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FEDERAL ENERGY
REGULATORY COMMISSION

July 16, 1997

P-2113-066

Lois Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

RE: RESPONSE TO AGENCIES COMMENTS TO WVIC MANAGEMENT PLANS; FERC PROJECT 2113

WVIC hereby submits an original and eight copies of the following management plans and an original and eight copies of the comment letters received relative to the plans.

Plans submitted are:

- License Article 405 - Gaging Plan
- License Article 407 - Debris Management Plan
- License Article 408 - Communication Plan
- License Article 409 - Drought Contingency Plan
- License Article 411 - Water Quality Monitoring Plan
- License Article 413 - Fish and Wildlife Management Plan
- License Article 415 - Bald Eagle Protection Plan (included with the Fish and Wildlife Management Plan)

Letters of comment are:

- Wisconsin Department of Natural Resources (WDNR)
- Michigan Department of Natural Resources (MDNR)
- U.S. Fish and Wildlife Service (USFWS)
- Stevens Point Flowage Property Owners Association (SPFPOA)

WVIC prepared the management plans and submitted copies to the agencies as specified in its License Articles. Agency comments to these plans are enclosed with this letter and are discussed below.

LICENSE ARTICLE 405 - GAGING PLAN

WVIC submitted copies of the Gaging Plan to the WDNR, US FWS, and USGS. The USGS supported the plan and the other agencies offered no specific comments on the plan.

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LICENSE ARTICLE 407 - DEBRIS MANAGEMENT PLAN

WVIC submitted copies of the Debris Management Plan to the WDNR, MDNR, U.S. Forest Service (USFS), and USFWS. WVIC received one comment from the MDNR. WVIC's response to this comment is provided below.

MDNR

- Page 4, Section 3.1
WVIC modified the final plan to specify that small, naturally occurring debris will be passed downstream. Large naturally occurring debris which cannot be passed through the gates and refuse will be removed and disposed.

LICENSE ARTICLE 408 - COMMUNICATION PLAN

WVIC submitted copies of the Communication Plan to the WDNR, MDNR, USFS, USFWS and SPFPOA. WVIC received comments from the SPFPOA. WVIC's response to these comments are provide below.

SPFPOA

- Page 2, Table 1. RIVOPS and DecTalk Data
Flow is already monitored continuously at the Dubai, Stevens Point, Wisconsin Rapids, Petenwell, and Castle Rock hydroplants by Consolidated Water Power Company who operates the plants. WVIC worked with Consolidated in the past to develop a real-time computer link between the Consolidated SCADA system that monitors hydroplant operation and the WVIC RIVOPS system, but it was found that such a link would open up serious security concerns with the Consolidated computer system. However, Consolidated is currently installing a new computer system that should eliminate this computer security concern and thus make the real-time flow data available to WVIC. WVIC will add hourly data for the Dubai, Stevens Point, Wisconsin Rapids, Petenwell, and Castle Rock hydroplants to the RIVOPS and DecTalk systems if it becomes feasible to develop this real-time computer link. Consolidated is also considering making this data available to the public via the Internet.
- Additional Flow Gage near Junction City
This flow gage would be located along the Stevens Point Hydroplant Flowage. Flow is already measured at the Dubai Dam on the upstream end of the Stevens Point flowage and the Stevens Point Dam on the downstream end of the Stevens Point flowage. No significant tributary streams enter the Stevens Point flowage. Therefore, this gage would not provide additional useful flow information.

Further, river flow can only be measured accurately at hydraulic structures (like dams) or on free-flowing stretches of river where a stage-discharge relationship can be developed. This site would be located in an impoundment where neither technique can be used. As such, accurate flow gaging is not physically possible at this location.

Consolidated Water Power Company, the owner of the Stevens Point and Dubay hydroplants, has monitored water elevations at this location for various river flows. This information is being used by Consolidated to develop a relationship between river flow and water elevation in this area. This relationship should be useful in forecasting the effect of future flood events and notifying affected residents (see the following response). For these reasons, a flow gage near Junction City was not added to the Plan.

- Page 4, Communication with Public Officials

The flow on the stretch of the Wisconsin River from the Dubay hydroplant downstream to the Stevens Point hydroplant is the total of the flow from the upper Wisconsin River (with 5,000 square miles of drainage area) and the discharge from the Eau Pleine reservoir (with 370 square miles of drainage area). As such, the discharge from the Eau Pleine reservoir may or may not be a significant factor in the total flow downstream from Dubay. For example, during the snowmelt runoff period in early April 1997 the discharge from the Dubay hydroplant reached 40,000 cfs but the discharge from the Eau Pleine reservoir never exceeded 4,200 cfs.

The critical flow for residents along this stretch of river is the discharge from the Dubay hydroplant. Consolidated Water Power Company, the operator of the Dubay hydroplant, already maintains a call list for residents between Dubay and Stevens Point who are affected by high flows. This list already includes Mr. Shippy, other members of SPFPOA, and Portage County officials.

WVIC's Communication Plan specifies that Consolidated will be notified of all flow changes at Eau Pleine. This will allow Consolidated to effectively plan the operation of Dubay and initiate their call list if Eau Pleine operation will cause the discharge from Dubay to rise significantly.

Therefore, notification of SPFPOA by WVIC would duplicate more comprehensive procedures that are already in place and a change to the Plan has not been made.

- Page 4, Section 3.2 Computer-Generated Speech System - Dectalk

WVIC will make the computer-generated speech system available to officers of any downstream river/reservoir associations (including SPFPOA) upon their request. The plan has been modified to reflect this change.

LICENSE ARTICLE 409 - DROUGHT CONTINGENCY PLAN

WVIC submitted copies of the Drought Contingency Plan to the WDNR, MDNR and USFWS. WVIC received comments from MDNR and USFWS. WVIC's response to these comments follow.

MDNR

- Page 6, Section 3.1.4

WVIC has added MDNR to the list of agencies consulted in Section 3.1.4. The other agencies will be added to the list upon their request.

USFWS

- Page 2, Drought Contingency Plan, Drought Concerns.
Reservoir operations do not cause droughts. Reservoir water levels may at times be lower during droughts, which are caused by meteorological conditions, when compared to water levels during normal or above normal years of precipitation. FERC staff concluded in the FEIS that WVIC man-made and natural-lake Project reservoirs support diverse and productive fisheries and wildlife resources and that reservoir operations have not adversely impacted these resources (pages 4-12 thru 4-16; 4-36; 4-53 thru 4-58; 4-87 and 4-88). These findings demonstrate the resources are resilient to droughts and low water, as recently evidenced following the drought which occurred from 1987-1989. FERC staff also concluded that the new modified reservoir operations and resulting higher water levels during the early-spring and summer at the man-made reservoirs would enhance fisheries, vegetation and water quality (FEIS, pages 4-29 thru 4-31). Based on these conclusions, WVIC does not believe there is any demonstrated basis to further evaluate the effects of drought conditions on fish and wildlife resources. Similarly, there is no basis to evaluate "low flows" again, since WVIC and the agencies collectively developed minimum flows for the Project reservoirs which were designed to protect fish and other aquatic life (FEIS, pages 4-31 and 4-32). WVIC has implemented these minimum flows. No change was made to the Plan in response to this comment.

LICENSE ARTICLE 411 - WATER QUALITY MONITORING PLAN

WVIC submitted copies of the Water Quality Monitoring Plan to the WDNR, MDNR, and USFWS. Comments to the Water Quality Monitoring Plan were received from the MDNR. WVIC's responses are provided below.

1. Page 3-1, Section 3.1.1.

The February sampling event issue was resolved at the November 2-3, 1995 Section 10(j) meeting and subsequently noticed by FERC on December 8, 1995 (page 11). This issue was then thoroughly discussed in the FEIS, Water Quality Monitoring Plan (pages 4-49 and 4-50). No change was made to the Plan.

2. Page 3-1, Section 3.1.2.

It is unclear why MDNR is reintroducing this issue, since this issue has already been resolved. The rationale for WVIC's proposed Water Quality Monitoring Plan was described in WVIC's 1991 License Application. MDNR had originally requested sampling these water quality parameters (pH, turbidity, nitrogen, NO₂/NO₃, and conductivity) at Lac Vieux Desert during preparation of WVIC's DRAFT License Application. On page 3 of its comment letter dated May 21, 1993, however, the MDNR had withdrawn this request and accepted the Plan as designed to monitor only Trophic State Index parameters at Lac Vieux Desert. The MDNR did request in its May 21, 1993 letter that a February sampling event be included in the Plan and also sediment core samples for paleolimnological analysis. WVIC disagreed to these two MDNR requests in its Response to Agency/Public Comments (July 1993; page 7, Condition Reference Number: # 6). The MDNR subsequently withdrew its request for paleolimnological analysis and the February sampling event was resolved at the November 2-3, 1995 Section

10(j) meeting, as cited above. WVIC believes there is no demonstrated basis to reopen this issue and that the Plan should remain "as written" and as previously agreed to by all the agencies, including the MDNR.

3. Page 3-2, Section 3.1.3,

As stated in this Section of the Plan, WVIC already agreed to provide the MDNR with copies of the field data and has no objection to including copies of WDNR's laboratory results from the TSI monitoring. The Plan will be amended to include this addition. WVIC believes the MDNR, however, should then be responsible for distributing the data within its own agency. Furthermore, WVIC did not receive any verbal or written requests during relicensing from the Lac Vieux Desert Band and USFS for data collected from the TSI Monitoring Program. WVIC would rely on the Lac Vieux Desert Band and USFS to submit their own requests for such data.

4. Page 3-2, Section 3.1.4,

WVIC disagrees with the MDNR's recommendation to (1) set a rigid time period to review the sampling program and (2) exclude WVIC when reviewing "chemical techniques". WVIC and WDNR agreed to leave this condition open and flexible as written, so that any participant in the program could request a review when there is a demonstrated need. More efficient methodologies for monitoring or laboratory analysis could surface at any time during the monitoring program, possibly after one year for example, and necessitate a need for consultation at that time, rather than waiting until the end of a three year period. In addition, WVIC has historically demonstrated the capability and expertise to assess "chemical techniques" and should be involved in any reviews. Furthermore, no requirements are included in the License Article 411 that requires MDEQ, USFS, and the Lac Vieux Desert Band to be involved in this review nor is there any apparent reason to include them.

LICENSE ARTICLES 413 & 415 (COMBINED) - FISH AND WILDLIFE MANAGEMENT PLAN AND BALD EAGLE PROTECTION PLAN

WVIC submitted copies of the Fish and Wildlife Management Plan and the Bald Eagle Protection Plan to the WDNR, MDNR, USFWS and USFS. WVIC received comments from WDNR, MDNR and USFWS. Many of the agencies comments addressed the same topic and were therefore combined. WVIC has identified the agency and its specific comment under each topic, which can be cross referenced to each agencies comment letter. WVIC's responses are provided below.

Consultation

The WDNR, MDNR, and USFWS each made recommendations regarding future consultation.

WVIC recognizes the complex and dynamic nature of the environmental resources within the project area as stated in the Fish and Wildlife Management Plan (Plan), and the potential need to modify management goals in the future based on results from studies outlined in the Plan. WVIC concurs with the WDNR that management of these resources requires flexibility and recognition that there may be issues, opportunities, or unforeseen problems either within or outside the scope of the Plan that may

require cooperative action in the future. WVIC agrees with the WDNR that informal consultations, on an as needed basis, would be most appropriate and effective for addressing future unforeseen issues, rather than a mandated annual meeting, as suggested by the USFWS and MDNR. WVIC has enjoyed a cooperative working relationship with the WDNR over the years under such an arrangement, one that WVIC agrees has benefitted both parties with shared knowledge and expertise, and new data. WVIC would welcome the opportunity to sustain this open working relationship and enter into a cooperative partnership with the WDNR and include the USFWS and MDNR working toward continued management of the environmental resources within the Project area.

The USFWS also made a general comment that WVIC "develop a work plan to accomplish objectives for each resource goal... each year". WVIC does not believe there is any demonstrated need for such a "work plan", because the Fish and Wildlife Management Plan already outlines resource studies and activities by year, as listed in Chapter 5 "Implementation Schedules". In addition, goals and tasks for carrying out these activities are already described within the Plan. Any necessary updates to the Plan will be made every five years, as required in Article 413.

Adaptive Management

Both the WDNR and USFWS recommend applying adaptive management as a means to manage environmental resources and/or operate the reservoir system to achieve management goals. WVIC's Plan is a dynamic plan that allows for flexibility and, in reality, represents an adaptive approach to managing the Project's environmental resources. FERC also found the Plan provided flexibility and opportunities for refinement (FEIS, page 4-58). While WVIC acknowledges the merits of an adaptive management approach, we believe that the new modified reservoir operations, implemented in July 1996, must be afforded the opportunity to be evaluated before any changes or modifications are considered.

