**Ecosystem Type: LAKES AND PONDS**

**Category: Biodiversity Conservation**

1. **Materials**

***Supplier*** – Lakes and ponds can provide a habitat to support the biodiversity of aquatic and terrestrial species (De Meester et al., 2005; Davies et al., 2008). Shallow, isolated lakes and ponds are rich in vegetative species and are resources of food and habitat for fauna such as aquatic birds, amphibians, and invertebrates (Scheffer et al., 2006).

***Driver*** – The ability of ponds and lakes to supply materials for biodiversity is affected by human disturbances (Bronmark and Hansson, 2002) and the availability and cleanliness of water. For some species, the size of the lake or pond also affects their presence (Oertli et al., 2002; Sondergaard, Jeppesen, and Jensen, 2005).

***Demander*** – not applicable

1. **Nutrition**

***Supplier*** – not applicable

***Driver*** - not applicable

***Demander*** - not applicable

1. **Energy**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Mediation of Waste, Toxics, and Other Nuisances**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Mediation of Flows**

***Supplier*** – Lakes and ponds are sinks of sediment that create a unique habitat for a diverse group of biota (Lake et al., 2000). Sediments that come from runoff can be trapped by the aquatic plants in these ecosystems or by settling to the lake bottom (Kling, Kipphut, and Miller, 1991).

***Driver*** – Human disturbances affect the flow of sediment that sinks in lakes and ponds, such as the damming of connecting waterways (Lake et al., 2000), which can reduce the biodiversity of the ecosystem. Further, the ability for lakes and ponds to retain water and mitigate the flow of sediment into downstream waterways is affected by changes in water use and adjacent land cover. For example, impervious surfaces can have a negative impact on the lake’s overall water quality. Higher discharge into lakes reduces the effectiveness these ecosystems have for capturing wastes. One study found that intensified discharge may lead to a decrease in the overall residence time for sediments flowing into the reservoir (Verstraeten and Poesen, 2000).

***Demander*** – not applicable

1. **Maintenance of Physical, Chemical, and Biological Indicators**

***Supplier*** – Lakes and ponds provide nutrient interception, which supports the biodiversity of aquatic species (Cereghino et al., 2008). For example, flood events that carry nutrients such as phosphorous and nitrogen, can be captured in the floodplains of lakes and ponds (Bonnet et al., 2008). This helps to maintain the water quality of the runoff entering the reservoirs.

***Driver*** – Nutrients levels increase the presence of aquatic plants in lakes and ponds, thus the density of aquatic herbivores (Leibold, 1999). However, overabundance of nutrients can cause eutrophication of the waters, decreasing the potential for a rich number of species (Leibold, 1999). Ponds and lakes that are isolated have shown minimal impairments and greater numbers of species (Biggs et al., 2005).

***Demander*** – not applicable

1. **Spiritual, Symbolic, Religious, and Social Experiences**

***Supplier*** – There is growth in understanding about the importance that lakes and ponds have for protecting the biodiversity of species not only in their own ecosystems, but in also surrounding environments. Organizations are forming specifically to target ponds for greater protection such as in the EU Habitats Directive (Cereghino et al., 2008).

***Driver*** – not applicable

***Demander*** – not applicable

1. **Physical and Intellectual Interactions w/ Biota, Ecosystems, and Land/Seascapes**

***Supplier*** – Aquatic species are supplied in lakes and ponds and hunted for sport or simply enjoyed for their aesthetics (George et al., 2018). For example, these species can be used for educational purposes (Simmons, 1998) or fishing (Ball and Tousignant, 1996; Lynch et al., 2016).

***Driver*** – not applicable

***Demander*** - not applicable

**Sources:**

Ball, R.L. and Tousignant, J.N. Indiana Department of Natural Resources Division of Fish and Wildlife. (1996). *The Development of an Objective Rating System to Assess Bluegill Fishing in Lakes and Ponds.* Indianapolis, Indiana.

Biggs, J. et al. (2005) 15 years of pond assessment in Britain: results and lessons learned from the work of Pond Conservation. *Aquatic Conservation: Marine and Freshwater Ecosystems, 15*(6), 693-714. DOI: 10.1002/aqc.745. [abstract only]

Bronmark, C. and Hansson, L.A. (2002) Environmental issues in lakes and ponds: current state and perspectives. *Environmental Conservation, 29*(3), 290-307. <https://doi.org/10.1017/S0376892902000218>. [abstract only]

Cereghino, R. et al. (2008) The ecology of European ponds: defining the characteristics of a neglected freshwater habitat. *Hydrobiologia, 597*(1), 1-6. <https://doi.org/10.1007/s10750-007-9225-8>. [abstract only]

Davies, B. et al. (2008) Comparative biodiversity of aquatic habitats in the European agricultural landscape. *Agriculture, Ecosystems & Environment, 125*(1-4), 1-8. <https://doi.org/10.1016/j.agee.2007.10.006>. [abstract only]

De Meester, L. et al. (2005) Ponds and pools as model systems in conservation biology, ecology an evolutionary biology. *Aquatic Conservation: Marine and Freshwater Ecosystems, 15*(6), 715-725. DOI: 10.1002/aqc.748. [abstract only]

George, S.D. et al. (2018) Effects of watershed and in-stream liming on macroinvertebrate communities in acidified tributaries to an Adirondack lake. *Ecological Indicators, 85*, 1058-1067. <https://doi.org/10.1016/j.ecolind.2017.11.048>. [abstract only]

Lake, P.S. et al., (2000) Global Change and the Biodiversity of Freshwater Ecosystems: Impacts on Linkages between Above-Sediment and Sediment Biota. *BioScience, 50*(12), 1099-1107. [https://doi.org/10.1641/0006-3568(2000)050[1099:GCATBO]2.0.CO;2](https://doi.org/10.1641/0006-3568(2000)050%5b1099:GCATBO%5d2.0.CO;2).

Leibold, M.A. (1999) Biodiversity and nutrient enrichment in pond plankton communities. *Evolutionary Ecology Research, 1*, 73-95. DOI: 10.1038/srep02835.

Lynch, A.J. et al. (2016) The social, economic, and environmental importance of inland fish and fisheries. *Environmental Reviews, 24*(2), 115-121. <https://doi.org/10.1139/er-2015-0064>.

Oertli, B. et al. (2002) Does size matter? The relationship between pond area and biodiversity. *Biological Conservation, 104*(1), 59-70. <https://doi.org/10.1016/S0006-3207(01)00154-9>. [abstract only]

Scheffer, M. et al. (2006) Small habitat size and isolation can promote species richness: second-order effects on biodiversity in shallow lakes and ponds. *OIKOS, 112*(1), 227-231. DOI: 10.1111/j.0030-1299.2006.14145.x. [abstract only]

Sondergaard, M., Jeppesen, E., and Jensen, J.P. (2005) Pond or lake: does it make any difference? *Archiv fur Hydrobiologie, 162*(2), 143-165(23). DOI: <https://doi.org/10.1127/0003-9136/2005/0162-0143>. [abstract only]