Before The
State Of Wisconsin
DIVISION OF HEARINGS AND APPEALS

In the Matter of the Review of the Water Level Decision for Lake Koshkonong and the Indianford Dam on the Rock River in Rock County, Wisconsin	Case No. 3-SC-2003-28-3100LR

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER

On April 15, 2005, the Wisconsin Department of Natural Resources (DNR) issued a decision and order number 3-SC-2003-28-3100LR relating to the operation of the Indianford Dam located on the Rock River in Rock County. The dam affects water levels upstream on the Rock River and on Lake Koshkonong.

The Rock-Koshkonong Lake District (the District) petitioned the DNR for a contested case hearing on the order, as did the Rock River—Koshkonong Association, Inc. (RRKA), and the Lake Koshkonong Recreation Association, Inc. (LKRA) by separate joint petition.

The DNR granted the requests for a contested case hearing, and on September 15, 2005, the DNR filed a request for hearing with the Division of Hearings and Appeals (Division), where the matter was assigned to the undersigned to conduct the hearing.

A prehearing conference was held in Fort Atkinson on October 25, 2005. The DNR was assigned the burden of proof in the contested case hearing pursuant to Wis. Admin. Code § NR 2.13(3). The contested case hearing commenced on March 29 and 30, 2006 in the City of Jefferson, during which time members of the public who had not been identified as parties to the contested case hearing were invited to participate by providing sworn testimony or statements pursuant to Wis. Admin. Code § NR 2.13(1). During these two days of hearing, forty-six individuals provided sworn testimony, which included some testimony from representatives of entities identified as Parties below.

The contested case hearing continued in the offices of the Division in Madison on April 3, 4, 5, 10, 11, 12, 13 and 14, 2006.[1] Thereafter, certain parties filed post-hearing briefs,

[1] At the hearing, the numbers 208 and 209 were mistakenly used twice each for the identification of exhibits. During cross-examination of Mr. Johnson on April 4, 2006, Exhibit 208, which includes Chapter 120 of the "Waterway and Wetland Handbook," and Exhibit 209, a DNR study dated March 17, 2000, were both received in evidence. During the examination of Dr. Kashian on April 13, 2006, two other documents were also mistakenly marked and identified as Exhibits 208 and 209, both of

and the final brief was filed on September 22, 2006. On October 27, 2006, pursuant to an order of the Division, certain parties filed supplemental briefs on a matter of law, whereupon the record was closed.

The PARTIES to this proceeding are certified pursuant to Wis. Stat. § 227.47(1) and Wis. Admin. Code § NR 2.155(3) as follows:[2]

Rock-Koshkonong Lake District, by

Attorney William P. O'Connor
Attorney Mary Beth Peranteau
Wheeler, Van Sickle & Anderson
25 W. Main Street, Suite 801
Madison, Wisconsin 53703-3398

Rock River—Koshkonong Association, Inc., and
Lake Koshkonong Recreation Association, Inc., both by

Attorney Arthur J. Harrington
Godfrey & Kahn
780 N. Water Street
Milwaukee, Wisconsin 53202-3590

Wisconsin Department of Natural Resources, by

Attorney Michael J. Cain
P.O. Box 7921
Madison, Wisconsin 53707-7921

Lake Koshkonong Wetland Association, and
Thiebeau Hunt Club, both by

Attorney Charles V. Sweeney
Axley Brynelson
P.O. Box 1767
Madison, Wisconsin 53701-1767

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which relate to residential real estate listings. The two exhibits identified during Dr. Kashian's testimony as exhibits 208 and 209 are hereby ordered respectively re-designated as Exhibits 208-A and 209-A.

[2] The Green Rock Audubon Society ("Society"), by Mr. Victor Illichmann, Treasurer, 15515 W. Elmer Road, Evansville, Wisconsin 53536, entered an initial appearance in the matter at a pre-hearing conference held on October 25, 2005, and in a scheduling order dated November 4, 2005, the Society was certified as a party on a preliminary basis pursuant to Wis. Admin. Code § NR 2.08(2). The Society did not thereafter appear or participate in any subsequent stages of the proceedings. Accordingly, pursuant to Wis. Stat. § 227.47(1) and Wis. Admin. Code § NR 2.155(3), the Society is not certified as a party to these proceedings.

Jefferson County Farm Drainage Board, by

Attorney Andrew R. Griggs
136 Hospital Drive
Watertown, Wisconsin 53098

Mr. Linn Duesterbeck
Mr. Victor Falk, III, and
Mr. Allen Haight, all by

Attorney Michael E. Grubb
Brennan, Steil & Basting
P.O. Box 1148
Janesville, Wisconsin 53547

Carcajou Shooting Club, by

Mr. Jeff Murley, Vice President
N2890 Mode Lane
Fort Atkinson, Wisconsin 53538

FINDINGS OF FACT

1. The Indianford Dam is located on the Rock River in Rock County. Lake Koshkonong is a natural widening of the Rock River and has an outlet to the Rock River about six miles upstream of the dam. The Indianford Dam affects water levels on the Rock River, Lake Koshkonong, and their tributaries, including segments of the Crawfish River and Bark River. (Ex. 46).

2. Rock County owned and operated the Indianford Dam from December 1964 to December 2004, when the Rock-Koshkonong Lake District ("District") accepted the county's conveyance of the dam. The District is a public inland lake protection and rehabilitation district, established pursuant to Chapter 33, Wis. Stats.

3. The Department of Natural Resources (DNR) regulates the operation of the Indianford Dam pursuant to Chapter 31, Wis. Stats., through the issuance of orders to the owners of dams.

4. On April 21, 2003, the District filed a petition with the DNR requesting that the DNR amend the then effective water level order (order number 3-SD-82-809, issued in 1991) by allowing increased water levels throughout the year, to include elimination of the ordered "winter draw down." The District requested the following principal changes to the 1991 order:

MSL[3] LEVELS (at lake gage)	**1991 Order**	**Petition**	**Change**
May through October			
Target	776.20′	776.8′	+ 0.6′ (7.2 inches)
Maximum (all gates open)	776.33′	777.0′	+ 0.67′ (8 inches)
Minimum	775.73′	776.4′	+ 0.67′ (8 inches)
November through April			
Maximum (all gates open)	775.77′	777.0′	+ 1.23′ (14.8 inches)
Minimum	775.00′	776.4′	+ 1.4′ (16.8 inches)

5. The DNR determined that by operation of Wisconsin Administrative Code § NR 150.03(8)(f)7 it was required to complete an Environmental Assessment (EA) to determine whether an Environmental Impact Statement (EIS) would be required. At the request of the DNR, the District submitted an Environmental Impact Report (EIR) in several stages between October 2003 and May 2004. (Exs. 6 & 6a). The DNR utilized the EIR in the development of its EA.

6. The DNR released a draft of its EA in December 2004 (Ex. 7) and invited the public to comment upon it. The DNR held a public hearing on the draft EA in January 2005 in Fort Atkinson, which was attended by approximately 150 citizens. On March 18, 2005, the DNR certified the EA as complete and determined that development of an EIS was not required.

7. On April 15, 2005, the DNR issued its decision and order on the District's petition of April 21, 2003, in which the DNR determined not to change authorized water levels for the months May through October. (Ex. 8). The order did, however, change authorized water levels for the months from November through April as follows: (a) raised the minimum lake level by 0.5 feet (six inches) to 775.50 msl, (b) raised the maximum lake level by 0.23 feet (2.8 inches) to 776.0 msl, and (c) established a November through April "target lake elevation" of 775.75 msl. This is the decision and order upon which the Petitioners were granted a contested case hearing. By its terms, implementation of the order is stayed during the pendency of the contested case hearing.

Rock River & Lake Koshkonong

8. Lake Koshkonong is a natural widening of the Rock River. Most of the surface area of the lake lies in Jefferson County, though parts also lie in Rock and Dane counties. The mouth of the Rock River flows into Lake Koshkonong about four miles downstream from the City of Fort Atkinson. The outlet of the lake back to the narrow channel of the Rock River is situated about six miles upstream of the Indianford Dam.

[3] Mean Sea Level (msl). The unit of measurement for water levels in this decision are all expressed in feet above mean sea level (msl), unless otherwise indicated.

9. The Rock River and Lake Koshkonong are navigable waters under the laws of the State of Wisconsin.

10. Lake Koshkonong is the sixth largest inland lake in the state of Wisconsin with a surface area of approximately 10,460 acres.

11. Lake Koshkonong is a shallow lake. When the water level is at 776.20 msl, the lake has a maximum depth of about seven feet, with an average depth of about 5 feet. Most of the shoreline has a very gentle slope into deeper water, and in places water depths of only a foot or two can extend hundreds of feet into the lake.

12. The lake has approximately 27 miles of shoreline. Approximately 10 miles of the shoreline is developed, predominantly for residential use, with some commercial uses as well. Approximately 12.4 miles of this shoreline is undeveloped wetland shoreline. Estimations of areal coverage of the riparian wetlands range from 3,080 to over 4,000 acres.

13. The drainage basin of the Rock River at the outlet of Lake Koshkonong has an area of approximately 2,560 square miles, larger than the state of Delaware. The drainage basin of the Rock River at the Indianford Dam is slightly larger at approximately 2,630 square miles. The surface area of Lake Koshkonong is 16.3 square miles, which amounts to 0.6% of the Rock River drainage basin at the lake's outlet.

