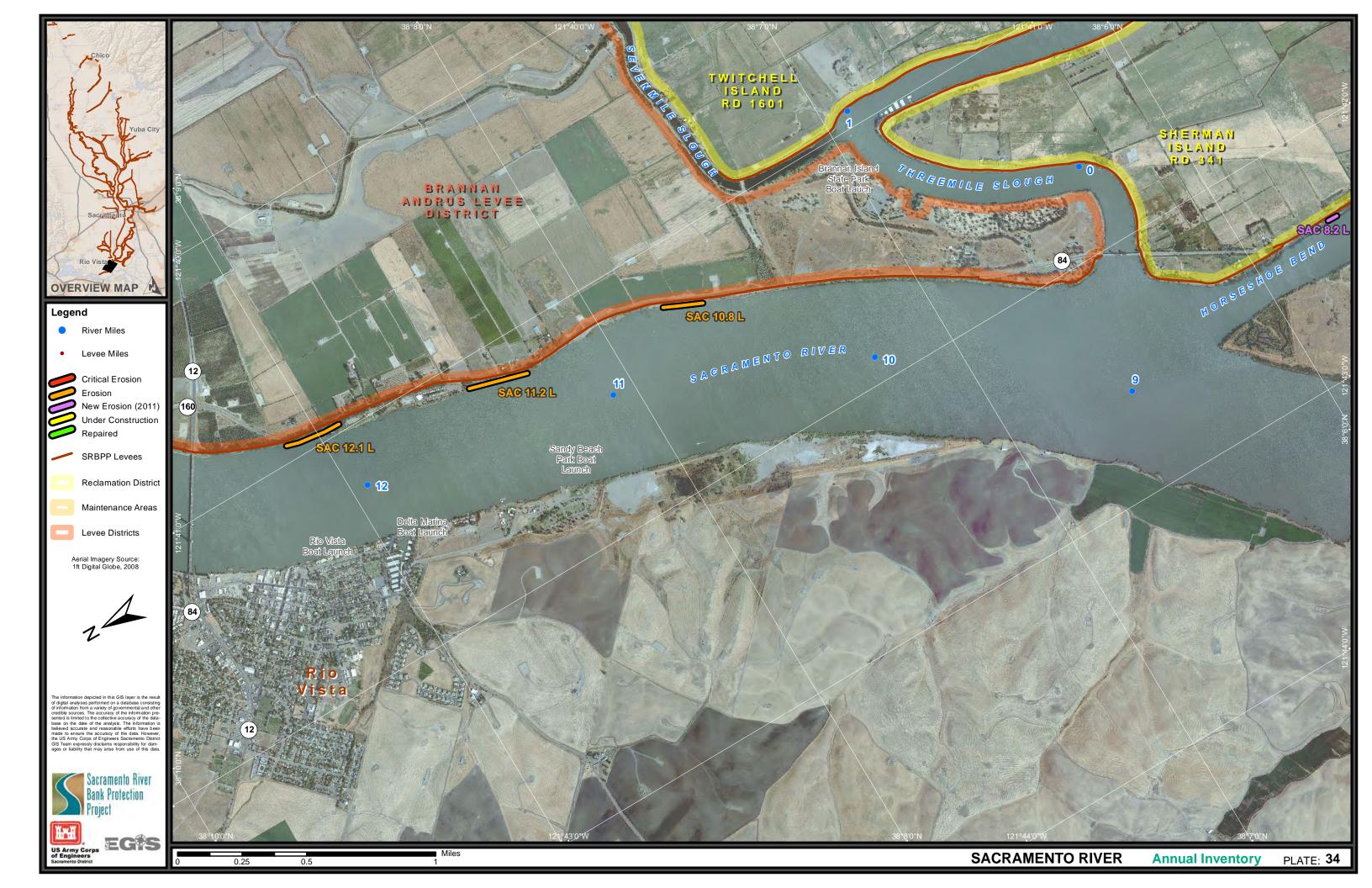


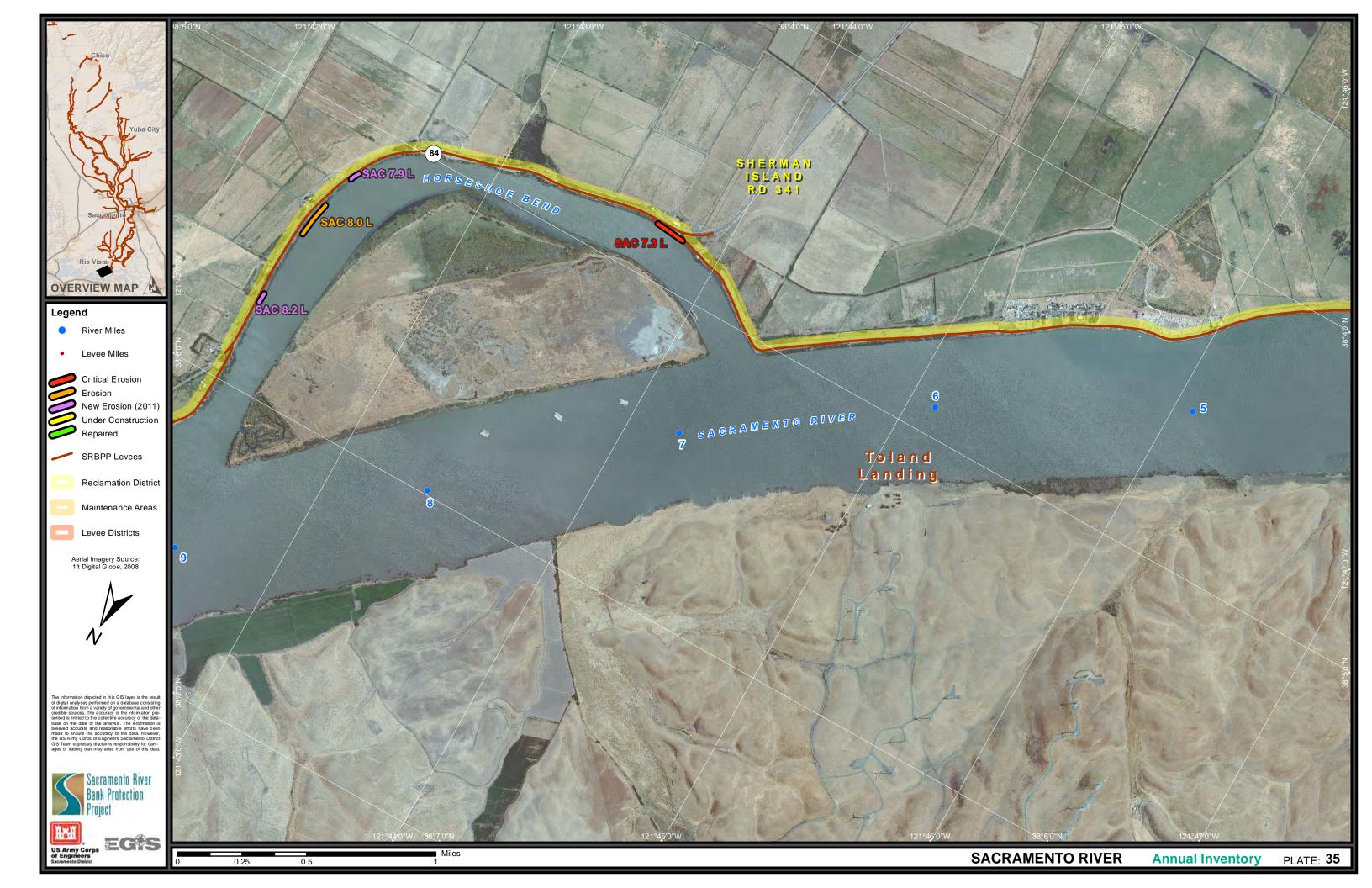


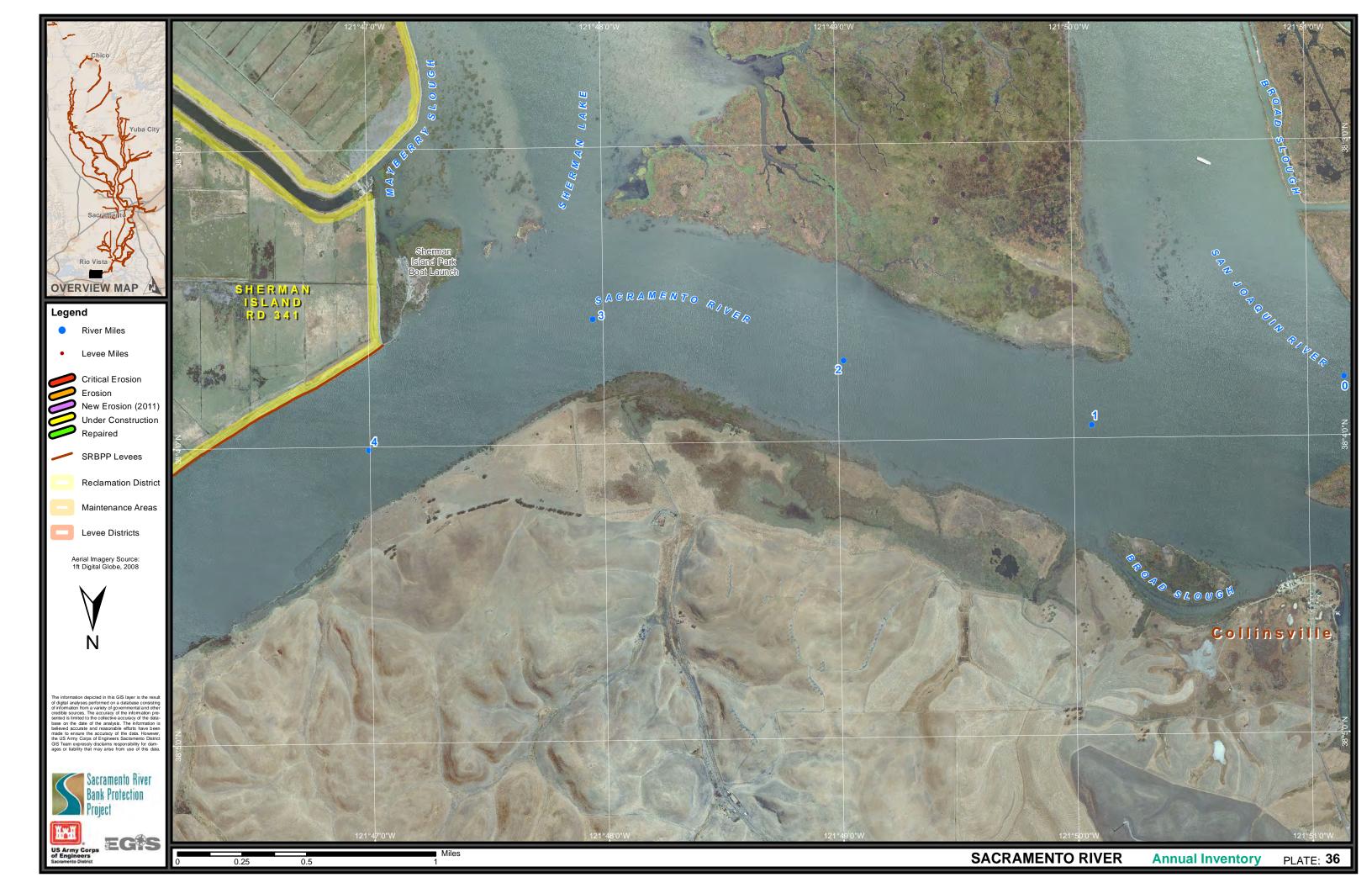


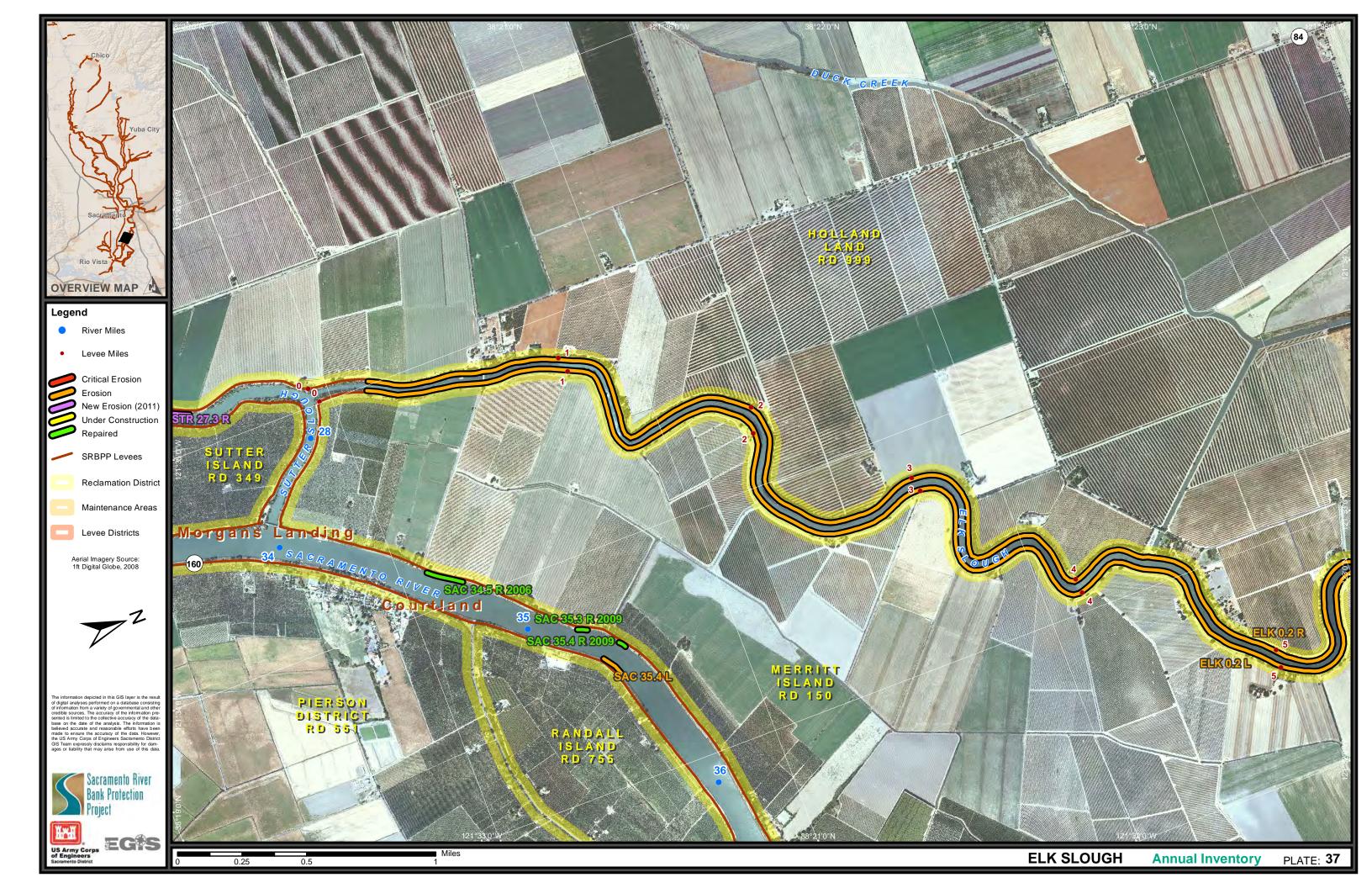