As discussed in the FEIS, the new modified reservoir operations represent a change in reservoir management which is anticipated to enhance the aquatic resources while balancing other competing uses of water. Considering the long-term nature of the monitoring programs, FERC's requirement for a five year update of the Plan over the life of the new license represents a logical time frame for evaluating the new reservoir management strategy and for determining whether management goals, such as panfish fisheries enhancement, are being achieved. Other future resource issues that merit consideration toward achieving WVIC, WDNR and USFWS common management goals can be addressed through the cooperative partnership, previously discussed.

In addition to the general comments received from the USFWS, a list of specific resource issues is included which it believes should to be addressed under the adaptive management process. WVIC does not believe that any of these issues, with the possible exception of "Control of exotic species" require further evaluation, since they simply represent issues originally raised by the USFWS during relicensing, issues which have already been resolved through the relicensing process. WVIC's responses to the USFWS list of resource issues are given below.

1. Fish stranding in potholes in the five man-made reservoirs

WVIC disagrees with USFWS's general assessment of pothole stranding and specifically that insufficient information exists to evaluate fish stranding. Further, the USFWS offers no explanation

of why it does not believe sufficient information exists. WVIC conducted a detailed evaluation of pothole stranding in the four man-made reservoirs that contain potholes (Appendix 1 of the Fish and Wildlife Management Plan) as required in Article 413. This involved an assessment of the juvenile and adult fish stocks and various structural indices, and creel data, which were used as indicators of the general status of the target species populations. The findings from this evaluation demonstrated that pothole stranding is not adversely impacting the fisheries in any of the reservoirs and therefore a plan to address pothole stranding is not necessary.

The USFWS also suggests WVIC excavate an escape channel in "one large pothole" in Spirit Reservoir and evaluate the numbers of fish and other aquatic organisms that use the escape channel. Such a study is (1) not necessary for the reasons previously stated; (2) impractical from the standpoint of producing any meaningful results, for example, it would be difficult to measure aquatic organism emigration from the pothole and then the effects this may have on the entire aquatic organism community in the reservoir; and (3) contrary to FERC's assessment of a "host of adverse environmental effects" to the environment from dredging such a channel. FERC staff in the FEIS (page 4-59) clearly disagreed with pothole dredging.

2. Winter drawdown of the man-made reservoirs

FERC staff has already evaluated the effects of a 25 percent minimum volume during the winter in the man-made reservoirs (FEIS, pages 4-53 thru 4-58). FERC staff concluded that winter drawdown has not caused serious negative effects on fisheries or vegetation (FEIS, page 4-12). They also concluded there was no compelling evidence that a 25 percent minimum pool would benefit aquatic resources, particularly the fisheries and Staff subsequently rejected such a condition. WVIC's new operating license and Articles reflect this conclusion.

FERC staff also thoroughly evaluated the dissolved oxygen issue at Eau Pleine Reservoir (pages 4-44 thru 4-47 and page 4-55) and concluded that retaining 25 percent volume in the reservoir over the winter would not necessarily enhance dissolved oxygen and could even exacerbate the problem. FERC recommended that WVIC continue both its management approach to controlling releases and aeration of the reservoir to minimize dissolved oxygen problems. FERC added that WVIC consult with the agencies when the reservoir would be drawn down below 25 percent volume as an added measure of Eau Pleine Reservoir management.

3. Maintain a minimum summer pool in the man-made reservoirs

WVIC does not believe there is any demonstrated basis for conducting a study of maintaining a minimum summer pool of 4 feet below the maximum water level at "one" of the reservoirs. WVIC's new reservoir operations at the man-made reservoirs represent an improvement of summer water levels over historical operations and the best balance of competing uses of water. As FERC staff concluded in the FEIS (page 4-57) the new operation would substantially increase the percent of time that summer pools would remain within 4 feet of maximum, particularly at Spirit and Eau Pleine reservoirs.

As discussed at the beginning of this letter, WVIC believes that the new modified reservoir operations must be afforded the opportunity to be evaluated before any changes or modifications to the operations are considered. Fish monitoring proposed in the Fish and Wildlife Management Plan was designed to collect the data necessary to accomplish this evaluation. Any changes at this time to any "one"

reservoir would negate any efforts to measure the long-term effects of the new reservoir operations before there has been adequate time for the aquatic resources, particularly the fisheries, to respond.

4. Minimum flow in the Pickerel Canal near Rainbow Reservoir

WVIC does not believe there is any basis to evaluate options to maintain a year-round flow in the Pickerel Canal. As already discussed in the FEIS (pages 4-47 thru 4-48 and 4-62 thru 4-66), Staff concluded that there was no demonstrated need to maintain a minimum flow during the 4-6 week winter period and did not recommend a minimum release from a water quality or fisheries perspective, since neither resource is adversely affected. Staff further concluded that protecting the 100 foot section of the 1000 foot man-made Pickerel Canal was not justifiable, because this would result in a significant loss of usable storage (53 percent) in Pickerel Reservoir with no significant benefit.

5. Ramping rate at the Willow Reservoir

WVIC already developed a ramping rate for Willow Reservoir in consultation with the agencies during relicensing, which was designed to protect aquatic resources. Specifically, headwater and tailwater level decreases were limited to not more than 1 inch per hour. This goal was accepted by the agencies, including USFWS. The Willow Reservoir ramping rate was then accepted by FERC in the FEIS (page 4-40) and subsequently included in the new license Article 422. There is no need to reevaluate the need for a ramping rate.

6. Control of exotic species

WVIC has already agreed to work cooperatively with the agencies in controlling purple loosestrife within the Project reservoirs, which is described in WVIC's new license, Article 414. Requiring WVIC to help control the zebra mussel, Eurasian milfoil, and "others" is a new request by the USFWS. Nevertheless, WVIC would consider a cooperative effort with the agencies in controlling those exotic species which are shown to be aggravated by reservoir operations and adversely impacting the resources within the Project reservoirs. Any cooperative effort, however, would have to be mutually agreeable between WVIC and the agencies. The Plan has been modified to reflect this request.

Specific USFWS Comments

The USFWS also included specific comments to WVIC's Fish and Wildlife Management Plan. WVIC's responses to those comments are listed below.

- Page 2-8, Fish and Wildlife Management Plan, Eau Pleine Reservoir Aeration and D. O. Monitoring.

WVIC did not intend to infer that aeration alone resolves the dissolved oxygen problem in the Eau Pleine Reservoir. As stated on page 2-8 of the Plan, the aeration system helps protect the fishery. WVIC has already tested and implemented reservoir operational measures to further minimize low dissolved oxygen problems, as described in its 1991 license application, in the July 1993 - Response to Agency/Public Comments (pages 32-33) and in the FEIS (pages 4-44 thru 4-47). These measures include raising the minimum water level, controlled reservoir releases coordinated with aeration, delaying drawdown, dissolved oxygen monitoring and consultation with the agencies. The Fish and Wildlife Management Plan will be amended to

include a statement reflecting these measures.

- Page 3-11, Fish and Wildlife Management Plan, Bald Eagle Protection Plan.
No response necessary.
- Page 3-12, Fish and Wildlife Management Plan, Nesting, 4th paragraph.
WDNR and WVIC determined that motorized vehicle traffic was adversely impacting the more sensitive environmental resources near Rainbow Reservoir, such as bald eagles and ospreys, wetlands, and forest habitat in general. To protect these resources, WVIC and WDNR entered into the Memorandum of Agreement to limit public access on lower standard roads through the use of gates and berms. This action has been effective in mitigating the impacts to the environmentally sensitive resources and has also served to curtail erosion resulting from vehicle traffic and minimize littering. WVIC is not aware of any other "resource issues" that need to be addressed in the MOA. It is unclear what other "resource issues" the USFWS believes should be included or the rationale for their inclusion.
- Appendix 1. Evaluation of Pothole Stranding at WVIC's Five Man-made Reservoirs.
It is unclear what the USFWS is inferring by its comment that the "data is largely used to minimize the concern for stranding of fish...". WVIC's evaluation of pothole stranding represents more than a rudimentary or casual effort to assess the effects of pothole stranding on the fisheries resources.

FERC staff included a detailed discussion of this issue in the FEIS (pages 4-58 and 4-59). They recommended that WVIC should develop a plan to address pothole stranding at the man-made reservoirs and that the first step should be "to evaluate the significance of the pothole stranding situation at each reservoir based on existing information and data". FERC staff added that if the results of the evaluation demonstrate that such stranding has a significant adverse impact on the fishery resources, WVIC should then develop a plan to further address this issue (Article 413).

WVIC conducted a detailed evaluation of pothole stranding in the four man-made reservoirs that contain potholes, as previously discussed in this letter (see 1. **Fish stranding in potholes in the five man-made reservoirs**). Although fish stranding is known to occur, and that these fish are predominately young-of-the-year panfish species and minnows, the findings from WVIC's evaluation demonstrate that pothole stranding is not adversely impacting the fisheries in any of the reservoirs, including Spirit Reservoir, and therefore a plan to address pothole stranding is not necessary. As previously discussed, there is also no need to evaluate channel dredging. USFWS is the only agency that has made this request. USFWS has neither provided any information or data that supports its belief of adverse impacts nor has it provided any information or data to counter WVIC's findings that demonstrates the fisheries are not impacted.

MDNR Comments

The MDNR submitted 44 comments to WVIC's Fish and Wildlife Management Plan. Since many of the MDNR comments address the same resource topic, WVIC consolidated those comments under topic headings, for example "Fishery resources". WVIC's responses to those comments are listed below.

1. References to Great Lakes Indian Fish and Wildlife Commission (GLIFWC), Native American Tribes, Lac Vieux Desert Band, USFS and USFWS

- MDNR Item No's. 1, 15, 16, 20, 24, 25, 26, 27, 30, 35, 38

The MDNR made eleven references directing WVIC to include GLIFWC (Native American Tribes, Lac Vieux Desert Band), USFS and USFWS in consultations on various aspects of the Fish and Wildlife Management Plan. All agencies do not possess authority or expertise in every resource area and we do not believe it is necessary or even useful to include every agency in all consultations. It is unclear what authority the MDNR is exercising in speaking on behalf of GLIFWC, USFS, and USFWS. Furthermore, WVIC did submit a copy of the Fish and Wildlife Management Plan to USFS for comment, as directed by FERC, but did not receive any comments on the Plan. Receiving no comments, WVIC must assume that USFS found the Plan acceptable, as written. WVIC did receive comments from USFWS, which were addressed at the beginning of this letter. GLIFWC, which frequently represents tribal issues, has already strongly criticized WVIC during relicensing for using information provided by other agencies to represent the Lac Vieux Desert Band's position. Specifically, in a letter dated May 31, 1991 from Mr. Peter David, Wildlife Biologist for GLIFWC, he stated:

"I must state my disappointment with the reference to the LVD water level issue in the DRAFT's Environmental Report. The report refers to the supposed desires of the Lac Vieux Desert Band as learned by WVIC from the U.S. Forest Service. WVIC's use of this strangely circuitous information route results in an inaccurate representation of the Tribe's position. Printing this reference without direct dialogue with the Tribe was obviously inappropriate."

For the above reasons, WVIC would rely on direct communication with GLIFWC, the USFS and USFWS to represent their own positions.

The MDNR also makes several references (MDNR Item No's. 15, 16, 25, 26, 27, 35) to various GLIFWC and USFS "guidelines" and "management programs" associated with endangered, threatened and special concern species, which should be consulted and/or included in the Fish and Wildlife Management Plan. Throughout the course of relicensing, neither GLIFWC nor the USFS have ever identified or provided WVIC with copies of any such "guidelines" and "management programs", with the exception of USFS bald eagle management guidelines, which are the same as the USFWS guidelines and were incorporated in WVIC's Bald Eagle Protection Plan. Accordingly, WVIC believes it is improper to include any of these MDNR recommendations.

2. Fishery resources

- MDNR Item No. 2, Page 2-7, Section 2.4.1.

MDNR has conducted two published comprehensive fishery surveys at Lac Vieux Desert, which were reviewed for compiling the fish species list, as referenced on page 2-1. These references were obtained from Mr. Ray Juetten, MDNR District Fisheries Biologist. The references will be included as MDNR comprehensive fishery surveys on page 2-7.