14. The Rock River channel between the lake's outlet and the dam is about six-miles long, between 300 and 600 feet wide, and about four to six feet deep in the center of the channel. The size of the drainage basin relative to the size of the lake, in combination with the constriction of flows at the lake outlet to the Rock River, causes the dam to exert little control over lake water levels during flood events.

15. The water flow of the Rock River at the Indianford Dam at a "10 year flood" level is 7,140 cubic feet per second (cfs) and at a "100-year flood" level is 10,500 cfs. (Ex. 832). The range for typical flood events is between 4000 to 7000 cfs. (Ex. 106). Typical low flow periods at the Indianford Dam are between 500 and 1000 cfs. Flood events typically occur in the spring or early summer, and periods of low flow typically occur in late summer or fall.

Indianford Dam

16. In the mid 1800's, the Wisconsin Territorial Legislature, and thereafter state legislation, authorized construction of a dam at the present site of the Indianford Dam, with the proviso that flowage of private lands without owner's consent was not authorized. The original dam was constructed in the 1850's and consisted of rock filled wooden cribs and a gristmill.

17. Today, the Indianford Dam consists of three sections: (a) a powerhouse on the west bank that contains two wicket gates (which were formerly used to regulate water inflow for turbines for power generation); (b) a 40-foot long slide gate section on the east bank consisting of six slide gates; and (c) in between the powerhouse and the slide gates, a fixed-

crest concrete spillway section approximately 277 feet wide, with an average crest elevation of 775.27 msl.

18. Around 1917, the dam was reconstructed and the crest was raised to an elevation of around 775.08 msl, which resulted in higher water levels on the lake.

19. In 1919, as a result of litigation precipitated by complaints from some riparian property owners about high water and property damage, the dam operator was required to fully open the dam's six slide gates whenever the water elevation at the dam exceeded 775.64 msl. (Because the lake is part of a flowage system, water levels on the lake are approximately 3.5 to 4.0 inches higher than water levels at the dam during normal flows. Thus, when the water level at the dam was 775.64, the water level on the lake would be about 775.95 msl during normal flow periods.)

20. In 1939, one hundred and thirty six property owners in the vicinity of Lake Koshkonong petitioned the Public Service Commission of Wisconsin (PSC) (predecessor state agency to the DNR on these issues) to raise the water levels held by the Indianford Dam by at least six inches over the then existing normal level. Some owners of low-lying land and farmers objected to any increase, citing flood damage and agricultural lands drainage. The PSC dismissed the request in 1939 at least in part on the stated ground that it lacked authority to order water levels that would infringe on private property rights by flowing lands that were not periodically flowed before. The PSC also determined that the then owner of the dam, Wisconsin Power & Light Co., had acquired flowage rights to maintain the dam at the height and according to the operating provisions established in the 1919 administrative order. (Ex. 7, p. 12).

21. The powerhouse has not been used to generate power since 1962 (Ex. 817), and the turbines and generators were long ago removed. The two wicket gates that controlled the flow to the turbines, however, remain in the powerhouse. There is no present intent to re-employ the powerhouse for the generation of hydroelectric power.

22. Rock County owned and operated the Indianford Dam from December 1965 until December 15, 2004, when the county conveyed the dam to the District, and the District continues to own and operate the dam.

23. In 1982, the DNR issued an order reestablishing water levels and operating procedures for the dam. The order was appealed and the Wisconsin Court of Appeals eventually remanded the matter to the DNR to conduct a contested case hearing.

24. After the remand, the parties to that proceeding reached a compromise respecting water levels at the lake, which was embodied in the Department's order 3-SD-82-809, dated April 25, 1991. (On December 14, 2004, the DNR amended the order [captioned order "3-SD-82-809 – Amended"] to make technical changes related to the District's becoming the owner/operator of the dam. The amended order made no substantive changes to the operating or water level provisions.)

25. Historical records suggest that after the dam ceased to be used for power generation in 1962, the wicket gates fell into disrepair and in the late 1960's were rusted shut, making that discharge capacity unavailable. (Ex. 7, p. 13). The wicket gates were partially rejuvenated in 1978 (Ex. 817), but remained in varying states of partial operability and repair until recent repairs were completed in 2002. Consequently, for much of the time between the late 1960's until about 2002, the hydraulic capacity of the dam and its ability to regulate water levels on the lake was diminished or compromised in varying degrees.

26. The highest flows at the Indianford Dam typically occur in the spring. For the period 1976 to 2003, from mid-March to mid-April, the average daily flows at the dam ranged from approximately 2,500 cfs to approximately 3,900 cfs. (Ex. 36, Fig. 5).

27. With all gates open at a lake level of 776.3 msl, the operable elements of the dam (the wicket gates and slide gates) account for almost all of the dam's hydraulic capacity of approximately 2,230 cubic feet per second (cfs), with only approximately 100 cfs flowing over the fixed concrete spillway. (Ex. 112). During the summer growing months, June through September, flows into the lake are lower than the dam's hydraulic capacity at lake level 776.3 about 81% of the time, and thus generally the dam is capable of controlling flow and lake levels about 81% of the time during the summer growing season. (Johnson, Ex. 801).

28. With all gates open at lake level 777.0, the operable elements of the dam account for approximately 89% of the dam's hydraulic capacity of approximately 2,700 cfs, with the spillway accounting for the balance of 11%, so the spillway has a relatively small depth of water overflowing its crest. Thus, at lake levels of 777.0 and below, the majority of the hydraulic capacity of the dam is operable by manipulation of the wicket gates and slide gates. (Montgomery Prefiled Direct, p. 13; Ex. 112). For the years 1987 through 2005, the lake levels were below 777.0 during the period May through October about 80% of the time. (Ex. 112).

Historic Water Levels on Lake Koshkonong

29. For the period 1932 to 2003, there is a statistically significant upward trend in average water levels on the lake, with the average "summer" water level increasing approximately 1.5 feet. (Exs. 37 & 811). The water levels on Lake Koshkonong through all seasons have increased from 1932 to 2003 independent of the flows on the Rock River. (Ex. 36; Ex. 811).

30. This upward trend in water levels is attributable at least in part to the occasional noncompliance with applicable operating orders, the diminished operating range of the wicket gates for much of the time from the late 1960's through 2001, and the obstruction of flow to the wicket gates from debris on trash racks.

31. The mean water level as measured on the Rock River upstream of the lake during the May through October period has been above the DNR's current lake target level of 776.20 every year since 1965, except for two years. (Ex. 322).

Water Level Modeling

32. From at least 1987 through 2001, the diminished hydraulic capacity of the dam due to shortcomings in the operation and maintenance of the dam caused lake levels to be higher than they would have been had all the gates been fully operable and the dam operated in compliance with controlling orders. (Exs. 116, 177).

33. The District commissioned modeling to predict what the lake levels would have been during the May through October "summer" period from 1987 to 2005, under the assumptions that the dam had been fully operational and operated in compliance with both the District's proposed order and the DNR's order. The model reliably predicted that under both operating regimes, the frequency of various lake levels would have been substantially the same at levels below approximately 776.1 (which would have occurred about 5% of the time during the "summer" under both regimes) and at levels above approximately 777.2 (which would have occurred about 20% of the time under both regimes). (Ex. 116). For the remaining 75% of the time during the "summer" months, the District's regime would have caused water levels to be higher than water levels under the DNR's regime.

34. If the May through October "summer" water levels proposed by the District had supplanted the water levels in the DNR's order and the dam operated properly according to the order, the dam operator would have been able to prevent water levels from falling below the District's proposed target of 776.8 msl for most of the "summer" months of 1987 through 2005.

35. If the November through April ("winter") water levels proposed by the District had supplanted the water levels in the DNR's order and the dam operated properly according to the order, then the dam operator would have been able to prevent lake levels from falling below 776.80 for most of the time during the "winter" periods of 1987 through 2005.

Wetland Complexes

36. Approximately 12.4 miles of Lake Koshkonong's 27 miles of shoreline are wetland shoreline. In the early 1900's, before the dam was modified in 1917 to raise water levels about two feet, the shallow and deep marshes on the lake were described as presenting a "sea of green" from the wild rice beds and other emergent vegetation. The shallow marshes around the lake were almost completely vegetated with emergent plants, with the exception of a portion of Mud Lake, and contained little aquatic bed or open water areas.

37. By the 1940's, these wetlands had been fundamentally altered from their state in 1900. The lake had transformed from a large riverine marsh supported by dense aquatic vegetation throughout most of the basin to a shallow open lake surrounded by a remnant marsh community. Over time, the higher water, in concert with other factors, caused the water quality in the lake to shift from a clear-water plant dominant condition to a degraded turbid algae-dominant water condition. This degraded condition persists today.

