Mad River Public Access
By: Martin Anderson and John Cortenbach
9th of December, 2014

Abstract

   The Mad River Public Access project is a visual and quantitative GIS analysis of opportunities for Humboldt State University students and the general public to access the Mad River near the city of Arcata. It will evaluate public access along the Mad River between the Highway 101 Bridge and the mouth of the river. Datasets were downloaded from the Humboldt County GIS website, USDA, USGS and the National Atlas for the United States and projected to the spatial reference system NAD 83 UTM Zone 10 North. We marked GPS waypoints along accessible river shoreline; trails to the shoreline and points of interest for river access. Using the GPS waypoints and NAIP imagery we digitized and measured accessible river shoreline; trails to the shoreline; points of interest for river access and digitized the Mad River as well. Using the collected and digitized datasets we created maps to visualize accessible areas along the Mad River from the Hammond Bridge and downstream to the river mouth. There is reasonable river access from four areas along the Mad River that Humboldt State University students and the general public can access. This includes approximately 5,254 yards of accessible shoreline and 3,358 yards of trails to the Mad River shoreline.

Introduction

   The Mad River is an approximately 100 mile long coastal river known for its top hatchery steelhead fishery in Northern California. It is flows in a roughly southeast to northwest direction starting in Trinity County and then emptying into the Pacific Ocean in Humboldt County [4]. The river is located 7.3 miles north of the city of Arcata. Highway 101 crosses over the river just north of the city of Arcata [5]. The river downstream from the Highway101 Bridge is surrounded by agriculture and riparian vegetation. The river provides recreational opportunities, semi-aquatic wildlife habitat and habitat for multiple aquatic species (steelhead, resident trout, salmon and more), including warm and cold freshwater habitat for fish migration and spawning [3]. Students that come to Humboldt State University can be unaware of how to access the Mad

River even though they would like to because it is only a few miles from the campus. The purpose of this project will be to analyze the Mad River downstream from the Highway 101 Bridge for fishing opportunities, picnicking areas, park benches, boat ramps and parking. Knowing where the Mad River can be accessed near the city of Arcata will allow Humboldt State University students and other people new to the area to enjoy what the Mad River of California's North Coast has to offer.
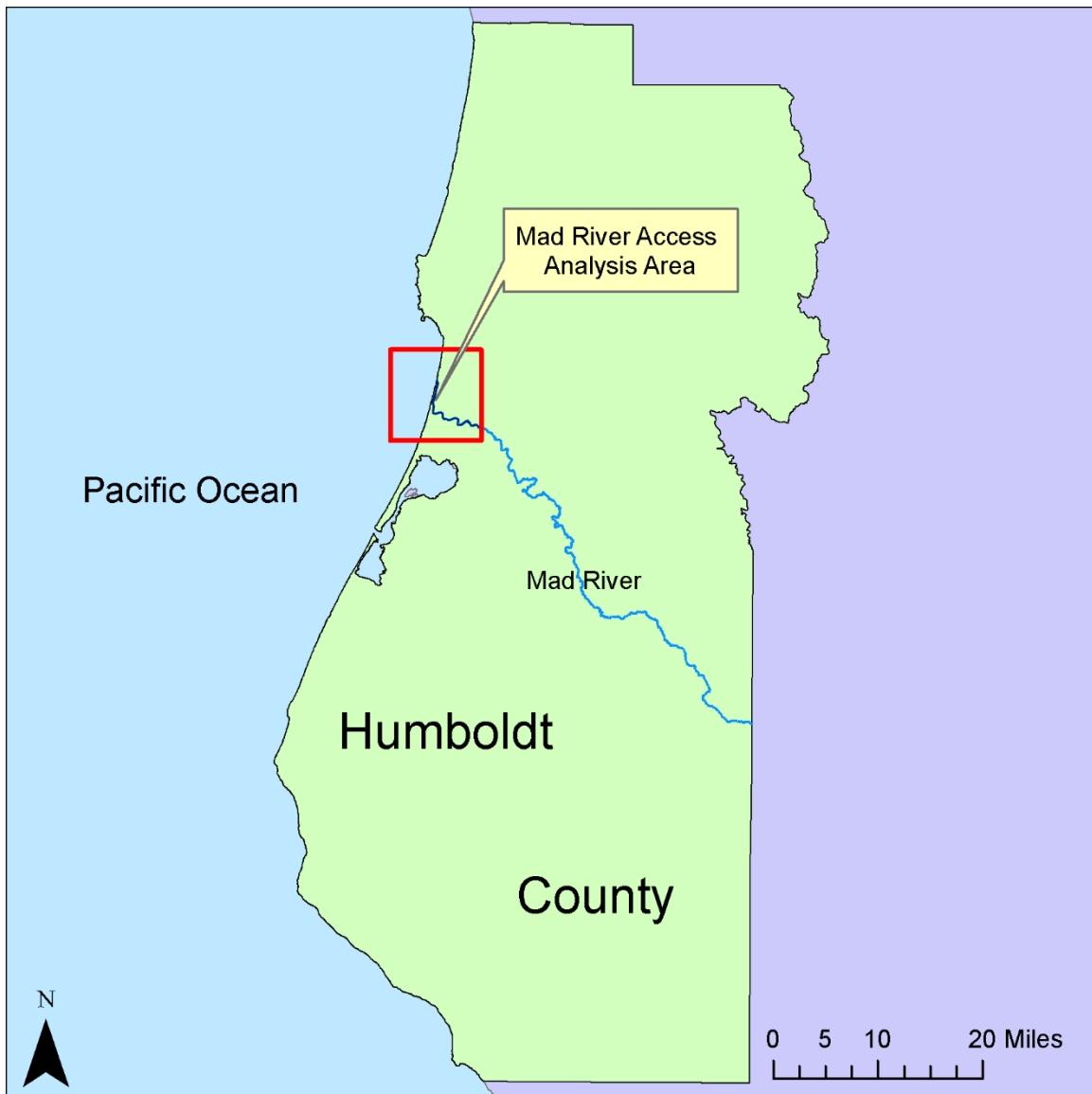