- MDNR Item No. 3, Page 2-6, Section 2.3.
WVIC consulted on October 22, 1990 with the Mr. Ray Juetten, MDNR District Fisheries Biologist, for such information during relicensing. Mr. Juetten did not make any reference to such a "Strategic Plan". WVIC was never aware of or informed by the MDNR during the relicensing process of it's "Strategic Plan". MDNR should assume the responsibility of determining if the goals are consistent with it's "Strategic Plan", not WVIC.
- MDNR Item No. 4, Page 2-13, Section 2.5.1.
WVIC agrees to amend the Plan and include a statement of MDNR's target fishery goals in this Section. MDNR concurs with the date for starting drawdown at Lac Vieux Desert, but adds a new statement that refill be completed... "not later than June 1". This issue of the refill has already been resolved. The completion of refill, i.e., reaching summer target operating levels, by June 1 in Lac Vieux Desert, as well as all the natural-lake reservoirs, is clearly stated as a goal in License Article 422. The agencies, including the MDNR, already agreed to this goal during relicensing.
- MDNR Item No. 5, Page 2-14, Section 2.5.1, Paragraph 1.
This statement is referring to WDNR activities, which WVIC assists in conducting. Previous WDNR management activities have involved walleye population assessment surveys and comprehensive fisheries surveys. These surveys will continue as defined in this paragraph. WDNR assumes responsibility for evaluating data from these surveys to determine the overall status of the fisheries within these lakes and within the context of fisheries of other lakes in the area, particularly those located in the WDNR Northern District management area. WDNR assess' data from these surveys to determine if any changes in fishery management practices may be warranted, such as fishing regulations and stocking. Language has been clarified in the Plan.
- MDNR Item No. 6, Page 2-14, Section 2.5.1, Paragraph 2.
This issue has already been resolved during relicensing. MDNR's recommendation for WVIC to work on any fisheries assessment work beyond walleye population assessments is a new addition to the original agreement, that would now place unknown or undefined responsibilities on WVIC. MDNR does not provide any information to support this new addition and therefore, WVIC has not included it in the Plan.

During relicensing consultation, MDNR instructed WVIC to consult with it's Baraga District Office in Baraga, MI to obtain information regarding the fisheries resources and MDNR fisheries management activities at Lac Vieux Desert. As instructed, WVIC contacted Mr. Ray Juetten, MDNR District Fisheries Biologist in Baraga, MI on October 22, 1990. Mr. Juetten verbally informed WVIC that MDNR has coordinated it's fisheries surveys with the WDNR in the past, but their fisheries policy has been to defer overall fisheries management at Lac Vieux Desert to the WDNR. This management arrangement was discussed in WVIC's 1991 License Application on page E.3-66. At that time, MDNR had not conducted any comprehensive fisheries surveys at Lac Vieux Desert since 1971. Based on this information, WVIC agreed to provide up to two staff biologists to work with the WDNR on walleye population assessments on the natural-lake reservoirs, which includes Lac Vieux Desert. This same working arrangement was described in the original 1991 Fish and Wildlife Management Plan; the MDNR did not have any objections at that time. The WDNR has scheduled a walleye

population assessment survey at Lac Vieux Desert in 2003, as described on page 2-14.

2. Endangered, threatened, and special concern species and wildlife

- MDNR Item No. 7, Page 3-2, Section 3.2.1.
WVIC did not leave out any discussion of endangered species for Michigan around Lac Vieux Desert. WVIC contacted the MDNR FERC Coordinator, at that time Mr. Bill Deephouse, by letter dated January 22, 1997 requesting an update of endangered and threatened species associated with the Michigan portion of Lac Vieux Desert. The purpose for the request was to update the Fish and Wildlife Management Plan. Mr. Deephouse consulted with his staff and personnel from the Michigan Natural Features Inventory and submitted updates for inclusion in the Plan by letter dated February 18, 1997; Mr. Whelan was copied on that letter. WVIC included all of the relevant information provided by the MDNR in the updated May 1997 Draft of the Plan. It is unclear what other information Mr. Whelan is referencing.
- MDNR Item No. 8, Page 3-2, Section 3.2.1.
WVIC has amended the Plan to include the MDNR information on the timber wolf.
- MDNR Item No's. 9, 10 11, 12, Pages 3-2 and 3-3, Section 3.2.1 and Page 3-4, Section 3.2.2.
The MDNR comment to include the piping plover contradicts instructions from Mr. Bill Deephouse (MDNR) in his letter dated February 18, 1997, which requested that the piping plover be removed from the Michigan list. MDNR needs to reach an agreement internally on this issue and WVIC will amend the Plan accordingly.

WVIC has amended the Plan to include the MDNR information on the peregrine falcon, pine marten, endangered dragonfly, and Blanding's turtle.
- MDNR Item No. 13, Pages 3-3 and 3-4, Section 3.2.2.
WVIC had originally expected this information from Mr. Deephouse in the aforementioned January 22, 1997 WVIC letter. Mr. Deephouse did not provide any updates of this nature. WVIC contacted Mr. Tom Weise with the MDNR on July 15, 1997 for information to update this section. Mr. Weise was not able to provide the updated information for inclusion in the Plan, due to the short notice and prior commitments. WVIC, however, agreed to include the information in future updates to the Plan.
- MDNR Item No's. 16 and 18, Page 3-8, Sections 3.3 and 3.4.1.
WVIC has amended the Plan to incorporate the Michigan Gray Wolf Recovery and Management Plan.
- MDNR Item No. 17, Page 3-8, Section 3.3.
The wild rice issue has not been resolved and is pending final action by FERC and USFS. Further, it has not been demonstrated that a self-sustaining wild rice crop can even be established, which would preclude any enhancement benefits.
- MDNR Item No. 19, Page 3-9, Section 3.4.1.
The MDNR misrepresents the context of this sentence. The statement correctly reads "...wolves' prey populations are not adversely impacted by seasonal water level fluctuations.

This statement is qualified within this section and further qualified and supported in WVIC's 1991 license application (Sections E.3.1.2.4 and E.3.1.4.4). Furthermore, FERC staff found that WVIC's proposed reservoir operations would not significantly affect wildlife populations, including endangered and threatened species, within the Project area (FEIS pages 4-87 thru 4-91). The fact that the wolf population has reached its recovery goals in Wisconsin and is anticipated to reach its Level 1 goal in Michigan in 1997 demonstrates that any potential effects of water level fluctuations are minimal and are not affecting beaver populations to the degree that wolf populations are affected. WVIC does not believe there is any justifiable reason to amend the text in the Plan.

- MDNR Item No. 20, Page 3-9, Section 3.4.2.

This represents a new MDNR recommendation. WVIC requested copies for agency management plans during relicensing. The MDNR has never provided WVIC with any management plans associated with the bald eagle, osprey or common loon and none were included with its July 8, 1997 comment letter. Accordingly, WVIC is not aware of any management objectives to which the MDNR is referring and therefore has not included them in the Plan at this time.

- MDNR Item No. 21, Page 3-9, Section 3.4.2, Paragraph 3.

WVIC's statement is accurate. The MDNR again misrepresents the context of this sentence. The statement correctly reads "...no adverse impacts to bald eagles due to water level fluctuations... This statement is qualified within this section and further qualified and supported in WVIC's 1991 license application (Sections E.3.1.2.4 and E.3.1.4.4). Furthermore, FERC staff found that WVIC's proposed reservoir operations would not significantly affect wildlife populations, including endangered and threatened species, within the Project area (FEIS pages 4-87 thru 4-91). In addition, FERC staff found that the fisheries resources are not adversely impacted by water level fluctuations at Project reservoirs. Bald eagle and osprey each reached their recovery goals in Wisconsin in 1991 and 1990, respectively and are continuing to increase, as described in Section 3.2.2. These facts demonstrate that any potential effects of water level fluctuations are minimal and are not affecting fisheries resources to the degree that bald eagle or osprey populations are affected. WVIC does not believe there is any justifiable reason to amend the text in the Plan.

- MDNR Item No. 22, Page 3-10, Section 3.4.3.

This represents a new MDNR recommendation. Throughout relicensing, the MDNR has never identified any need for osprey nesting structures. Similarly, MDNR offers no information or data to justify the need for these structures now. Active osprey nests have, in fact, increased from 1 to 2 nests since 1989 (page 3-3, Table 3-1). Based on these facts and the information presented above in Item No. 21, WVIC does not believe any need for structures has been demonstrated and therefore this recommendation is not included in the Plan.

- MDNR Item No. 23, Page 3-10, Section 3.4.4.

The effect of water level fluctuations on waterfowl, including the common loon, was thoroughly discussed in WVIC's 1991 License Application (Sections E.3.1.2.4 and E.3.1.4.4) and in a WVIC 1990 report "An assessment of water level fluctuation effects on wildlife resources at Lac Vieux Desert", which was prepared at the request of the MDNR. These

assessments demonstrated no adverse impacts to waterfowl and the common loon due to water level fluctuations. The MDNR in a letter dated June 4, 1991 acknowledged this assessment, specifically that the affects were "minor". These findings were also supported in the FEIS where FERC staff found that WVIC's proposed reservoir operations would not significantly affect wildlife populations, including endangered and threatened species, within the Project area (FEIS pages 4-87 thru 4-91). The common loon population has experienced a continual increase in Wisconsin over the past 19 years, as discussed in Section 3.2.2 of this Plan. WVIC has amended the Plan to incorporate the finding of no adverse impacts to the common loon due to water level fluctuations. Accordingly, management guidelines are not necessary.

The request for floating nesting structures is a new MDNR recommendation. The MDNR's request for the structures at this time, is inconsistent with its previous acknowledgement of "minor" impacts, as discussed above, and the fact that the loon population is continuing to increase. Furthermore, the MDNR has not provided any data supporting the need for floating nesting structures. The USFWS and USFS had originally requested similar structures during relicensing, but withdrew the requests based primarily on the lack of adverse impacts. Based on the above facts, WVIC has not included the MDNR recommendations in the Plan.

- MDNR Item No. 24, Page 3-10, Section 3.4.5, Paragraph 1
WVIC has amended the Plan to include this information on the piping plover, peregrine falcon and pine marten.
- MDNR Item No. 26 and 27, Page 3-11, Sections 3.5 and 3.5.1.
WVIC has amended the Plan to include consultation with the MDNR. Based on the findings of no adverse impacts on the timber wolf and osprey at Lac Vieux Desert, as previously discussed, there is no demonstrated need for WVIC management of these species. Further, since MDNR has historically managed these species and because no special management measures have been required of the MDNR as a result of Lac Vieux Desert Reservoir operations, WVIC will rely on MDNR's continued management of these species.

As discussed above under Item No. 22, MDNR offers no information or data to justify the need for these structures. WVIC does not believe any need for structures has been demonstrated and therefore this recommendation is not included in the Plan.

- MDNR Item No. 28, Page 3-11, Section 3.5.1.
WVIC's reservoir operations do not impair fish production. FERC staff concluded in the FEIS that WVIC man-made and natural-lake Project reservoirs support diverse and productive fisheries and wildlife resources and that reservoir operations have not adversely impacted these resources (pages 4-12 thru 4-16; 4-36; 4-53 thru 4-58; 4-87 and 4-88). FERC staff also concluded that the new modified reservoir operations and resulting higher water levels during the early-spring and summer at the man-made reservoirs would enhance fisheries (FEIS, pages 4-29 thru 4-31). FERC staff also found that WVIC's proposed reservoir operations would not significantly affect endangered and threatened species, within the Project area (FEIS pages 4-87 thru 4-91). Osprey reached their recovery goals in Wisconsin in 1990, and are continuing to increase, as described in Section 3.2.2. These facts demonstrate that any potential effects of water level fluctuations are minimal and are not affecting fisheries resources or osprey populations. WVIC does not believe there is any justifiable reason to amend the text in the

Plan.

