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The current proposed project design involving the boat channel, boat basin, and boat house dredging is not needed for the applicant to exercise their riparian rights. Cumulative development, resulting in the loss of aquatic habitat, has been shown to adversely affect fish and wildlife, and negatively influence recreational fishing (Jennings et al. 1999, O'Neal and Soulliere 2006, Strayer and Findlay 2010, Wehrly et al. 2012, Dustin and Vondracek 2017). The applicant has not avoided and minimized impacts to the maximum extent and has not demonstrated a feasible and prudent alternative, such as a seasonal dock extending to boatable water, is not available.

Increased development results in a loss of refugia and habitat heterogeneity that can cause negative impacts on littoral fish and wildlife communities (Christiansen et al. 1996, Jennings et al 1999, Garrison et al. 2005, Newbrey et al. 2005, Woodford and Meyer 2003, Radomski et al. 2010, Strayer and Findlay 2010). Developed littoral areas have less woody structure, and less vegetation cover, density, and complexity than undeveloped shorelines and in lakes with greater cumulative lakeshore development (Radomski and Goeman 2001, Elias and Meyer 2003, Jennings et al. 2003, Wherly 2012). Physically complex littoral zones support a richer biota than simple ones, with higher species diversity (Tonn and Magnuson 1982, Strayer and Findlay 2010). The reduced aquatic plants and littoral structure resulting from development reduces littoral complexity and has negative implications for aquatic species (Radomski et al. 2010). Woodford and Meyer 2003 found that human-caused littoral zone alterations on lakes in northern Wisconsin have negatively affected green frog populations. Increases in shoreline development and the use of personal watercraft also may increase the susceptibility of turtle wounding and mortality (Smith et al. 2006). Macrophytes provide protective structure for nursery areas for birds, in addition to providing diverse foraging opportunities (Newbrey et al. 2005). Henning and Remsberg (2009) found that increased vegetation complexity results in higher avian diversity, and that the riparian understory at the individual parcel level can alter local bird communities. Increased shoreline development increases nutrient export to the lake (Garrison and Wakeman 2000). Fish density, biomass, body size, and species richness is greater in structurally complex habitats with vegetation and woody structure (Barwick et al. 2004, Madjeczak et al. 1998, Jennings et al. 1999, Strayer and Findlay 2010). Soils that have been disturbed by construction and the removal of aquatic vegetation are more susceptible to erosion and transport of fine sediment particles that can lead to greater amounts of nutrients and contaminants entering the lake (Jennings et al. 2003). The proposed dredging will result in increased sediment and nutrient suspension in the water column, which could cumulatively result in increased phytoplankton production, contribute increased lake turbidity, and lower water quality, which would reduce the functions, values and services of Long Lake. This is in addition to the loss of submerged habitat that will directly reduce fish and wildlife use of the area. The proposed dredging would have to be continually maintained which would perpetuate these negative impacts.

Bryan and Scarnecchia 1992 compared the species richness, composition, and relative abundance of young-of-the-year (YOY) fish assemblages at naturally vegetated sites and sites altered by shoreline development and vegetation removal in a lake where extensive development had eliminated emergent and submerged vegetation from 90% of the lake shoreline. They found that the naturally vegetated nearshore areas with diverse submerged and emergent macrophytes had greater YOY fish species richness and abundance than the adjacent developed sites. Their results coincide with many other studies highlighting the importance of shallow-water vegetation beds to YOY and juvenile fish. The elimination of shallow-water vegetation can reduce the survival and future recruitment of juvenile fish into the fishery (Bryan and Scarnecchia 1992). Bryan and Scarnecchia 1992 contend that the removal of nearshore submerged and emergent vegetation has short-term and long-term impacts resulting from the loss of nursery habitat. The short-term impacts are a potential reduction in year-class strength of vegetation-dependent species. The long-term impacts are changes in fish community richness and composition that alter lake fishery (Bryan and Scarnecchia 1992). Projects that remove submerged and emergent vegetation can impair recreational fishing by reducing fish recruitment and altering the fishery by removing vital fish habitat for critical life stages.