Figure 1. Map showing the location of the area of analysis for the Mad River Access project.

Methods

We downloaded datasets available from previous Introduction to GIS labs that we had previously reviewed for quality (Table 1). After obtaining the necessary datasets, we made sure that all collected datasets had been projected to the NAD 83 UTM Zone 10 North spatial reference system.

Table 1. Acquired dataset information.

Feature	Dataset Name	File, Type	Source
Boundaries, United States of America	Statep010	Shapefile, polygons	National Atlas of the United States
Boundary, Humboldt County	CNTYOUTL	Shapefile, polygon	Humboldt County GIS
Parcels, Humboldt County	apnhum48sp_parcel	Shapefile, polygons	Humboldt County GIS
Roads, Humboldt County	humtrans3sp_20130417	Shapefile, polylines	Humboldt County GIS
Wetlands, California	CONUS_wet_poly	Shapefile, polygons	USDA (United States Department of Agriculture)
Rivers, Humboldt County	nhd24kst_l_ca023	Shapefile, polylines	USGS (United States Geological Survey)
Satellite NAIP imagery, Humboldt County	ortho_1-1_1n_s_ca023_2012_1	sid file, Raster- 1 meter pixels	USDA

We then used ArcMap vector analysis tools and raster tools to narrow down the following datasets to the study area for analysis. All selected attributes were exported as a new shapefile.

- CONUS_wet_poly was clipped to the CNTYOUTL polygon
    - CONUS_wet_poly was selected by attributes for:
    "WETLAND_TY"= "Riverine" OR "WETLAND_TY"= "Estuarine and Marine Deepwater".

- nhd24kst_l_ca023 was selected by attributes for:
    "GNIS_NAME"= "Mad River".

- apnhum48sp_parcel was selected by attributes for:
  "EXLU4" = "public" OR "EXLU4" = "open space/parks" OR "EXLU4" = "vacant" OR
  "EXLU4" = '' ('' *refers to unassigned parcel*)
    - The new parcel shapefile was clipped to a buffer around the digitized Mad River
      polygon to select for parcels next to the Mad River
        - Previously the CONUS_wet_poly.shp buffer was used until discrepancies
          were discovered between the CONUS_wet_poly.shp and ortho_1-
          1_1n_s_ca023_2012_1.si d (Figures 2- 4).

- ortho_1-1_1n_s_ca023_2012_1 was clipped to the study area.

We created polygons for the Mad River, parking lots, playground, public lands with parcel categories for unassigned parcels, open space/parks, public, and vacant and used the Humboldt County Outline and Humboldt County parcel data set. We collected GPS waypoints from the field and labeled the points in ArcMap as benches, bike racks, boat ramps, fishing points, horse hitching bar, picnic tables, restrooms, and stairs. The GPS used was a Garmin GPSmap 60CSx. Using waypoints and the interface between river and parcel polygons we digitized shoreline and trail polylines. We also used the Humboldt County Road dataset to visualize access to the trails that accessed the river shoreline. ArcMap Calculate Geometry was used to determine the length of the shorelines and trails.