- MDNR Item No. 29, Page 3-12, Section 3.5.2.
The derogatory tone and nature of this MDNR comment adds nothing constructively to the enhancement of the Plan. Managing bald eagles on public and private lands is MDNR's responsibility, not WVIC's. WVIC has never walked away from its responsibility of assisting the agencies in the management of bald eagles. WVIC's long-standing commitment, since 1979, to cooperate with the WDNR and USFWS in the recovery efforts of the bald eagle on Project lands is well documented and described in WVIC's 1991 License Application (Section E.3.3.1.4), in Section 3.4.2 of this Plan, and recognized by FERC staff in the FEIS (page 4-90). WVIC's participation has directly benefitted the bald eagle recovery efforts. WVIC does not have any regulatory authority to administer bald eagle management on public and private lands. This function is clearly an agency responsibility. WDNR willingly acknowledges and carries out the responsibility for managing bald eagles on public and private lands in the Project area. Since WVIC has no regulatory authority, this recommendation is not included in the Plan.
- MDNR Item No. 30, Page 3-12, Section 3.5.2.
WVIC has not been provided a copy of MDNR's bald eagle management guidelines and therefore it is not possible to amend the Plan at this time. WVIC would amend the Plan, if necessary, when the MDNR provides WVIC a copy of its guidelines.
- MDNR Item No. 31, Page 3-13, Section 3.5.2.
WVIC has amended the Plan to clarify the open use policy and overnight camping.
- MDNR Item No. 32, Page 3-13, Section 3.5.2.
WVIC has amended the Plan to include the information on bald eagle roosting and will contact MDNR staff for the locations.
- MDNR Item No. 33, Page 3-13, Section 3.5.2.
This is a new MDNR recommendation. Throughout the relicensing process MDNR has never requested funding for bald eagle aerial surveys. The MDNR does not provide any data in its comment that demonstrates any adverse impacts to the bald eagle population due to Project operations that could justify WVIC providing funds. MDNR has not demonstrated any need for funding its surveys and therefore this recommendation is not included in the Plan.
- MDNR Item No. 34, Page 3-13, Section 3.5.3.
WVIC's statement is correct. The MDNR misrepresents the context of this sentence. The statement correctly reads "The reservoir operations plan...is not expected to have any significant effects...". The effect of water level fluctuations on reptiles and amphibians was thoroughly discussed in WVIC's 1991 License Application (Sections E.3.1.2.4 and E.3.1.4.4) and in a WVIC 1990 report "An assessment of water level fluctuation effects on wildlife resources at Lac Vieux Desert", which was prepared at the request of the MDNR. These assessments demonstrated no adverse impacts to reptiles and amphibians due to water level fluctuations. The MDNR in a letter dated June 4, 1991 acknowledged this assessment, specifically that the affects were "minor". These findings were also supported in the FEIS where FERC staff found that WVIC's proposed reservoir operations would not significantly

affect wildlife populations, including endangered and threatened species, within the Project area (FEIS pages 4-87 thru 4-91).

The MDNR also discusses "rapid changes in flows" and recommends modifications in WVIC's operation to accommodate dragonfly species. This recommendation has already been resolved. WVIC consulted with the agencies, including the MDNR, and developed minimum flows and ramping rates for all Project reservoirs during relicensing. The minimum flows and ramping rates were specifically designed to protect aquatic resources, including dragonflies. Specifically, headwater and tailwater level decreases were limited to not more than 1 inch per hour, which was a requirement of all the agencies. Except for the Pickerel Canal, the minimum flows and ramping rates were accepted by the agencies and subsequently by FERC in the FEIS (page 4-40 and 4-62). These were included in the new license Articles 404 and 422.

Based on the above information, WVIC does not believe there is any justifiable reason to amend the text in the Plan regarding impacts on turtle nesting and there is no need or basis to make modifications in WVIC's operation to accommodate dragonfly species. Therefore, no changes were made in the Plan.

- MDNR Item No. 36, Page 3-14, Section 3.5.5.
As previously discussed under Item 17, the wild rice issue has not been resolved and is pending final action by FERC and USFS. It would be premature to discuss the wild rice issue at this time and therefore this recommendation is not included in the Plan.

3. Botanical resources

- MDNR Item No. 37, Page 4-1, Section 4.1.1, Paragraph 2.
This is not a typo. Eastern hemlock, and eastern hemlock mixed with northern hardwood species are distinct.
- MDNR Item No's. 39, 40, 41, Pages 4-4 and 4-5, Sections 4.4.3, Paragraph 2, 4.5, and 4.5.3.
This is a new MDNR recommendation, which implies control of any aquatic plant or aquatic plants in general, which is ambiguous and unsupported by any data or justification. WVIC does not believe there is any justifiable reason to amend the text in the Plan to include aquatic plants in general.

WVIC has already agreed to work cooperatively with the agencies in controlling purple loosestrife within the Project reservoirs, which is described in WVIC's new license, Article 414 and previously discussed in this letter under USFWS No. 6. **Control of exotic species.** WVIC would consider a cooperative effort with the agencies, including the MDNR, in controlling those invasive exotic species which are shown to be aggravated by reservoir operations and adversely impacting the resources within the Project area. Any cooperative effort, however, would have to be mutually agreeable between WVIC and the agencies. The Plan has been modified in Section 4.5.4 to reflect this addition.

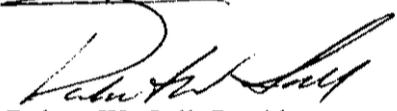
- MDNR Item No. 42, Page 4-6, Section 4.5.4.
WVIC is currently conducting pilot studies on purple loosestrife control, as discussed in

Section 4.4.4, and working with the WDNR toward development of a control plan. Final development of the control plan is dependent on results from the ongoing pilot studies and WDNR efforts to help streamline the adjacent landowner notification process required by Wisconsin statutes.

4. Implementation schedules

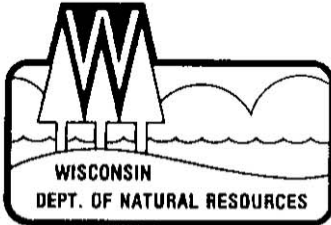
- MDNR Item No. 43, Page 5-1.
The list is complete. WVIC has not proposed installing any wildlife enhancement structures and has not included the MDNR's recommended two osprey platforms or floating nesting structures for loons in the Plan, for reasons previously discussed in this letter. WVIC is unaware of any required other wildlife enhancement structures.
- MDNR Item No. 44, Page 5-1.
This issue has been previously discussed under MDNR Item No. 42. The wild rice issue has been previously discussed under MDNR Item No's. 17 and 36.

Sincerely,



Robert W. Gall, President

Enclosures



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary
William H. Smith, Regional Director

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REGULATORY COMMISSION

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July 7, 1997

Mr. Bob Gall, President
Wisconsin Valley Improvement Company
2301 N. Third Street
Wausau, Wisconsin 54403

RECEIVED
JUL 8 - 1997
W.V.I.C.

Dear Mr. Gall:

This letter responds to your request of June 4, 1997, for comments on FERC management plans for project 2113, the Wisconsin River Headwaters system. In that letter, with attachments, you respond to FERC license articles 405, 407, 408, 409, 411, 413 and 415, requiring management plans for fish and wildlife, gaging, water quality, communications and debris management. The Department has reviewed all of these plans. We commend WVIC for the thorough nature of the plans and the sound analysis of the available data. We also appreciate the extensive consultation you and staff have extended to the Department staff in this effort. Because of the extensive consultation and the use of some of our data in addition to your own, we believe that these plans are well designed to manage the natural resources in the WVIC system. Because of the complicated, dynamic nature of the biological and physical system WVIC has control over, we recommend that the Department of Natural Resources, the Fish and Wildlife Service and WVIC enter into a cooperative partnership designed to use the principles of adaptive management to identify resource management problems, list possible solutions, test hypotheses and implement results. We feel this process is much more cost-effective, more responsive and eventually will result in better resource management than attempting to add specific requirements into each individual plan required by the license. In addition, the cooperative partnership approach improves the exchange of information, increases the available biological and hydrological expertise devoted to problems in this system and builds over time a feeling of trust and confidence in each other that will result in better solutions to biological problems. As we have discussed in the past, we believe that this mode of operation should include consultation meetings as needed to accomplish our jointly held goals. We recommend avoiding a rigid consultation schedule (e.g., a mandated annual meeting) and instead favor consultation to take advantage of opportunities, address unforeseen problems, adjust work plans, etc., with meetings jointly scheduled to address an identified need.

We offer to enter into this arrangement for several reasons. First, we believe WVIC has extensive biological and hydrological expertise, data and experience; second, you have the personnel and the equipment to carry out resource management goals; third, we believe WVIC shares many of the fish and wildlife goals that the agencies hold for this system. The Department will attempt to incorporate studies and field work as necessary in our budgeting and work planning process; although, we cannot guarantee a specific level of support in any given year. Again let me compliment the company for the work it has done so far. We look forward to increased cooperation in the future and we expect a more flexible, cost-effective resource management system will result from this adaptive management approach. If you have questions, please contact me at (715)365-8969.

Sincerely,



Bob Martini, Project Manager
Wisconsin River Project

BM:da

cc: Tom Bashaw, Rhinelander
Tom Jerow, Wisconsin Rapids
Jim Fossum, USFWS, Green Bay
DuWayne Gebken, SS/6

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DEPARTMENT OF NATURAL RESOURCES

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K. L. COOL, Director

RECEIVED
JUL 14 1997
W.V.I.C.

REPLY TO:

FISHERIES DIVISION
PO BOX 30446
LANSING MI 48909-7946

Refer to:
4202.2.42

July 8, 1997

Mr. Robert W. Gall
President
Wisconsin Valley Improvement Company
2301 N. Third Street
Wausau, WI 54403

Dear Mr. Gall:

Re: Wisconsin River Headwaters System (FERC No. 2113)
FERC Management Plans Review

The Department of Natural Resources (Department) has reviewed the plans for the Wisconsin River Headwaters System which were dated June 9, 1997 and received on June 11, 1997. We have the following comments:

License Article 407 - WVIC Debris Management Plan

The Department has reviewed the WVIC Debris Management Plan and has the following comment:

1. Page 4, Section 3.1 - The Department recommends that all vegetative debris be passed downstream as this is important fish and wildlife habitat and forage. All human created refuse should be disposed of in a proper manner.

With the inclusion of the above comment, the Department finds the plan acceptable.

License Article 409 - Drought Contingency Plan

The Department has reviewed the Drought Contingency Plan and has the following comments:

1. Page 6, Section 3.1.3 - The proposed target for drought consultation is appropriate and acceptable.

2. Page 6, Section 3.1.4 - The Michigan Department of Natural Resources, Lac Vieux Desert Band and U.S. Forest Service should be added to the list of consulted agencies as all of these entities have management responsibilities that could be impacted by any change in project operation.

With the inclusion of the above comments, the Department finds the plan acceptable.

License Article 408 - Communications Plan

The Department has reviewed the Communications Plan and finds it acceptable.

Water Quality Monitoring Plan

The Department has reviewed the Water Quality Monitoring Plan which covers water quality monitoring outside of the wild rice restoration plan requirements. The wild rice restoration plan requirements for water quality monitoring that do not duplicate items in the Water Quality Monitoring Plan must be conducted in addition to those proposed in this plan. We have the following comments:

1. Page 3-1, Section 3.1.1 - The sampling frequency, as outlined, is acceptable. The Department recommends adding a mid-winter sampling (late February) to the Lac Vieux Desert monitoring because of the known low dissolved oxygen in the lake at that time. The winter period should be monitored for the life of the license to detect any changes that may impact fish and wildlife resources.
2. Page 3-1, Section 3.1.2 - The Department recommends collecting dissolved oxygen and temperature profile data during each sampling bout at Lac Vieux Desert given the potential dissolved oxygen problems from dense weed growth at this lake. It is unclear why you are only going to collect total phosphorus, chlorophyll "a" and secchi depth in addition to the dissolved oxygen and temperature profile information. Historically, you collected a much wider range of information which provided a comprehensive view of water quality in Lac Vieux Desert. We recommend that this effort be continued and not reduced to sampling for only Trophic State Index parameters. Data on pH, turbidity, nitrogen, NO₂/NO₃ and conductivity should continue to be collected to allow for a full analysis of water quality trends at Lac Vieux Desert and to allow for a comparison with historic data.
3. Page 3-2, Section 3.1.3 - The Department requests that we be provided with the laboratory results for Lac Vieux Desert. All results should also be provided to the Michigan Department of Environmental Quality (att: John Suppnick, Surface Water Quality Division), Lac Vieux Desert Band and U.S. Forest Service as these entities have management responsibilities that may be impacted by water quality at Lac Vieux Desert.
4. Page 3-2, Section 3.1.4 - The Department recommends that a review of the sampling program be conducted prior to and after each three year sampling period to ensure that the sampling program is consistent with ecological thought at that

future time. Review of chemical techniques to be used should be conducted by the agencies (WDNR, MDNR, MDEQ, USFWS, USFS and Lac Vieux Desert Band) prior to each three-year sampling period to ensure that the most effective techniques will be used.

With the inclusion of the above comments, the Department finds the plan acceptable.