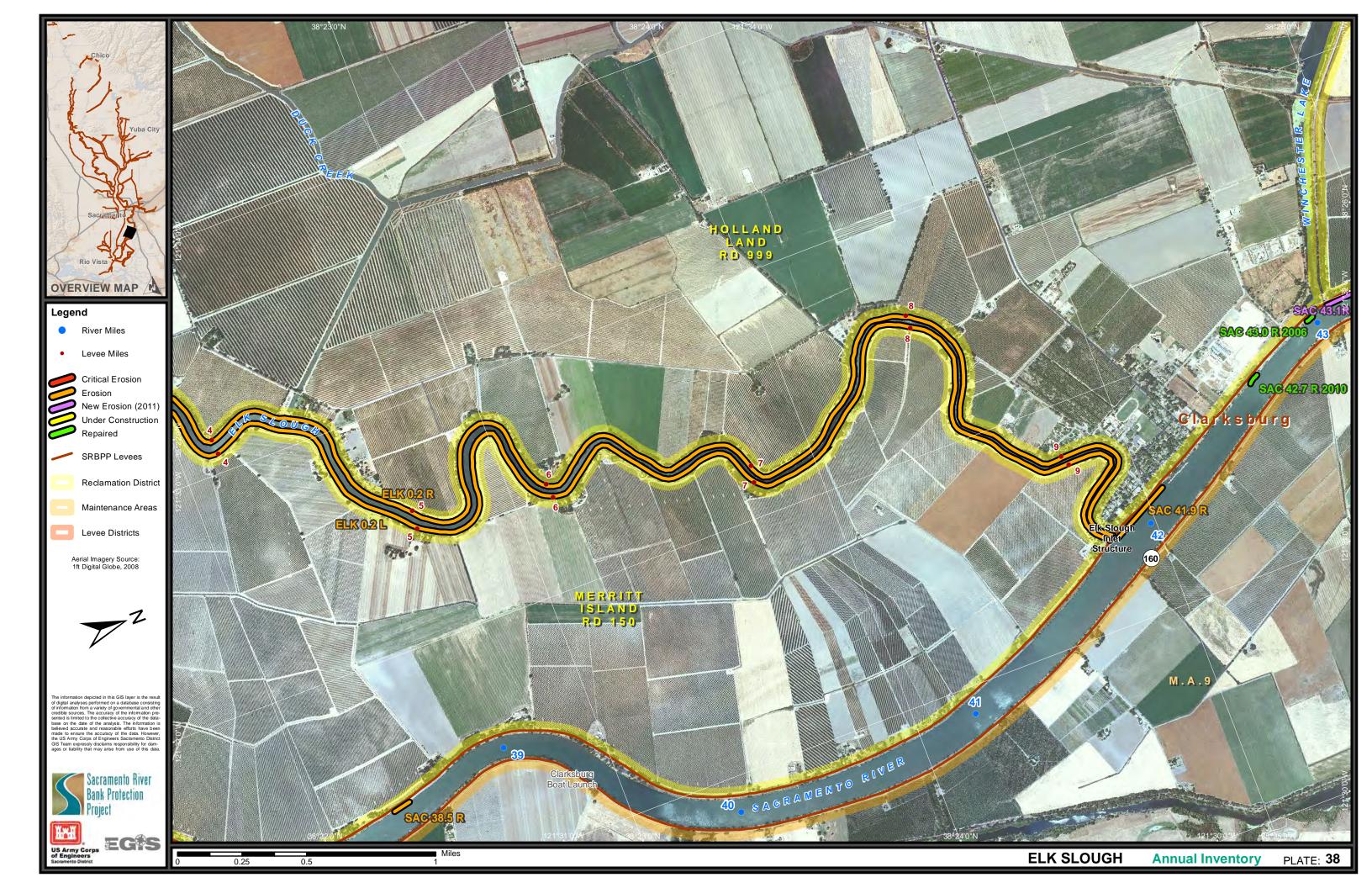


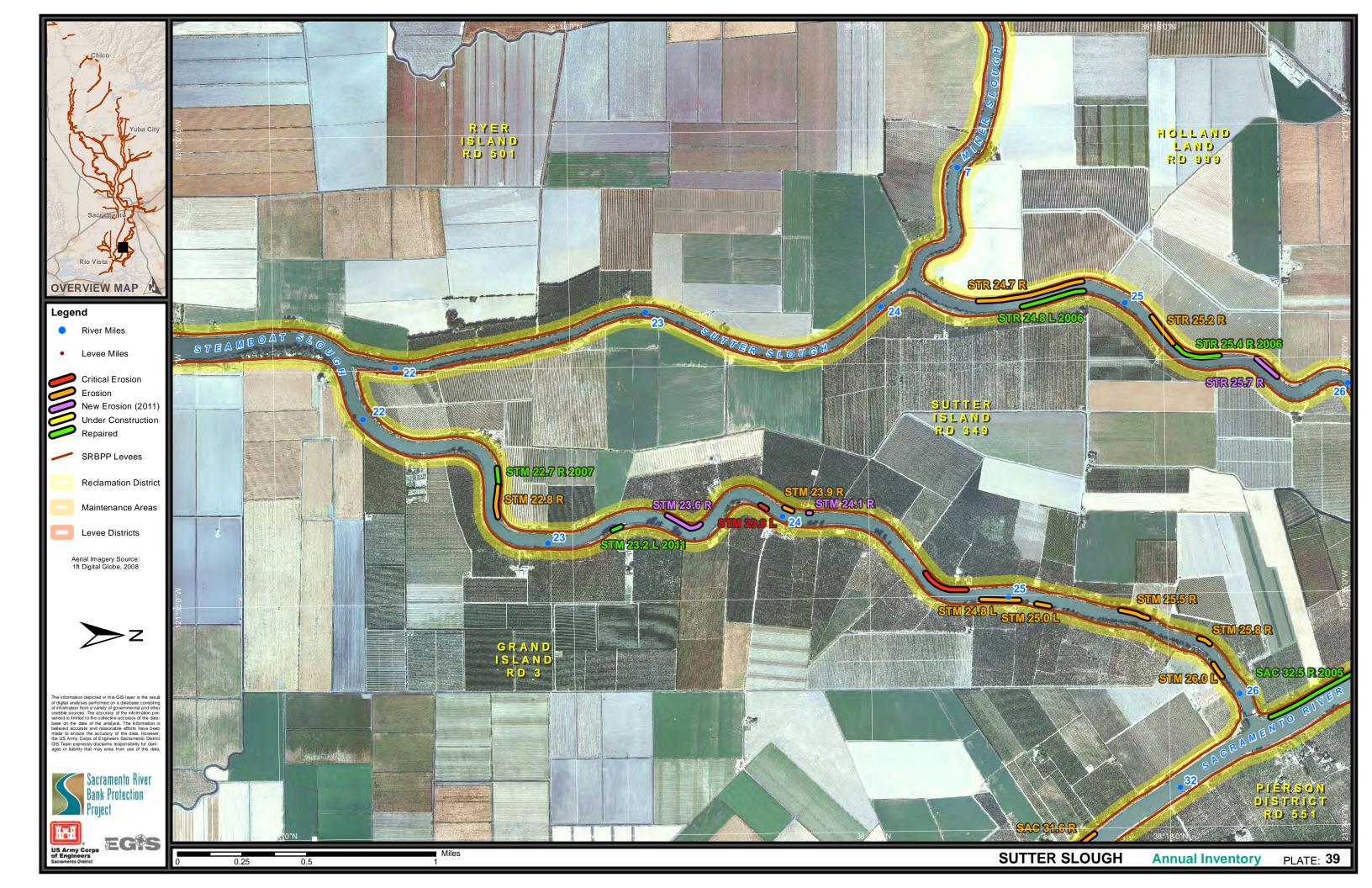


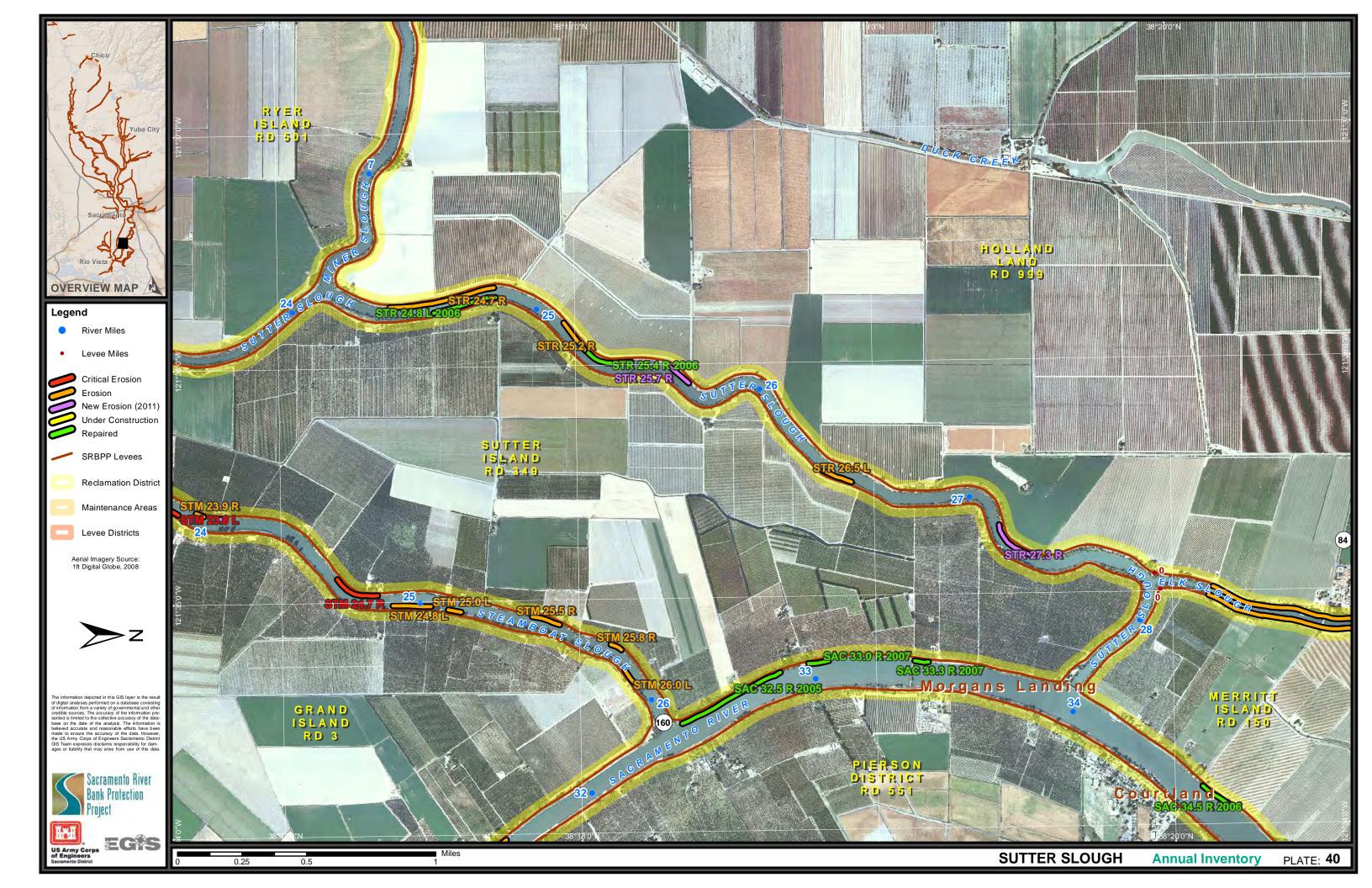


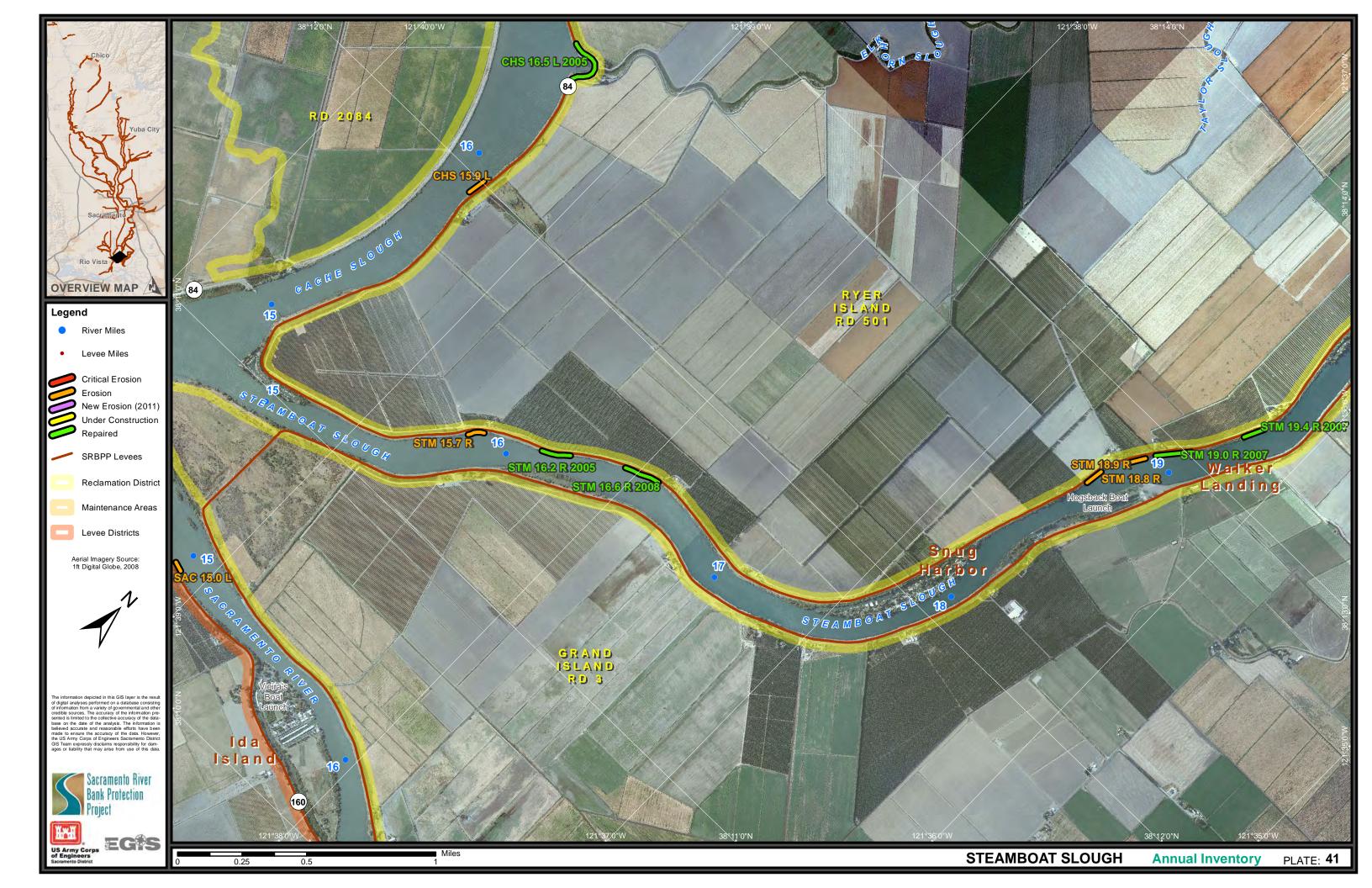