38. The wetlands currently present around the lake include submerged aquatic beds, deep marsh, shallow/emergent marsh, wet meadow, shrub carr, and floodplain forest. (Ex. 79b; Trochlell).

a. Since 1940, submerged aquatic beds in Lake Koshkonong have decreased from about 30% coverage of the lakebed to approximately 1 to 4 % of the lakebed today. The dominant plant species in the submerged aquatic beds on Lake Koshkonong today is sago pondweed, which is more tolerant of the turbid conditions of the lake and more resistant to damage by carp than other submergent plants. (Nichols, Ex. 180). Sago pondweed can also act as an annual plant by reproducing from seed and thereby can re-vegetate areas where it would have been killed from exposure during winter drawdown periods. (Nichols). Submerged aquatic vegetation is at the bottom of the aquatic food chain, and provides habitat for zooplankton and other invertebrates, young fish, amphibians, and turtles. (Hay). Submerged aquatic vegetation promotes better water quality by helping to stabilize bottom sediments, reduce sediment re-suspension, and reduce wave energy.

b. The marsh communities contain a high level of species diversity, particularly at the upper margins. The marshes have a high density of cattail at the wetland fringe, but they also support other plant species.

c. The floodplain forest wetlands near Lake Koshkonong are regionally rare, comprising 3% of the land use in the geologic region. (Ex. 7, p. 48). The best development of floodplain forest occurs along large rivers that flood periodically. Besides the floodplain forest connected to Koshkonong Creek, the only other significant stands of floodplain forest in southern Wisconsin are along the Lower Wisconsin River and Sugar River. (Belser, Ex. 839).

d. The sedge or wet meadows or shrub/scrub zone of the Lake Koshkonong riparian wetlands tend to be situated at higher elevations at the extreme upper edge of flooding. These wetlands are groundwater dependent and are normally found in saturated soil conditions, though they will survive short periods of inundation. They have a high floristic quality. (Ex 345, p. 20).

39. The largest wetland areas are: Koshkonong Creek, with about 278 acres of shallow marsh and floodplain forest; Krumps Creek, about 335 acres of shallow marsh; Mud Lake, about 921 acres of shallow marsh; the state-owned Koshkonong Wildlife Area (KWA), about 715 acres of shallow marsh, shrub/carr, and wet or sedge meadow; Otter Creek, about 334 acres of shallow marsh and floodplain forest; and Thiebeau Marsh, about 494 acres of shallow marsh, shrub/carr, and wet or sedge meadow. (Ex. 338; Ex. 7, p. 54).

40. Aerial photography reliably demonstrates that Lake Koshkonong's wetland shoreline has continued to erode and degrade since 1940. (Kraemer). Moreover, other evidence reliably establishes that the erosion of riparian wetlands has continued since implementation of the DNR's 1991 order:

a. In 1982, the DNR documented the loss of 52 acres of shoreline occurring between 1950 and 1963, and an additional 270 acres between 1963 and 1975. (Dresen; Ex. 817).

b. Between 1940 and 2000, the 2.6 miles of wetland shoreline in the Koshkonong Creek area, which includes property owned by the Carcajou Shooting Club and the Crescent Bay Hunt Club, has receded up to 500 feet in some areas with a loss of about 61 acres. Over 100 acres of emergent and forested wetlands has converted to open water. (Kraemer).

i. There is about 1.5 miles of shoreline associated with the Carcajou Shooting Club. The outlet of Koshkonong Creek to the lake has receded about 300 yards since 1937. (Murley; Exs. 301 & 304). Today, when water levels are at 776.20, the floor of the floodplain forested areas are exposed to sun and air and are not inundated. (Persson). There are no trees in this area below elevation 776.30. (Reinartz)(Ex. 62).

ii. There is about 3,000 feet of shoreline associated with the Crescent Bay Hunt Club, and includes about 60 acres of riparian wetlands, some of which is floodplain forest. (Gruennert, Exs. 1034 & 1032). In the last 25 years, this shoreline has receded due to erosion, and floodplain forest has been lost to the lake. (*Id.*, Exs. 1025 & 1029). This floodplain forest has not experienced any expansion from higher water levels. Rather, some acreage in this area once cleared for agricultural purposes, has reverted to floodplain forest.

c. Between 1950 and 2000 in the Mud Lake area, the 1.9 miles of lakeshore has receded more than 400 feet in some areas, with a loss of 33 acres of wetland shore. About 244 acres of emergent marsh have become lake marsh. (Kraemer)(Scullin; Exs. 1042-1055)(Ex. 94).

d. Between 1940 and 2000 in the Otter Creek/Haights Bay area, along the 2.5 miles of shoreline, about 64 acres of emergent vegetation has converted to lake marsh. (Kraemer).

e. Between 1937 and 2000 in the Krump Creek/Stinkers Bay area, the 1.8 miles of shoreline has receded more than 400 feet in areas, with a loss of about 29 acres of wetland shoreline, and about 89 acres of emergent vegetation has converted to lake marsh. (Kraemer).

f. Non-quantitative aerial views of Thiebeau Marsh and the state-owned Koshkonong Wildlife Area have reflected similar trends in emergent vegetation loss and conversion to lake marsh surrounded by emergent vegetation. (Kraemer).

41. The reduced frequency of low water conditions during the summer and the increase in the average summer water levels on Lake Koshkonong account for the loss of wetlands over

the past 70 years. (Cunningham, Ex. 811)(Nichols, Cross-Examination, 4/13/06). Flood events have also caused some wetland loss at least since the heightening of the dam in 1917, if not before. In dynamic wetland systems, wetlands rebound from such losses through countervailing dry cycles. The artificial maintenance of minimum water levels has dampened the dry cycles and has inhibited recovery of wetland losses caused by flood events or by simple wave action at prevailing water levels. While some of the historic wetland loss on Lake Koshkonong has occurred in flood or high water events (Hjort, Ex. 503, p. 2), the maintenance of artificially high water levels has prevented reversal of such losses during countervailing dry cycles and continued to erode the wetland margin. (Cunningham; Ex. 811).

Effects of Water Levels

Water Quality

42. Lake Koshkonong has been identified as an impaired water body under section 303(d) of the federal Clean Water Act. The listed pollutants have been identified as phosphorous and sediments. The listed impairments are eutrophication, sedimentation, and loss of habitat. Increased water levels during the open water seasons will cause more sedimentation as a result of accelerated erosion and habitat loss from the destruction of riparian wetlands. Carp and recreational boating stir up sediments and increase turbidity, reducing light penetration and submergent plant growth. (Ex. 79b). It is the goal of the federal Clean Water Act and the State of Wisconsin to remove impairments that cause water bodies to be listed under Section 303(d). An increase in water levels is likely to further degrade overall water quality on Lake Koshkonong, but the lake is likely to remain identified as an impaired water body under either the DNR's order or the District's proposed water levels.

43. The erosion of wetlands will likely continue at the DNR target levels, and such continued losses are not likely to be reversed for so long as water levels are maintained at artificially high levels by the dam. The continued erosion of wetlands would be accelerated and greater under the higher year round water levels sought by the District.

44. Maintenance of water levels at 776.80 as proposed by the District could cause some marshes to pass through the productive hemi-marsh stage, in transition toward the least productive "lake marsh" stage. The marshes would likely remain in lake marsh stage or further degrade to open water from which they would not likely recover, because the sustained high water levels would be maintained to the exclusion of any sustained periodic low water conditions necessary for marsh regeneration. (Fendry; Ex. 852)(Ex. 811, Cunningham).

45. The submerged aquatic vegetation in Lake Koshkonong today, because of its low density, provides marginal benefit to the lake's water quality. Higher water levels are likely to lead to further loss of submerged aquatic vegetation because less light will reach the submerged plants through the deeper turbid waters. Though some areas of emergent

vegetation may be eroded by higher water and be converted to submergent aquatic vegetation areas, there would likely be no net gain in the areal coverage of submergent aquatic vegetation on the lake. (Kahl, prefiled direct testimony, pp. 6-7; Garrison, prefiled direct, pp. 5-7; Hay hearing testimony).

46. Average non-flood growing season water levels and the duration of flood events both have strong correlations with the various characteristics of wetland communities. (Ex. 350). Average, non-flood, growing season water levels influence the depth of aerated soil and hence the rooting zone available to wetland plants. (Ex. 350). Increasing non-flood summer and winter water levels to a target level of 776.8 msl would likely decrease the depth of aerated soil in many wetland areas and result in accelerated long term loss and degradation of riparian wetlands on Lake Koshkonong (Kahl, Ex. 843), and environs as follows:

a. At the District's proposed maximum water level of 777.0, approximately 42 acres of marsh, wet meadow, and flood plain forest situated east of Koshkonong Creek would be inundated for most if not all of the growing season. Inundation of floodplain forest throughout the growing season would eventually kill all trees in the inundated areas. (Ex. 11b; Ex. 330)(Kraemer)(Hay)(Gruennert; Murley; Persson)

b. The decline of the degenerating marshes and erosion of wetlands in the Mud Lake area and Krumps Creek/Stinkers Bay areas would be accelerated under the District's proposed order. (Ex. 843)(Scullin).

c. Water levels in the state owned Koshkonong Wildlife Area, as well as other near marshes that do not have a surface water connection to the lake, would likely increase to the level of the lake waters, with the more stable levels substantially eliminating the wet-dry cycle necessary for higher quality marshes. (Fendry).

d. Portions of the riparian wetlands on the east side of Bingham's Point would be inundated resulting in further loss of about 10 acres of the emergent vegetation and wet meadow. (Duesterbeck; Ex. 420).

e. Portions of wooded wetlands on the west side of Thiebeau Point would be inundated, resulting in the eventual death of those trees, and permanent alteration of the character of those wetlands. (Exs. 438-446; Duesterbeck; Pyrek).

47. Even under the DNR's 2005 order, there may be continued long term loss and degradation of riparian wetlands on the lake (Cunningham), but to a considerably lesser extent than would occur at the higher water levels sought by the District. (Reinartz).

48. Implementation of the District's proposed order would tend to dampen the drought cycles and stabilize water levels at or near the 776.8 level during non-flood periods. This would likely cause large areas of emergent vegetation that are now at or near the maximum tolerable water levels to be inundated for most of the growing season and result in their eventual destruction. (Kahl, Ex. 843). This would likely result in a new line of emergent

vegetation at a higher elevation, that would tend toward monotypic stands such as cattails. (Kahl; Reinartz). It would also likely cause transitional shallow marshes to proceed to "lake phase" with reduced areas of emergent vegetation and reduced insect population. (Ex. 6, Att. 15A, p. 7-8).