Fish and Wildlife Management Plan

The Department has reviewed the Fish and Wildlife Management Plan and has the following comments:

1. Page 1-8, Section 1.8 - The Native American tribes and/or bands that have expressed interest will also need to be consulted.
2. Page 2-7, Section 2.4.1, Comprehensive fishery survey - The Department has also conducted fishery surveys on Lac Vieux Desert which are not mentioned in this plan. This should be indicated in next revision.
3. Page 2-6, Section 2.3 - Are your goals in this plan consistent with the Michigan Department of Natural Resources Fisheries Division Strategic Plan? This should be determined and incorporated in this section. If you need a copy of this plan, please let us know.
4. Page 2-13, Section 2.5.1 - The Department also has target fishery goals which is to maintain a naturally producing trophy fishery in Lac Vieux Desert with the following main target fish: walleye, muskie, northern pike and panfish. This should be clearly stated in the next draft of this report. The Department concurs with your plan to begin the drawdown of Lac Vieux Desert by October 1 and to complete refill as soon as possible but not later than June 1.
5. Page 2-14, Section 2.5.1, Paragraph 1 - This paragraph states that management programs for the natural lakes will involve similar management activities as in the past. Whose activities are you referring to in this statement?
6. Page 2-14, Section 2.5.1, Paragraph 2 - The Department expects that the proposal to provide two WWIC staff biologists to assist in walleye population assessments would also be applicable to Lac Vieux Desert if the Department needs assistance on fish population assessments. In addition, the Department recommends that WWIC biologists be made available to work on any population assessment work, not just walleye population assessments, following the same protocols as described for WDNR. We also expect that at the annual consultation meeting that we would be made aware of the actual availability of WWIC biologists. These items should be incorporated into the draft plan.
7. Page 3-2, Section 3.2.1, Endangered Species - You left out much of the endangered species discussion for Michigan around Lac Vieux Desert. This needs to be corrected in the draft plan. If you need information to complete this discussion, please let us know.

8. Page 3-2, Section 3.2.1, Timber wolf - Michigan now has a minimum of 112 wolves as of March 1997. There is also one pack of 3 individuals approximately 2-4 miles north of Lac Vieux Desert. The Department has a three level recovery goal system: a) when there are 80 wolves in Michigan and Wisconsin, the species will be considered for federal downlisting. If there are 50 or less wolves counted in late winter counts in Michigan in 3 consecutive years that there are 80 wolves in Wisconsin, then the Michigan population will be listed as federally threatened. Conditions for downlisting have been reached in both states; b) the minimum population size goal to ensure population viability and recovery in Michigan is 200 individuals in at least 20 packs for 5 consecutive years; and c) the fully occupied range goal is between 800-950 wolves. Whether fully occupied goal is culturally acceptable is unknown, therefore when wolves reach cultural capacity the species will be classified as a game animal and regulated under the Wildlife Conservation Act. This should be added to the draft plan.
9. Page 3-2, Section 3.2.1, Piping plover - Piping plovers are known to nest along Lake Superior in the Upper Peninsula in Michigan. This should be corrected in the draft plan.
10. Page 3-2, Section 3.2.1, Peregrine falcon - Peregrine falcons currently nest in the Trap Hills area near Lake Gogebic and in the Porcupine Mountains in the Upper Peninsula. These are the closest populations to Lac Vieux Desert. This should be added to the draft plan.
11. Page 3-2, Section 3.2.1, Pine Marten - Pine martens are now common in the Lac Vieux Desert vicinity in Michigan and continue to increase in the project area. This needs to be corrected in the draft plan. A correction will also be needed to Section 3.2.2, Paragraph 1.
12. Page 3-3, Section 3.2.1 - In 1996, a Wisconsin endangered dragonfly species (*Ophiogomphus anomalus*) was collected for the first time in the Paint River near Crystal Falls, MI. This indicates that this species is likely to be found in the project area and should be added to this section.
13. Pages 3-3 and 3-4, Section 3.2.2, Bald eagles, osprey and loons - The status of these species in and around Lac Vieux Desert and in Michigan should be included in this section to be consistent with the discussion of these species in Wisconsin. Please contact Tom Weise (517-373-1263) for the latest information on these species in Michigan and in the Upper Peninsula.
14. Page 3-4, Section 3.2.2, Blanding's turtle - Blanding's turtle has been reported from eastern Iron County, Michigan. This should be included in the draft plan.
15. Page 3-8, Section 3.3, Paragraph 2 - The Department, USFS, Native American tribes (as appropriate) and USFWS should be added as entities to consulted and cooperated with concerning T/E/SC species. The Department, USFS and Native

American tribal guidelines should also be used in the protection of habitat for these species. This should be corrected in the draft plan.

16. Page 3-8, Section 3.3, Paragraph 4 - The Michigan Gray Wolf Recovery and Management Plan (a draft is enclosed) should also be consulted in developing your plans along with any USFS and Native American tribal plans that pertain to this project. This should be corrected in the draft plan.
17. Page 3-8, Section 3.3 - You should state that the wild rice enhancement plan for Lac Vieux Desert will also enhance wetlands in this part of the project which will enhance T/E/SC species. The items in this plan will be done in addition to that plan.
18. Page 3-8, Section 3.4.1, Timber Wolf - The Department's Michigan Gray Wolf Recovery and Management Plan must be incorporated into this section.
19. Page 3-9, Section 3.4.1, Timber Wolf, Paragraph 1 - While we agree that beaver populations are high and at nuisance levels, your statement that seasonal water fluctuations will not impact wolf prey items is incorrect as beaver are directly impacted by fluctuating water levels.
20. Page 3-9, Section 3.4.2, Bald Eagles - Bald eagle objectives for Michigan should be included in this section as the Department also manages bald eagles in the project area. In addition, USFS and Native American tribes also manage bald eagles on their lands in the project area and should be included in this section. The same comment also applies to osprey management in Section 3.4.3 and loon management in Section 3.4.4.
21. Page 3-9, Section 3.4.2, Bald Eagles, Paragraph 3 - The statement that the water level fluctuations will have no impact on bald eagle forage is wholly inaccurate as the continued fluctuations will impair the amount of fish produced by the reservoirs. This in turn will reduce bald eagle production. Therefore, we strongly disagree with your statement on this issue. This comment also applies to osprey management in Section 3.4.3.
22. Page 3-10, Section 3.4.3, Ospreys - The Department recommends that two nesting structures be constructed on Lac Vieux Desert to assist the recovery of this species.
23. Page 3-10, Section 3.4.4, Common Loon - It is interesting and inconsistent that you make no mention of the impacts of water level fluctuation on loon nesting who are very susceptible to fluctuations during nesting. The nesting period overlaps the floating leaf stage for wild rice and stable water levels during this period will benefit both species. A discussion of these impacts and how you will reduce them should be included in the draft plan. Floating nesting structures should be used to offset the impacts of your water level fluctuations. There is also no mention of management guidelines that you will follow for this species. This items should be incorporated into the draft plan.

24. Page 3-10, Section 3.4.5, Paragraph 1 - Recovery efforts for the species listed in this paragraph are also directed by the Department along with USFS and Native Americans on their lands. Piping plover recovery efforts are also taking place along Lake Superior in Michigan. Peregrine falcon and pine marten recovery efforts are also taking place in the Upper Peninsula as stated above. These items should be corrected in the draft plan.
25. Page 3-10, Section 3.4.5, Paragraph 2 - USFS and Native American tribes also have programs for these species on their lands. This should be corrected in the draft plan. This comment also applies to Section 3.4.6.
26. Page 3-11, Section 3.5 - The Department must also be consulted on the management of these species. In addition, USFS and Native American tribes also have programs for these species on their lands and must be consulted on lands in their jurisdictions. This should be corrected in the draft plan.
27. Page 3-11, Section 3.5.1 - You will need to follow Department guidelines for these species along with USFWS, USFS and Native American tribal guidelines for these species. The Department requests that two osprey platforms be constructed on Lac Vieux Desert to assist in their recovery on this impoundment. It is unclear from this section exactly what measures you are proposing to implement with respect to timber wolf or osprey management on Lac Vieux Desert. Please provide this to us for our review. These should be incorporated into the draft plan.
28. Page 3-11, Section 3.5.1- Your management of these impoundments with the continued wide fluctuations in water levels does directly impair fish production which will impair osprey production, thus we strongly disagree with your statement on the lack of impacts on osprey of your proposed operation. This should be corrected in the draft plan.
29. Page 3-12, Section 3.5.2, Measures to protect existing habitat - You state in the first paragraph that you have no responsibility for eagle nests on public and private lands within the Project boundary over which WVIC has no control. We disagree in that you do have responsibility for all aspects of project management within the project boundary. You may not have direct control of all aspects but do have a responsibility to make a good faith effort to try to protect the nest sites within the project boundary. You simply cannot walk away from this responsibility as it is an advertised benefit of the Project. This should be changed in the draft plan.
30. Page 3-12, Section 3.5.2, Nesting - You need to include the Department, USFS and the tribes as appropriate in this section. This should be corrected in the draft plan.
31. Page 3-13, Measures to control public access - There are a couple of specifics missing in this section. They are: a) what are the exceptions to the open use policy?; and 2) When is overnight camping permitted? These items should be clarified in the draft plan.

32. Page 3-13, Measures to protect winter roosting and feeding sites - Bald eagles do roost in the Upper Peninsula in the winter. Please contact Tom Weise for the locations near the project area. This should be corrected in the project area.
33. Page 3-13, Implementation and maintenance costs - The Department requests that WVIC provide funding for the annual bald eagle surveys conducted by airplane over Lac Vieux Desert. This would amount to \$200 annually and will ensure that these critical data continue to be collected for the life of the license.
34. Page 3-13, Section 3.5.3 - Water level fluctuations during turtle nesting periods will cause the loss of turtle nests, therefore your statement that your continued operation will have no impact is incorrect. In addition, rapid changes in flows will also impact the T/E/SC dragonflies that are in the project area. Therefore, you do need to make modifications in your operation to accommodate these species.
35. Page 3-14, Section 3.5.4 - Again, you need to include the USFS and the tribal programs as appropriate.
36. Page 3-14, Section 3.5.5 - You do not discuss the rehabilitation of wild rice in Lac Vieux Desert which will enhance the wetlands at this impoundment. This should be mentioned in this section and the discussed efforts in this section are in addition to the wild rice program.
37. Page 4-1, Section 4.1.1, Paragraph 2 - You state that the pre-settlement vegetation was eastern hemlock and eastern hemlock which is clearly a typo.
38. Page 4-1, Section 4.1.1, Paragraph 3 - You should also note any tribal lands in the project area.
39. Page 4-4, Section 4.4.3, Paragraph 2 - The Department expects that WVIC will be responsible for aquatic plant control, if necessary, on Lac Vieux Desert. This should be noted in the revised plan.
40. Page 4-5, Section 4-5 - Comment 36 also applies to this section. There also should be a plan developed to deal with other exotic plants, such as Eurasian milfoil and their control. WVIC is responsible to make sure that the anticipated and advertised wetland values of these projects is protected from invasive exotic plants. These exotic plants could greatly reduce the value of the wetlands at these projects and may have to be controlled in the future to ensure the quality of the project wetlands. This should be included in the next revision of this plan.
41. Page 4-5, Section 4.5.3, Paragraph 2 - Comment 39 also applies here.
42. Page 4-6, Section 4.5.4 - We request that this plan be developed and completed as soon as possible to complete our consultation on this issue.

43. Page 5-1 - This list seems to be incomplete given the number of issues discussed in this plan. For example, the schedule for installing wildlife enhancement structures at the project impoundments is missing. Please review your action items in this plan to examine if all are covered by this schedule.
44. Page 5-1, Botanical Resources - The Department requests that the purple loosestrife and Eurasian milfoil control plan be developed as soon as possible. There should also be a mention of the Lac Vieux Desert wild rice plan in this schedule.

With the inclusion of the above comments, the Department finds the plan acceptable.

The Department appreciates the opportunity to comment on these plans and looks forward to our continued interactions on this project. If you have any questions on this matter, please contact me.

Sincerely,



Gary E. Whelan
MDNR FERC Project Coordinator
FISHERIES DIVISION
(517) 373-1280

Enclosure

cc: Ms. Janet Smith, USFWS
Mr. Robert Marteney, WDNR
Mr. Joe Kastenholtz, USFS
Mr. Robert Evans, USFS
Mr. Peter David, GLIFWC
Mr. John McGeshick, Lac Vieux Desert Tribal Chairman



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Green Bay ES Field Office
1015 Challenger Court
Green Bay, Wisconsin 54311-8331
Telephone 414/465-7440
FAX 414/465-7410

June 30, 1997

RECEIVED
JUL 2 - 1997
W.V.I.C.

Mr. Robert W. Gall, President
Wisconsin Valley Improvement Company
2301 N. Third Street
Wausau, Wisconsin 54403

re: FERC Management Plans
Project No. 2113
Wisconsin River Headwaters
Storage System

Dear Mr. Gall:

Your letter of June 4, 1997, requested U.S. Fish and Wildlife Service (FWS) review of the Wisconsin Valley Improvement Company's (WVIC) draft management plans for submission to the Federal Energy Regulatory Commission (FERC) relative to several articles of the license for the referenced storage reservoir project. The management plans address flow gaging, debris management, communications, drought contingency, water quality monitoring, fish and wildlife management, and bald eagle protection.

