

# Higgins eye (*Lampsilis higginsii*) Essential Habitat Areas

## 2008 Review and Addition of New EHAs

### Background

U.S. Fish and Wildlife Service's (Service) recovery plan for Higgins eye (*Lampsilis higginsii*, U.S. Fish and Wildlife Service 2004) focuses on the recovery of the species within *Essential Habitat Areas* (EHA). In the plan, the Service described ten EHAs, but also noted that it intended to "assess other areas that may contain the features that indicate that they are of utmost importance for the conservation of Higgins eye."

In this document, we describe four new EHAs that the Service has added, in consultation with the recovery team. In each of these areas, recent survey data indicates that key characteristics of the mussel beds exceed the Higgins eye EHA guidelines (Table 1). Therefore, there are now fourteen EHAs – the ten described in the recovery plan plus the four new EHAs described below.

### Mapping New EHAs

In each case, we based the longitudinal boundaries of the new and proposed EHAs on the up- and downstream limits of the mussel bed, using the EHA guidelines (e.g.,  $>10$  mussels/m<sup>2</sup>) and recent reports (Table 1) to define the mussel bed. For main channel areas we used the shoreline and the thalweg<sup>1</sup> to determine the lateral breadth of EHAs (e.g., see Fig. 2). If the EHA mussel bed was contained in a slough outside of the main channel, the EHA extends between the lateral boundaries of the slough, as represented by shorelines, vegetated islands, point bars, intersections with other sloughs, etc. (e.g., see upstream portion of Fig. 1).

#### *UMR, Pool 11, RM 606-608 – Cassville, Wisconsin*

The polygon for this site (Fig. 1) was digitized based on the location of the mussel bed (Ecological Specialists Inc. 2006) and modified to align with shoreline and other features as depicted in USGS quadrangle map and the 2006 color aerial photograph. The mussel bed in this area extends upstream of the EHA, but data are not yet sufficient to determine whether the characteristics of the bed (e.g., see Table 1) warrant extending the boundaries of the EHA further upstream (Winterringer & Dunn 2008)

#### *UMR, Pool 9, RM 660-661 – Near Lansing, Iowa*

The polygon for this EHA (Fig. 2) was hand digitized based on the area in which the mussel bed was mapped based on qualitative sampling conducted 24-26 May 2005 (Table 1, E. Belt, Ecological Specialists, Inc., O'Fallon, MO, pers. comm. 14 February 2008). We then adjusted the boundaries to better align with the shoreline areas as depicted by the USGS 24K quadrangle map and extended the EHA laterally to the thalweg (Fig. 2).

#### *UMR Pool 16, RM 470-471 – Near Buffalo, Iowa*

We hand digitized a polygon around the locations of high density samples, ( $>10$  mussels/sq. m, Helms 2003) to delineate the approximate boundaries of the mussel bed and then adjusted the boundaries to better align with the shoreline areas as depicted by the quadrangle map and 2006 color aerial photograph and extended the EHA laterally to the thalweg (Fig. 3).

---

<sup>1</sup> We used the GIS layer, RECTRC ("Recommended Track" – Inland Electronic Navigation Charts, <http://www.tec.army.mil/echarts/inlandnav/>) to represent the thalweg (see the red line in Figs. 1-3).

*UMR, Pool 14, RM 509.1 -510.1 (Hanson's Slough)*

We hand digitized the mussel bed based on a polygon of the bed sampled by Ecological Specialists, Inc. in 2007 (Ecological Specialists 2008), extending the EHA from the right descending bank laterally to the thalweg and, in part, to more proximate islands and bars (Fig. 4).

