Kangaroo Lake Sensitive Area Designation

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Introduction

Kangaroo Lake in Door County is a 1,123 acre hardwater drainage lake averaging 6 feet in depth with a maximum depth of 12 feet. Primary species of fish include northern pike, walleye, largemouth and smallmouth bass, and panfish. The lake supports a variety of recreational opportunities that include fishing, boating, swimming, and wildlife viewing. Most importantly, Kangaroo Lake provides an important and unique ecological function to the region which merits protection efforts.

Chapter NR107 of Wisconsin's Administrative Code allows for the designation of sensitive areas within waterbodies if they fall under the following definition:

> "areas of aquatic vegetation identified by the Department as offering critical or unique fish and wildlife habitat, including seasonal or lifestage requirements, or offering water quality or erosion control benefits to the body of water."

These might include:

- Diverse stands of high quality native aquatic plants which help provide a buffer against the invasion of exotic species of plants. An example would be Eurasian water milfoil which is a very aggressive non native aquatic plant increasingly becoming a nuisance in Wisconsin's lakes.

- Areas of vegetation which trap sediments and nutrients flowing into the lake thereby improving water clarity and reducing available nutrients for undesirable plant growth.

- Areas of vegetation which offer spawning, nesting, or feeding habitat for fish and/or wildlife.

- Areas of vegetation whose species composition or hydrology make it an ecologically unique community.

Sensitive areas designations can be used to protect vital aquatic plant communities and to provide recommendations for lake groups that can be used in implementing further protection measures such as boating and zoning ordinances.

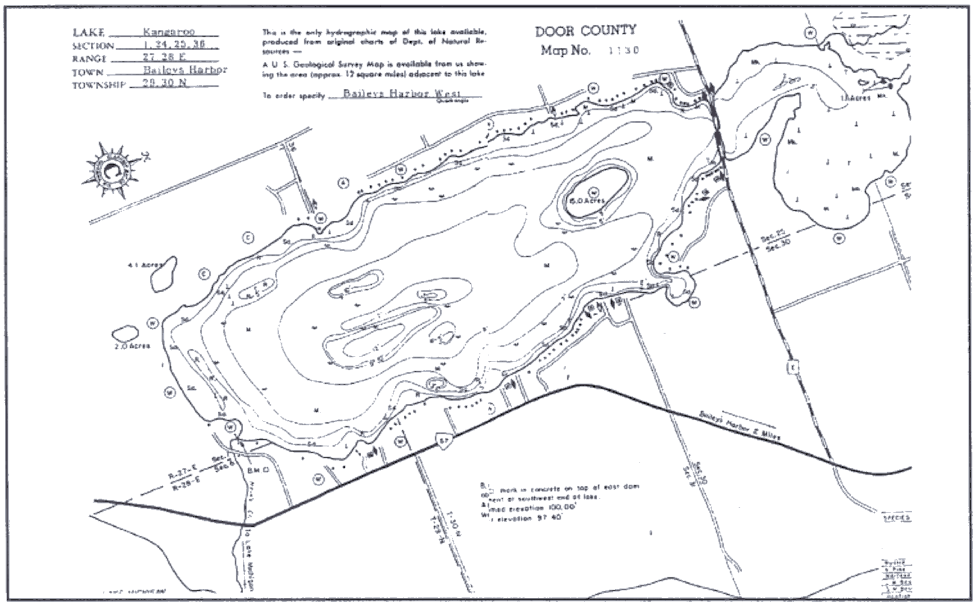
Natural History
The ridge of dunes is the feature which has literally created Kangaroo Lake. In the early post-glacial era, what now exists as Kangaroo Lake was nothing more than a bay of the Nipissing stage of Lake Michigan. Eventually, when post-glacial lake levels dropped, a ridge of sand dunes along the southeastern area prevented the floodwaters from receding into Lake Michigan, thus forming Kangaroo Lake. These dunes eventually became covered in vegetation and remain wooded to this day, providing habitat for animals and plant-life alike, preventing erosion, and protecting Kangaroo's wetlands and marshes.

Niagara dolomite is the principle bedrock in the Kangaroo Lake watershed. Door County is the northward extension of the Niagara Escarpment which stretches the length of Wisconsin parallel to Lake Michigan. Since dolomite is rich in calcium and magnesium carbonates, its predominance accounts for the precipitation of marl in Kangaroo Lake. Alkalinities range around 180 mg/l (total carbonate hardness) which is high, but normal for Door County.

Site Description
Kangaroo Lake is divided into two distinct lobes by the CTH "E" causeway which was created in the late 1800s. There is a dramatic difference in the ecological attributes between the two portions of Kangaroo Lake.

The larger south lobe is approximately 800 acres in size and is characterized by turbid water (average Secchi of 4.5 feet), lack of diversified aquatic vegetation including the presence of Eurasian watermilfoil, significant shoreline development, and considerable recreational use.