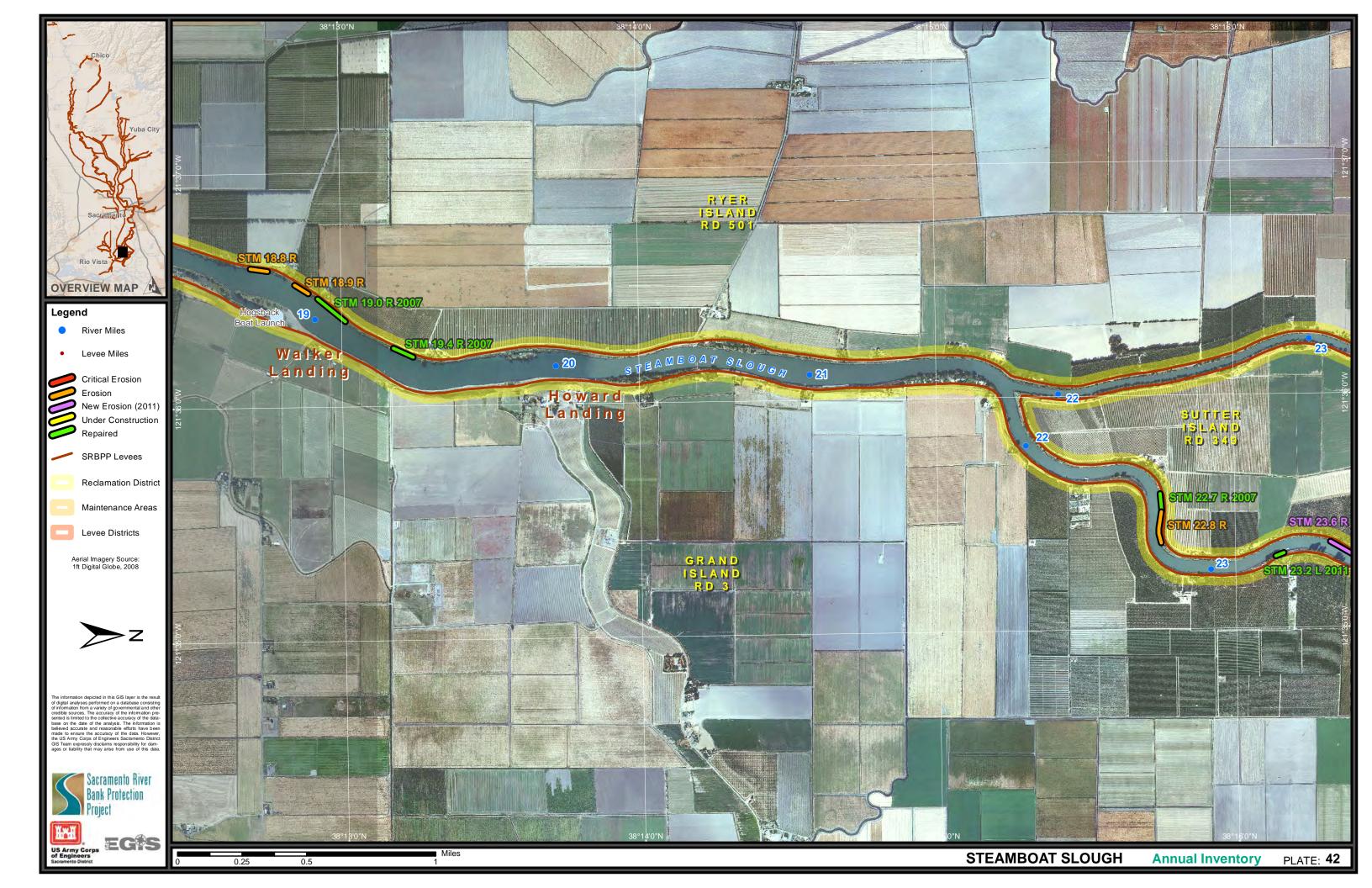


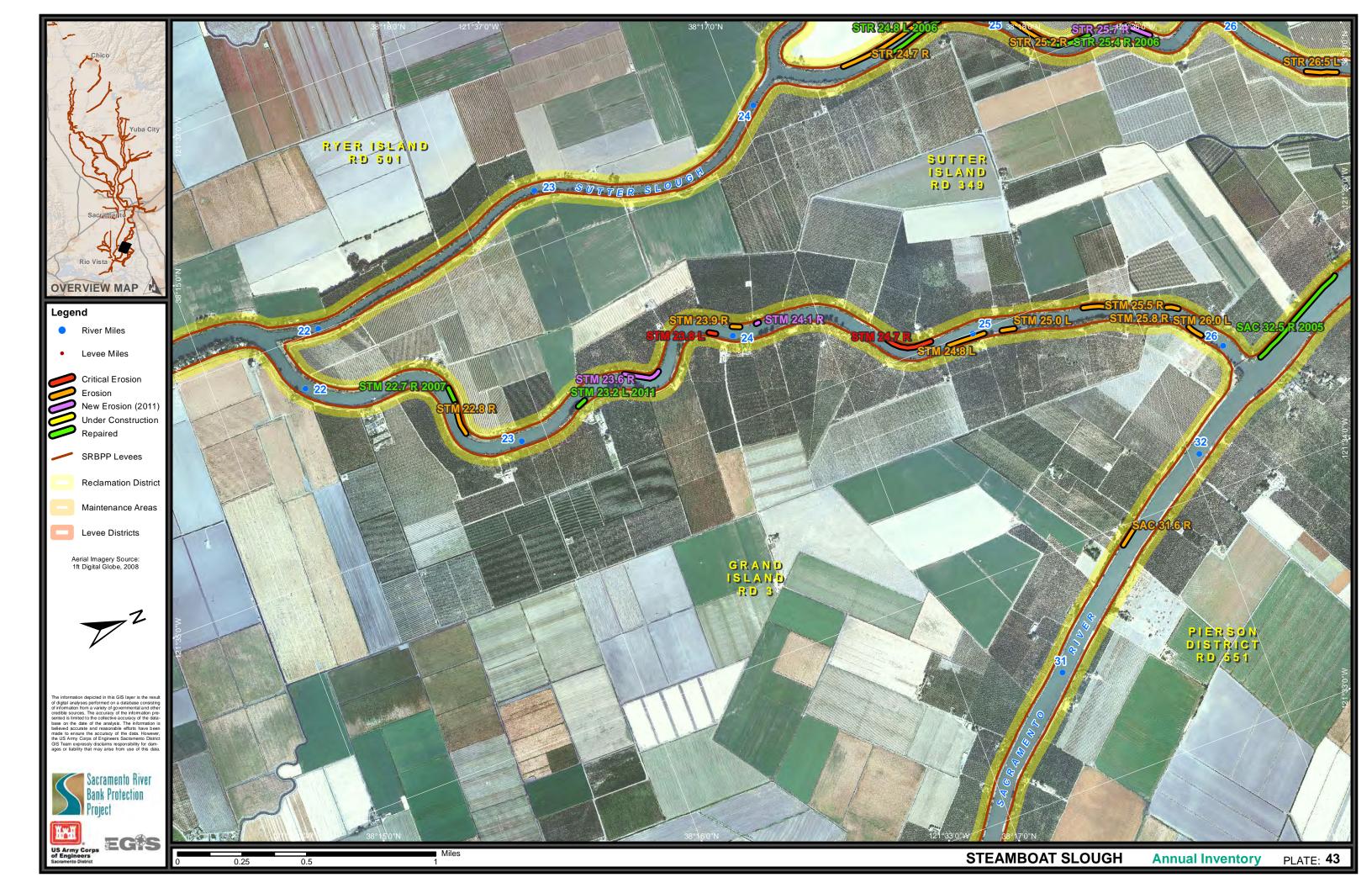


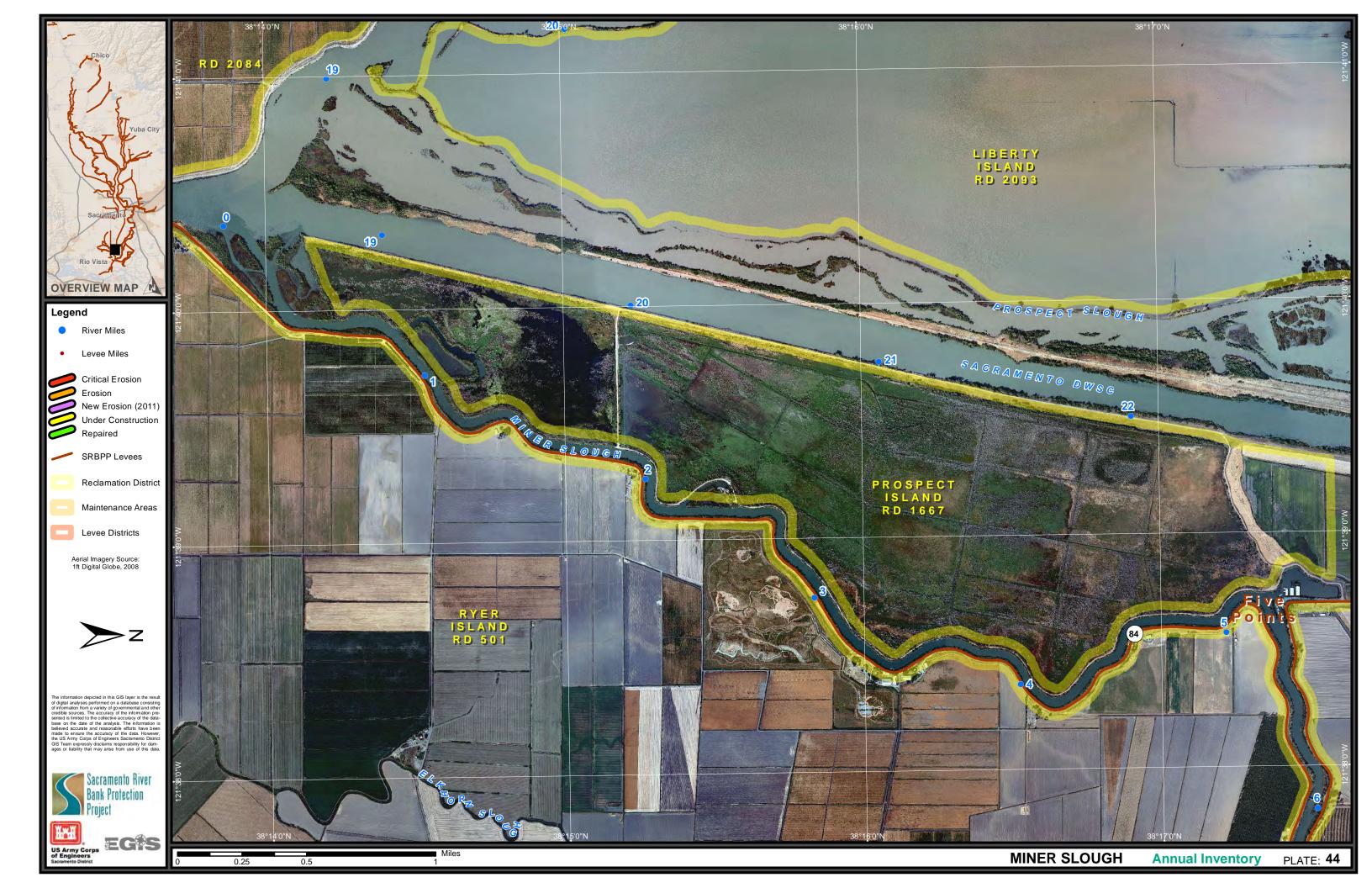


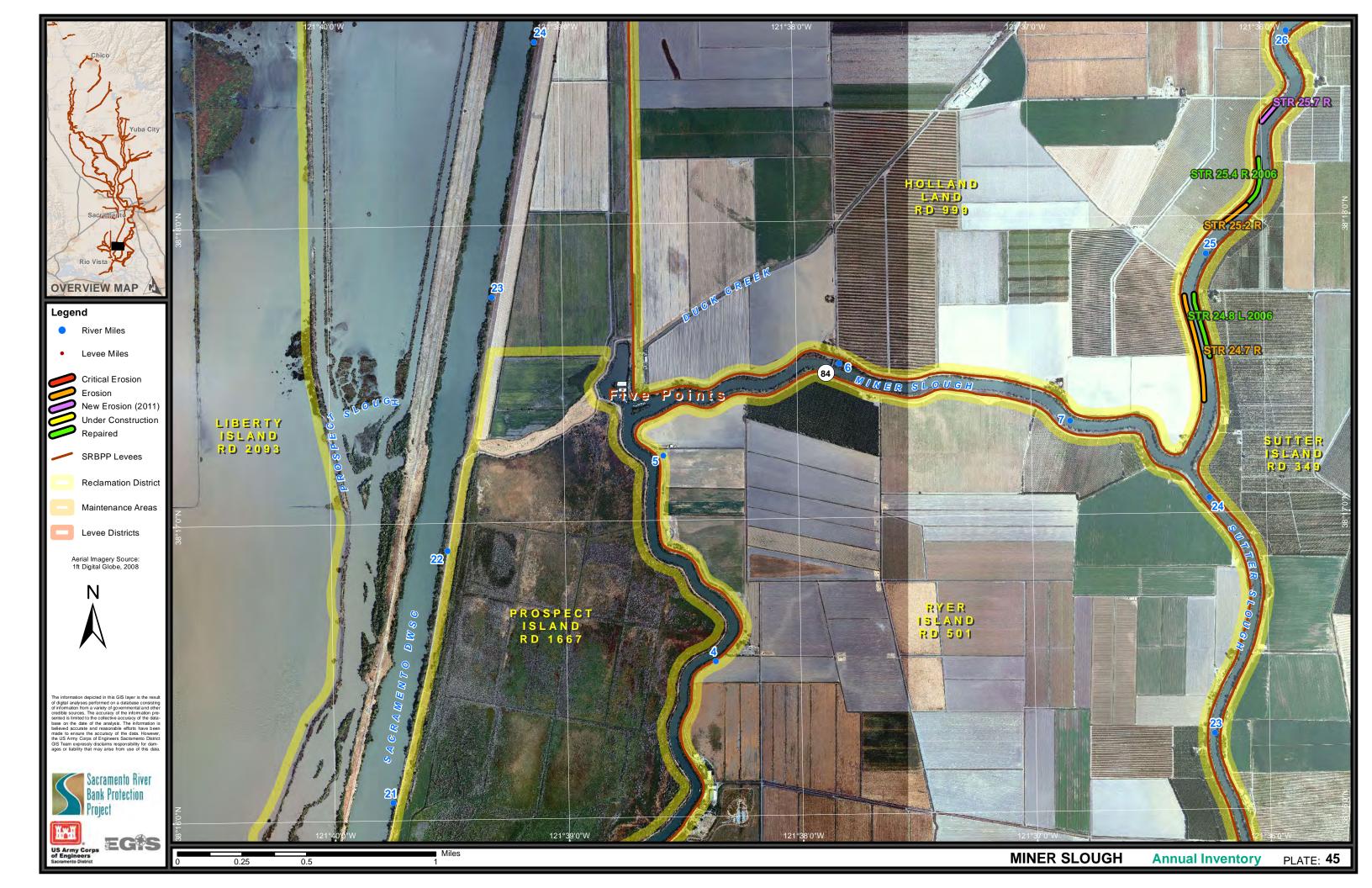