**Table 1. Most recent data for current, proposed, and potential Higgins eye (*Lampsilis higginsii*) Essential Habitat Areas (EHA). Areas that exceeded the EHA guidelines (see below) are highlighted in green. EHAs with the status, “Recovery Plan”, are those listed as EHAs in the recovery plan (U.S. Fish and Wildlife Service 2004). “New” EHAs are those the Service has added to the list of EHAs since approval of the recovery plan. “Proposed” EHAs exceed the EHA guidelines based on the most recent survey and “Potential” EHAs exceed *some* of the guidelines. The percentage of the native mussel community constituted of Higgins eye is based on quantitative (e.g., quadrat samples) or qualitative (e.g., catch-per-unit-effort) sampling methods, or both. According to the guidelines in the recovery plan, an area may be considered as an EHA if at least 15 other mussel species are present at densities > 0.01/m<sup>2</sup> and total density of native mussels is >10/m<sup>2</sup> in the Mississippi River and >2/m<sup>2</sup> in other rivers, respectively. In addition, Higgins eye should constitute > 0.25% of the native mussel community. If Higgins eye constitutes < 0.25% of mussel community, zebra mussel (*Dreissena polymorpha*) density should be < 0.5/m<sup>2</sup>.**

Area	EHA Status	Relative Abundance – Percent Higgins Eye		Zebra Mussel Density (#/m <sup>2</sup> )	Estimated Native Mussel Density (#/m <sup>2</sup> )	Number Species >0.01/m <sup>2</sup>	Source	Notes
		Qualitative	Quantitative					
St. Croix River, Franconia	Recovery Plan	0.20	0.11	Not detected	9.5	23	(Heath 2004)	
St. Croix River, Hudson	Recovery Plan	2.2	1.7	Present <sup>2</sup>	7.55	20	(Heath 2004)	May consider extending this EHA downstream to RM 14.1 (see Kelner & Davis 2002:12)
St. Croix River, Prescott	Recovery Plan	0.45/0.5	Not detected	89	6.3	14	(Farr 2004)	Two qualitative sampling methodologies used
Wisconsin River, Orion	Recovery Plan	5.67	See note.	Not detected	1.7	14	(Heath 2007)	Relative abundance is based on a combination of qualitative collections and quantitative samples (Heath 2007).
UMR Pool 9, Whiskey Rock	Recovery Plan	2/3	1	180	7.4	19	(Farr 2004)	
UMR Pool 10, Harper's Slough	Recovery Plan	Not detected	Not detected	861	12.0	12	(Anderson 2005)	Based on qualitative survey (Miller & Payne 2001) Higgins eye constituted 0.63% mussel community in 2000
UMR Pool 10, McMillan Island	Recovery Plan	1.0/1.2	0.77	461	5.2	28	(Farr 2005)	zebra mussel density based on Miller & Payne (2001)
UMR Pool 10, Prairie du Chien	Recovery Plan	3.6	2.2	1394	4.8	12	(Winterringer & Dunn 2007)	Zebra mussel densities sampled in 2004 (Anderson 2005)
UMR Pool 14, Cordova	Recovery Plan	1.8	2.4	12.8	4.7	24	(Ecological Specialists 2008; Farr 2005)	Qualitative percent composition Higgins eye based on mean of six sampling efforts 2004-2007 (Ecological Specialists 2008). Native mussel density based on Ecological Specialists (2008). Quantitative percent composition, zebra mussel density, and number species >0.01m <sup>2</sup> based on Farr

<sup>2</sup> Present, but density not sampled quantitatively.