After working with the CONUS wetland polygon dataset we discovered that it did not match up with the 2012 NAIP imagery (Figures 2 and 3). There was a fairly serious difference between the shoreline position of the CONUS polygon and the shoreline visible on the NAIP imagery. We decided to digitize our own polygon over the Mad River using the NAIP imagery (Figure 4). The corrected digitized polygon includes sand and gravel bars without visible vegetation to take winter flooding into account.
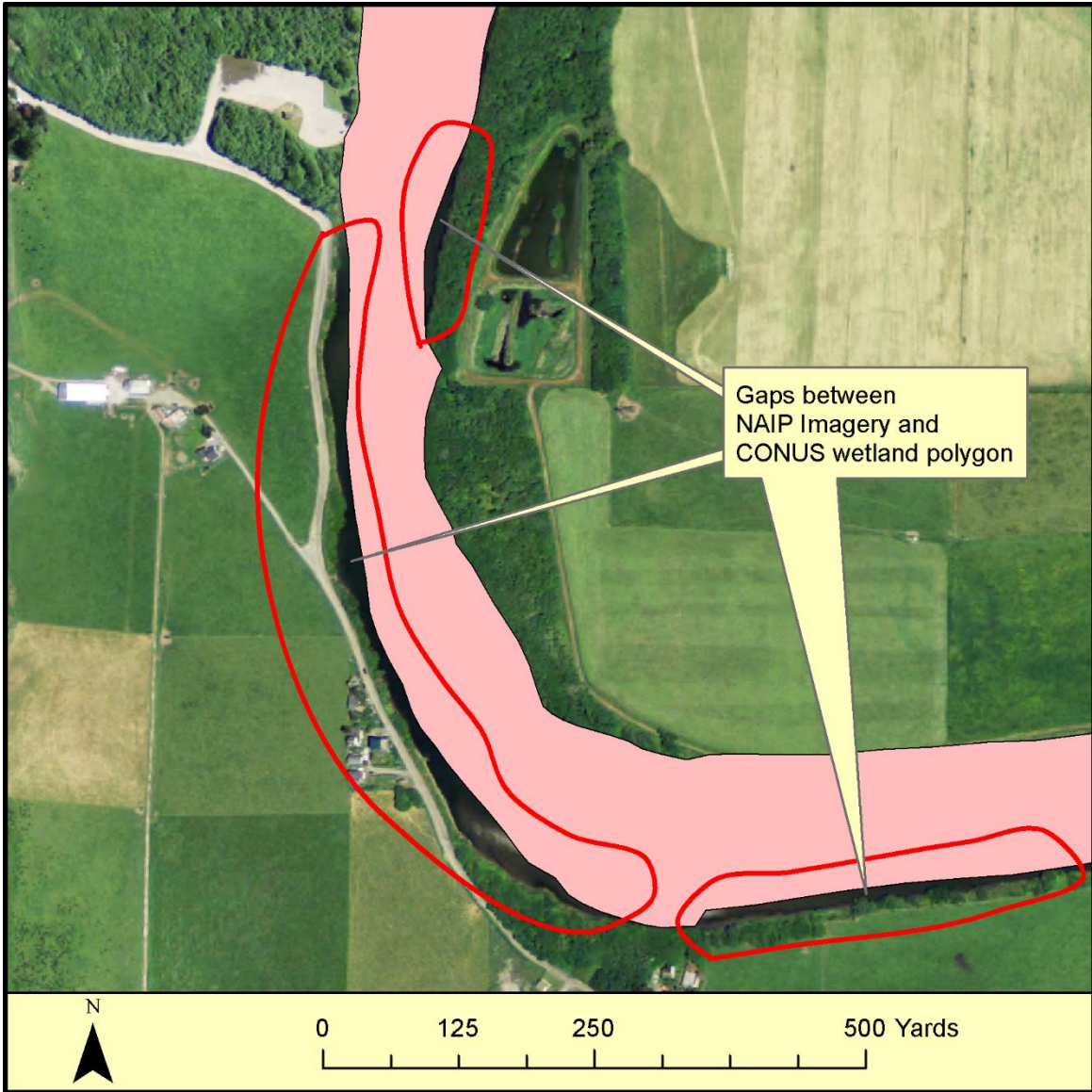
Gaps between
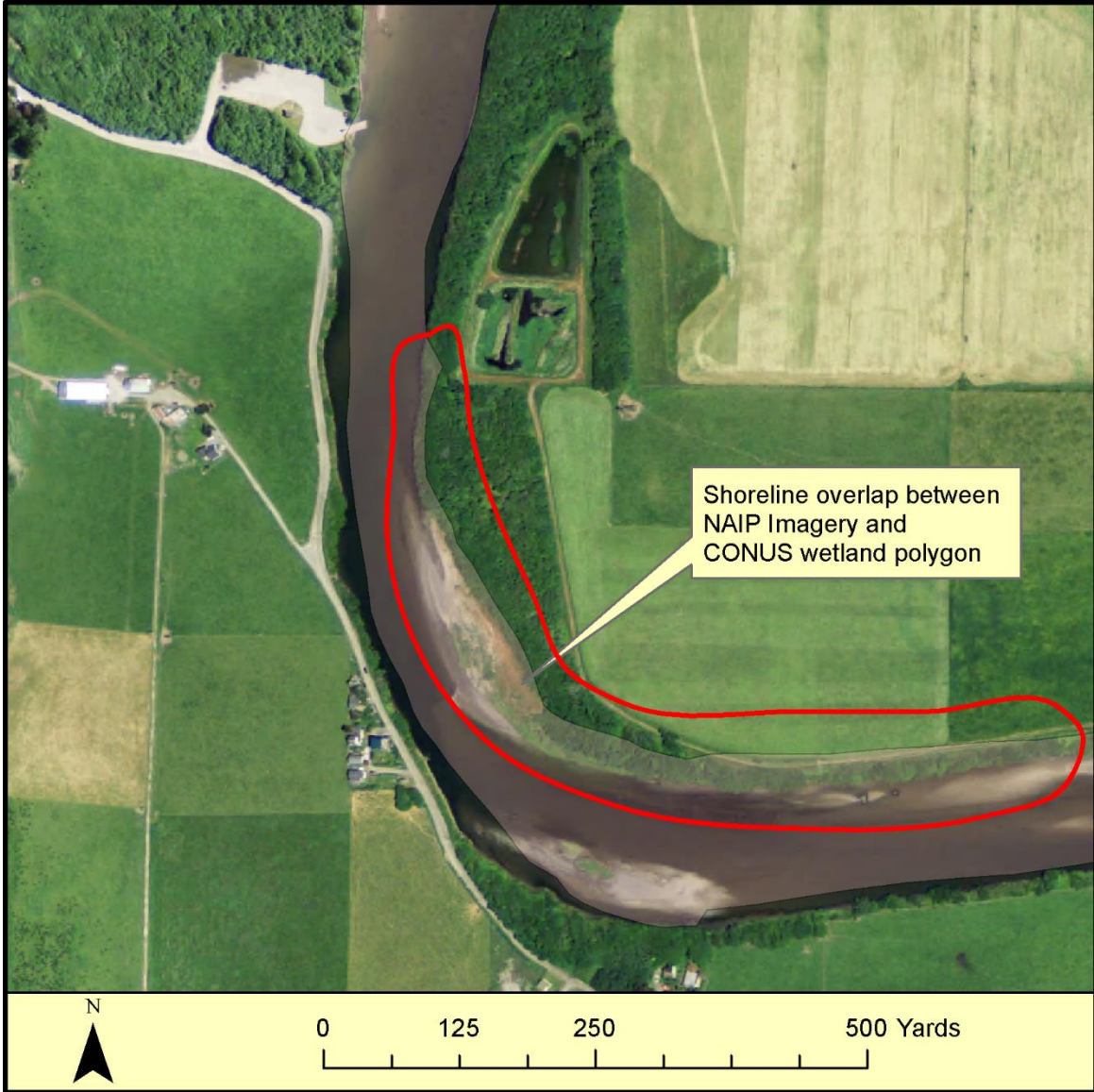NAIP Imagery and
CONUS wetland polygon