The smaller north lobe is approximately 300 acres in size and acts as the headwaters for the lake. It is clear and quite shallow (approx. 3-4 feet), contains a variety of open water and wetland species of plants, is surrounded by undisturbed forests, and the shoreline remains undeveloped with only walk-in access available. Piel Creek drains into the north lobe through an extensive maze of vegetative islands providing clean, cool water to Kangaroo Lake. Water flows from the north lobe to the south lobe through three culverts which run beneath the causeway.



Concerns

For many years, locals have witnessed a decline in water clarity of the south lobe of the lake. Department of Natural Resources' data along with volunteer collected data (through the DNR's Self-Help Lake Monitoring Program) depicts that turbidity of the south lobe of the lake is mainly a result of inorganic suspended solids rather than algae.

Parameter	**Phosphorus**	**Secchi**	**Chlorophyll a**
Value	12 ug/l	4.52 ft	6.74 ug/l
TSI	48	**55**	49

Trophic Category Descriptions

Category	TSI	Lake Characteristics
Oligotrophic	1 - 40	Clear water; oxygen rich at all depths, except if close to mesotrophic border; then may have low or no oxygen; cold-water fish likely in deeper lakes.
Mesotrophic	41 - 50	Moderately clear; increasing probability of low to no oxygen in bottom waters.
Eutrophic	51 - 70	Decreased water clarity; probably no oxygen in bottom waters during summer; warm-water fisheries only; blue-green algae likely in summer in upper range; plants also excessive.
Hypereutrophic	70 - 100	Heavy algal blooms throughout the summer; if >80, fish kills likely in summer and rough fish dominate.

Table -- Average Nutrient Values for Kangaroo Lake 1993-1995)

The large size and shallow depth allow prevailing easterly winds off of nearby Lake Michigan to disturb the bottom, resuspending the flocculent marl substrate and causing turbidity. Although Kangaroo Lake is rather non-productive, it is hypothesized that the decline in hardstem bulrush as well as other aquatic plant species has removed important near-shore buffering which once was present to alleviate the effects of wave activity. Other possible reasons for turbidity may include increased motorboat activity, expanded shoreline development, and increased numbers of rough fish.

The CTH "E" causeway has allowed for the two portions of Kangaroo Lake to evolve separately. It is possible to view the north lobe as a representation of what

the entire lake once was like. The north lobe is surrounded by a fir-tamarack swamp which is an extension of a boreal condition caused by the cooling effects of Lake Michigan. This area also exhibits characteristics associated with the warmer water of an inland lake. This unique situation allows for diverse ecological characteristics which are exhibited in both the flora and fauna of the area.

Plant Survey

On October 12, 1994 Scott Szymanski and Brad Johnson (DNR Water Resources personnel) along with Paul Mahlberg (Kangaroo Lake resident and Self-Help Volunteer) and Mike Grimm (Door County project manager of the Wisconsin Chapter of the Nature Conservancy) conducted a survey of the north lobe of Kangaroo Lake. Aquatic plants, depth, bottom type, shoreline development were noted. At this time the following aquatic plants were identified:

Common Name	Scientific Name
Bladderwort	*Utricularia sp.*
Floating-leaf Bur Reed	*Sparganium sp.*
Muskgrass	*Chara sp.*
Large-leaf Pondweed	*Potamogeton amplifolius*
Wild Celery	*Vallisneria americana*
White Water Lily	*Nymphaea sp.*
Yellow Water Lily	*Nuphar sp.*
Hardstem Bulrush	*Scirpus acutus*
Native water milfoil	*Myriophyllum spp.*
Eurasian water milfoil	*Myriophyllum spicatum*
Naiad	*Najas sp.*
Cattail	*Typha sp.*
Wild Rice	*Zizania aquatica*
Mare's-tail	*Hippuris sp.*

Mike Grimm has identified wire sedge (*Carex lasiocarpa*) along with cattails and bulrush as plant species dominating the sedge islands, some which are floating mats. Other wetland species identified include shrubby cinquefoil (*Potentilla fruticosa*), marsh fern (*Thelypteris palustris*), pitcher plant (*Sarracenia purpurea*), and twig rush (*Cladium mariscoides*).

Fauna

A variety of insects, amphibians, and mammals are native to this area. The area is home to the federally endangered Hine's emerald dragonfly (*Somatochlora hineana*) and the Dorcas copper butterfly (*Epidemia dorcas*). Waterfowl, wading birds, and shorebirds, and nongame migratory birds inhabit this area at various times of the year. The following is a listing of avian species of concern as documented by The Nature Conservancy, U.S. Fish & Wildlife Service, and U.S. Environmental Protection Agency as well as local naturalists.