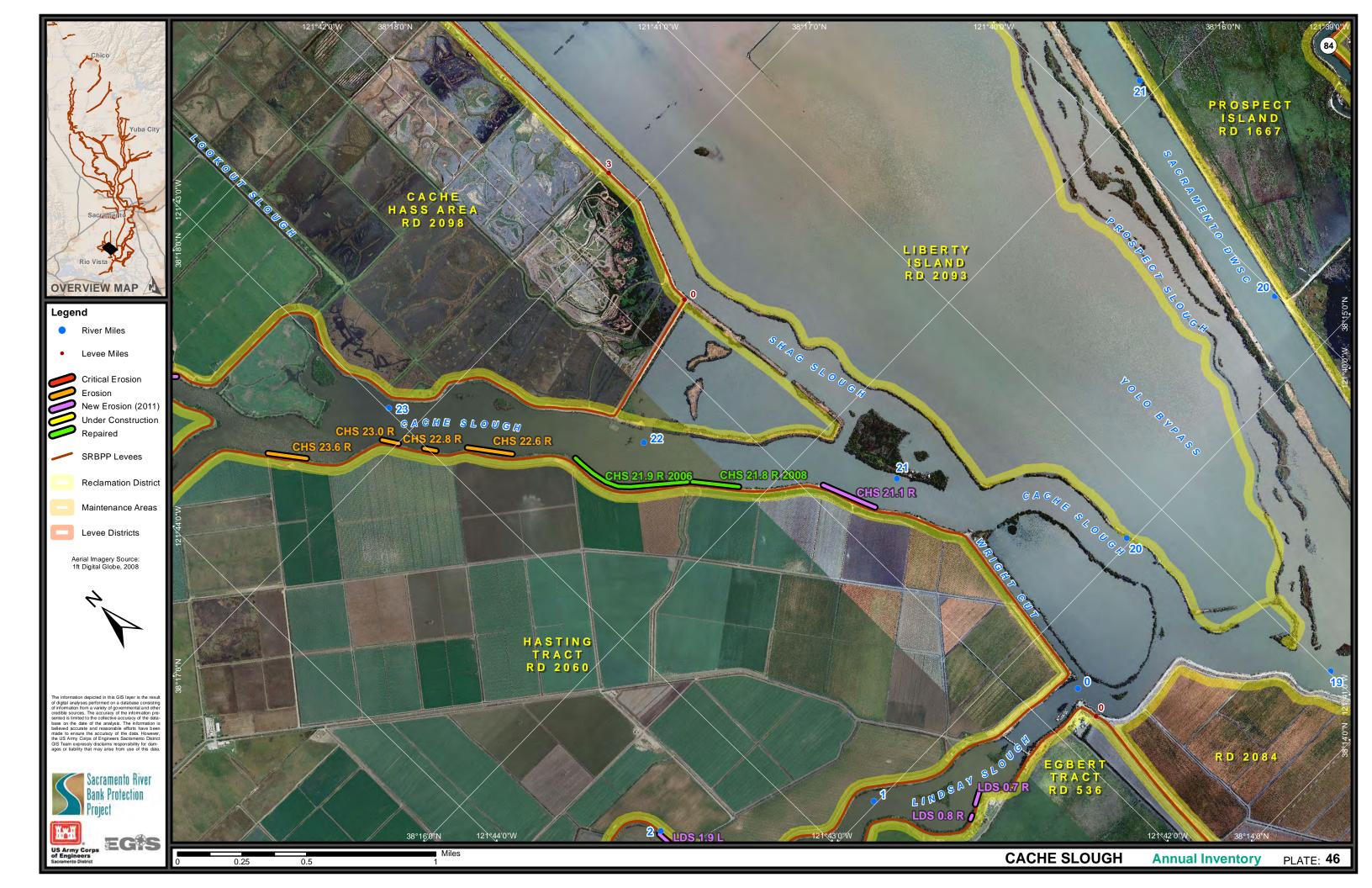


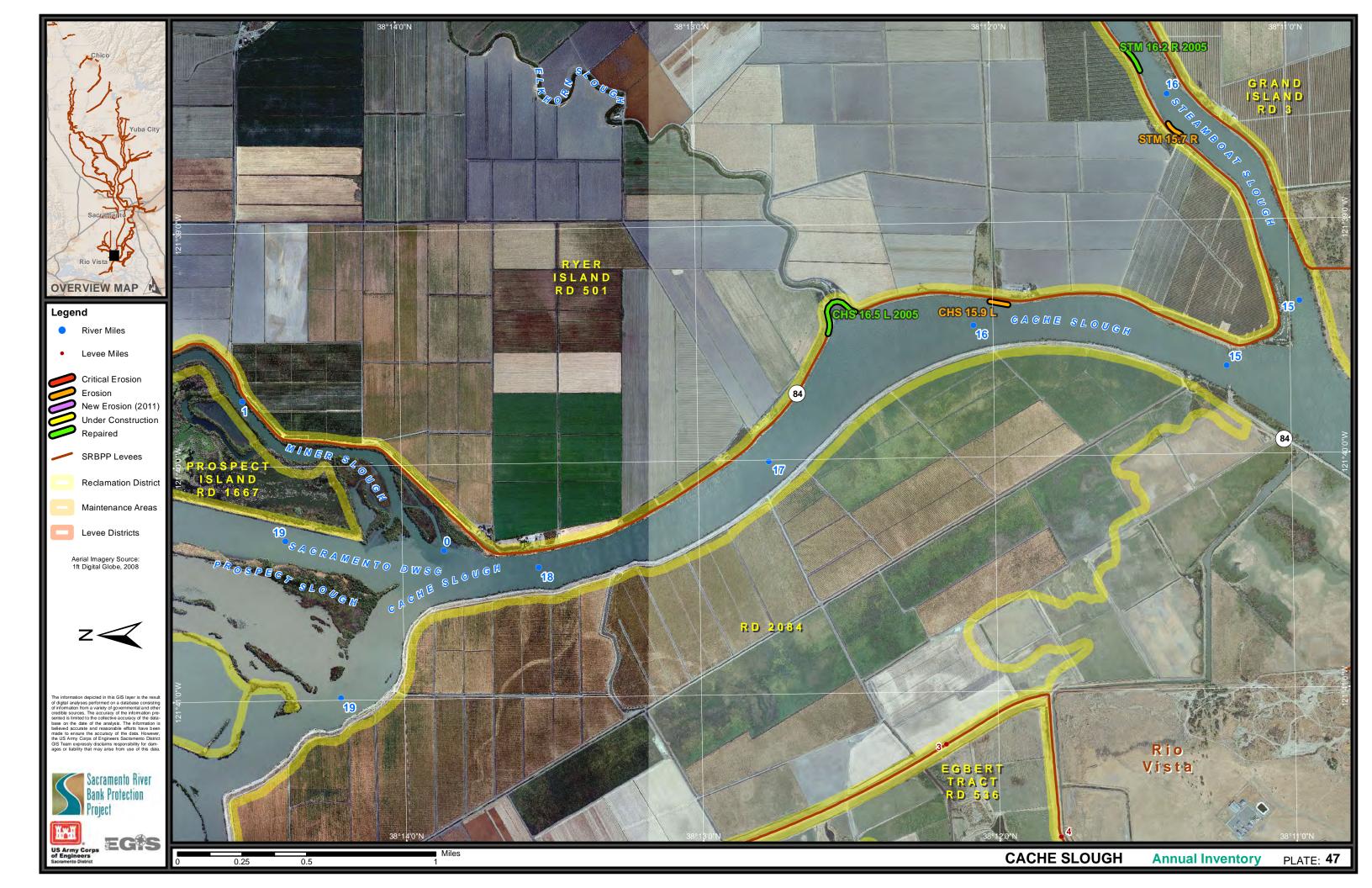


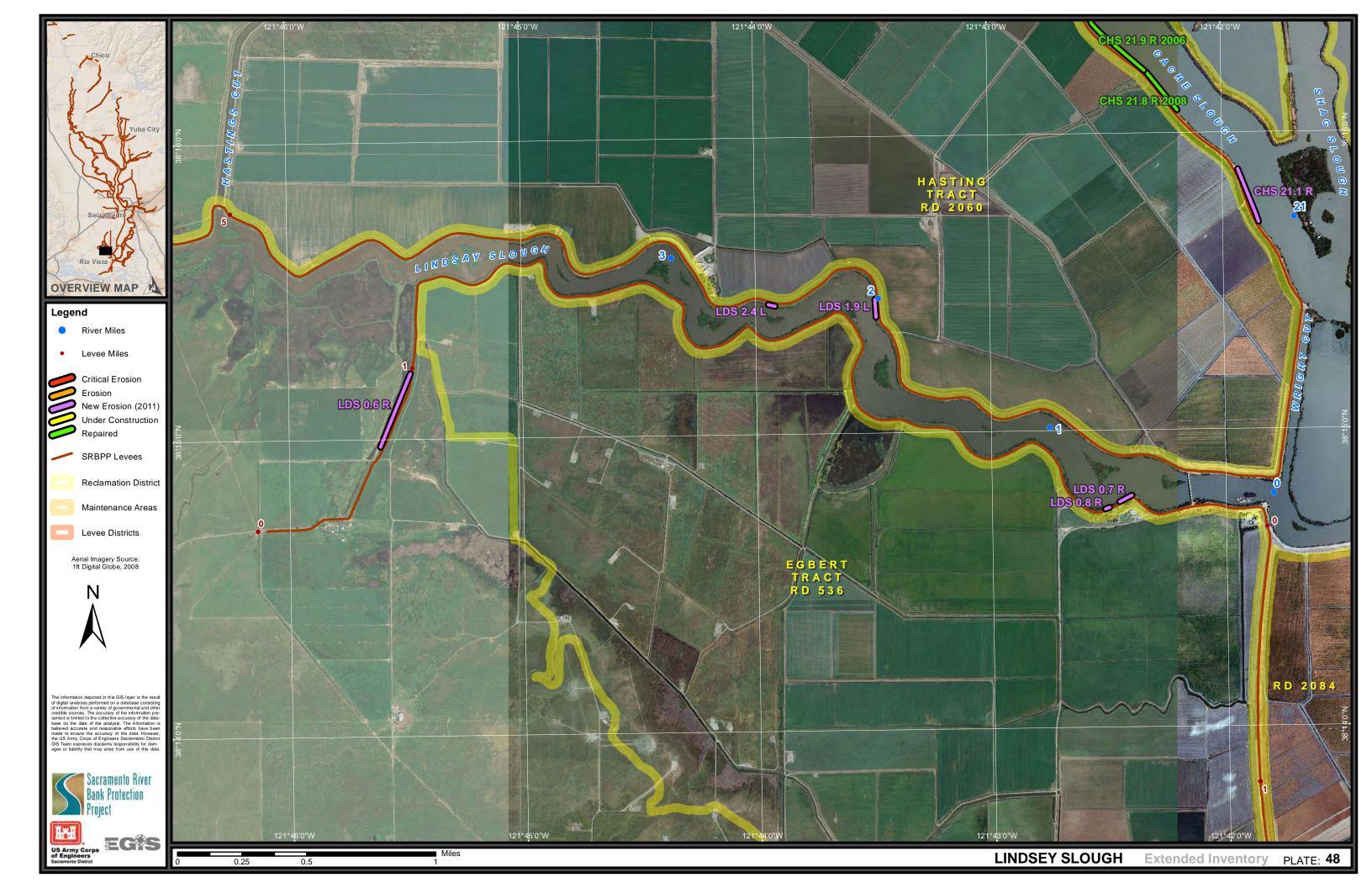


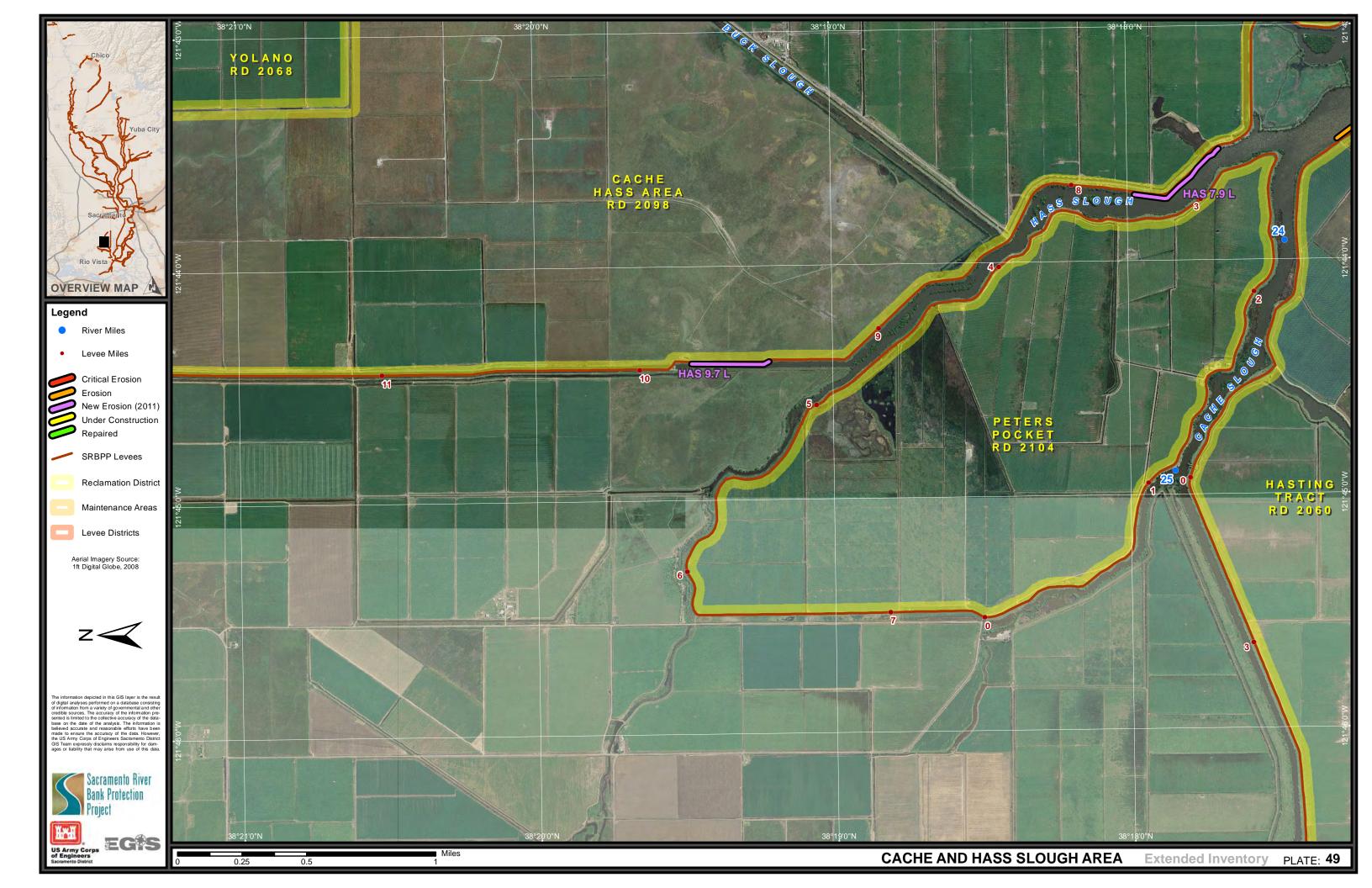


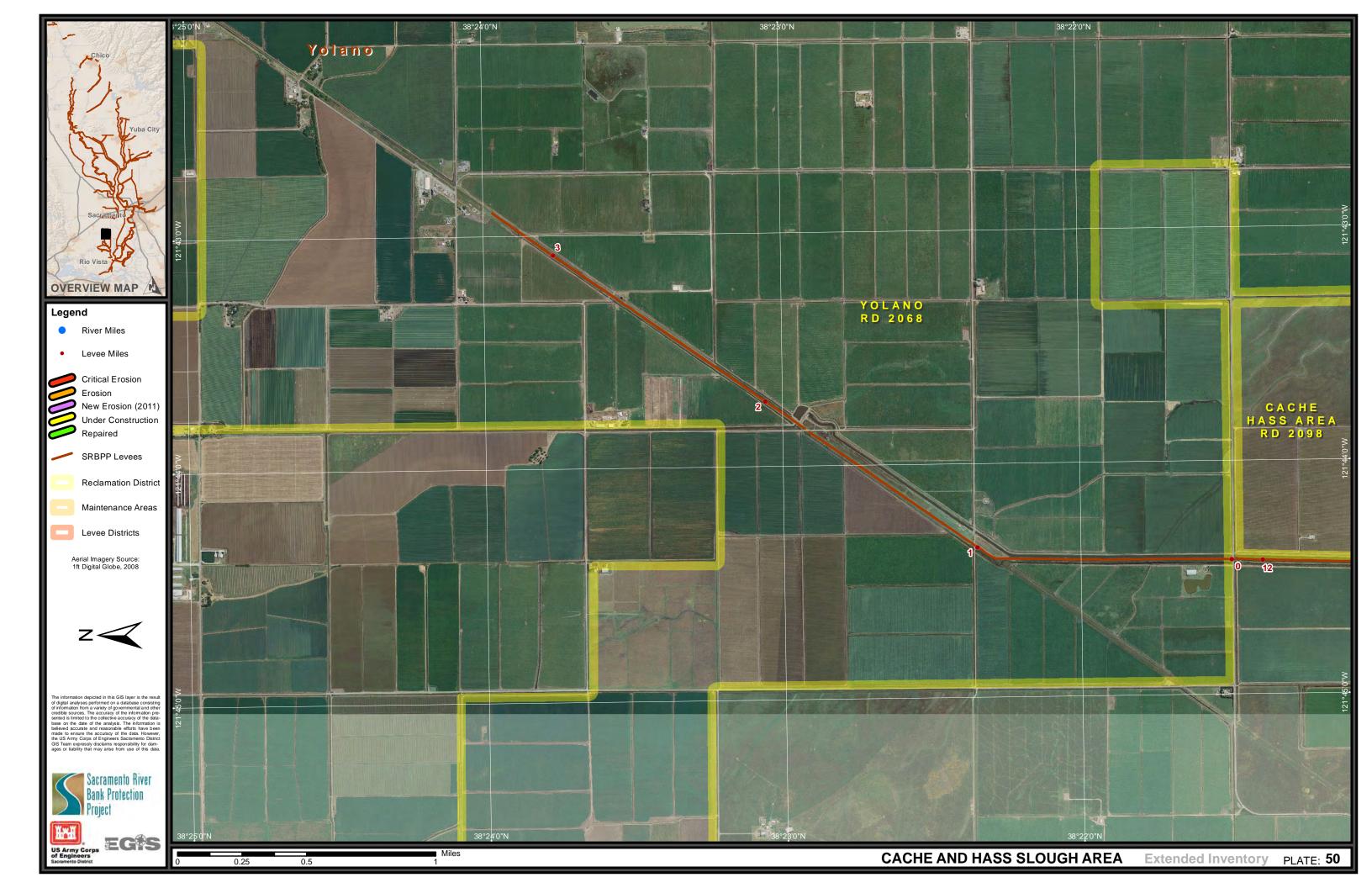