Statewide assessments of lake health conducted in 2012 have indicated that the loss of lakeshore habitat and physical lakeshore complexity are major stressors for Michigan lakes (Lipsey and Schoen 2017). A substantial percentage of Michigan lakes are in the “most disturbed” category in terms of lake riparian vegetation cover (Figure 1), shallow water habitat (Figure 2), and lakeshore disturbance (Figure 3). Additionally, Michigan lakes exceed the eco-region and national percentages of lakes that are in the “most disturbed” categories, and the number of lakes in the “most disturbed” category has increased over time in each of the three indicators as shown in the figures below. Across the state, EGLE has made an effort in recent years to increase understanding of how cumulative impacts of excessive shoreline development negatively affect lake health, and that alternative designs, which minimize these impacts, are available to property owners.

In conclusion, the Wetlands, Lakes and Streams Unit does not support issuance of a permit for the project as currently designed due to the risk for adverse impacts related to the proposed dredging. WLSU recognizes the value of removing the seawall and implementing more natural shoreline techniques, implementing the rain gardens, and avoiding wetland impacts onsite. However, the applicant has not demonstrated that adverse impacts related to the dredging aspect of the project have been avoided and minimized to the maximum extent practicable, and that a feasible and prudent alternative is not available to minimize impacts to aquatic littoral habitats. Potential feasible and prudent alternatives, such as a seasonal dock extending to boatable water, need to be explored by the applicant. A dock could be designed to minimize impacts and still allow the applicant to exercise their riparian rights.

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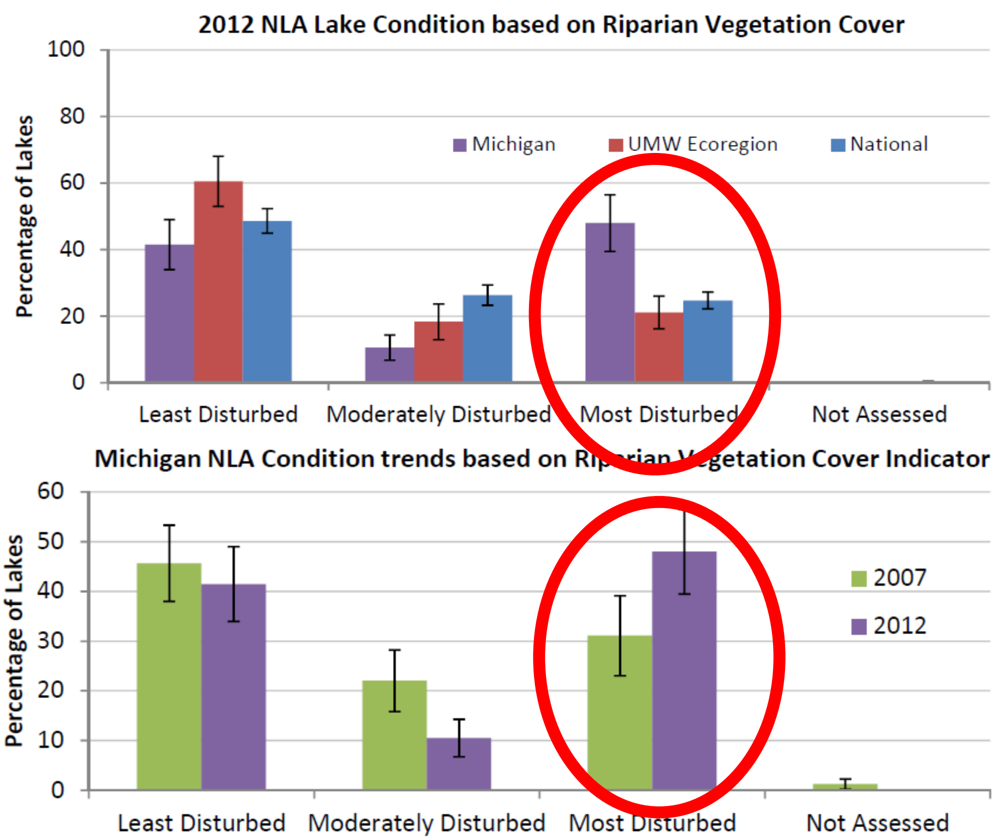

Figure 1 (from Lipsey and Schoen 2017). 50% of Michigan's lakes are in the "most disturbed" category for riparian vegetation cover – this is over double the regional and national average, and has continued to get worse over time (from 2007 to 2012).