GENERAL COMMENTS

The FWS believes that the management plans are well written and when implemented, will accommodate most concerns about fish and wildlife resource protection and management that the FWS and Wisconsin Department of Natural Resources (DNR) (Agencies) expressed to WVIC during preapplication consultation. The FWS has discussed these plans with the Wisconsin DNR, and the Agencies believe that due to the size and complexity of the Wisconsin River Headwaters Storage System, an adaptive management strategy for management plan implementation should be adopted by all concerned parties. We believe adaptive management is most responsive to addressing natural resource issues in a dynamic environment like that affected by WVIC's reservoir system. Rather than stipulating more requirements in each plan for WVIC to implement, the Agencies would prefer to use adaptive management to address resource issues described in each plan. This concept would allow all parties the flexibility to change the mode of resolving resource problems if the current strategy is not producing desired results. Further, we recommend that WVIC conduct an annual meeting with the Agencies to develop a work plan to accomplish objectives for each resource goal that will be addressed in that year. The FWS supports the FERC requirement that these management plans be updated every five years. It will provide an opportunity for the results of adaptive management actions to be communicated to all concerned parties and an opportunity to propose different management options if needed.

The Agencies believe adaptive management should be used as the process to address the resource issues listed below, as well as other resource issues that are identified by the Agencies or WVIC over the term of the license.

1. Fish stranding in potholes in the five manmade reservoirs

Fish stranding in potholes caused by drawdown of WVIC's manmade reservoirs was discussed extensively during preapplication consultation. However, we do not believe sufficient information currently exists to document the extent of the stranding/entrapment problem. Based on information to date, we believe the Spirit Reservoir most likely has the biggest stranding problem due to the irregular morphology of the riverbed. We suggest that WVIC conduct a study, in consultation with the Agencies, to excavate an escape channel in one large pothole in the Spirit Reservoir. The numbers and species of fish and other aquatic life entrapped must be known before the escape channel is opened so it can be determined whether or not mobile aquatic organisms use the escape channel. If found to be effective, the escape channel concept should be evaluated for more widespread use throughout WVIC's reservoir system.

2. Winter drawdown of the manmade reservoirs

The effectiveness of maintaining a 25 percent minimum volume limit in WVIC's manmade reservoirs during winter drawdown should be evaluated. Since the Eau Pleine Reservoir has known dissolved oxygen problems during winter drawdown, that reservoir would be a good candidate to test the benefits and detriments of the 25 percent minimum pool volume concept on fish and wildlife resources and water storage.

3. Maintain a minimum summer pool in the manmade reservoirs

We recommend that, initially, one of the five manmade reservoirs be selected to test the Agencies' recommendation of maintaining a minimum summer pool of 4 feet below the current maximum water level. Again, the benefits and detriments to fish and wildlife resources, recreational use, and water storage should be evaluated by WVIC and the Agencies.

4. Minimum flow in the Pickerel Canal near Rainbow Reservoir

Delivery options to maintain a year-round minimum flow in the Pickerel Canal should be evaluated by WVIC and the Agencies, and the environmental benefits assessed.

5. Ramping rate at the Willow Reservoir

The Agencies wish to evaluate the possible need of a ramping rate below the Willow Reservoir Dam when higher flows are reduced to the minimum flow of 75 cubic feet per second. We raise this issue in response to a complaint the Wisconsin DNR received from a citizen. The rate and magnitude of tailwater fluctuation resulting from WVIC's current operational practice at Willow Dam needs to be evaluated by field testing.

6. Control of exotic species

The Agencies wish to work cooperatively with WVIC to prevent the spread of exotic species such as the zebra mussel, Eurasian milfoil, purple loosestrife, and others, throughout WVIC's reservoir storage system. Control techniques for many exotics are not yet well developed or accepted by the scientific community. Therefore, control of any species over the term of the license must be handled on a case by case basis and cooperatively between WVIC and the Agencies.

SPECIFIC COMMENTS

Page 2-8, Fish and Wildlife Management Plan, Eau Pleine Reservoir Aeration and D.O. Monitoring. This paragraph, as currently worded, could lead the reader to conclude that the aeration system is adequate and resolves the low winter dissolved oxygen (DO) problem in Eau Pleine Reservoir. While we concur that aeration helps to improve DO levels, this does not, in and of itself, totally resolve the problem. Additional measures to improve low DO levels should be tested such as operational changes in the reservoir.

Page 3-11, Fish and Wildlife Management Plan, Bald Eagle Protection Plan. The FWS provided input to and concurs with WVIC's Bald Eagle Protection Plan.

Page 3-12, Fish and Wildlife Management Plan, Nesting, 4th paragraph. It is stated, "WVIC will develop similar MOAs for Willow and Spirit reservoirs in cooperation with the WDNR to further support its long-standing policy of protecting the wilderness character of these tracts of undeveloped project forest lands." The FWS commends and concurs with WVIC's intention but we believe the memorandum of agreement (MOA) should be developed in the spirit of adaptive management such that several resource issues, not just motorized vehicle access on project land, can be address through the MOA.

Page 2, Drought Contingency Plan, Drought Concerns. Another bullet on drought concerns should be added here: "Effects on fish and wildlife species resulting from droughts caused by reservoir operation."

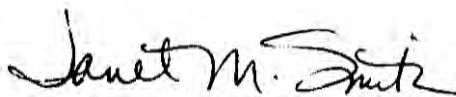
The impact of low reservoir levels and low flows on fish and wildlife species and the habitat upon which they depend should be addressed in this plan. There are natural droughts caused by weather and unnatural droughts caused, at times, by reservoir operation. Unnatural drought events from operations is an issue the Agencies wish to address with WVIC through adaptive management.

Appendix 1. Evaluation of Pothole Stranding at WVIC's Five Manmade Reservoirs. This section contains useful fishery data that compares panfish population data among reservoirs; however, the discussion and data is largely used to minimize the concern for stranding of fish and other aquatic life in potholes during drawdown. In the Spirit Reservoir, we know that hundreds of fish are stranded in numerous potholes that develop during drawdown. This currently results in unmitigated fishery and aquatic resource damage to the citizens of Wisconsin, and as previously discussed, the Agencies want to have the escape channel concept evaluated to help alleviate pothole stranding in the manmade reservoirs.

The FWS looks forward to working cooperatively with WVIC in an adaptive management fashion to implement the fish and wildlife management plans over the term of the license for the Wisconsin River Headwaters Storage System. If you wish to discuss this further, please call Jim Fossum of my staff at 414-465-7421.

Through a coordinated interagency review of WVIC's draft management plans, Wisconsin DNR input also is reflected in this letter.

Sincerely,



Janet M. Smith
Field Supervisor

cc: Bob Martini, Wisconsin DNR, Rhinelander, WI
Lois D. Cashell, Secretary, FERC, Washington, D.C.
Director, Division of Project Review and Compliance, FERC, Washington,
D.C.

Stevens Point Flowage Property Owners Association
Adelle M. Spaay
2322 County Highway E
Junction City, WI 54443

July 5, 1997

WVIC
2301 North Third Street
Wausau, Wisconsin 54403

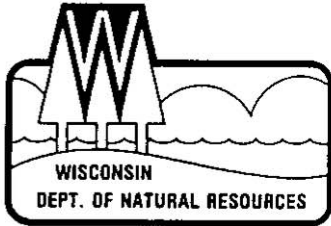
RECEIVED
JUL 9 - 1997
W.V.I.G.

RE: Ferc Management Plans; Project 2113, Wisconsin River
Headwaters System (Article 40B, Communications Plan)

Upon review of the WVIC, May 1997, Communication Plan Draft, SPFPOA has the following concerns and requests.

- 1) Page 2, Table 1. RIVOPS and DecTalk Data. The Dubay Hydroplant, Stevens Point Hydroplant, Wisconsin Rapids Hydroplant, Petenwell Hydroplant, and Castle Rock Hydroplant are listed as having flow monitoring frequency and RIVOPS availability on a DAILY basis. SPFPOA requests the data be obtained HOURLY to be consistent with all 19 other reservoirs, gaging stations, and hydroplants listed in Table 1 to obtain a higher degree of accuracy in monitoring the entire system.
- 2) SPFPOA is requesting WVIC provide and maintain an automated computer data electronic monitoring station to measure the flow of the water of the Wisconsin River in the area of Green Tree Drive, Junction City, Wisconsin.
- 3) Page 4, Communication with Public Officials. Table 3 lists the Rainbow, Willow, Rice, and Spirit Reservoirs with Trigger Flows, Area Affected, and Contact. However, "None" is listed for each category for Eau Pleine Reservoir. Since the Eau Pleine Reservoir minimums have been raised to retard adverse affects to fish and wildlife as well as increased recreational opportunities, this creates a dangerous flooding potential downstream between the DuBay Hydroplant and the Stevens Point Hydroplant. Therefore SPFPOA respectfully requests Table 3 be updated to read Eau Pleine "Trigger Flow" 5,000 cfs, "Area Affected" DuBay Hydroplant to Stevens Point Hydroplant, "Contact" SPFPOA Officer James Shippy, 1935 River Road, Junction City, Wisconsin 54443. Home phone 1-715-345-0575. Daytime phone 1-715-344-6993. Portage County Sheriff could be listed as "Contact" also.
- 4) Page 4, 3.2 Computer-Generated Speech System - Dectalk. SPFPOA respectfully requests to have access to Dectalk through SPFPOA Officer James Shippy, 1935 River Road, Junction City, Wisconsin 54443. Home phone 1-715-345-0575. Daytime phone 1-715-344-6993.

Thank you for the opportunity to contribute to the Communications Plan. The proposed communications plan will indeed enhance the entire Wisconsin River system and its operation.



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary
William H. Smith, Regional Director

Northern Region Co-Headquarters
PO Box 818, 107 Sutliff Ave.
Rhineland, WI 54501-0818
TELEPHONE 715-365-8900
FAX 715-365-8932
TDD 715-365-8957

57 JUL 17 PM 1:03
REGULATORY COMMISSION

July 7, 1997

Mr. Bob Gall, President
Wisconsin Valley Improvement Company
2301 N. Third Street
Wausau, Wisconsin 54403

RECEIVED
JUL 8 - 1997
W.V.I.C.

Dear Mr. Gall:

This letter responds to your request of June 4, 1997, for comments on FERC management plans for project 2113, the Wisconsin River Headwaters system. In that letter, with attachments, you respond to FERC license articles 405, 407, 408, 409, 411, 413 and 415, requiring management plans for fish and wildlife, gaging, water quality, communications and debris management. The Department has reviewed all of these plans. We commend WVIC for the thorough nature of the plans and the sound analysis of the available data. We also appreciate the extensive consultation you and staff have extended to the Department staff in this effort. Because of the extensive consultation and the use of some of our data in addition to your own, we believe that these plans are well designed to manage the natural resources in the WVIC system. Because of the complicated, dynamic nature of the biological and physical system WVIC has control over, we recommend that the Department of Natural Resources, the Fish and Wildlife Service and WVIC enter into a cooperative partnership designed to use the principles of adaptive management to identify resource management problems, list possible solutions, test hypotheses and implement results. We feel this process is much more cost-effective, more responsive and eventually will result in better resource management than attempting to add specific requirements into each individual plan required by the license. In addition, the cooperative partnership approach improves the exchange of information, increases the available biological and hydrological expertise devoted to problems in this system and builds over time a feeling of trust and confidence in each other that will result in better solutions to biological problems. As we have discussed in the past, we believe that this mode of operation should include consultation meetings as needed to accomplish our jointly held goals. We recommend avoiding a rigid consultation schedule (e.g., a mandated annual meeting) and instead favor consultation to take advantage of opportunities, address unforeseen problems, adjust work plans, etc., with meetings jointly scheduled to address an identified need.

We offer to enter into this arrangement for several reasons. First, we believe WVIC has extensive biological and hydrological expertise, data and experience; second, you have the personnel and the equipment to carry out resource management goals; third, we believe WVIC shares many of the fish and wildlife goals that the agencies hold for this system. The Department will attempt to incorporate studies and field work as necessary in our budgeting and work planning process; although, we cannot guarantee a specific level of support in any given year. Again let me compliment the company for the work it has done so far. We look forward to increased cooperation in the future and we expect a more flexible, cost-effective resource management system will result from this adaptive management approach. If you have questions, please contact me at (715)365-8969.