49. Implementation of the District's order would lead to the continued loss of floodplain forest and marsh surrounding Koshkonong Creek, and conversion of these parts of the forest to open water. (Kisow; Pyrek). Approximately 42 acres of riparian wetland east of Koshkonong Creek would be inundated at the maximum water level proposed by the District. (Kisow; Ex 330). Permanent inundation in this area around Koshkonong Creek would result in the eventual destruction of any trees in the floodplain forest at elevations that would be permanently inundated during the growing season. (Pyrek; Ex. 829; Hay). Trees below the 776.8 msl level in the floodplain forest area located on the Rock River in the Koshkonong Wildlife Area would be similarly affected. (Pyrek, direct testimony, p. 9). Loss of floodplain forest would reduce the overall diversity of wetland types in the Lake Koshkonong area, including a likely reduction in species of flora and fauna that require that habitat. (Reinartz; Ex. 350).

50. Floodplain forests provide valuable habitat for amphibians and reptiles ("herptiles"), and continued loss of this type of wetland would continue to incrementally diminish and degrade the existing habitat for herptiles. (Hay).

a. Downed trees in the floodplain forest provide additional habitat for amphibians to the extent that the trees were not in standing water. This condition, however, would not likely be the case as to trees felled and killed because of sustained inundation of their root systems at lake level 776.80. (Ex. 821; Hay). There exists ample downed woody debris to provide habitat to amphibians in the floodplain forest under present conditions. (*Id.*).

b. Downed trees in the floodplain forest would not benefit reptile populations on Lake Koshkonong. (*Id.*)

51. The state owns and the DNR manages an area near Blackhawk Island known as the Koshkonong Wildlife Area (KWA), which includes most of an 852-acre wetland complex. The KWA wetlands are classified under Wis. Admin. Code § NR 103.04 as an area of "special natural resource interest." (Trochlell). The KWA is separated from the lake by an ice rampart that is 1.5 foot above the water at lake level 776.20, and which is 25 feet wide at its narrowest point. There is no surface water connection between the KWA and the lake, so the shallow marshes in the KWA are protected from permanent inundation by lake water, and are similarly protected from increased wave action and damage to aquatic plants from carp infestation. (Fendry). The higher year round water levels that would result under the District's proposed order would increase wave action and erosive pressures on the rampart, and could lead to the marsh being drawn into the lake. (Fendry). This would end the natural

wet-dry hydrologic cycle in the marsh, and cause this high quality shallow marsh to proceed to a lower quality "lake marsh," similar to what has occurred in the Mud Lake area over the last 60 years. The construction of an armored dike along the shoreline to protect against erosion of the existing ice rampart would require expenditure of public funds, and the structure itself would be a monotypic material that would reduce the diversity of habitat types on the lake. (Fendry).

52. Mud Lake is not presently hemi-marsh dominant, but rather is comprised of emergent marsh through hemi-marsh to open water, surrounded by emergent marsh. Higher waters on Mud Lake will lead to an accelerated decline toward lake marsh stage. (Kahl, Ex 843).

53. An increase in lake levels could result in an elevation of the water table level in at least parts of riparian wetlands, including floodplain forests. (Storlid; Hjort). An increase in the groundwater level would impact wetland plants that require periods of dry soil conditions to allow for oxygenating the soil to enable root growth. (Reinartz).

54. Increased lake levels could result in elevating groundwater levels, which could adversely affect the floral diversity in sedge meadows. (Bleser, prefiled direct testimony; Trochlell, Ex. 845). The DNR recognized that it was unknown whether or to what extent any sedge meadow would be affected by an elevation of groundwater levels. Nevertheless, the DNR reasonably considered the heightened risk to floral diversity and risk to rare floral species, including the federally threatened species Eastern Prairie White-Fringed Orchid, in assessing the District's request for higher lake levels.

55. Additional wetland loss will result in the loss of important wildlife and fishery habitat, including habitat for rare species.

56. Increased water levels would degrade and result in loss of wetlands in areas of special natural resources interest, including the Koshkonong Wildlife Area.

57. Additional wetland loss will incrementally reduce the system's capacity to slow flood and stormwater, and diminish the capacity to filter nutrients, sediments and other pollutants, resulting in increased levels of pollutants being carried downstream in surface waters.

58. Additional wetland loss and increased open water areas will diminish the natural scenic beauty of the area in the eyes of some segments of the public.

OHWM

59. In 1979, the DNR determined the ordinary high water mark (OHWM) on Lake Koshkonong to be 776.67 msl. A survey conducted in 2001 identified ordinary high water marks in nine locations around the lake at levels ranging from 778.11 to 778.83, with an average elevation of points surveyed of 778.42. (Ex. 39). For purposes of evaluating the District's proposed order, the DNR considered the 778.11 msl to be a representative OHWM level. (Johnson).

60. The increase in the OHWM between 1979 and 2001 was likely the result of generally higher water levels in the 20 years that preceded the survey conducted in 2001. (Johnson, prefiled direct testimony; Ex. 18). All the factors that have contributed to this increase in the OHWM are unknown, but it is likely that the inoperability of the wicket gates during much of the 20 years preceding the 2001 OHWM survey, along with inadequate maintenance of the trash racks that protect the wicket gates, were factors in these increased levels, as well as increased flow volumes during high water seasons. (Johnson; Montgomery; Simon).

61. With the wicket gates having been restored to full operability, and with better maintenance of the trash racks, the current OHWM elevation could decrease with consistent compliance with the DNR's 2005 order. (Simon; Josheff).

62. Under the District's proposed order, with a year round target elevation of 776.8, wind "set-up" and wave run-up would combine from time to time to cause the presence and action of water above the current OHWM of 778.11 at various locations. This presence and action of water above the present OHWM could result in the OHWM migrating further landward. (Halsted profiled direct testimony; Johnson; Simon). Such further upward migration of the OHWM would be consistent with general observations that OHWMs on large flowages such as Lake Koshkonong are generally about 1.5 to 2.0 feet higher than normal summertime water levels. (Simon).

Erosion Protection from Riprap Structures

63. Approximately 38%, or 4.7 miles of wetland shoreline on Lake Koshkonong has been partially protected by offshore breakwater structures constructed with small rock riprap materials, which dissipate wave action. (Exs. 51, 52, 88a). At the target and maximum levels sought by the District, many of these existing structures would be subject to increased incidence of flow-through, overtopping by wave action, and ice deterioration. This would render these structures less effective at dissipating wave action and would cause the structures to degrade more rapidly.

64. The expense of fortifying the existing riprap structures to protect against the increased water levels would involve the expenditure of hundreds of thousands of dollars. (Kisow). Maintaining the District's proposed year round target level of 776.8 would impede the maintenance of the existing or fortified armoring structures. (Johnson). Increased use of riprap would not wholly protect riparian wetlands from further degradation at the higher water levels that would prevail under the District's proposed order. Fortification of the existing riprap structures to protect against increased wave action from the proposed higher water levels would not likely protect riparian wetlands from long-term erosion resulting from the increased water levels. (Garrison; Ex. 844).

Wildlife

65. Several turtle species, including the state-threatened Blanding's turtle, painted turtles, and snapping turtles, are dependent on submerged vegetation for foraging and cover, and the

loss of submergent vegetation in Lake Koshkonong has likely diminished their populations. (Hay). Continued loss of submerged aquatic vegetation would have incremental adverse impacts on turtles. (*Id.*).

66. Emergent shallow marsh provides natural habitat for some turtles, water snakes, and green frogs, and its loss through erosion or degradation has likely diminished populations of these amphibians and reptiles (collectively described as "herptiles") on and around Lake Koshkonong. (Hay).

67. Continued loss of submergent and emergent habitat and floodplain forest habitat will likely lead to continued incremental loss of herptile populations on and around Lake Koshkonong. (Hay).

68. Lake Koshkonong provides habitat for a variety of bird species. Wetlands that provide habitat for state or federally endangered species have the status of wetlands with "special natural resource interest" pursuant to Wis. Admin. Code § NR 103.04.

a. The floodplain forest area around Koshkonong Creek supports three species classified as "threatened" (Cerulean Warbler, Acadian Flycatcher, Yellow-Crowned Night Heron) and several species classified as "special concern" (Black Crowned Night Heron, Prothonotary Warbler, Yellow Billed Cuckoo). (Bleser prefiled direct; Ex. 7, p. 64). These birds require large blocks of mature, closed canopy forest. (Ex. 839; Ex. 79a). Further loss of suitable habitat in the Koshkonong Creek area would increase the risk of local extirpation. (Ex. 79a).

b. The marshes on the north side of the lake support species of "special concern" (American Bittern, Least Bittern, Foraging Black Tern) and an endangered species (Forster's Tern). The Koshkonong Marsh, including the Mud Lake area, support species of "special concern" (Least Bittern, King Rail, Yellow-Billed Cuckoo, Prothonotary Warbler, American Bittern, Black Tern, American White Pelican). (Bleser prefiled direct; Ex. 7, p. 64). Continued loss of emergent marshes would result in incremental diminished habitat for these rare bird species. (Bleser).

c. Lake Koshkonong has long been noted for its large concentrations of migratory waterfowl. (Ex. 79a). Waterfowl require a wide variety of wetland types for habitat, and the riparian wetlands of Lake Koshkonong contain these types. (Fendry, prefiled direct testimony, pp. 5-6). The accelerated loss and degradation of the various varieties of wetlands due to the water levels proposed by the District would make Lake Koshkonong less attractive to waterfowl for staging and local production and would likely have a negative incremental impact on the diversity and density of migratory waterfowl. (Fendry; Kahl, prefiled direct, pp. 3-5).