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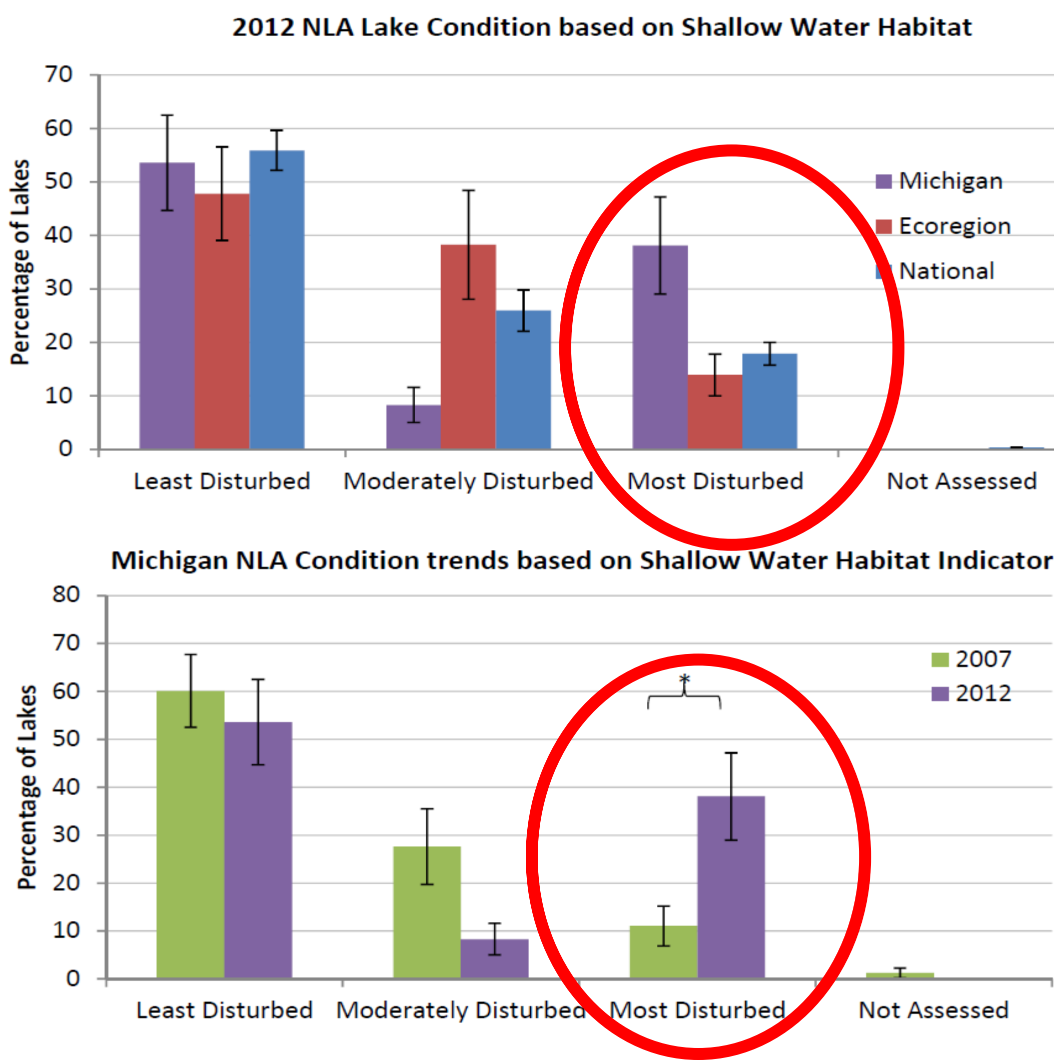

Figure 2 (from Lipsey and Schoen 2017). Almost 40% of Michigan's lakes are in the "most disturbed" category for shallow water habitat – this is (again) over double the regional and national average, and has continued to get worse over time (from 2007 to 2012).