Area	EHA Status	Relative Abundance – Percent Higgins Eye		Zebra Mussel Density (#/m <sup>2</sup> )	Estimated Native Mussel Density (#/m <sup>2</sup> )	Number Species >0.01/m <sup>2</sup>	Source	Notes
		Qualitative	Quantitative					
								(2005).
UMR Pool 15, Sylvan Slough	Recovery Plan	0.2	1.7	408.8	5.9	6	(Farr et al. 2003)	15 species detected in qualitative surveys (Farr et al. 2003)
UMR Pool 11, Cassville	New	1.4/1.1	0.9	Present	41.4	26	(Ecological Specialists Inc. 2006)	
UMR, Pool 9, RM 660	New		0.8		14.8	25	(Ecological Specialists Inc. 2005b)	Might connect w/ RM 659.4-659.8 site (see above) for a single EHA. Both are near Whiskey Rock EHA.
UMR Pool 16, RM 470	New	n/a	1.8	Present	19.7	26	(Helms 2003)	
UMR, Pool 14, RM 509.1 - 510.1 (Hanson's Slough)	New	-	0.4	Present	11.1	19	(Dunn 2008; Ecological Specialists 2008)	Bed may extend further upstream and downstream (E. Dunn, Ecological Specialists, Inc., pers. comm. 3 Aug 2008).
UMR Pool 7, Winters Landing	Potential	0.63/0.29	Not detected	5.3	9.44	21	(Farr 2005)	Two qualitative sampling methodologies used in 2005 (Farr 2005); total mussel density = 11.7 in 2000 (Miller & Payne 2001); Miller & Payne (2001) source for zebra mussel density
UMR Pool 9, RM 659.4-659.8	Potential	5.7	5.0	Present	4.7	15	(Havlik 1999)	Less than one mile upstream of Whiskey Rock EHA.
UMR Pool 17, RM 451, Muscatine	Potential	n/a	Not detected	Present	13	19	(Helms 2006)	<i>Plethobasus cyphus</i> also present; <i>L. higginsii</i> constituted 0-0.3% of mussel community in 1999-2004; zebra mussels on nearly 100% of native mussels
UMR Pool 14, RM 518.8	Potential	n/a	0.5	Present	8.3	16	(Helms 2007)	Live zebra mussels on 72% of native mussels.
UMR Pool 13, RM 556.4, Bellevue	Potential	0.2/Not detected	Not detected	183	7.4	12	(Farr 2004)	Estimated percent community composition was 0.1/1.9 in 2002 (Farr et al. 2003); Miller & Payne (2001) found 18 species at densities >0.01/m <sup>2</sup> in 2000
UMR, Pool 11, RM 589-589.5	Potential	0.8	Not detected	Present	10.2	22	(Ecological Specialists Inc. 2005a)	Zebra mussels attached to 22.4 % of native mussels. Exceeds EHA guidelines, but additional survey effort needed to describe the mussel bed.