Winter Draw Down

69. Due to a variety of factors, the winter draw down required by the 1991 order was not fully implemented during most winters since 1991. The full winter drawdown as required by the 1991 order was achieved only once, in the winter of 2002-2003.

70. The District conducted a stage duration analysis comparing predicted "winter" levels at both the DNR's and the District's proposed orders, but did not present it during the contested case hearing. The information presented in evidence, however, provides sufficient information from which the relative "winter" stage durations of the two water level regimes may be interpolated. The dam's fixed spillway has a hydraulic capacity of less than 200 cfs at the DNR's summer maximum level 776.33 (Ex. 112), and this capacity shrinks as water levels move downward toward the DNR winter target level. The typical low flow periods into Lake Koshkonong are in the 500 to 1000 cfs range. (Montgomery, p. 5). It is reasonably inferable that even during these typical low flow periods, the dam would likely have the capacity to prevent lake levels from falling below the District's proposed target level of 776.80 msl for most of the time. Thus, if the November through April water levels proposed by the District supplanted the water levels in the DNR's order, the lake levels would be higher most of the time during non-flood events, and the difference between the two levels could be maintained at or near the approximate one-foot higher target level that the District seeks.

71. The winter drawdown in the DNR's order moves the waters off wetland shorelines. This keeps the wetland shoreline from freezing into the ice cover on the lake, and prevents ice jacking or push from the ice at the lake/shore interface, which causes shore erosion. Freezing into the root/rhizome zone on the wetland fringe can create "floating bogs" as rising spring waters lift the ice and frozen root/rhizome mat from the bottom. (Ex. 843)(Kahl; Mickelson). Conditions conducive to creation of "floating bogs" would not occur under ice conditions at the winter draw down target level. (Kahl).

72. During open water periods, the winter drawdown takes wave action off the shoreline, eliminating erosion from wave action.

73. A winter drawdown will cause all fish, including carp, to leave the shallow marshes such as Mud Lake, Koshkonong Wildlife Area, and Otter Creek. This will improve water quality in the marshes, because the carp would not be present to root up vegetation or kick up bottom sediments, or use the marshes as hatcheries. (Bush).

74. Dispensing with the winter draw down will result in the loss of fish spawning habitat through continued erosion of peripheral wetlands. (Bush). The higher water will allow carp to remain in shallow marshes where they root up plants and increase turbidity, converting well vegetated marshy bays to shallow turbid water. (Bush).

75. The winter drawdown in the DNR's order will not adversely affect the present scant coverage of submerged aquatic vegetation, which is predominantly sago pondweed. (Hay; Kahl, Ex 843). Sago pondweed coverage was not diminished in areas that were exposed in the winter draw down of 2002-2003, and in some aquatic beds that were exposed in that year's winter draw down, the abundance of sago pondweed the following growing season increased. (Bush; Garrison; Persson; Kisow). Similarly, a dense stand of lily pads in the Mud Lake area that was exposed in the winter draw down of 2002-2003 came back the next spring without adverse effect. (Bush).

76. The elimination of the winter drawdown proposed by the District would make the existing or fortified riprap structures more vulnerable to damage from ice jacking events in the winter months. (Garrison, Ex. 844; Johnson; Persson; Kisow).

77. The winter draw down impairs ice fishing activity. (Bush). The shallower water during winter drawdown causes more fish to leave the lake and migrate up the Rock River, reducing the lake's winter fish populations. The lower water in the winter also creates conditions in which fish are more easily spooked by anglers, further diminishing the quality of ice fishing. (Bush). Poor ice fishing conditions tend to lead to enhanced open water fishing conditions in the open water seasons. (Bush).

78. The boating season in southern Wisconsin is identified as from April through October. (Ex. 61). The winter draw down will diminish navigational depth during open water months from November through February. Higher water that typically begins in March and continues into April each year will usually restore navigational depth that is lost during the winter draw down.

79. Open water anglers who access Lake Koshkonong during the winter draw down period must use boat ramps on the Rock River to get to the lake, although fishing conditions are generally better on the river than on the lake during these periods. (Bush). Spring flooding that typically occurs in March and April normally results in lake levels that rise above summer target levels, and normally restores access and navigability at or above summer water levels for those months.

80. The winter drawdown in the DNR's order does not expose the lake to higher risk of fish kill conditions. (Bush).

81. Eliminating the winter draw down would not have a significant impact on the abundance of the fish populations in the lake or river. (Bush).

82. The winter draw down makes the marsh areas less accessible for waterfowl hunting. (Bush).

83. Higher winter water levels would be beneficial to the survival of muskrats, though muskrat populations diminished by a draw down could repopulate. (Fendry).

84. The winter draw down causes mortality to a variety of aquatic invertebrates, including freshwater mussels. These impacts do not result in long-term population losses because of the mussels' short life spans and high reproductive capacity. (Ex. 821)(Hay).

85. Reducing, eliminating, or changing the timing of the winter drawdown would benefit winter hibernating herptiles by increasing the area where they can overwinter, though the reduction in the degree of the drawdown in the DNR's 2005 amended order may mitigate this impact. (Hay). The population loss resulting from the winter drawdown is outweighed by the preservation of herptile habitat that would be destroyed if no drawdown were implemented. (Hay).

Agricultural Drainage

86. The Jefferson County Farm Drainage Board administers certain farm drains in Jefferson County, including drains identified as numbers 24 and 39, which are available to farmers to connect their tile systems for drainage of water from lands that, without such drainage, would retain too much water to permit cultivation. Drains 24 and 39 would both be adversely affected by the increased water levels that would prevail under the District's proposed order.

87. Drain 24 has an outlet to Deer Creek, which is a tributary of the Rock River northeast of Fort Atkinson. (Exs. 703; 837). The elevation of the outlet of Drain 24 is 777.5 msl. When water levels on Lake Koshkonong are at the maximum proposed level of 777.0, there is a backwater effect that impedes drainage of farmland served by drain 24. Slower drainage causes the farmland to be flooded longer during the planting season and thus delays or prevents planting, which results in smaller crop yield. (Kutz; Russell).

88. Drain 39 has an outlet to the Bark River, which flows into the Rock River at the City of Fort Atkinson. (Ex. 703; 837). The outlet for the drain on the Bark River is under elevation 775 msl. (Ex. 837; Russell). The present lake levels under the DNR's 1991 operating order impede drainage for some areas served by drain 39. (Russell). There would be greater adverse impacts under the District's proposed maximum water level of 777.0 than under the DNR's operating order. (Russell). Lake water levels at the 777.0 msl elevation have a backwater effect into the main ditch of drain 39 for about 1,500 feet and flood out several private drains that drain into the main ditch. These water levels also cause part of lateral ditch number 4 to the main ditch 39 to become flooded. The sustained maintenance of the District's proposed target level of 776.80 would make it more difficult to plant crops during planting season in farmland that is affected by the backwater effect on the drain. (Russell; Ex. 837).

89. Persistent higher waters in drains 24 and 39 may cause increased sediment deposits in the drains and tiles, as well as to Deer Creek to which ditch 24 drains, necessitating more frequent clearing of sediment from the drains, tiles, and tributaries, and sometimes requiring replacement of privately owned tiles. (Russell).

90. Raising water levels will also adversely affect agricultural drains situated to the northwest of the lake. (Russell). These drains are presently submerged from time to time under the existing DNR order. A persistent increase in water levels to the District's proposed summer target level would retard the rate that the farmlands drain and delay the time for planting or make some areas unsuitable for planting. (Russell).

91. A persistent increase of water levels on Lake Koshkonong will also adversely affect agricultural drainage on certain farmlands located near the Rock River east of Fort Atkinson. (Kutz; Exs. 700-703). Water levels at the District's proposed summer target submerge the outlet depicted in Exhibit 702. A persistent increase in water levels would retard the drainage rate of farmlands served by the drain depicted on Exhibit 702 and the tile fields depicted on Exhibit 700, causing a delay in the time the land could be planted and resulting in diminished crop yield. (Kutz).

Public Access

92. During the public hearing and public comment period on the DNR's draft Environmental Assessment, there were no comments related to any perceived need for better public access to the lake. (Johnson)(Ex. 15). In the year 2000, the District conducted a formal survey regarding the lake and its uses. Among the respondents to the survey, 81% believed there was adequate public access, with the balance of 19% believing otherwise. Five percent of the respondents identified the "most negative aspect" of the lake to be "not enough public access," while 29% percent complained either that there was too much boat traffic or that boats and motors were too large. Over 54% of the respondents identified "worsening water quality" as the most negative aspect of the lake. (Ex. 6, Att. 2A).

93. There are five no-fee public boat ramps on the lake (Vinne Ha Ha; North Shore Road; Kuehn Road; Carcajou Road; Bingham Road) that are rarely used by summer time recreational boaters. (Bush; Cross; Ex. 814). These landings are located in shallow bays where mud flats extend several hundred feet from shore. (Cross). These landings are used primarily by duck hunters in the fall and small fishing boats in the spring and fall. (Cross).

94. There is one fee-based public boat landing (Dallman's Landing) located on the lake that is regularly used by recreational boaters.