	Breeding	Migratory/Staging	Feeding
Waterfowl			
Blue-winged teal	✓	✓	
Bufflehead		✓	
Canada geese	✓	✓	
Common goldeneye		✓	
Common loon	✓	✓	✓
Greater scaup		✓	
Green-winged teal		✓	
Hooded merganser	✓	✓	
Lesser scaup		✓	
Ringed-neck duck		✓	
Shoveler		✓	
Wood duck		✓	
Shore and Wading Birds			
Black tern	✓		
Caspian tern			✓
Common tern			
Least bittern	✓		
Short-billed dowitcher		✓	
Sora	✓		
Virginia rail	✓		
Nongame species			
Bald eagle			✓
Belted kingfisher			✓
Blue-winged warbler	✓		
Bobolink	✓		
Golden-winged warbler	✓		
Grasshopper sparrow	✓		
Northern waterthrush	✓		
Osprey			✓
Savannah sparrow	✓		
Sandhill crane	✓		
Upland plover	✓		
Veery	✓		
Whimbrel		✓	
Wood thrush	✓		

Great blue herons have been observed feeding in this region over the past six years. River otters, which are relatively rare in Door County, also find this area to their liking.

The diverse ecological character of the north lobe is critical to several species of fish. A variety of sediment types including sand, gravel, and marl provides suitable spawning substrate for several species of fish including bluegills, walleye, and smallmouth bass. Emergent and submergent aquatic vegetation provides spawning habitat as well as feeding and rearing areas for different developmental stages of fish including northern pike. Bowfin and gar have also been documented in this area.

Water Quality Benefits

Perhaps the most important function of this shallow aquatic environment can be defined as its ability to purify water entering the lake from the surrounding watershed. Piel Creek weaves through a maze of sedge mats, cattail islands, bulrush stands, and submergent aquatic plants before draining to Kangaroo Lake. On its methodical journey through this wetland area, Piel Creek is cleansed by the filtration of suspended matter and absorption of nutrients. The aforementioned fir-tamarack swamp buffers the rest of the north lobe from potential run-off sources in the surrounding watershed.

Other Notable Efforts

The distinctive ecological features of the north lobe and surrounding area has been recognized previously by other individuals and groups. It is listed in "Heritage Areas of Door County" (Van Zandt and Hutchinson, 1978) as second only to the Mink River among important wetland areas, and as the third most important wildlife area of north Door County. The late Dr. James Zimmerman, Door County conservationist, in his 1988 *Location Paper: C-6* identified it as a critical natural resource and proposed that it be designated the North Kangaroo Lake Wilderness Area.

Currently, the Door County Land Trustees is working in cooperation with the Nature Conservancy and the Ridges Sanctuary to identify and purchase property around the north end in an effort to establish the Kangaroo Lake Ecopreserve. It follows, then, that the aquatic community is deserving of similar protection efforts.

Summary

The preservation of the northern lobe of Kangaroo Lake is imperative for ecological reasons. The complex interactions found to exist in the north lobe are critical to supporting an array of aquatic and terrestrial species, maintaining and improving water quality, and preventing the spread of exotic nuisances. Furthermore, one can not underestimate the aesthetic importance of this natural area in an era where such tracts are quickly vanishing. Due to the overall significance of this region, the entire north end of Kangaroo Lake shall be considered a sensitive area.

Recommendations

For the above sensitive area, the following recommendations should be adhered to:

- ➡ Chemical treatment of aquatic plants will be limited to the control of exotic species only. These chemical applications should be as selective as possible to reduce impacts on the native aquatic plant community. Hand pulling or manual raking are recommended as an alternative; however, the removal of any native aquatic plants is strongly discouraged.

- ➡ Aquatic plant screens will be considered on a case by case basis but hand pulling or raking is recommended instead.

- ➡ Weed rollers will not be permitted

- ➡ Dredging will not be allowed in the sensitive area including the wetland portion of the region.

  Pea gravel/sand blanket will not be allowed in the wetland area and is not necessary in other shoreline areas.

- ➡ Filling and rip-rapping will not be permitted except where the threat of erosion poses more severe environmental consequences.

- ➡ Seawall construction will not be allowed.

- ➡ The installation of piers will be evaluated on a case by case basis but should not interfere with ecological and aesthetic functions.

In addition, the Kangaroo Lake Association should consider

- ✓ focusing on educational efforts that inform people of the ecological benefits that this area provides,
- ✓ adopting a local ordinance declaring the north lobe as a "no-motor" zone to avoid disruption of native flora and fauna and to prevent re-suspension of flocculent bottom sediments in this shallow area,
- ✓ continuing in the participation with local conservation groups to acquire property around the north lobe, and
- ✓ acting as a "watchdog" to ensure Door County zoning regulations are adhered to, especially the 75 foot shoreline setback rule.

Acknowledgments

Integral information for this report was obtained from unpublished notes, memos, and reports provided by Michael Grimm of the Wisconsin Chapter of the Nature Conservancy and Paul Mahlberg of the Kangaroo Lake Association.