N

| 0 | 125 | 250 | 500 Yards |

Figure 2.   Gap Error

Shoreline overlap between NAIP Imagery and CONUS wetland polygon
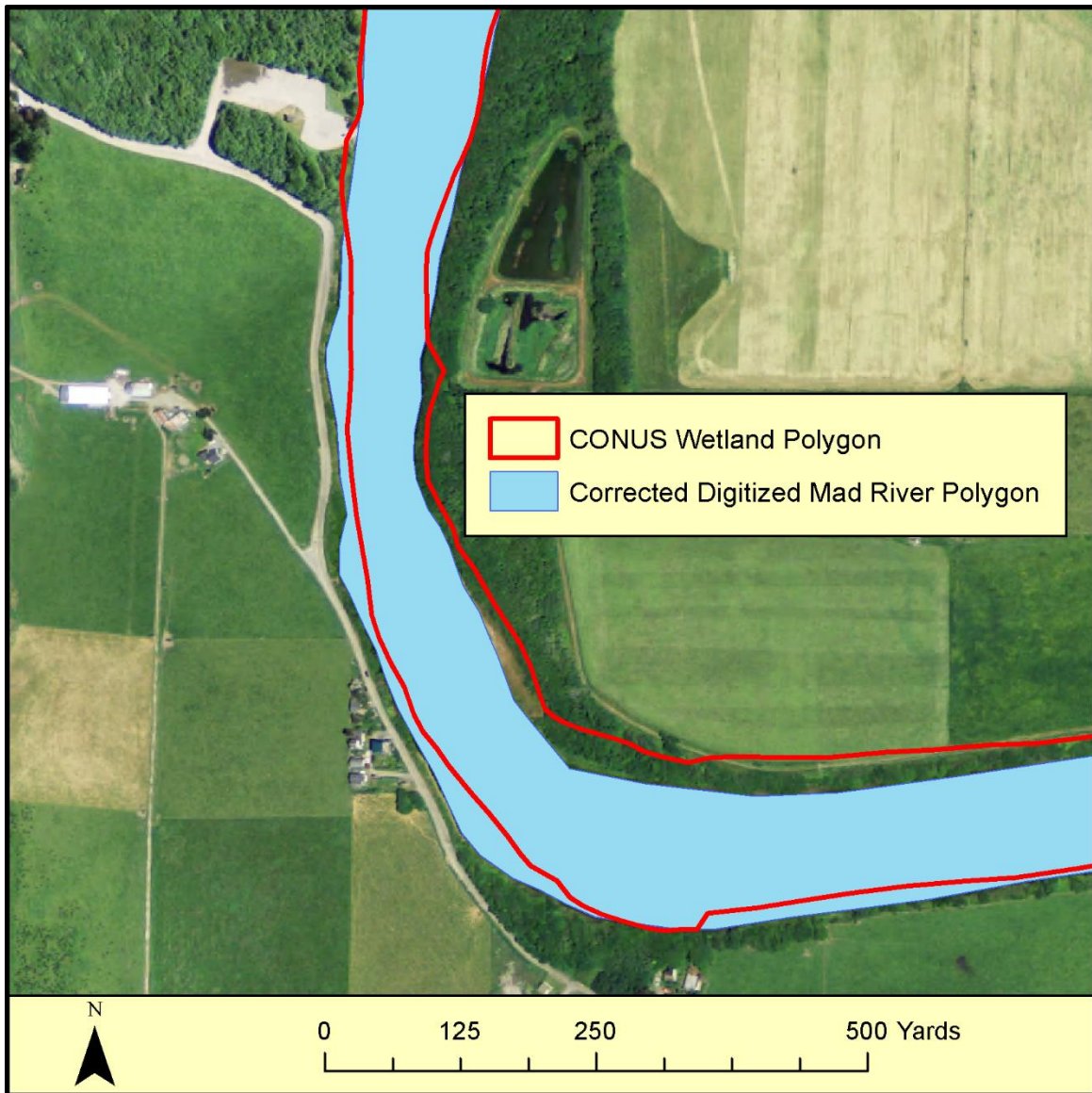
Figure 3. **Overlap Error**