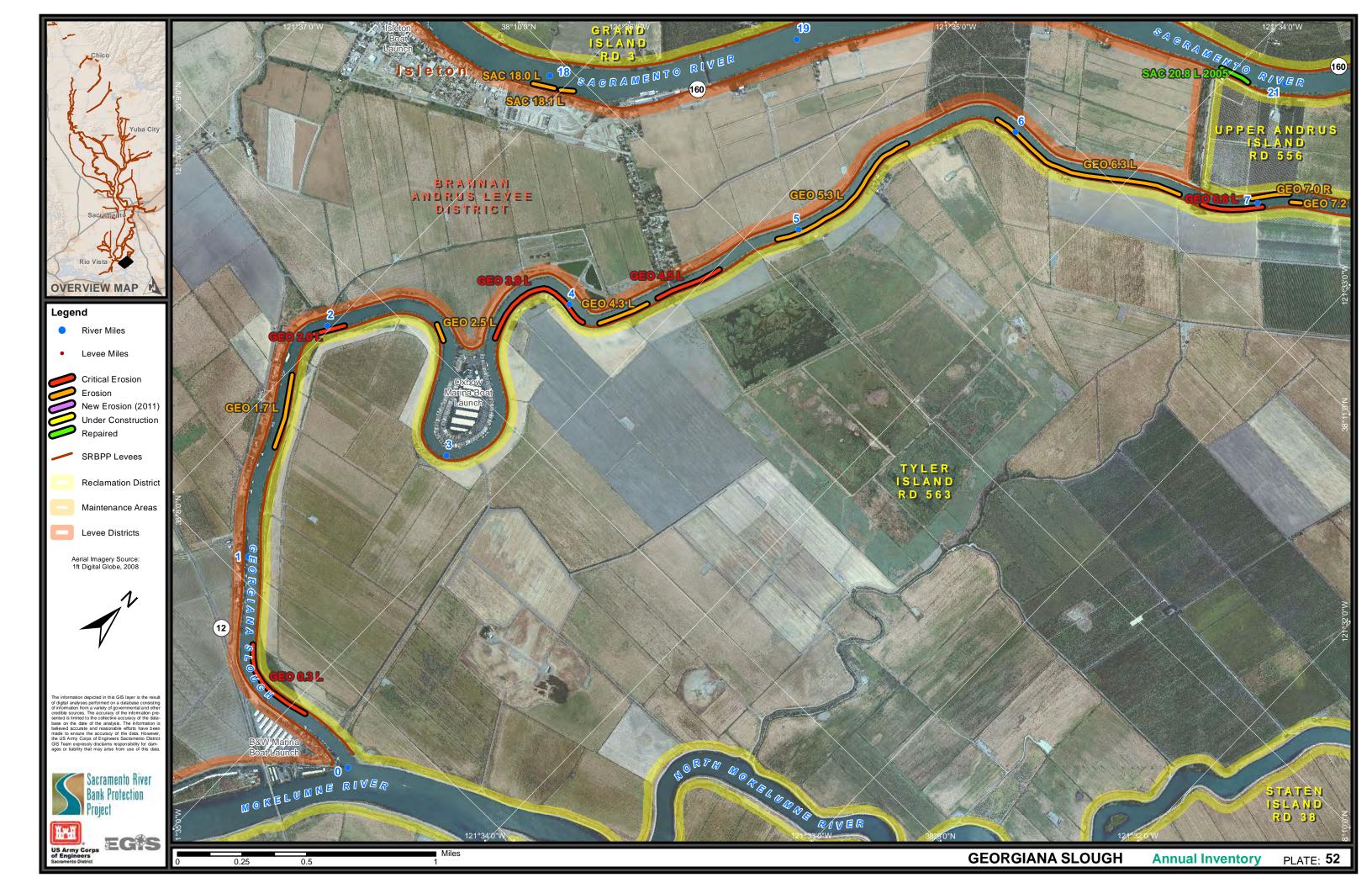


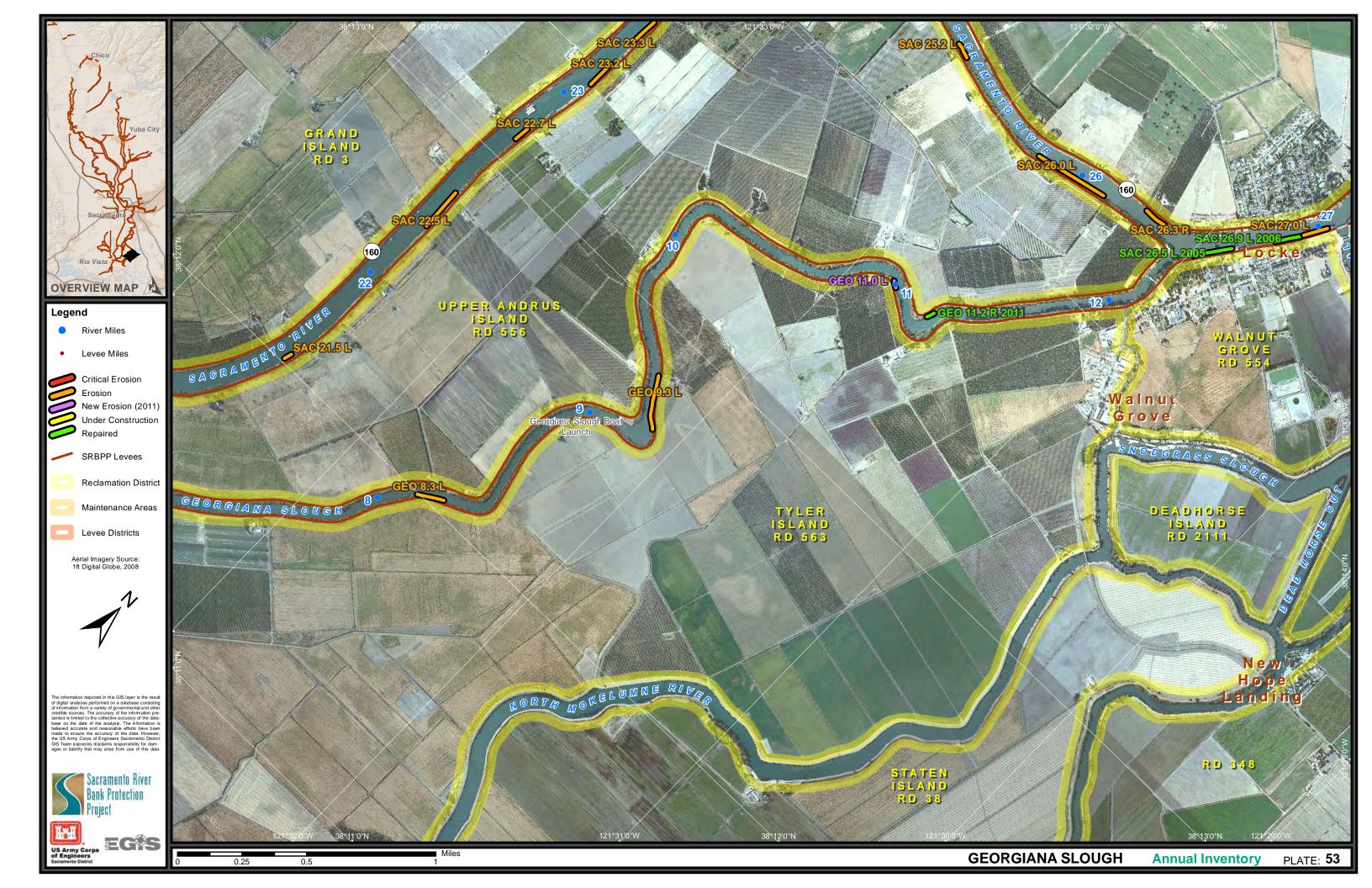


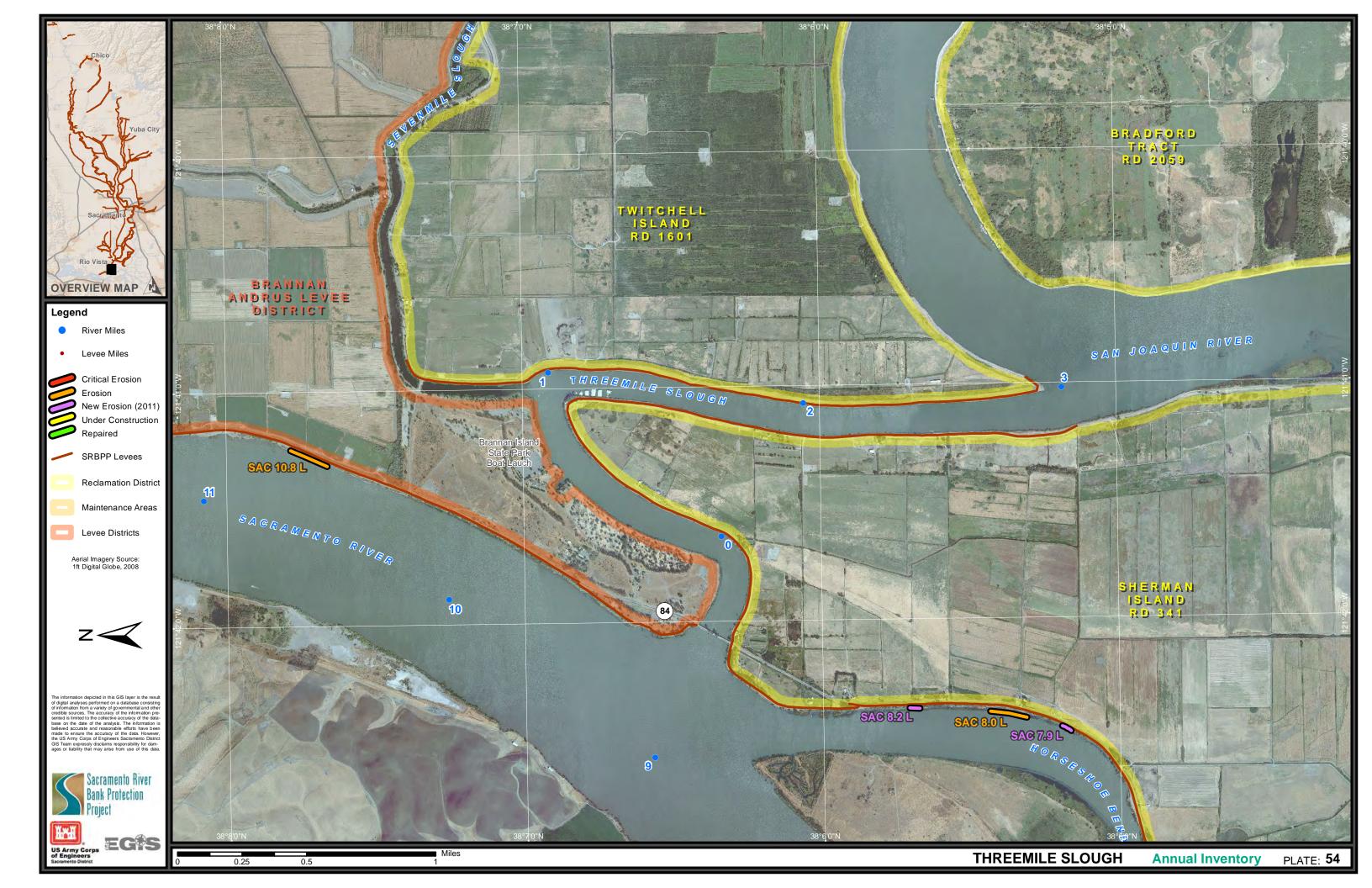




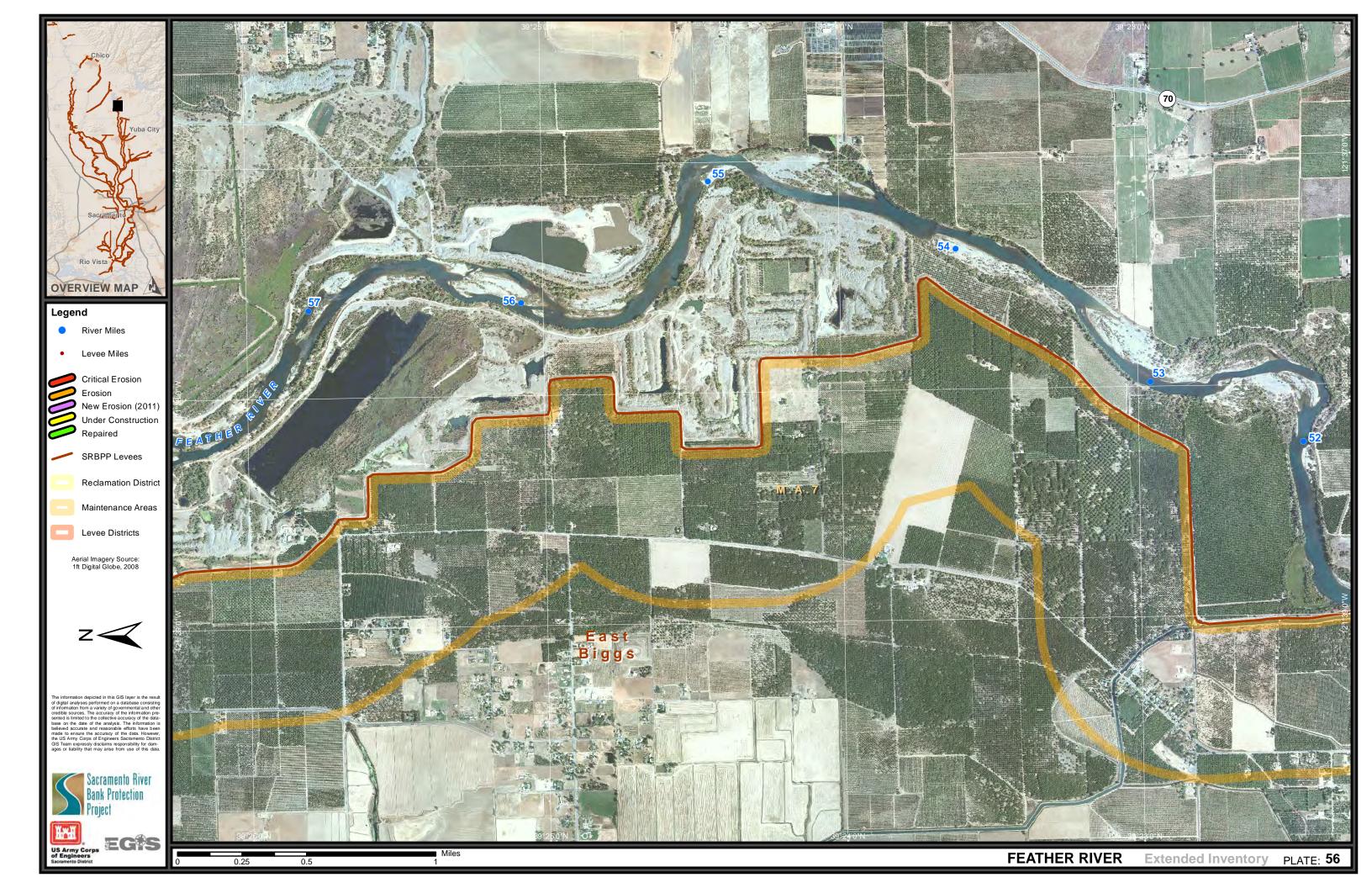