95. None of the public landings on the lake, including Dallman's Landing, have sufficient depth at lake level 775.70 to allow for launching of an 18-foot long V-hull boat. At the DNR's "summer" target level of 776.2, boat launching conditions at these landings for this size boat are only marginally better, and except for Dallman's Landing, are not sufficient to launch most recreational boats. (Richardson; Micale). Even at the District's proposed target level of 776.8 msl, the no-fee public landings remain difficult to use. (Johnson). During flood events, the no-fee landings have sufficient depth to permit the launching of some motorized recreational boats. (Bush).

96. There are a number of boat access points on the Rock River, all of which have sufficient depth to permit any recreational boat suitable for Lake Koshkonong to launch when the lake level is at 775.70 msl. The DNR—Newville site is about three miles downstream from the lake outlet. The DNR—Wildlife site is about 2 miles upstream of the lake inlet. There are also no-fee public boat ramps on the Rock River located in Fort Atkinson and in Jefferson, both over six miles upstream from the lake. There are also two commercial fee-based access sites on the Rock River that are less than a mile from the lake. (Bush). Most non-riparian boaters who access the lake enter from the Rock River, primarily from the following points: no-fee DNR—Newville and DNR—Wildlife sites; a commercial site at the Rock River inlet; private marinas near the lake outlet. (Cross).

97. Dredging around public boat landings temporarily increases water depth at the landings, but dredged areas typically fill back in with silt within weeks or months of the dredging activity. (Ex. 221; Micale; Bush; Payson).

98. Most duck hunters access the lake from landings on the upper Rock River. (Cross). Increasing water levels on the lake would not substantially improve access to the lake waters to waterfowl hunters, although the winter draw down makes some marsh areas less accessible or inaccessible by watercraft for waterfowl enthusiasts. (Bush).

99. The higher winter water target level of 776.8 proposed by the District would often facilitate easier access to lake ice by road vehicles, though ice jacking and drifted snow sometimes impair access even in higher water/ice conditions. (Cross). All terrain vehicles are able to overcome conditions that affect the capability of road vehicles to access the ice, and in recent years have become an increasingly popular mode of transportation for ice fishing. (Cross).

Riparian Access

100. Approximately 10 miles of the shoreline are developed for both commercial and residential use. As of 1999, there were approximately 2788 residential parcels located within one-half mile of the shores of Lake Koshkonong, most of which fall within the geographic boundaries of the District. Of these, approximately 616 parcels are riparian properties on Lake Koshkonong, and approximately 466 other properties were directly behind these riparian properties with no lake frontage. The balance of these properties (approximately 1706) are behind the second tier properties or beyond, within one-half mile of the lake. (Ex. 207, pp. 22-23).

101. All of Lake Koshkonong has a very flat gradient from the water's edge, but some of the flattest areas are found near many residential riparian properties. The gradient from the shore to the 3-foot bathymetric contour is among the lengthiest on the lake near the following residential areas: Charlie Bluff area; Binghams Bay area; Gilbert Bay/Vinne Ha Ha area; Stinkers Bay/North Drive Shore area; Joyce Road/Koshkonong Manor area; Olson Bay/Lake Road area. (Exs. 227, 228.) Among persons who reside in these areas, there is strong and

substantial, though not universal, sentiment in favor of the District's proposal, to improve riparian access and the perceived scenic beauty of the riparian residential property. (E.g., testimony during public participation from: McMahon; Proud; Sander; Ferguson; Samuelson; Abedroth; Mantey; King; Larsen; Mueller; Nolfi; Saunders; Pepin; Payson; Scherrer; Mayer; Jackowski; Micale).

102. In the year 2000, the District conducted a survey within the District that was likely received by most of the riparian residential property owners. The response rate on the survey was only 8%, but among those responding, 112 or 81% reported that low water negatively impacted their use and enjoyment of the lake "much," "very much," or "medium," with the balance reporting low water had little to no impact. In response to the identical question posed on the impact of *high* water, 46% of the respondents stated that high water adversely impacted their use and enjoyment of the lake, while the balance of 54% responded that high water had little or no impact. (Ex. 6, Att. 2A). It is reasonably inferable on this record as a whole, including the public participation component of the contested case hearing, that a majority of owners and residents on or near riparian residential properties on Lake Koshkonong support the District's proposal to raise water levels and believe that higher water would enhance their enjoyment of the lake and their residential properties. (Micale; Rock River—Koshkonong Association, Inc.).

103. It is reasonably inferable on this record that a majority of business owners operating commercial enterprises doing business on or near the lake, including many of the approximate 30 businesses who are associated with the Lake Koshkonong Recreational Association, Inc., support the District's proposed order. (Richardson; Pope; Larsen; Stanley; Samuelson; Hanson).

104. Increasing summer water levels from 776.2 to the District's proposed target of 776.8 would allow many riparian owners to maintain shorter piers to reach depths of 2 to 3 feet. Under the present water level order, piers must be very long to reach waters 2 to 3 feet in depth at many locations, and consequently many riparian owners do not maintain piers out to the 3-foot depth. (Ex. 7, p. 85). Increasing the summer water level from 776.2 to 776.80 would allow piers in the following areas to be shortened in the following approximate lengths in order to reach the same water depth:

a. In the Joyce Road/Koshkonong Manor area, piers could be shortened in some areas by as much as 100 feet (from 300 feet to 200 feet) to reach the same water depth at lake level 776.20. (Ex. 16B)(McMahon; Proud; Stanley; Pepin).

b. In the North Shore area, piers could be shortened in some areas by 85 to 100 feet to reach the same water depth at lake level 776.20. (Ex. 7, p. 87, Ex. 16C)(Larsen).

c. In the Charlie Bluff area, piers could be shortened in some areas as much as 120 feet (the 3-foot gradient would move from as far out as 520 feet, to 400 feet) to reach the same water depth at lake level 776.20. (Ex. 16D).

d. In the Vinnie Ha Ha area, piers could be shortened in some areas as much as 160 feet (the 3-foot gradient would move from as far out as 500 feet, to 340 feet) to reach the same water depth at lake level 776.20. (Ex. 16B).

e. In the Olsen Bay area, piers could be shortened in some areas by about 80 feet (from about 260 feet to 180 feet) to reach the same water depth at lake level 776.20. (Ex. 7, p. 87; Ex. 16B)(Saunders).

105. Increasing summer water levels would also make it easier for riparian owners to maintain boat lifts and shore stations closer to shore and in waters with greater depth. (Cross; Samuelson; Mayer; Micale).

Natural Scenic Beauty

106. There are over 600 riparian residential parcels on Lake Koshkonong. Many riparian residential owners who reside along shallower shorelines, and many recreational users, regard the exposed lakebed during the winter draw down and during low water times to be aesthetically inferior to full pool levels. (Stockham, prefiled direct testimony, p. 9; e.g., Payson; Nolfi; Pepin).

107. Riparian wetland complexes on and near Lake Koshkonong, and the flora and fauna supported by those complexes, have considerable aesthetic value to many users. The permanent loss of diverse wetlands on or near the lake would degrade the natural scenic beauty of the lake ecosystem.

Swimming/Bathing

108. The shallow morphology of Lake Koshkonong, with its flat gradient from the shoreline, is not conducive to swimming and there is little swimming activity on the lake. Recreational bathing activities for the most part involve wading and walking in the shallow near shore waters. (Cross).

109. Adoption of the District's proposed order would move bathing activities closer to the shoreline. Adoption of the District's proposed order would not create further distance between boat traffic and bathers who access the lake either from the shore or from watercraft, since the relative water depth necessary to support either activity remains constant regardless of the lake level.

Navigability – Boating, Fishing, Recreation, Public Safety

110. Fishing, recreational boating, waterfowl hunting and trapping are the most common recreational uses of Lake Koshkonong and the Rock River. (Cross). Various types of watercraft use the lake and river, from smaller craft such as personal watercraft, sail boats, canoes and skiffs, to larger watercraft such as runabouts, fishing boats and pontoon boats. (Cross). Through the years, the average sizes of boats and motors on the lake has increased, as has the number of recreational boats and fishing boats. There are a number of locations on the lake where boaters tend to pull near the shoreline to bathe and socialize. (Cross).

111. An 18-foot V-hull boat with an appropriately sized motor is capable of traversing most of the surface area of Lake Koshkonong waters, up to depths of 8 to 10 inches with the motor trimmed. (Bush). Other styles of deep draft boats are capable of accessing the shallow bays of the lake by trimming their motors. (Cross). Shallow draft watercraft such as personal water craft and pontoon boats can also access shallow waters. (Cross; Bush). Waterfowl hunters are able to access extremely shallow areas of the lake and shallow marshes with as little as two inches of water, using "mud motors." (Cross; Richardson). Most fishing boats can access water twelve inches deep with a trolling motor. (Duesterbeck). Mud Lake and other shallow marsh areas with a surface water connection to the lake may be accessed by kayaks, skiffs and other craft designed for shallow water. (Scullin).

112. A DNR safety watercraft, 18-feet long with a 150-horsepower motor, is able to patrol in waters 18 inches deep by trimming the motor. (Cross). Such boats require about 20 to 24 inches of water to operate at high speed, and would need to be in at least approximately 33 inches of water to move immediately from idle to full speed. (Richardson; Ex. 218).