Figure 4.   Gap and Overlap Error Correction

Results

We found that the Mad River can be publicly accessed downstream from the Highway 101 Bridge from the Hammond Footbridge, Mad River Beach County Park, Hiller Park and the area surrounding the west end of Murray Road. Hammond Footbridge (Figure 6) has access to 9 yards of shoreline. Mad River Beach County Park (Figure 7) has a trail that goes 1227 yards north to the Mad River sand bar, which has 3803 yards of river shoreline. Hiller Park (Figure 8) has access to 397 yards of shoreline. Murray Road (Figure 9) has access to 1145 yards of shoreline.
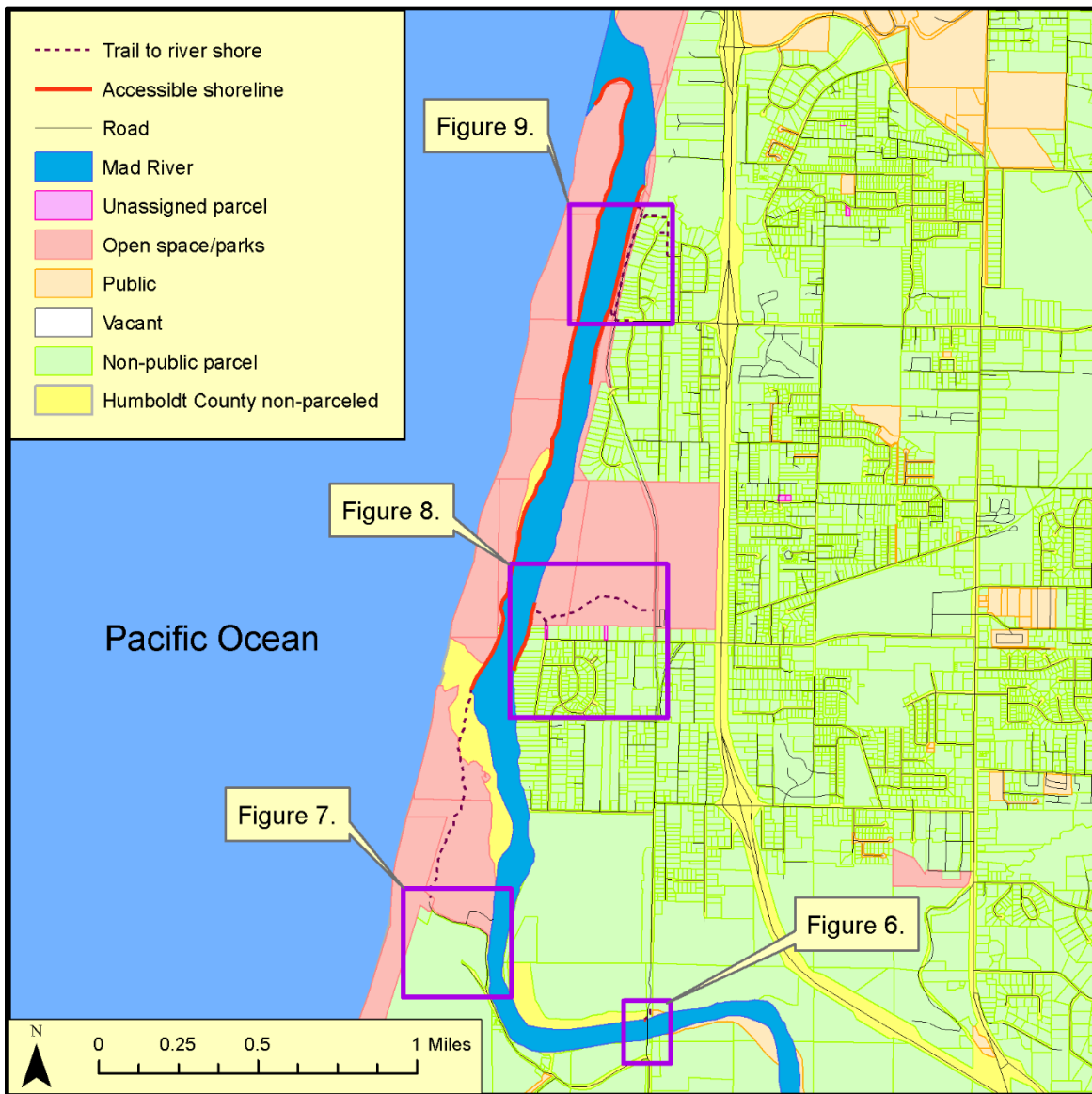
Figure 5. Map overview of Mad River access showing trails to accessible river shoreline, specific study sites corresponding to Figures 6-9 and Humboldt County parcel assignments
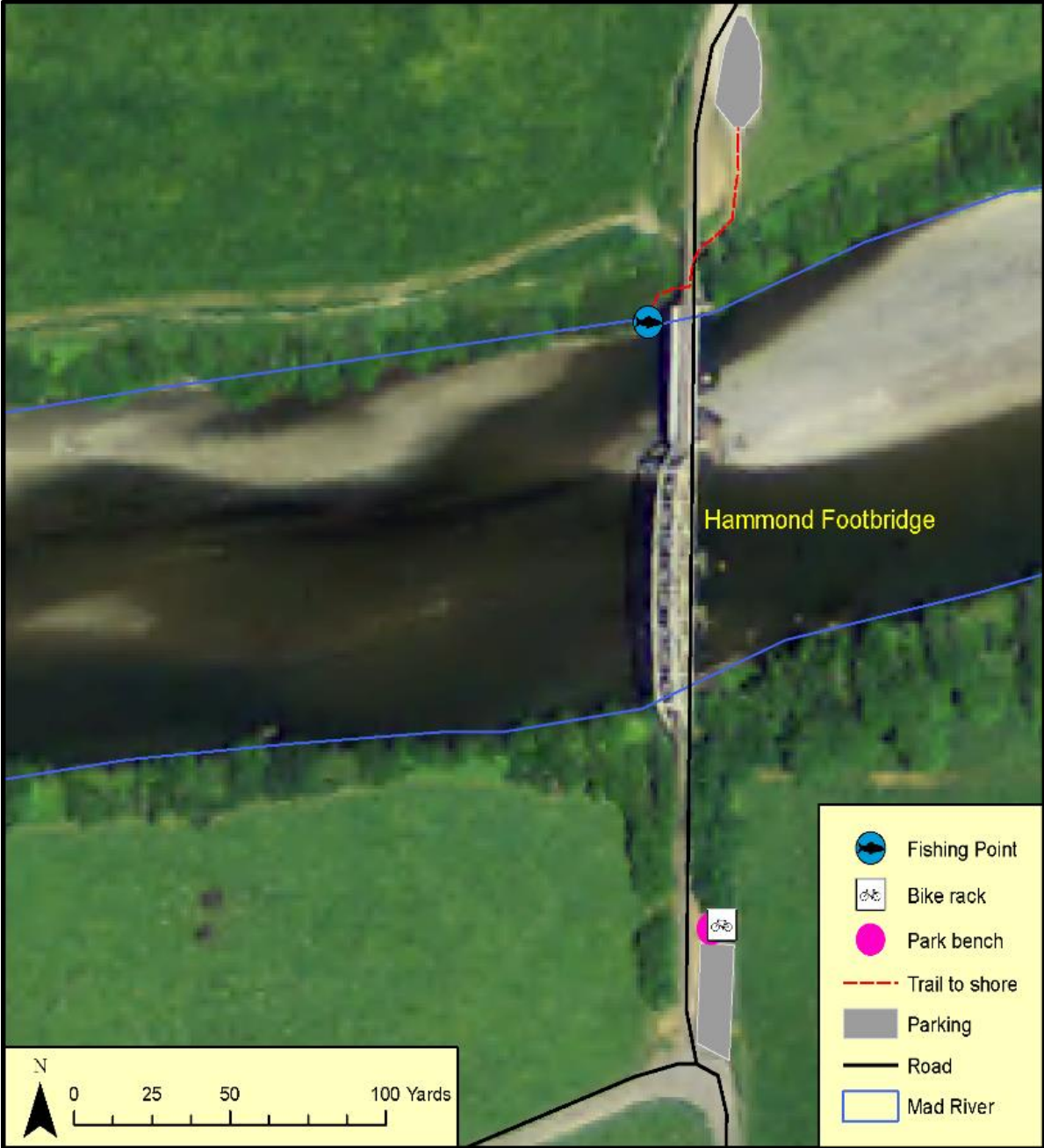
Figure 6. Map of Hammond Footbridge river access and points of recreational interest
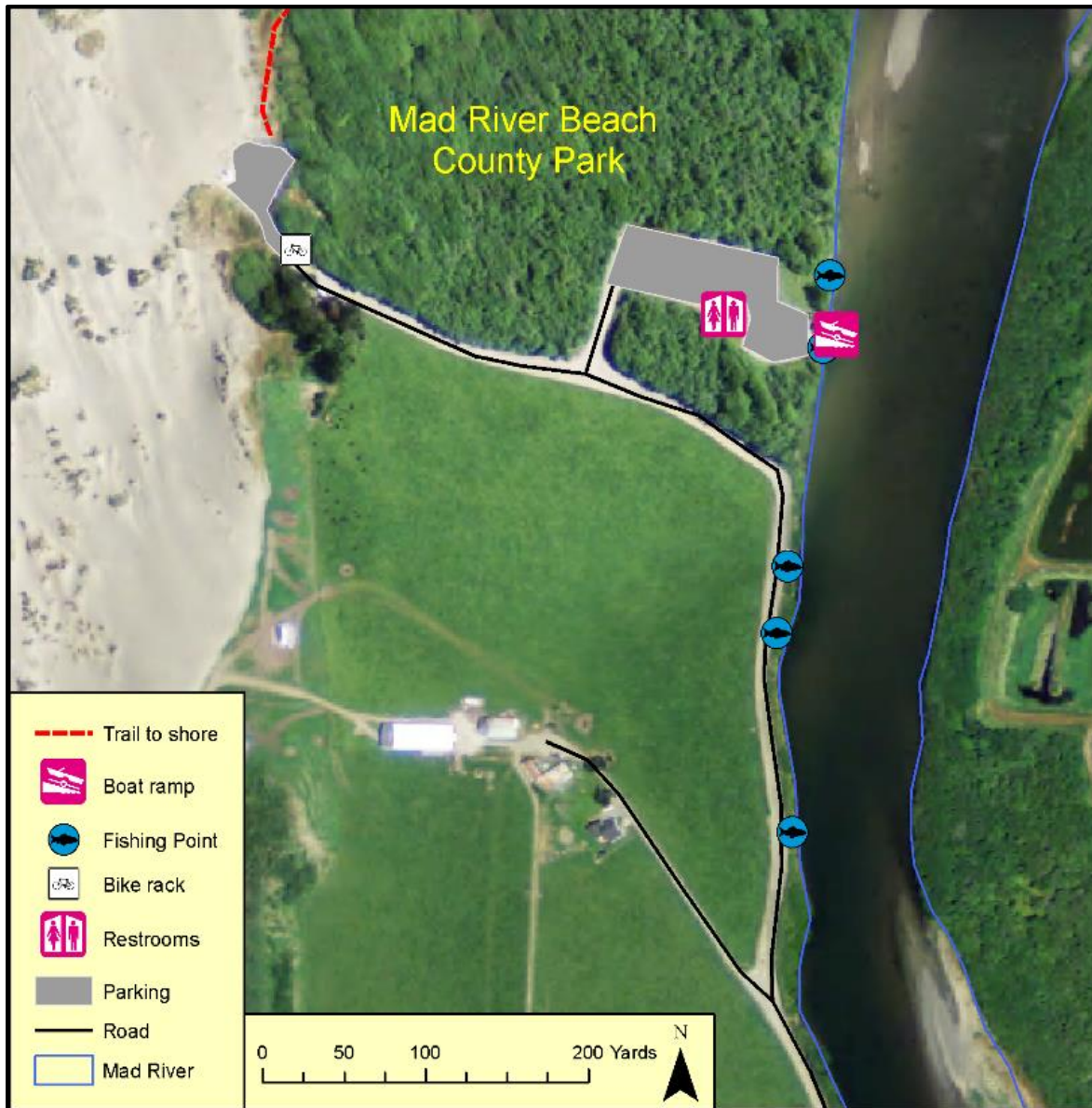
Figure 7. Map of Mad River Beach County Park river access and recreational points of interest