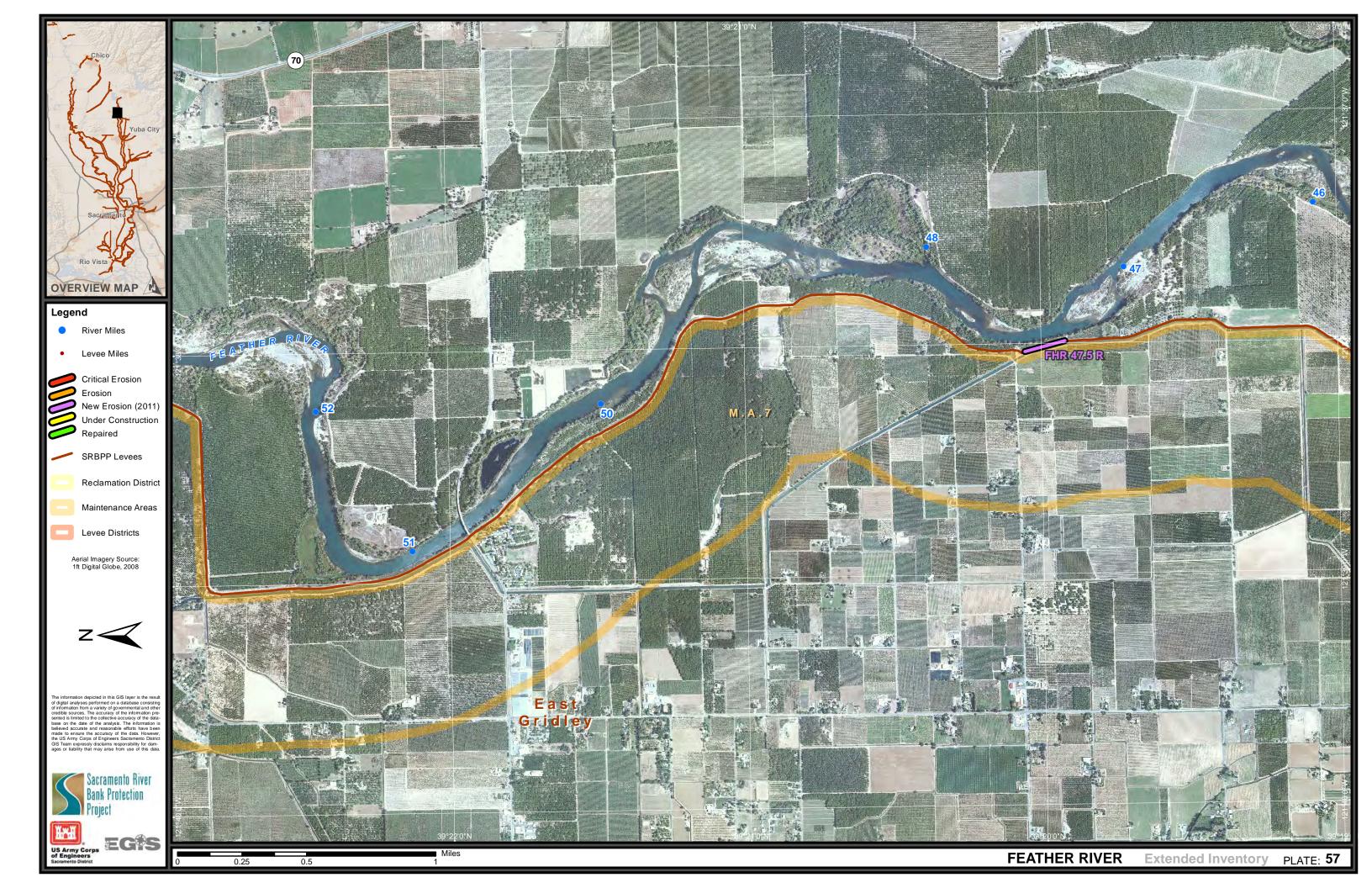


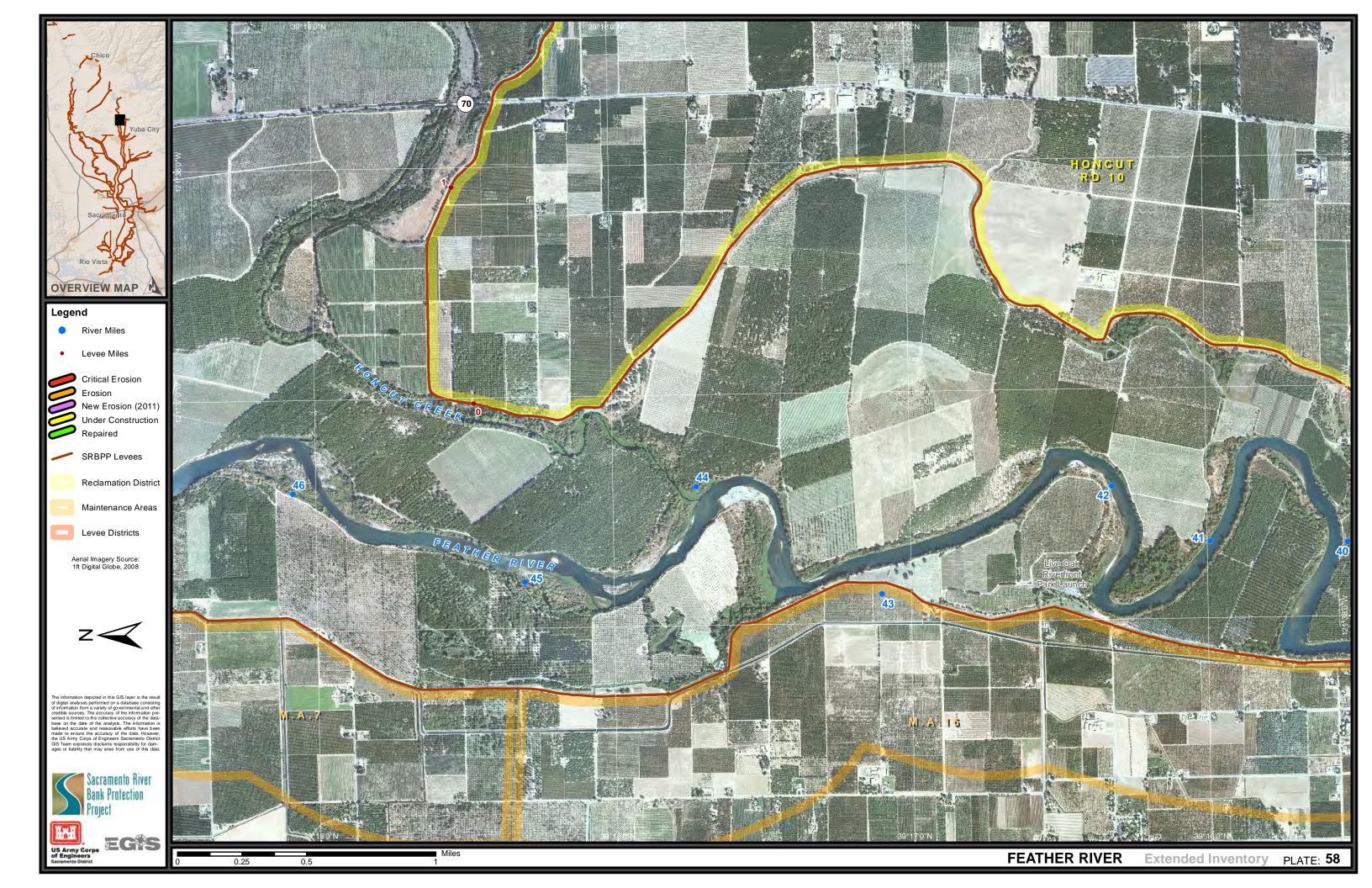


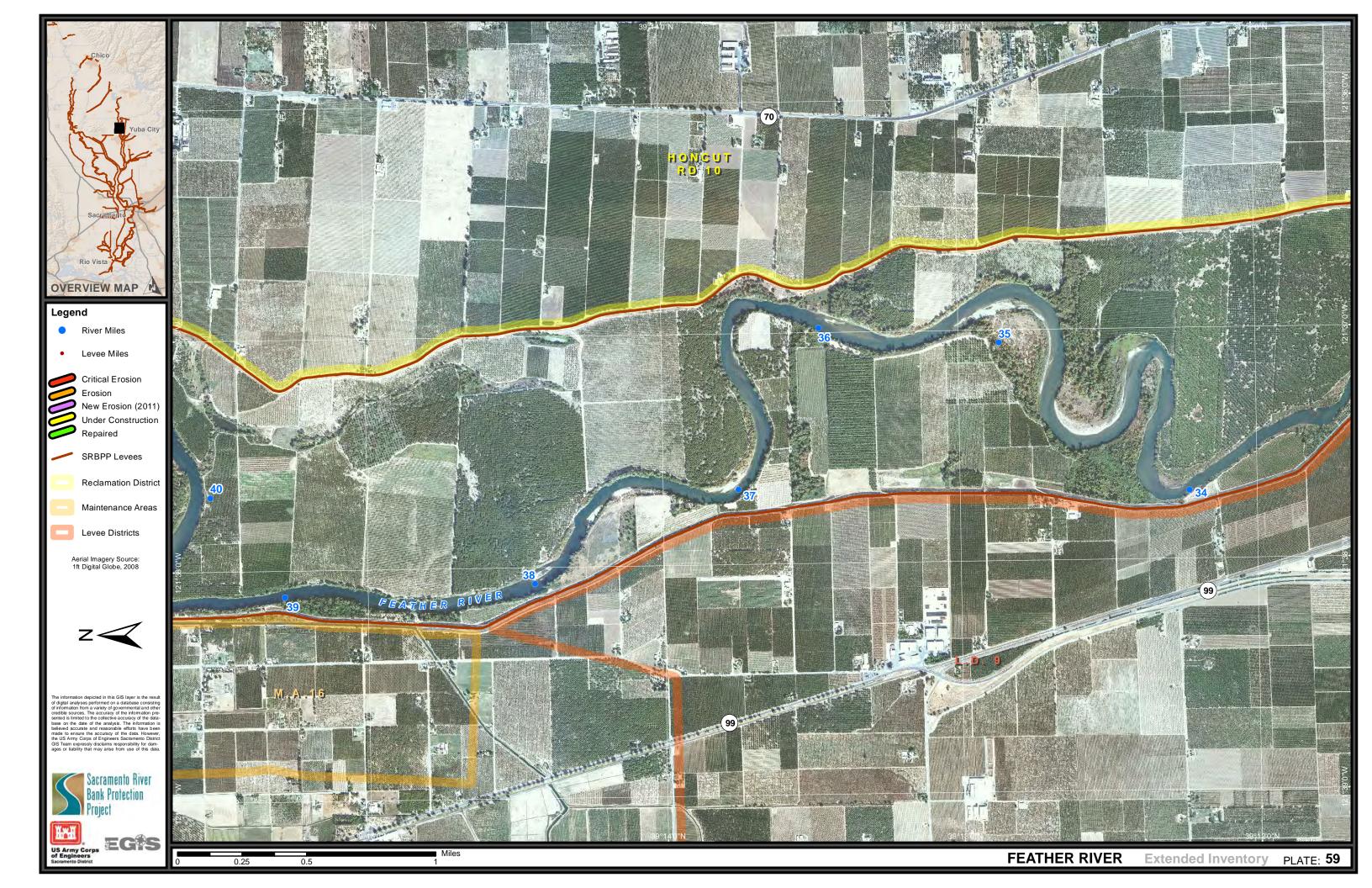


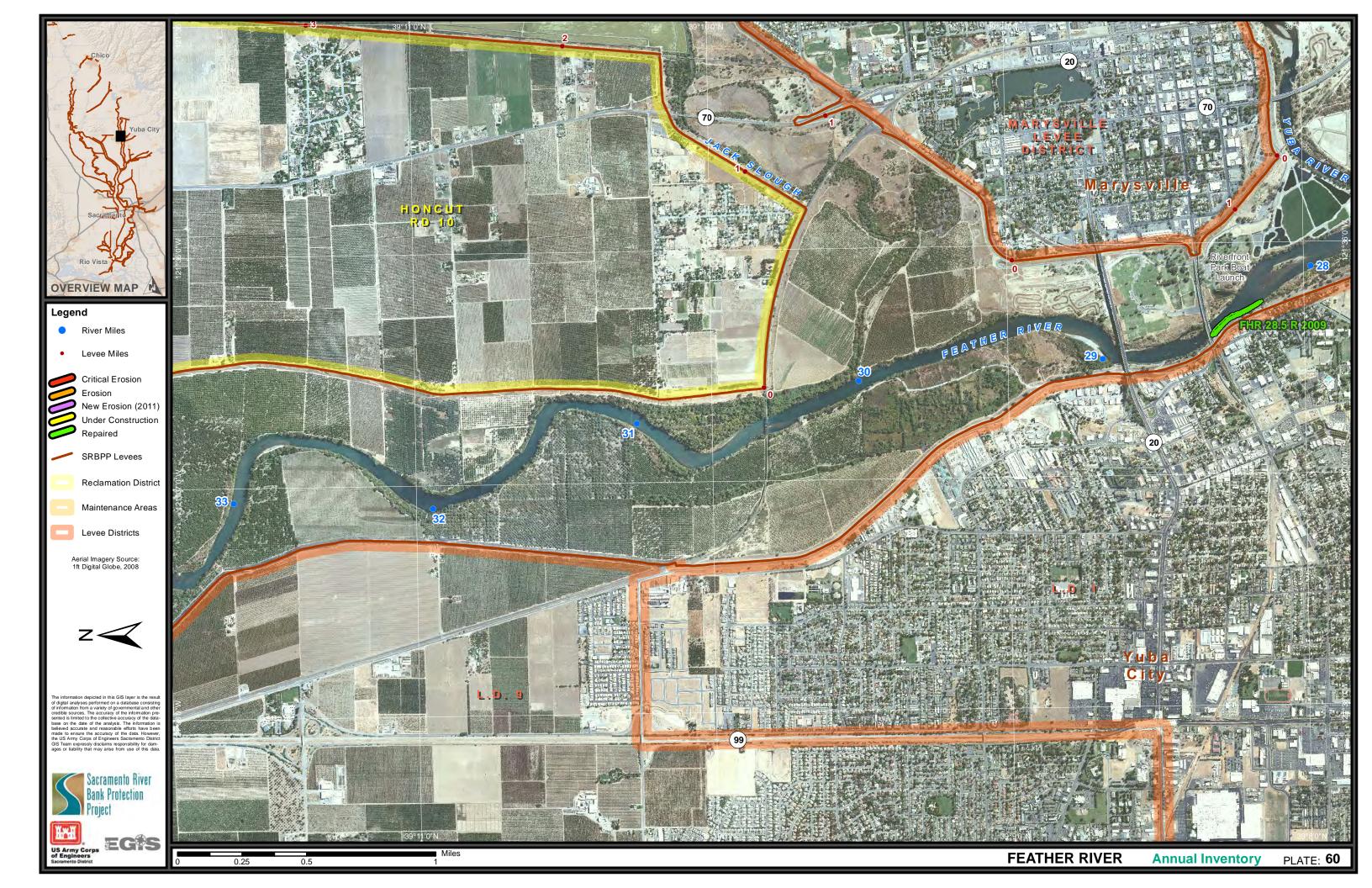