Sincerely,



Bob Martini, Project Manager
Wisconsin River Project

BM:da

cc: Tom Bashaw, Rhinelander
Tom Jerow, Wisconsin Rapids
Jim Fossum, USFWS, Green Bay
DuWayne Gebken, SS/6

**NATURAL RESOURCES
COMMISSION**

JERRY C. BARTNIK
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STATE OF MICHIGAN



JOHN ENGLER, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T MASON BUILDING, PO BOX 30028, LANSING MI 48909-7528

K. L. COOL, Director

RECEIVED
JUL 14 1997
W.V.I.C.

REPLY TO:

FISHERIES DIVISION
PO BOX 30446
LANSING MI 48909-7946

Refer to:
4202.2.42

July 8, 1997

Mr. Robert W. Gall
President
Wisconsin Valley Improvement Company
2301 N. Third Street
Wausau, WI 54403

Dear Mr. Gall:

Re: Wisconsin River Headwaters System (FERC No. 2113)
FERC Management Plans Review

The Department of Natural Resources (Department) has reviewed the plans for the Wisconsin River Headwaters System which were dated June 9, 1997 and received on June 11, 1997. We have the following comments:

License Article 407 - WWIC Debris Management Plan

The Department has reviewed the WWIC Debris Management Plan and has the following comment:

1. Page 4, Section 3.1 - The Department recommends that all vegetative debris be passed downstream as this is important fish and wildlife habitat and forage. All human created refuse should be disposed of in a proper manner.

With the inclusion of the above comment, the Department finds the plan acceptable.

License Article 409 - Drought Contingency Plan

The Department has reviewed the Drought Contingency Plan and has the following comments:

1. Page 6, Section 3.1.3 - The proposed target for drought consultation is appropriate and acceptable.

2. Page 6, Section 3.1.4 - The Michigan Department of Natural Resources, Lac Vieux Desert Band and U.S. Forest Service should be added to the list of consulted agencies as all of these entities have management responsibilities that could be impacted by any change in project operation.

With the inclusion of the above comments, the Department finds the plan acceptable.

License Article 408 - Communications Plan

The Department has reviewed the Communications Plan and finds it acceptable.

Water Quality Monitoring Plan

The Department has reviewed the Water Quality Monitoring Plan which covers water quality monitoring outside of the wild rice restoration plan requirements. The wild rice restoration plan requirements for water quality monitoring that do not duplicate items in the Water Quality Monitoring Plan must be conducted in addition to those proposed in this plan. We have the following comments:

1. Page 3-1, Section 3.1.1 - The sampling frequency, as outlined, is acceptable. The Department recommends adding a mid-winter sampling (late February) to the Lac Vieux Desert monitoring because of the known low dissolved oxygen in the lake at that time. The winter period should be monitored for the life of the license to detect any changes that may impact fish and wildlife resources.
2. Page 3-1, Section 3.1.2 - The Department recommends collecting dissolved oxygen and temperature profile data during each sampling bout at Lac Vieux Desert given the potential dissolved oxygen problems from dense weed growth at this lake. It is unclear why you are only going to collect total phosphorus, chlorophyll "a" and secchi depth in addition to the dissolved oxygen and temperature profile information. Historically, you collected a much wider range of information which provided a comprehensive view of water quality in Lac Vieux Desert. We recommend that this effort be continued and not reduced to sampling for only Trophic State Index parameters. Data on pH, turbidity, nitrogen, NO₂/NO₃ and conductivity should continue to be collected to allow for a full analysis of water quality trends at Lac Vieux Desert and to allow for a comparison with historic data.
3. Page 3-2, Section 3.1.3 - The Department requests that we be provided with the laboratory results for Lac Vieux Desert. All results should also be provided to the Michigan Department of Environmental Quality (att: John Suppnick, Surface Water Quality Division), Lac Vieux Desert Band and U.S. Forest Service as these entities have management responsibilities that may be impacted by water quality at Lac Vieux Desert.
4. Page 3-2, Section 3.1.4 - The Department recommends that a review of the sampling program be conducted prior to and after each three year sampling period to ensure that the sampling program is consistent with ecological thought at that

future time. Review of chemical techniques to be used should be conducted by the agencies (WDNR, MDNR, MDEQ, USFWS, USFS and Lac Vieux Desert Band) prior to each three-year sampling period to ensure that the most effective techniques will be used.

With the inclusion of the above comments, the Department finds the plan acceptable.

Fish and Wildlife Management Plan

The Department has reviewed the Fish and Wildlife Management Plan and has the following comments:

1. Page 1-8, Section 1.8 - The Native American tribes and/or bands that have expressed interest will also need to be consulted.
2. Page 2-7, Section 2.4.1, Comprehensive fishery survey - The Department has also conducted fishery surveys on Lac Vieux Desert which are not mentioned in this plan. This should be indicated in next revision.
3. Page 2-6, Section 2.3 - Are your goals in this plan consistent with the Michigan Department of Natural Resources Fisheries Division Strategic Plan? This should be determined and incorporated in this section. If you need a copy of this plan, please let us know.
4. Page 2-13, Section 2.5.1 - The Department also has target fishery goals which is to maintain a naturally producing trophy fishery in Lac Vieux Desert with the following main target fish: walleye, muskie, northern pike and panfish. This should be clearly stated in the next draft of this report. The Department concurs with your plan to begin the drawdown of Lac Vieux Desert by October 1 and to complete refill as soon as possible but not later than June 1.
5. Page 2-14, Section 2.5.1, Paragraph 1 - This paragraph states that management programs for the natural lakes will involve similar management activities as in the past. Whose activities are you referring to in this statement?
6. Page 2-14, Section 2.5.1, Paragraph 2 - The Department expects that the proposal to provide two WVIC staff biologists to assist in walleye population assessments would also be applicable to Lac Vieux Desert if the Department needs assistance on fish population assessments. In addition, the Department recommends that WVIC biologists be made available to work on any population assessment work, not just walleye population assessments, following the same protocols as described for WDNR. We also expect that at the annual consultation meeting that we would be made aware of the actual availability of WVIC biologists. These items should be incorporated into the draft plan.
7. Page 3-2, Section 3.2.1, Endangered Species - You left out much of the endangered species discussion for Michigan around Lac Vieux Desert. This needs to be corrected in the draft plan. If you need information to complete this discussion, please let us know.

8. Page 3-2, Section 3.2.1, Timber wolf - Michigan now has a minimum of 112 wolves as of March 1997. There is also one pack of 3 individuals approximately 2-4 miles north of Lac Vieux Desert. The Department has a three level recovery goal system: a) when there are 80 wolves in Michigan and Wisconsin, the species will be considered for federal downlisting. If there are 50 or less wolves counted in late winter counts in Michigan in 3 consecutive years that there are 80 wolves in Wisconsin, then the Michigan population will be listed as federally threatened. Conditions for downlisting have been reached in both states; b) the minimum population size goal to ensure population viability and recovery in Michigan is 200 individuals in at least 20 packs for 5 consecutive years; and c) the fully occupied range goal is between 800-950 wolves. Whether fully occupied goal is culturally acceptable is unknown, therefore when wolves reach cultural capacity the species will be classified as a game animal and regulated under the Wildlife Conservation Act. This should be added to the draft plan.
9. Page 3-2, Section 3.2.1, Piping plover - Piping plovers are known to nest along Lake Superior in the Upper Peninsula in Michigan. This should be corrected in the draft plan.
10. Page 3-2, Section 3.2.1, Peregrine falcon - Peregrine falcons currently nest in the Trap Hills area near Lake Gogebic and in the Porcupine Mountains in the Upper Peninsula. These are the closest populations to Lac Vieux Desert. This should be added to the draft plan.
11. Page 3-2, Section 3.2.1, Pine Marten - Pine martens are now common in the Lac Vieux Desert vicinity in Michigan and continue to increase in the project area. This needs to be corrected in the draft plan. A correction will also be needed to Section 3.2.2, Paragraph 1.
12. Page 3-3, Section 3.2.1 - In 1996, a Wisconsin endangered dragonfly species (*Ophiogomphus anomalus*) was collected for the first time in the Paint River near Crystal Falls, MI. This indicates that this species is likely to be found in the project area and should be added to this section.
13. Pages 3-3 and 3-4, Section 3.2.2, Bald eagles, osprey and loons - The status of these species in and around Lac Vieux Desert and in Michigan should be included in this section to be consistent with the discussion of these species in Wisconsin. Please contact Tom Weise (517-373-1263) for the latest information on these species in Michigan and in the Upper Peninsula.
14. Page 3-4, Section 3.2.2, Blanding's turtle - Blanding's turtle has been reported from eastern Iron County, Michigan. This should be included in the draft plan.
15. Page 3-8, Section 3.3, Paragraph 2 - The Department, USFS, Native American tribes (as appropriate) and USFWS should be added as entities to consult and cooperated with concerning T/E/SC species. The Department, USFS and Native

American tribal guidelines should also be used in the protection of habitat for these species. This should be corrected in the draft plan.

16. Page 3-8, Section 3.3, Paragraph 4 - The Michigan Gray Wolf Recovery and Management Plan (a draft is enclosed) should also be consulted in developing your plans along with any USFS and Native American tribal plans that pertain to this project. This should be corrected in the draft plan.
17. Page 3-8, Section 3.3 - You should state that the wild rice enhancement plan for Lac Vieux Desert will also enhance wetlands in this part of the project which will enhance T/E/SC species. The items in this plan will be done in addition to that plan.
18. Page 3-8, Section 3.4.1, Timber Wolf - The Department's Michigan Gray Wolf Recovery and Management Plan must be incorporated into this section.
19. Page 3-9, Section 3.4.1, Timber Wolf, Paragraph 1 - While we agree that beaver populations are high and at nuisance levels, your statement that seasonal water fluctuations will not impact wolf prey items is incorrect as beaver are directly impacted by fluctuating water levels.
20. Page 3-9, Section 3.4.2, Bald Eagles - Bald eagle objectives for Michigan should be included in this section as the Department also manages bald eagles in the project area. In addition, USFS and Native American tribes also manage bald eagles on their lands in the project area and should be included in this section. The same comment also applies to osprey management in Section 3.4.3 and loon management in Section 3.4.4.
21. Page 3-9, Section 3.4.2, Bald Eagles, Paragraph 3 - The statement that the water level fluctuations will have no impact on bald eagle forage is wholly inaccurate as the continued fluctuations will impair the amount of fish produced by the reservoirs. This in turn will reduce bald eagle production. Therefore, we strongly disagree with your statement on this issue. This comment also applies to osprey management in Section 3.4.3.
22. Page 3-10, Section 3.4.3, Ospreys - The Department recommends that two nesting structures be constructed on Lac Vieux Desert to assist the recovery of this species.
23. Page 3-10, Section 3.4.4, Common Loon - It is interesting and inconsistent that you make no mention of the impacts of water level fluctuation on loon nesting who are very susceptible to fluctuations during nesting. The nesting period overlaps the floating leaf stage for wild rice and stable water levels during this period will benefit both species. A discussion of these impacts and how you will reduce them should be included in the draft plan. Floating nesting structures should be used to offset the impacts of your water level fluctuations. There is also no mention of management guidelines that you will follow for this species. This items should be incorporated into the draft plan.

24. Page 3-10, Section 3.4.5, Paragraph 1 - Recovery efforts for the species listed in this paragraph are also directed by the Department along with USFS and Native Americans on their lands. Piping plover recovery efforts are also taking place along Lake Superior in Michigan. Peregrine falcon and pine marten recovery efforts are also taking place in the Upper Peninsula as stated above. These items should be corrected in the draft plan.
25. Page 3-10, Section 3.4.5, Paragraph 2 - USFS and Native American tribes also have programs for these species on their lands. This should be corrected in the draft plan. This comment also applies to Section 3.4.6.
26. Page 3-11, Section 3.5 - The Department must also be consulted on the management of these species. In addition, USFS and Native American tribes also have programs for these species on their lands and must be consulted on lands in their jurisdictions. This should be corrected in the draft plan.
27. Page 3-11, Section 3.5.1 - You will need to follow Department guidelines for these species along with USFWS, USFS and Native American tribal guidelines for these species. The Department requests that two osprey platforms be constructed on Lac Vieux Desert to assist in their recovery on this impoundment. It is unclear from this section exactly what measures you are proposing to implement with respect to timber wolf or osprey management on Lac Vieux Desert. Please provide this to us for our review. These should be incorporated into the draft plan.
28. Page 3-11, Section 3.5.1- Your management of these impoundments with the continued wide fluctuations in water levels does directly impair fish production which will impair osprey production, thus we strongly disagree with your statement on the lack of impacts on osprey of your proposed operation. This should be corrected in the draft plan.
29. Page 3-12, Section 3.5.2, Measures to protect existing habitat - You state in the first paragraph that you have no responsibility for eagle nests on public and private lands within the Project boundary over which WWIC has no control. We disagree in that you do have responsibility for all aspects of project management within the project boundary. You may not have direct control of all aspects but do have a responsibility to make a good faith effort to try to protect the nest sites within the project boundary. You simply cannot walk away from this responsibility as it is an advertised benefit of the Project. This should be changed in the draft plan.
30. Page 3-12, Section 3.5.2, Nesting - You need to include the Department, USFS and the tribes as appropriate in this section. This should be corrected in the draft plan.
31. Page 3-13, Measures to control public access - There are a couple of specifics missing in this section. They are: a) what are the exceptions to the open use policy?; and 2) When is overnight camping permitted? These items should be clarified in the draft plan.