## References

- Anderson, D. 2005. Draft December 2005 Mussel Coordination Team 2005 mussel surveys, Harpers and Prairie du Chien *Lampsilis higginsii* Essential Habitat Areas, Pool 10, Upper Mississippi River. U.S. Army Corps of Engineers, St. Paul, MN. 5 p.
- Dunn, H. Ecological Specialists, Inc., personal communication, 10 July 2008.
- Ecological Specialists, I. 2008. Draft report: 2007 results of unionid mussel monitoring near Quad Cities Nuclear Station, Mississippi River miles 495 to 515. Exelon Generation Company, Warrenville, IL. 48 p.
- Ecological Specialists Inc. 2005a. Final report: Characterization of unionid communities, navigation ecosystem sustainability project, Pool 11, Mississippi River, Dubuque County, Iowa and Grant County, Illinois. U.S. Army Corps of Engineers, Rock Island, IL. 17 p.
- Ecological Specialists Inc. 2005b. Final report: Unionid community characterization in the Mississippi River near Lansing, Allamakee County, Iowa. O'Fallon, MO. 18 p.
- Ecological Specialists Inc. 2006. Draft report: 2006 monitoring of native and non-indigenous mussel species in the Upper Mississippi River. U.S. Army Corps of Engineers, Rock Island, IL. 29 p.
- Farr, M. D. 2004. Summary of results from 2004 UMR mussel survey. USACE- ERDC, p.
- Farr, M. D. 2005. Summary of ERDC UMR 2005 mussel survey at Winters Landing, McMillan Island, and Cordova Essential Habitat Areas. 1 p.
- Farr, M. D., A. C. Miller, and B. S. Payne. 2003. Ecological aspects of native and non-indigenous bivalves at selected sites in the Upper Mississippi River, 2002 studies. U.S. Army Engineer Research and Development Center, Vicksburg, MS. 19 p.
- Havlik, M. E. 1999. A survey for unionid mussels, Alliant Generating Plant, Mississippi River Mile 659.4-660.4, Lansing, Allamakee Co., IA, July-Aug 1999. Malacological Consultants, LaCrosse, WI. 24 p.
- Heath, D. 2004. Results of 2004 monitoring of freshwater mussel communities of the Saint Croix National Scenic Riverway, Minnesota and Wisconsin. Wisconsin Department of Natural Resources, LaCrosse, WI. p.
- Heath, D. 2007. Results of 2007 Monitoring of Freshwater Mussel Communities of the Wisconsin River near Orion, Richland County, Wisconsin. Wisconsin Department of Natural Resources, La Crosse, WI. 22 p.
- Helms, D. 2003. Mussel survey for the Blackhawk Barge Fleet PCS site in Mississippi River Pool 16, River Mile 470, Scott Co., Iowa. Helms & Associates, Bellevue, IA. 17 p.
- Helms, D. 2006. Results of the third mussel monitoring survey at the River Trading Company dock facility Mississippi River Pool 17 (river mile 451) near Muscatine, Iowa. Helms & Associates, Bellevue, IA. 21 p.
- Helms, D. 2007. Results of the second mussel/sediment monitoring survey for the J.T. Cullen barge docking site located at Mississippi River Pool 14, River Mile 518.8, Whiteside County, Illinois. Helms & Associates, Bellevue, IA. 16 p.
- Kelner, D. and M. Davis. 2002. Final report: Mussel (Bivalvia: Unionidae) surveys 2001: Lower St. Croix River from Stillwater, Minnesota (RM 23.7) to Prescott, Wisconsin (RM 1.7); Mississippi River Pool 7; Mississippi River Lock and Dam 3 tailwaters mussel bed mapping; Higgins' eye gravid female mussel collection. St. Paul, MN. 45 p.
- Miller, A. C. and B. S. Payne. 2001. Effects of zebra mussels (*Dreissena polymorpha*) at essential habitats for *Lampsilis higginsii* in the Upper Mississippi River System, 2000. U.S. Army Corps of Engineers, Aquatic Ecology Branch, Engineering Research and Development Center, Vicksburg, MS. 27+ p.
- U.S. Fish and Wildlife Service. 2004. Higgins eye pearlymussel (*Lampsilis higginsii*) recovery plan: First revision. Ft. Snelling, MN. 126 p. [[http://ecos.fws.gov/docs/recovery\\_plan/040714.pdf](http://ecos.fws.gov/docs/recovery_plan/040714.pdf)]
- Winterringer, R. and H. Dunn. 2007. Draft Report: 2007 Monitoring of Native and Non-Indigenous Mussel Species in the Upper Mississippi River - Cassville and Prairie du Chien Higgins' Eye Pearlymussel Essential Habitat Areas. U.S. Army Corps of Engineers, St. Paul, MN. 38 p.
- Winterringer, R. and H. Dunn. 2008. Final Report: 2007 Monitoring of Native and Non-Indigenous Mussel Species in the Upper Mississippi River - Cassville and Prairie du Chien Higgins' Eye Pearlymussel Essential Habitat Areas. U.S. Army Corps of Engineers, St. Paul, MN. 28 p.