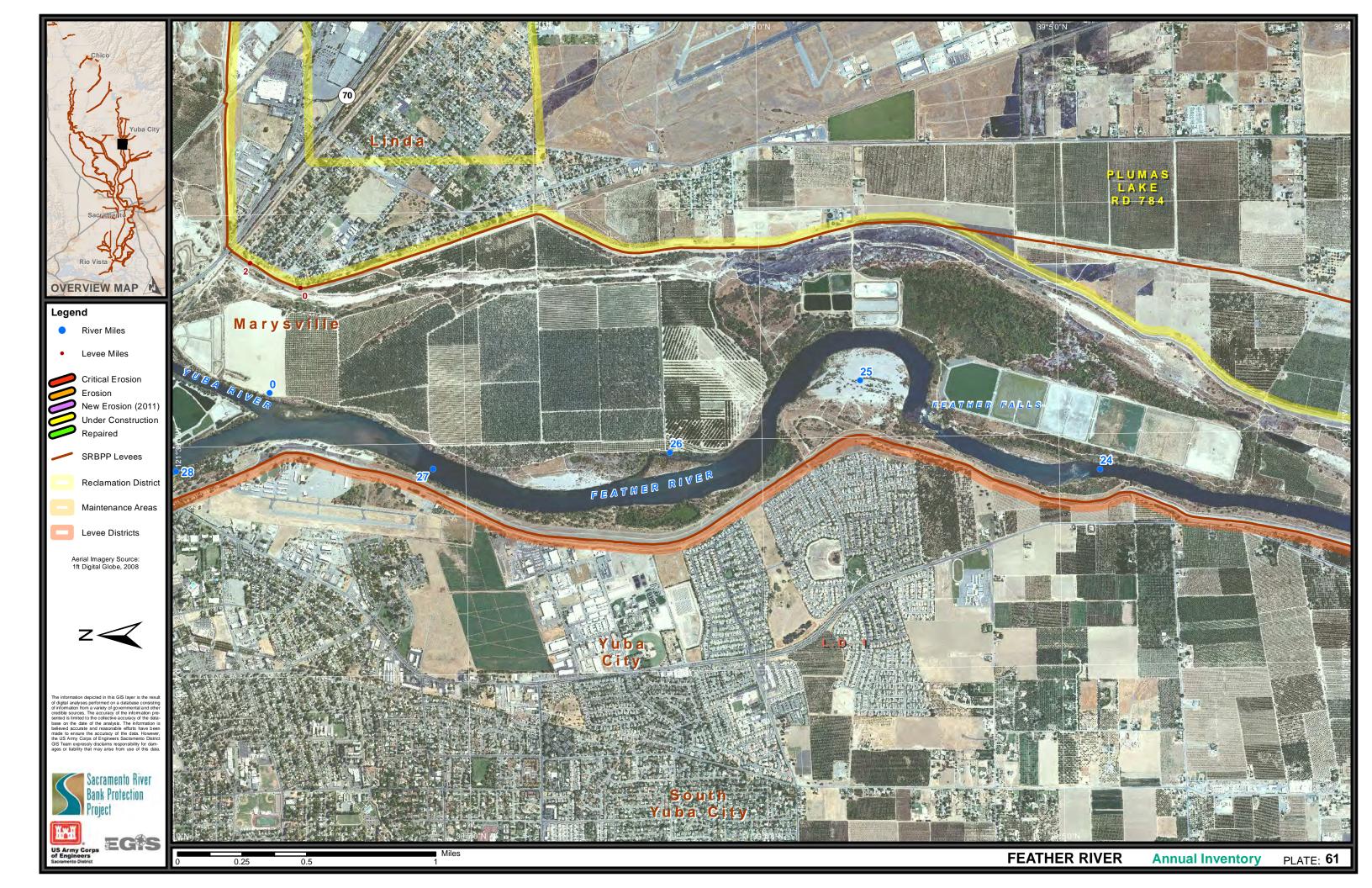


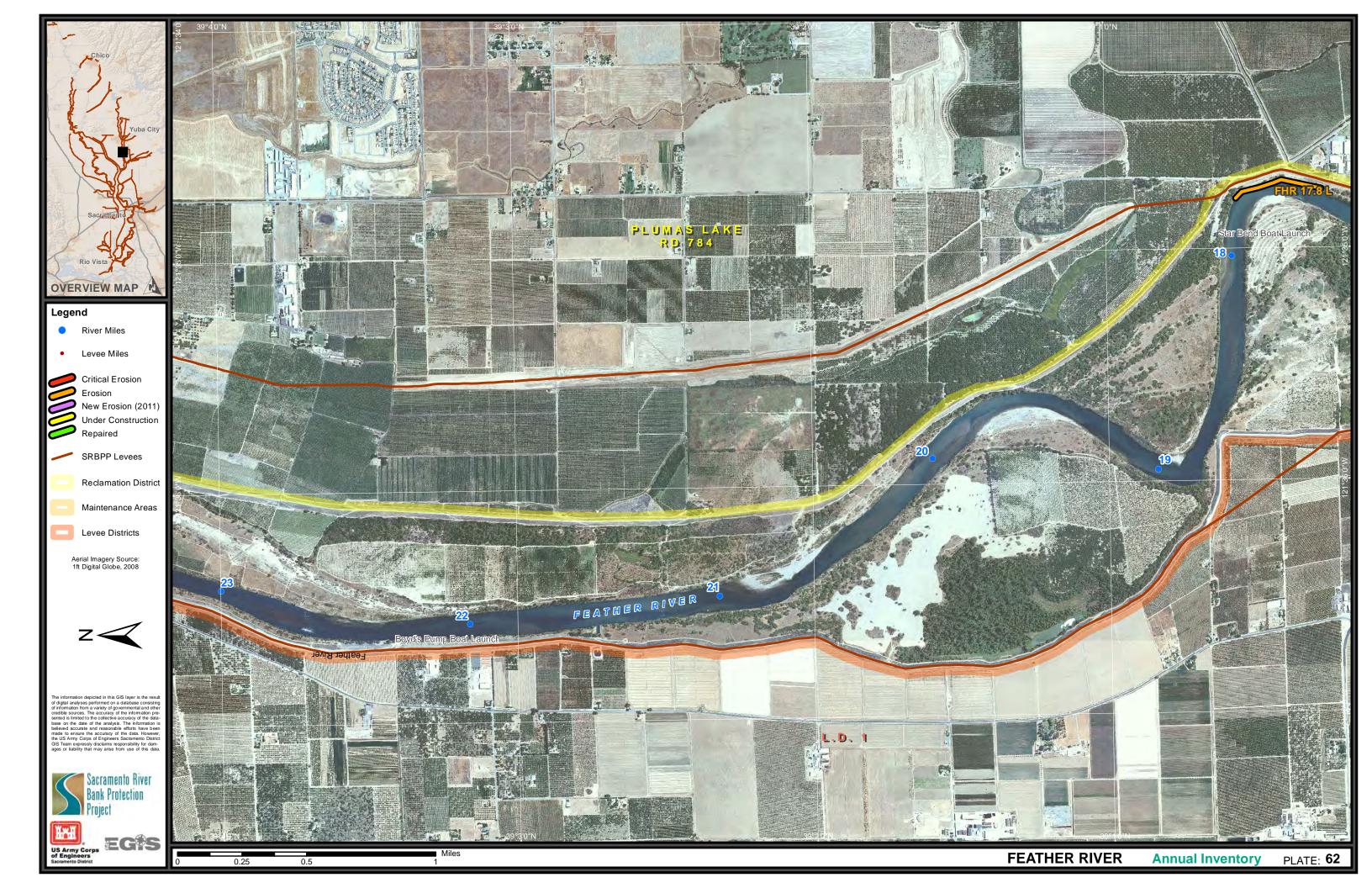


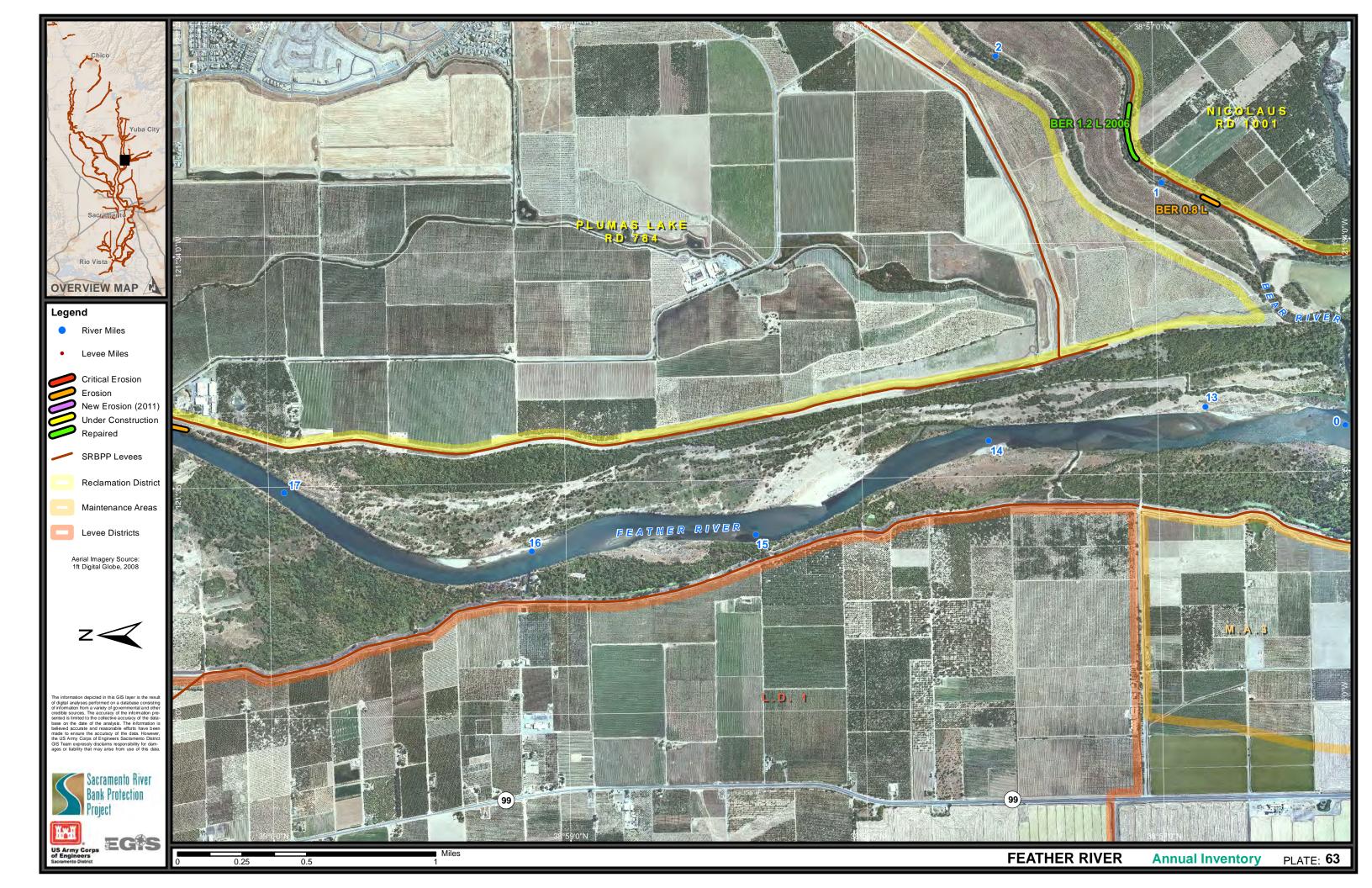


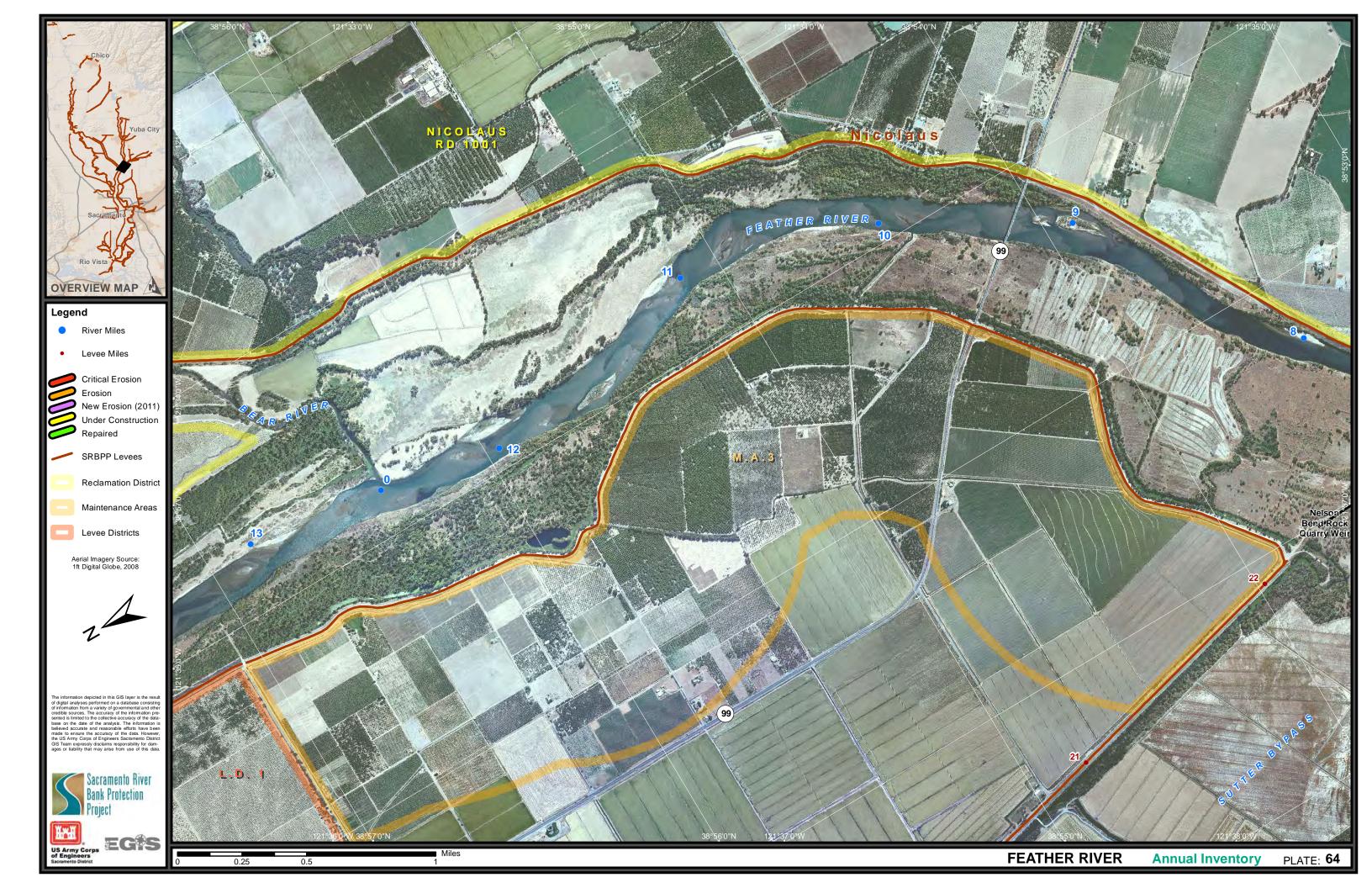