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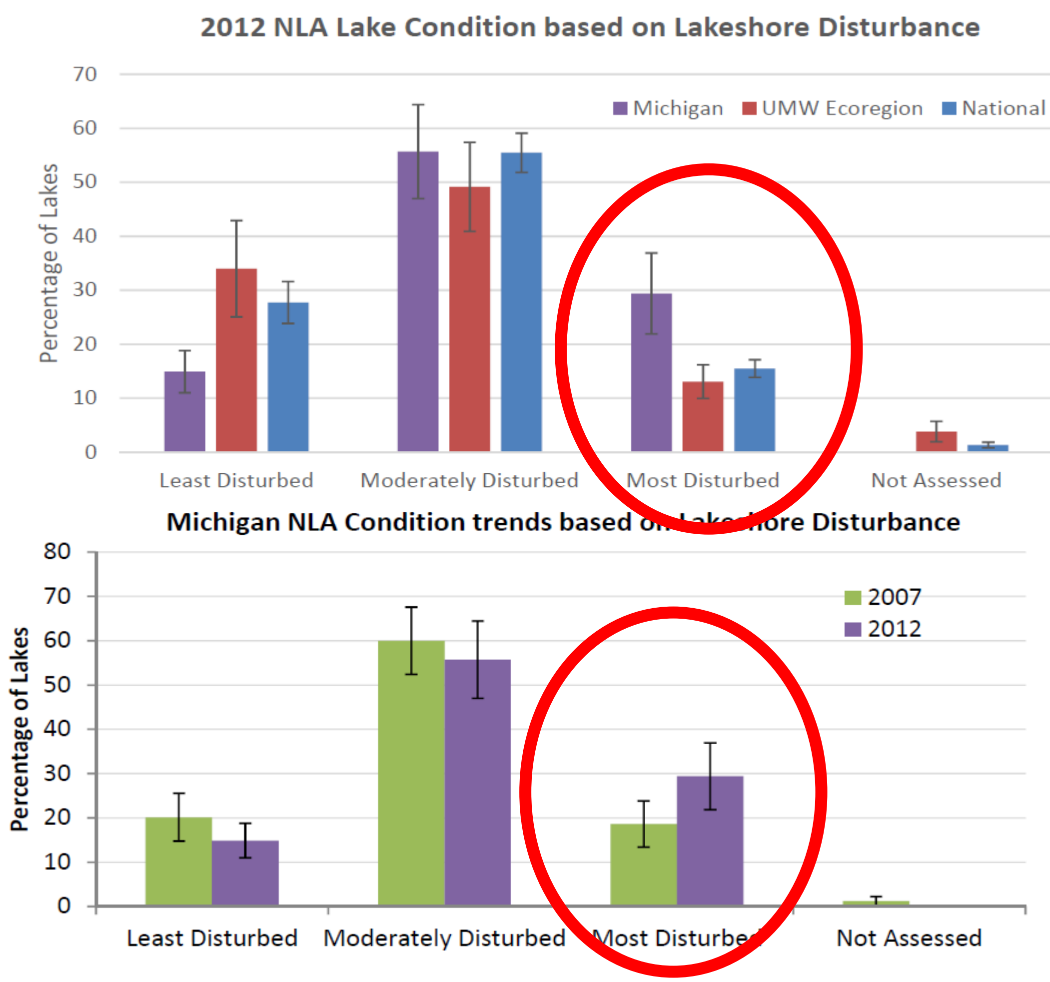

Figure 3 (from Lipsey and Schoen 2017). Roughly 30% of Michigan's lakes are in the most disturbed category for lakeshore disturbance – this is (again) over double the regional and national average, and has continued to get worse over time (from 2007 to 2012).

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