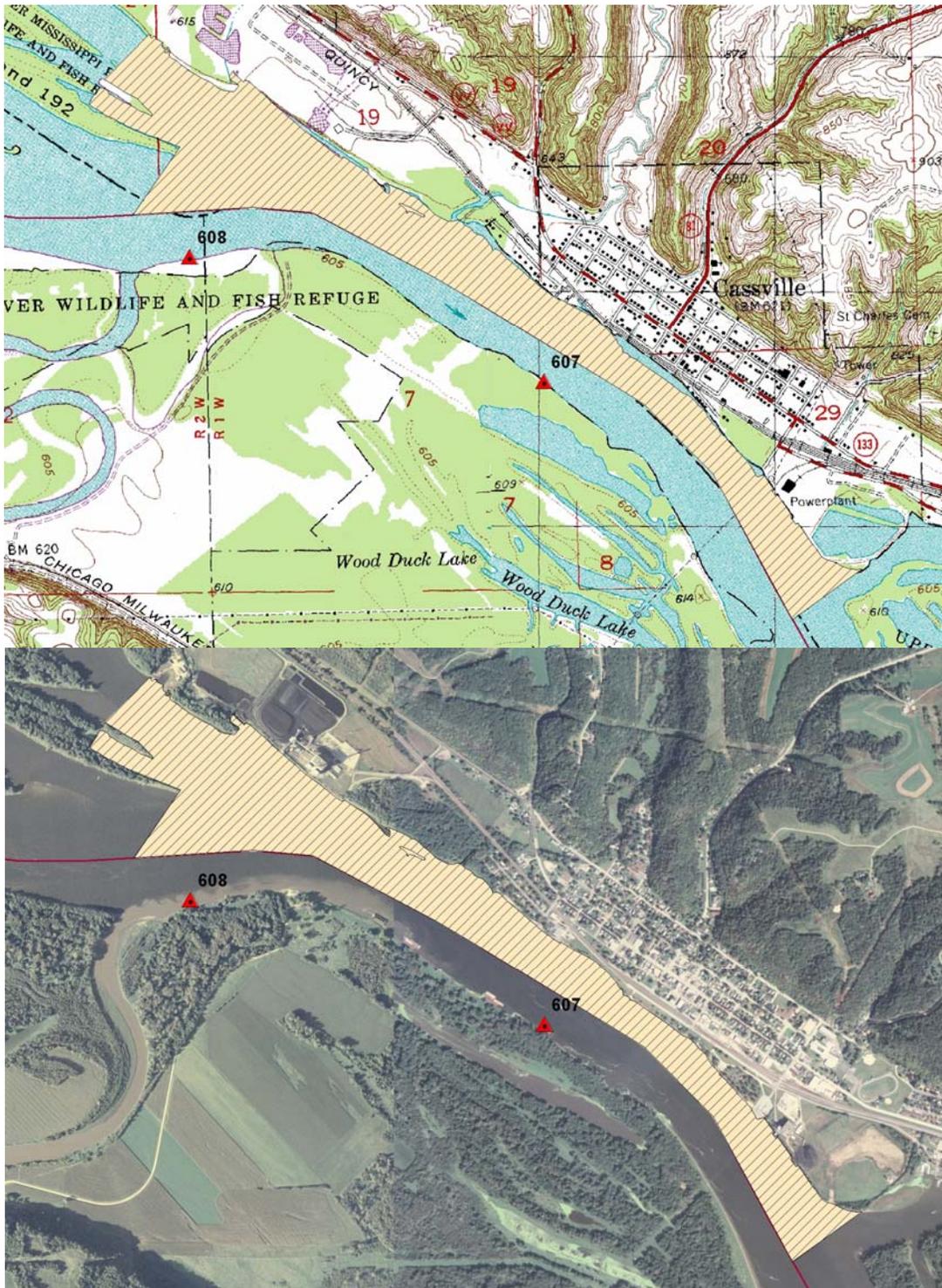


Figure 1. Cassville Essential Habitat Area, Mississippi River, Pool 11.



Figure 2. New Essential Habitat Area at River Mile 660, Mississippi River, Pool 9 near Lansing, Iowa. Mussel bed (E. Belt, Ecological Specialists, Inc., O'Fallon, MO, pers. comm. 14 February 2008) is shown in beige and Essential Habitat Area is hatched.