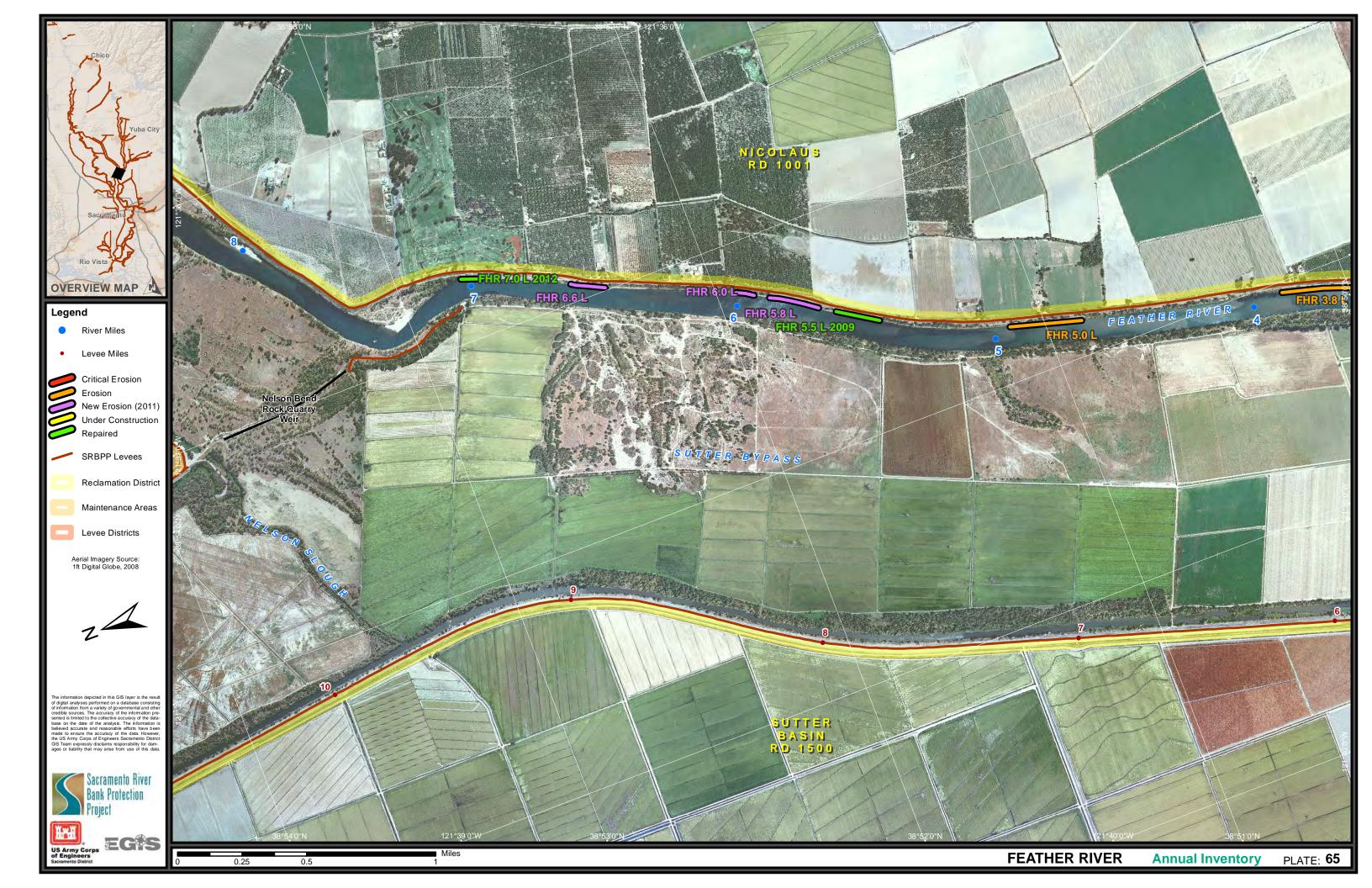














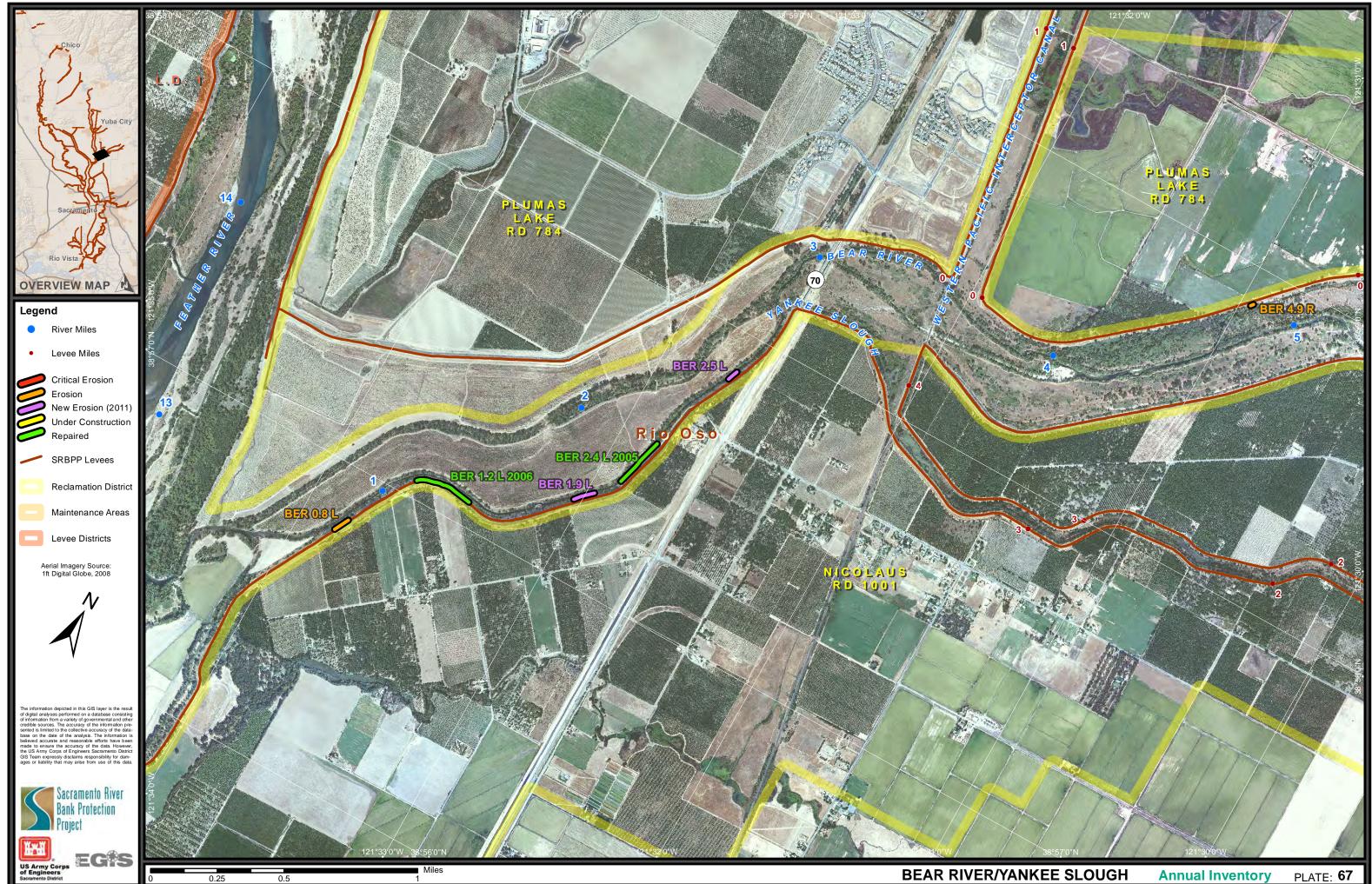
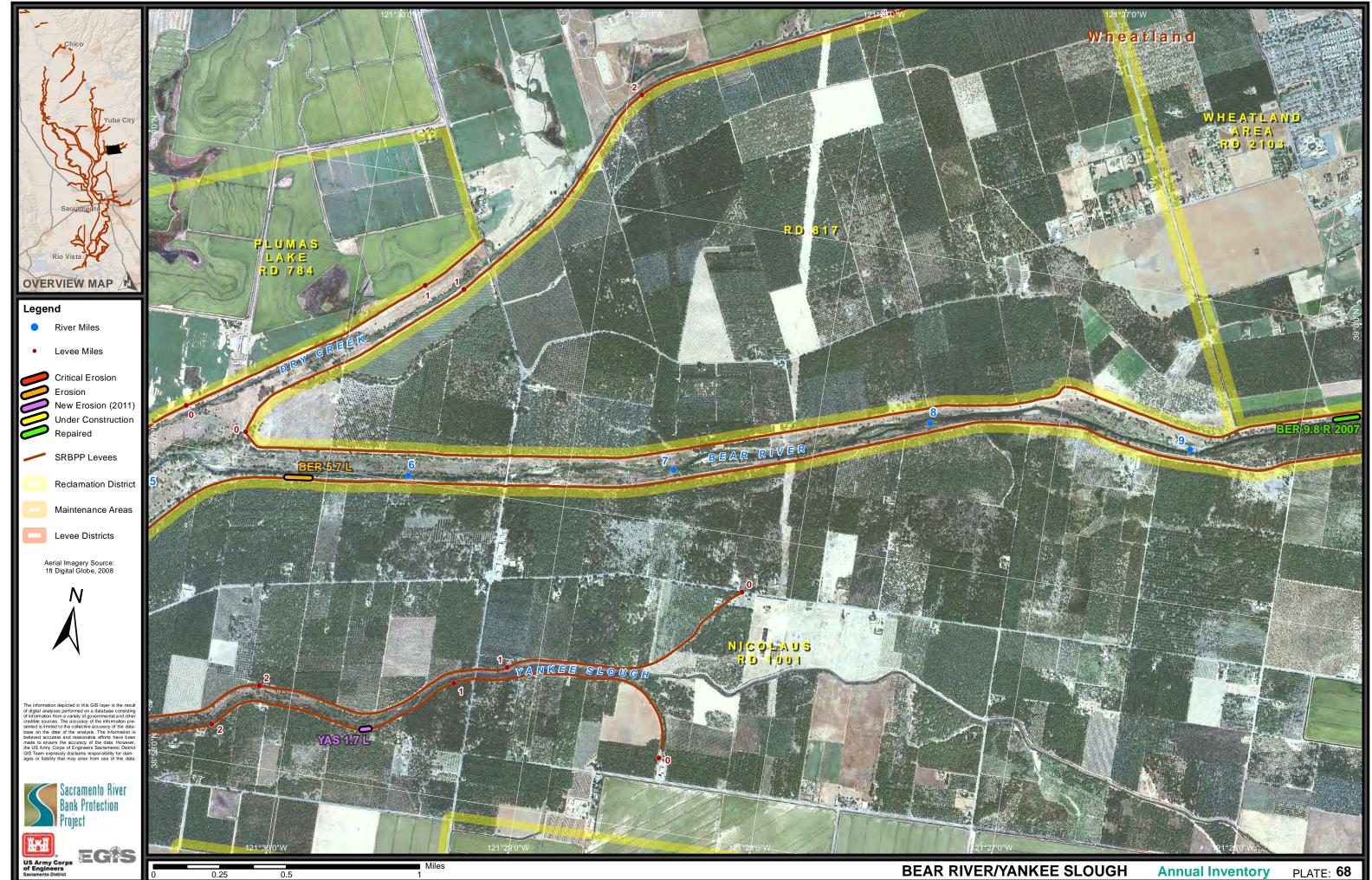


PLATE: **67** 



**Annual Inventory** 