113. Public safety and rescue watercraft typically launch from docks on the river. (Sautin). The shallow boat landings on the lake are not conducive to launching public safety and rescue watercraft, either at the DNR target levels or at the District's proposed levels. Launching rescue craft from the lakeside access points is unlikely to shorten response time in most rescue scenarios, after factoring in drive time to the lake landings and potential complications in launching rescue watercraft from these landings, even at the higher water levels that would prevail under the District's proposed order. (Cross). During high use times, public safety personnel are frequently on duty on the lake. At top speeds under flat water conditions, commonly sized recreational and public safety watercraft are capable of traversing the approximate six-mile length of the lake from the inlet to the outlet in 10 to 15 minutes under either the DNR's target levels or the District's proposed levels. (Richardson).

114. Public safety and rescue watercraft are not always able to reach shallow draft boats located in shallow waters, and on occasion this has impeded emergency operations. (Sautin). Maintaining water levels at the District's proposed target may improve responsiveness of public safety watercraft in some of the shallow margins of the lake. (Sautin). However, even with higher sustained lake levels, similar predicaments would not be wholly avoided, in that shallower draft boats would continue to be able to enter areas not accessible to certain types of public safety craft.

115. Increasing the lake level from 776.20 to 776.80 would allow recreational watercraft and public safety watercraft to traverse Lake Koshkonong waters closer to the shoreline, with the largest improvement in navigational depth occurring along those areas near the shore with the shallowest gradient, which are predominantly near the developed shoreline areas. (Ex. 228)(e.g., Micale). The increased water levels could entice some boaters to travel faster and closer to shore, heightening risk factors for boating accidents.

116. Increasing the lake level from 776.20 to 776.80 would have the immediate effect of expanding the surface area of the lake by approximately 44 acres, and a further increase from 776.80 to 777.00 would expand the surface area of the lake an additional 19 acres, for a gross expansion of lake area of approximately 63 acres at 777.0 msl. (Ex. 6, "2004 GPS Survey;" Ex. 855; Hjort). This increased surface area does not account for likely future riparian wetland and shoreline loss caused by water, wave, and ice action as a result of sustained higher water levels under the District's proposed order. (Trochlell).

117. Increasing water levels as proposed by the District would not alter the lake's morphology as a shallow lake or the navigational limitations that inhere in such bodies of water. At the increased water level proposed by the District, shallow depths would continue to exist on the lake, and these shallow depths would likely continue to impede rescue and public safety responses from time to time, though possibly with reduced frequency. The evidence presented establishes some impediments to rescue and public safety responses from time to time at the DNR's proposed target level, but does not establish that inadequate depths are a chronic or persistent condition that significantly affects the responsiveness of public safety personnel and watercraft or that poses a substantial threat to public safety.

118. Navigational hazards that exist on Lake Koshkonong at the DNR target levels include rock piles, stump fields, sandbars, mudflats, and shallow bays on the lake. (Cross)(Ex. 219). Damages to boats and propellers are more common at the DNR target levels than at higher water levels, but careful boating practices can diminish the risk of damage. (Richardson; Storlid, Ex. 348). Adoption of the District's proposed order would not eliminate these navigational hazards from the lake as a whole (Cross), but likely would mitigate them to some degree.

119. The navigational depth of the lake would be improved mostly in near shore and shallow marsh areas by adoption of the District's proposed order. The navigational depth of the lake and marshes at the summer and winter levels specified in the DNR's 2005 order provides reasonably sufficient access to recreational boaters, sailboats, fishing boats, waterfowl hunters, and rescue and safety watercraft to the lake, including the shallower waters nearer the shoreline. (Cross).

Section 31.02(1) Standard

120. The net negative effects of the proposed higher water levels far outweigh the enhancements to navigation and access. Allowing increased water levels as proposed by the District would be inconsistent with the interest of public rights in Lake Koshkonong and the Rock River, and would not serve to protect life, health or property. Public safety may be marginally promoted with increased water levels, but the water levels specified in the DNR's 2005 order do not pose undue risks to public safety.

DISCUSSION

Wisconsin Stat. § 31.02(1) empowers the DNR to regulate and control the level and flow of water in all navigable waters "in the interest of public rights in navigable waters or to promote safety and protect life, health and property." Section 31.02(2) provides that the "construction, operation, maintenance and equipment … of dams in navigable waters shall be subject to the supervision of the [DNR] and to the orders … of the [DNR]."[4]

"Public rights" in the state's public trust navigable waters extend beyond navigation relating to commerce, and include the following: "sailing, rowing, canoeing, bathing, fishing, hunting, skating and other public purposes," *Nekoosa Edwards Paper Co. v. Railroad Commission*, 201 Wis. 40, 228 N.W. 144, 147 (1929); right to clean, unpolluted water, *Reuter v. DNR*, 43 Wis.2d 272, 168 N.W.2d 860 (1969); consideration of wetlands and near shore lands, *Just v. Marinette County*, 56 Wis.2d 7, 201 N.W.2d 761 (1972); wildlife habitat, and preservation of scenic beauty, *Village of Menomonee Falls v. DNR*, 140 Wis.2d 579, 412 N.W.2d 505 (Ct. App. 1987).

Public rights or interests in navigable waters may sometimes conflict, but "no single public interest … is absolute," and the "uses must be balanced and accommodated on a case by case basis." *State v. Village of Lake Delton*, 93 Wis.2d 78, 286 N.W.2d 622, 632 (Ct. App. 1979).

Modeling Evidence

The District presented modeling evidence to project the anticipated water levels of the lake under both its proposed operating order and the DNR's order. The results of its modeling

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[4] The complete texts of subparagraphs (1) and (2) of section 31.02, Stats., are as follows:

> **Powers and duties of department. (1)** The department, in the interest of public rights in navigable waters or to promote safety and protect life, health and property may regulate and control the level and flow of water in all navigable waters and may erect, or may order and require bench marks to be erected, upon which shall be designated the maximum level of water that may be impounded and the lowest level of water that may be maintained by any dam heretofore or hereafter constructed and maintained and which will affect the level and flow of navigable waters; and may by order fix a level for any body of navigable water below which the same shall not be lowered except as provided in this chapter; and shall establish and maintain gauging stations upon the various navigable waters of the state and shall take other steps necessary to determine and record the characteristics of such waters.
>
> **(2)** The department may investigate and determine all reasonable methods of construction, operation, maintenance, and equipment for any dam so as to conserve and protect all public rights in navigable waters and so as to protect life, health and property; and the construction, operation, maintenance and equipment, or any or all thereof, of dams in navigable waters shall be subject to the supervision of the department and to the orders and regulations of the department made or promulgated under this chapter.

provided the evidentiary foundation for virtually all of its evidence respecting the environmental impacts of adopting its order. The modeling evidence was limited to predicted water levels from May through October, denominated as the "summer" water level. No modeling of predicted water levels during the "winter" period of November through April was offered in evidence, though the District caused such modeling to be completed.

The model used data of the actual Rock River flow records for the period 1987 to 2005, and made certain assumptions regarding the operation of the wicket gates and slide gates as to both the DNR order and the District's proposed order. The gate operation assumptions for the DNR order were aptly described as a regime that "aggressively" manipulated the gates towards maintaining water levels at or near the DNR target of 776.2 msl at all times in the summer. As a result of these gate operating assumptions, the model results yielded water levels being maintained at or slightly below the DNR target of 776.2 about 70% of the time during the May to October time period. The provisions of the DNR's 2005 order and decision do not require such aggressive gate operation. If the model had been based on gate assumptions that met the minimum standards for opening and closing the wicket and slide gates, the model would have predicted higher water levels under the DNR's order.

In contrast, the model's assumptions for the District's proposed levels were not configured to achieve and consistently maintain water levels at the District's proposed target level. Instead, the assumptions employed resulted in water levels being below the requested target level about 65% of the time for the May through October period. If the flood and drought conditions during which both operating regimes yield the same water levels are removed from the calculus (about 25% of the time during the May through October period), then the District's proposed levels would be below its requested target level about 86% of the remainder of the time. (Ex. 117; Montgomery, Direct Examination, hearing).

The absence of evidence respecting the modeling results for the "winter" period (November through March) is significant because this period includes open water months during which water action would continue to act upon the fringes of the lake. It is reasonably inferable that water (and ice) levels would be higher nearly all of the time during this period at the District's proposed levels than under the DNR's 2005 order, except during flood events, when the levels would be about the same.

The reliability of the District's modeling results has a substantial impact on the District's evidence presented respecting the predicted environmental effects of implementing its proposed water levels. Most of that evidence was grounded upon the modeler's conclusion that the water levels under the District's order would be 0.2 to 0.3 feet (2.4 to 3.6 inches) higher than historic water levels for the majority of the time from May through October. (Montgomery, Prefiled Direct Testimony, pp. 24-25; Hjort; Nichols). This flawed assumption regarding the degree of the water level increases under the District's proposal taints this expert testimony and substantially diminishes its weight.

The District asserts in its post-hearing briefs that the DNR could amend the operating order to prescribe the gate operation assumptions employed by the model. The DNR rejects this suggestion, stating, "It would make no sense to establish a high 'Target' elevation at 776.80 and to then require the dam operator to keep large numbers of gates open when water levels are dropping past that 'Target' elevation." (DNR Reply Brief, p. 15).

If the District's suggestion to prescribe the gate operation regime assumed by its modeling were followed, the result would be lake levels below the District's designated "target" of 776.80 msl for 70% of the time. This would cause the nominal "target" level to be more like a de facto maximum level than a true target level. If this were mandated, it is easy to envision that there would continue to be dissatisfaction with water levels in some quarters, leading to some future iterative effort to amend the operating order to achieve yet higher water levels.