Figure 8. Map of Hiller Park river access and recreational points of interest

Figure 9. Map of Murray Road river access and recreational points of interest

Trail and shore length

The combined total length of accessible shoreline of the Mad River estuary was approximately 5254.2 yards.

The combined total length of trails to the Mad River estuary shoreline was approximately 3358.3 yards.

Conclusion

The Mad River downstream from the Highway 101 Bridge has four major areas of river access available to the public. The two most accessible areas are the Mad River Beach County Park for fishing and boating and Hiller Park for dog walking, picnicking, and wildlife watching. There is no practical public access between the Highway 101 Bridge and the Hammond Footbridge. The Mad River sand bar can only be accessed from the western parking lot of the Mad River Beach County Park. Shore access at the Hammond Footbridge is negligible. A lesser known area of access includes trail heads from Murray Road, Wilbur Avenue and Sandpointe Drive. The CONUS_wet_poly.shp dataset from the USDA did not line up with the 2012 NAIP imagery which meant we had to digitize our own polygon of the Mad River based on the 2012 NAIP Imagery. The parcel data also did not line up perfectly with the 2012 NAIP but it was close enough to indicate where publicly accessible areas were. A particular consideration for the analysis of river shoreline length is that the Mad River water level, especially near the mouth, tends to fluctuate due to seasonal rains, drought and the tides. The position of the river mouth is also known to changes positions north or south along the western sand bar visible on the left side of Figure 8. In fact the parcel data displayed in Figure 5 shows an area of non-parceled land just north of Figure 7 (Mad River Beach County Park) that may have been the mouth of the river when the Humboldt County parcels were established. Overall there are at least four areas from where Humboldt State University Students and the general public can access from the Highway 101 Bridge down to the river mouth known as the Hammond footbridge, Mad River Beach County Park, Hiller Park and Murray Road.

Acknowledgements

Humboldt State University GSP Lab

George Pease, Storage Manager, of the Forestry Building Rm 208 - providing the GPS

United States Department of Agriculture

United States Geological Survey

National Atlas of the United States

Bibliography

1. *Download Seamless Wetlands Data*. (2014, October 15). Retrieved November 10, 2014, from The National Wetlands Inventory Web : http://www.fws.gov/wetlands/data/Data-Download.html

2. *GIS Data Download*. (n.d.). Retrieved November 10, 2014, from Humboldt County Californai Redwood Coast website: http://humboldtgov.org

3. Jacob. (2012, June 12). *Mad River*. Retrieved 12 12, 2014, from The Mad River Alliance: http://www.madriveralliance.org

4. *Mad River History*. (2012, January 1). Retrieved November 13, 2014, from Mad River Information: http://www.northcoastweb.com

5. *One of Northern California's Finest RV parks*. (2005, January 1). Retrieved November 14, 2014, from Mad River Rapids: http://www.madriverrv.com/