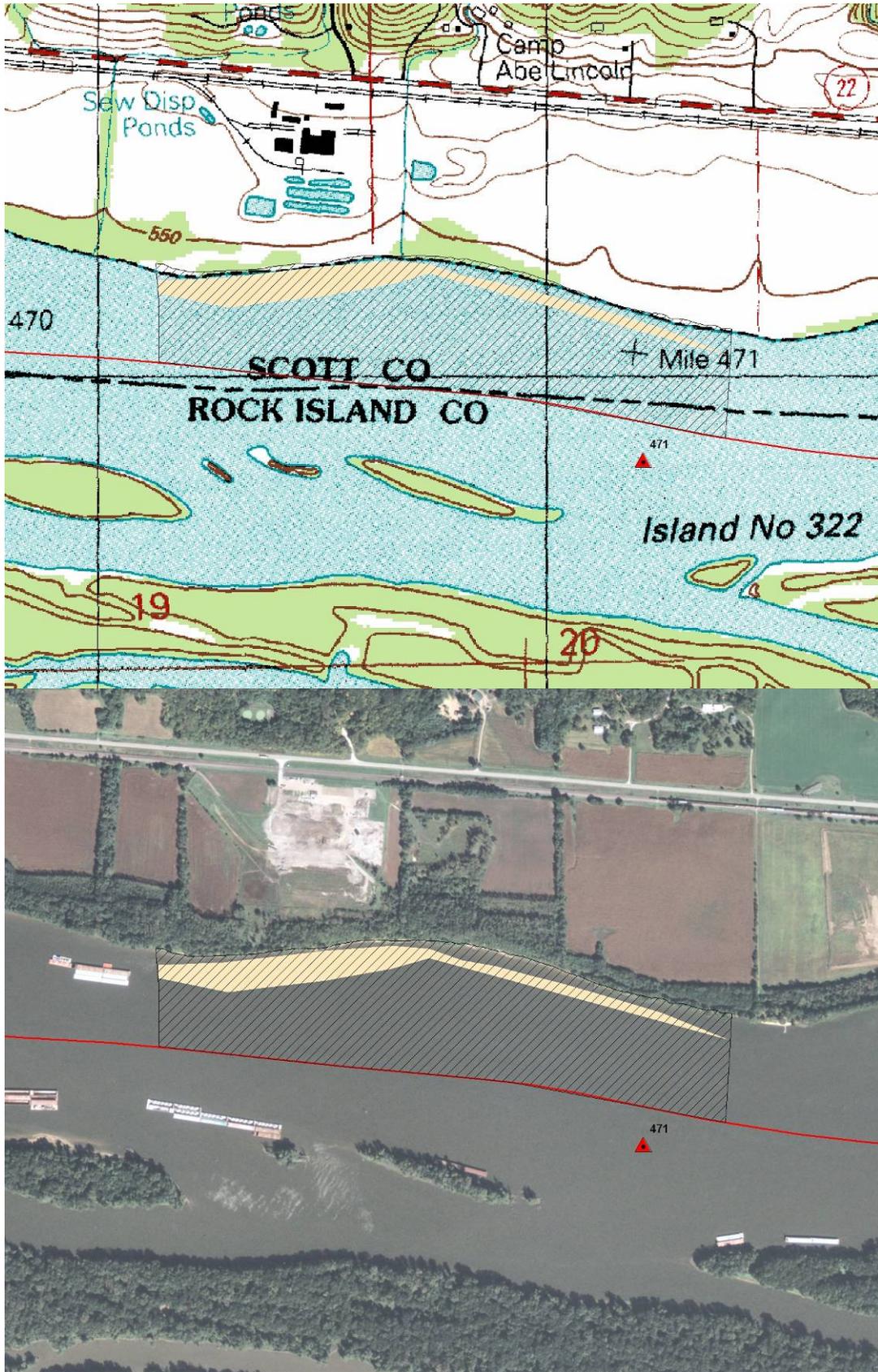
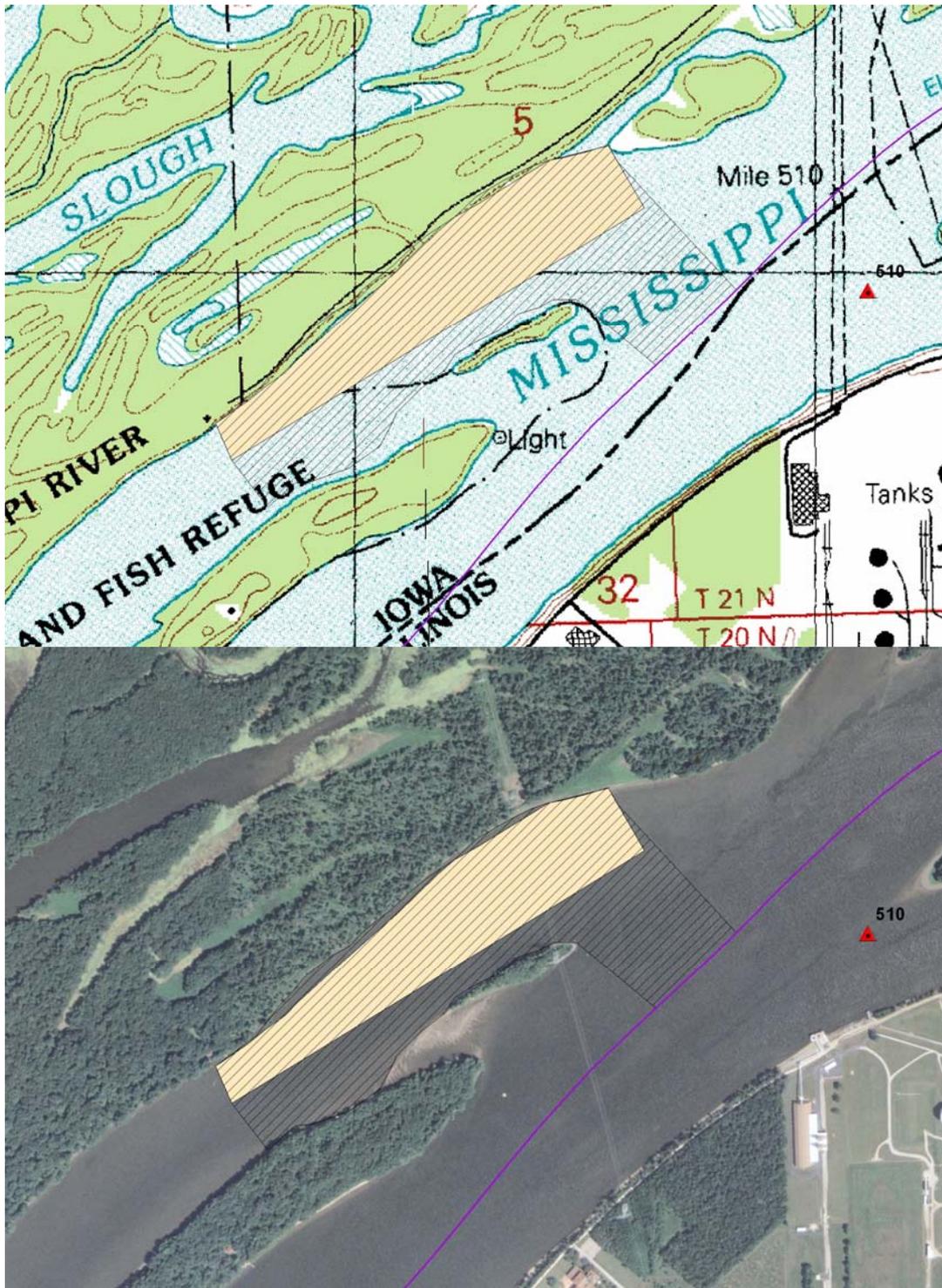


Figure 3. New Essential Habitat Area at River Mile 471, Mississippi River, Pool 16. Mussel bed (Helms 2003) is shown in beige and Essential Habitat Area is hatched.



**Figure 4. New Essential Habitat Area at UMR, Pool 14, RM 509.1 -510.1 (Hanson's Slough) near Camanche, Iowa. Mussel bed (H. Dunn, Ecological Specialists, Inc., O'Fallon, MO, pers. comm. 14 August 2008) is shown in beige and Essential Habitat Area is hatched.**