Even if the modeler's gate operating assumptions were prescribed in an operating order, the standards of section 31.02(2) would likely continue to weigh against allowing the more modest elevation of water levels. Even though the smaller water level increases would cause less environmental damage, the enhancements to navigability and access would also be less dramatic.

Secondary Economic Impacts

In the course of the contested case hearing, the DNR objected to the admission of certain evidence relating to the effect of water levels on residential real estate values, business income, and public revenues. (Kashian; Stockham; Duesterbeck). The DNR asserted at the hearing, and continues to assert in its post-hearing briefs, that this evidence is not relevant to a water level determination under section 31.02, Stats. The post-hearing briefs fully address the relevance of this evidence. Upon careful consideration of the briefs and authorities cited therein, the DNR's record objections to this evidence are sustained. The supreme court's reasoning in *Wisconsin's Environmental Decade, Inc. v. DNR*, 115 Wis.2d 381, 340 N.W.2d 722 (1983), applies with similar force here, even though that case involved action by the DNR under Chapter 30, not Chapter 31, Stats. Secondary or indirect economic impacts of a water level determination do not bear on the statutory standard set forth in section 31.02(1), Stats. The evidence to which the DNR objected at the hearing is stricken, specifically the following: testimony from Dr. Kashian and related exhibits 208-A, 209-A, 222, 223, 224, 225, 226, 856, & 857; portions of Mr. Stockham's testimony to which the DNR objected; and portions of Mr. Duesterbeck's testimony to which the DNR objected, along with related exhibits 222, 223, 224, & 360.

While such secondary economic impacts are outside the scope of a section 31.02(1) water level determination, the DNR and the hearing examiner here have considered evidence that comprehends at least one component of these asserted secondary impacts, albeit in a somewhat different form. Access to water is a riparian right that can be affected by changes in water levels. The diminished ease of access experienced by many riparians and their desire

for higher water levels, reflects their diminished utility and enjoyment of their property, which doubtless reduces the value of that property to them. This diminished utility and enjoyment of the property, and the expectation that higher water would enhance the utility and enjoyment of riparian property, has been considered and weighed under the standards of Wis. Stat. § 31.02(1).

Prescriptive Flowage Rights

The District claims that it has a prescriptive right to maintain flowage at the present higher OHWM, and that the DNR should have recognized this right in balancing the various interests under section 31.02, Stats. The District recognizes, however, that any such claimed prescriptive right would "not defeat the State's regulatory authority to set a water level order below the level of the dam owner's flowage rights." (Surreply brief, p. 7).

The assertion of a prescriptive flowage right to the present OHWM of 778.11 msl was first made in the District's post-hearing brief. Assuming without deciding that all persons necessary for an adjudication of a claim of flowage rights by prescription are parties to this proceeding and that the Division has the authority to adjudicate any such claim, no such claim was asserted before or during the ten days of the contested case hearing. Consequently, the evidentiary record is insufficiently developed to support findings of fact that would bear on any such claim. Accordingly, the DNR did not err not in not taking into account any newly asserted yet inchoate flowage right of the District.[5] The Joint Petitioners' further argument that riparian owners on the lake have a corresponding equitable right to the same water levels that the District now asserts it has gained by prescription, fails for the same reasons.

Balancing Public Rights, Safety, & Protection of Life, Health and Property

The DNR was required in this matter to assess the impact of increasing water levels on competing rights in navigable waters. The great weight of the evidence supports the DNR's 2005 order and decision to maintain "summer" water levels at the levels set in 1991 and to moderate the "winter" draw down water levels as being "in the interest of public rights in navigable waters" and "to promote safety and protect, life, health and property." A vast preponderance of the evidence establishes that increasing lake levels to a year round target of 776.80 would have profound and lasting negative effects on much of the property and ecological resources abutting the lake and its tributaries. Much of the evidence presented by the District positing ecological benefits or minimal impacts from higher water levels was largely discredited by persuasive controverting evidence. There were many conflicts and competing inferences in the evidence relating to the likely environmental effects and hazards of increasing water levels. The findings of fact set forth above resolve those conflicts in favor

[5] In 1939, certain prescriptive flowage rights were established in favor of the dam owner, and the District now possesses those rights as the successor in title. The DNR's 2005 decision and order does not infringe upon these established rights.

of the more convincing evidence, though largely without recitation of discredited or insufficiently weighty controverting evidence. See Wis. Stat. § 227.47(1).

The preponderance of convincing evidence showed that the positive ecological benefits from the proposed increased water levels are slight in comparison to the profound substantial negative effects.

A preponderance of the evidence established that increasing water levels as proposed would only modestly enhance navigability and access to this shallow lake. To be sure, these modest enhancements would have substantial significance to many riparian owners and lake users. Even at the proposed higher water levels, however, navigation and access to the lake would continue to be limited by the lake's character as a shallow lake with an extremely gentle slope adjoining most of its developed shoreline. The DNR has established by a preponderance of the evidence that the enhancement to access and navigation from increased water levels would be far outweighed by the substantial negative environmental impacts caused by the higher water.

The District argues that the DNR was required to balance and accommodate conflicting interests respecting water levels from the context of the condition of the lake as it exists today, without regard to its history as a water body that has been fundamentally altered and degraded as a result primarily of the raising of the dam crest around 1917. The DNR properly considered the cumulative impacts on the ecosystem that a further increase in lake levels would have. See Wis. Admin. Code § NR 103.03(d). The DNR reasonably concluded that navigational and access issues had been appropriately balanced and accommodated under the 1991 operating order, and that an increase in water levels under the present conditions would upset this balance in favor of navigational and access interests at the substantial expense of other public rights in the waters.

The Petitioners argue, in effect, that the DNR's rejection of higher water levels was preordained in part by an institutional bias (and, in the case of some individual staff members, personal biases) in favor of wetland preservation, without due regard to other interests in navigable waters. The DNR evaluated the proposed water level increase against the appropriate regulatory standards, including chapter NR 103, Wis. Admin. Code, with a critical eye, but with objectivity and fairness. The evidence fails to establish that the exercise of the DNR's discretion under Wis. Stat. § 31.02 was infected by bias or prejudice, or that the DNR did not give due consideration to all relevant factors and interests.

The DNR reasonably exercised its regulatory authority under section 31.02(1), Stats., in the issuance of its 2005 decision and order.

CONCLUSIONS OF LAW

1. The Division of Hearings and Appeals has the authority under Wis. Stat. §§ 31.02 and 227.43 to hear contested cases required to be conducted by the Department of Natural Resources.

2. The DNR, in the interest of public rights in navigable waters or to promote safety and protect life, health and property, may regulate and control the level and flow of water in all navigable water. Wis. Stat. § 31.02.

3. The DNR's decision and order 3-SC-2003-28-3100LR dated April 15, 2005 is necessary to protect the public rights in navigable waters and reasonably balances and accommodates public and private rights, the promotion of safety, and the protection of life, health, and property. Wis. Stat. § 31.02(1).

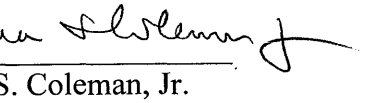
4. The DNR has complied with the requirements of Wisconsin's Environmental Policy Act ,Wis. Stat. § 1.11.

ORDER

WHEREFORE, IT IS ORDERED that the DNR's issuance of the decision and order 3-SC-2003-28-3100LR dated April 15, 2005 is sustained.

Dated at Milwaukee, Wisconsin December 1, 2006.

STATE OF WISCONSIN
DIVISION OF HEARINGS AND APPEALS
819 North 6th Street, Room 92
Milwaukee, WI 53203-1685
Telephone: (414) 258-6736
Fax: (414) 227-3818

By: 

William S. Coleman, Jr.
Administrative Law Judge

NOTICE

Set out below is a list of alternative methods available to persons who may desire to obtain review of the attached decision of the Administrative Law Judge. This notice is provided to insure compliance with Wis. Stat. § 227.48 and sets out the rights of any party to this proceeding to petition for rehearing and administrative or judicial review of an adverse decision.

1. Any party to this proceeding adversely affected by the decision attached hereto has the right within twenty (20) days after entry of the decision, to petition the secretary of the Department of Natural Resources for review of the decision as provided by Wisconsin Administrative Code § NR 2.20. A petition for review under this section is not a prerequisite for judicial review under Wis. Stat. §§ 227.52 and 227.53.

2. Any person aggrieved by the attached order may within twenty (20) days after service of such order or decision file with the Department of Natural Resources a written petition for rehearing pursuant to Wis. Stat. § 227.49. Rehearing may only be granted for those reasons set out in Wis. Stat. § 227.49(3). A petition under this section is not a prerequisite for judicial review under Wis. Stat. §§ 227.52 and 227.53.

3. Any person aggrieved by the attached decision which adversely affects the substantial interests of such person by action or inaction, affirmative or negative in form is entitled to judicial review by filing a petition therefor in accordance with the provisions of Wis. Stat. §§ 227.52 and 227.53. Said petition must be filed within thirty (30) days after service of the agency decision sought to be reviewed. If a rehearing is requested as noted in paragraph (2) above, any party seeking judicial review shall serve and file a petition for review within thirty (30) days after service of the order disposing of the rehearing application or within thirty (30) days after final disposition by operation of law. Since the decision of the Administrative Law Judge in the attached order is by law a decision of the Department of Natural Resources, any petition for judicial review shall name the Department of Natural Resources as the respondent, and shall be served upon the Department of Natural Resources. Persons desiring to file for judicial review are advised to closely examine all provisions of Wis. Stat. §§ 227.52 and 227.53, to insure strict compliance with all its requirements.