32. Page 3-13, Measures to protect winter roosting and feeding sites - Bald eagles do roost in the Upper Peninsula in the winter. Please contact Tom Weise for the locations near the project area. This should be corrected in the project area.
33. Page 3-13, Implementation and maintenance costs - The Department requests that WVIC provide funding for the annual bald eagle surveys conducted by airplane over Lac Vieux Desert. This would amount to \$200 annually and will ensure that these critical data continue to be collected for the life of the license.
34. Page 3-13, Section 3.5.3 - Water level fluctuations during turtle nesting periods will cause the loss of turtle nests, therefore your statement that your continued operation will have no impact is incorrect. In addition, rapid changes in flows will also impact the T/E/SC dragonflies that are in the project area. Therefore, you do need to make modifications in your operation to accommodate these species.
35. Page 3-14, Section 3.5.4 - Again, you need to include the USFS and the tribal programs as appropriate.
36. Page 3-14, Section 3.5.5 - You do not discuss the rehabilitation of wild rice in Lac Vieux Desert which will enhance the wetlands at this impoundment. This should be mentioned in this section and the discussed efforts in this section are in addition to the wild rice program.
37. Page 4-1, Section 4.1.1, Paragraph 2 - You state that the pre-settlement vegetation was eastern hemlock and eastern hemlock which is clearly a typo.
38. Page 4-1, Section 4.1.1, Paragraph 3 - You should also note any tribal lands in the project area.
39. Page 4-4, Section 4.4.3, Paragraph 2 - The Department expects that WVIC will be responsible for aquatic plant control, if necessary, on Lac Vieux Desert. This should be noted in the revised plan.
40. Page 4-5, Section 4-5 - Comment 36 also applies to this section. There also should be a plan developed to deal with other exotic plants, such as Eurasian milfoil and their control. WVIC is responsible to make sure that the anticipated and advertised wetland values of these projects is protected from invasive exotic plants. These exotic plants could greatly reduce the value of the wetlands at these projects and may have to be controlled in the future to ensure the quality of the project wetlands. This should be included in the next revision of this plan.
41. Page 4-5, Section 4.5.3, Paragraph 2 - Comment 39 also applies here.
42. Page 4-6, Section 4.5.4 - We request that this plan be developed and completed as soon as possible to complete our consultation on this issue.

43. Page 5-1 - This list seems to be incomplete given the number of issues discussed in this plan. For example, the schedule for installing wildlife enhancement structures at the project impoundments is missing. Please review your action items in this plan to examine if all are covered by this schedule.
44. Page 5-1, Botanical Resources - The Department requests that the purple loosestrife and Eurasian milfoil control plan be developed as soon as possible. There should also be a mention of the Lac Vieux Desert wild rice plan in this schedule.

With the inclusion of the above comments, the Department finds the plan acceptable.

The Department appreciates the opportunity to comment on these plans and looks forward to our continued interactions on this project. If you have any questions on this matter, please contact me.

Sincerely,



Gary E. Whelan
MDNR FERC Project Coordinator
FISHERIES DIVISION
(517) 373-1280

Enclosure

cc: Ms. Janet Smith, USFWS
Mr. Robert Marteney, WDNR
Mr. Joe Kastenholtz, USFS
Mr. Robert Evans, USFS
Mr. Peter David, GLIFWC
Mr. John McGeshick, Lac Vieux Desert Tribal Chairman



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Green Bay ES Field Office
1015 Challenger Court
Green Bay, Wisconsin 54311-8331
Telephone 414/465-7440
FAX 414/465-7410

June 30, 1997

RECEIVED
JUL 2 - 1997
W.V.I.C.

Mr. Robert W. Gall, President
Wisconsin Valley Improvement Company
2301 N. Third Street
Wausau, Wisconsin 54403

re: FERC Management Plans
Project No. 2113
Wisconsin River Headwaters
Storage System

Dear Mr. Gall:

Your letter of June 4, 1997, requested U.S. Fish and Wildlife Service (FWS) review of the Wisconsin Valley Improvement Company's (WVIC) draft management plans for submission to the Federal Energy Regulatory Commission (FERC) relative to several articles of the license for the referenced storage reservoir project. The management plans address flow gaging, debris management, communications, drought contingency, water quality monitoring, fish and wildlife management, and bald eagle protection.

GENERAL COMMENTS

The FWS believes that the management plans are well written and when implemented, will accommodate most concerns about fish and wildlife resource protection and management that the FWS and Wisconsin Department of Natural Resources (DNR) (Agencies) expressed to WVIC during preapplication consultation. The FWS has discussed these plans with the Wisconsin DNR, and the Agencies believe that due to the size and complexity of the Wisconsin River Headwaters Storage System, an adaptive management strategy for management plan implementation should be adopted by all concerned parties. We believe adaptive management is most responsive to addressing natural resource issues in a dynamic environment like that affected by WVIC's reservoir system. Rather than stipulating more requirements in each plan for WVIC to implement, the Agencies would prefer to use adaptive management to address resource issues described in each plan. This concept would allow all parties the flexibility to change the mode of resolving resource problems if the current strategy is not producing desired results. Further, we recommend that WVIC conduct an annual meeting with the Agencies to develop a work plan to accomplish objectives for each resource goal that will be addressed in that year. The FWS supports the FERC requirement that these management plans be updated every five years. It will provide an opportunity for the results of adaptive management actions to be communicated to all concerned parties and an opportunity to propose different management options if needed.

The Agencies believe adaptive management should be used as the process to address the resource issues listed below, as well as other resource issues that are identified by the Agencies or WVIC over the term of the license.

1. Fish stranding in potholes in the five manmade reservoirs

Fish stranding in potholes caused by drawdown of WVIC's manmade reservoirs was discussed extensively during preapplication consultation. However, we do not believe sufficient information currently exists to document the extent of the stranding/entrapment problem. Based on information to date, we believe the Spirit Reservoir most likely has the biggest stranding problem due to the irregular morphology of the riverbed. We suggest that WVIC conduct a study, in consultation with the Agencies, to excavate an escape channel in one large pothole in the Spirit Reservoir. The numbers and species of fish and other aquatic life entrapped must be known before the escape channel is opened so it can be determined whether or not mobile aquatic organisms use the escape channel. If found to be effective, the escape channel concept should be evaluated for more widespread use throughout WVIC's reservoir system.

2. Winter drawdown of the manmade reservoirs

The effectiveness of maintaining a 25 percent minimum volume limit in WVIC's manmade reservoirs during winter drawdown should be evaluated. Since the Eau Pleine Reservoir has known dissolved oxygen problems during winter drawdown, that reservoir would be a good candidate to test the benefits and detriments of the 25 percent minimum pool volume concept on fish and wildlife resources and water storage.

3. Maintain a minimum summer pool in the manmade reservoirs

We recommend that, initially, one of the five manmade reservoirs be selected to test the Agencies' recommendation of maintaining a minimum summer pool of 4 feet below the current maximum water level. Again, the benefits and detriments to fish and wildlife resources, recreational use, and water storage should be evaluated by WVIC and the Agencies.

4. Minimum flow in the Pickerel Canal near Rainbow Reservoir

Delivery options to maintain a year-round minimum flow in the Pickerel Canal should be evaluated by WVIC and the Agencies, and the environmental benefits assessed.

5. Ramping rate at the Willow Reservoir

The Agencies wish to evaluate the possible need of a ramping rate below the Willow Reservoir Dam when higher flows are reduced to the minimum flow of 75 cubic feet per second. We raise this issue in response to a complaint the Wisconsin DNR received from a citizen. The rate and magnitude of tailwater fluctuation resulting from WVIC's current operational practice at Willow Dam needs to be evaluated by field testing.

6. Control of exotic species

The Agencies wish to work cooperatively with WVIC to prevent the spread of exotic species such as the zebra mussel, Eurasian milfoil, purple loosestrife, and others, throughout WVIC's reservoir storage system. Control techniques for many exotics are not yet well developed or accepted by the scientific community. Therefore, control of any species over the term of the license must be handled on a case by case basis and cooperatively between WVIC and the Agencies.

SPECIFIC COMMENTS

Page 2-8, Fish and Wildlife Management Plan, Eau Pleine Reservoir Aeration and D.O. Monitoring. This paragraph, as currently worded, could lead the reader to conclude that the aeration system is adequate and resolves the low winter dissolved oxygen (DO) problem in Eau Pleine Reservoir. While we concur that aeration helps to improve DO levels, this does not, in and of itself, totally resolve the problem. Additional measures to improve low DO levels should be tested such as operational changes in the reservoir.

Page 3-11, Fish and Wildlife Management Plan, Bald Eagle Protection Plan. The FWS provided input to and concurs with WVIC's Bald Eagle Protection Plan.

Page 3-12, Fish and Wildlife Management Plan, Nesting, 4th paragraph. It is stated, "WVIC will develop similar MOAs for Willow and Spirit reservoirs in cooperation with the WDNR to further support its long-standing policy of protecting the wilderness character of these tracts of undeveloped project forest lands." The FWS commends and concurs with WVIC's intention but we believe the memorandum of agreement (MOA) should be developed in the spirit of adaptive management such that several resource issues, not just motorized vehicle access on project land, can be address through the MOA.

Page 2, Drought Contingency Plan, Drought Concerns. Another bullet on drought concerns should be added here: "Effects on fish and wildlife species resulting from droughts caused by reservoir operation."

The impact of low reservoir levels and low flows on fish and wildlife species and the habitat upon which they depend should be addressed in this plan. There are natural droughts caused by weather and unnatural droughts caused, at times, by reservoir operation. Unnatural drought events from operations is an issue the Agencies wish to address with WVIC through adaptive management.

Appendix 1. Evaluation of Pothole Stranding at WVIC's Five Manmade Reservoirs. This section contains useful fishery data that compares panfish population data among reservoirs; however, the discussion and data is largely used to minimize the concern for stranding of fish and other aquatic life in potholes during drawdown. In the Spirit Reservoir, we know that hundreds of fish are stranded in numerous potholes that develop during drawdown. This currently results in unmitigated fishery and aquatic resource damage to the citizens of Wisconsin, and as previously discussed, the Agencies want to have the escape channel concept evaluated to help alleviate pothole stranding in the manmade reservoirs.

The FWS looks forward to working cooperatively with WVIC in an adaptive management fashion to implement the fish and wildlife management plans over the term of the license for the Wisconsin River Headwaters Storage System. If you wish to discuss this further, please call Jim Fossum of my staff at 414-465-7421.

Through a coordinated interagency review of WVIC's draft management plans, Wisconsin DNR input also is reflected in this letter.

Sincerely,



Janet M. Smith
Field Supervisor

cc: Bob Martini, Wisconsin DNR, Rhinelander, WI
Lois D. Cashell, Secretary, FERC, Washington, D.C.
Director, Division of Project Review and Compliance, FERC, Washington,
D.C.

Stevens Point Flowage Property Owners Association
Adelle M. Spaay
2322 County Highway E
Junction City, WI 54443

July 5, 1997

WVIC
2301 North Third Street
Wausau, Wisconsin 54403

RECEIVED
JUL 9 - 1997
W.V.I.G.

RE: Ferc Management Plans; Project 2113, Wisconsin River
Headwaters System (Article 408, Communications Plan)

Upon review of the WVIC, May 1997, Communication Plan Draft, SPFPOA has the following concerns and requests.

1) Page 2, Table 1. RIVOPS and DecTalk Data. The Dubay Hydroplant, Stevens Point Hydroplant, Wisconsin Rapids Hydroplant, Petenwell Hydroplant, and Castle Rock Hydroplant are listed as having flow monitoring frequency and RIVOPS availability on a DAILY basis. SPFPOA requests the data be obtained HOURLY to be consistent with all 19 other reservoirs, gaging stations, and hydroplants listed in Table 1 to obtain a higher degree of accuracy in monitoring the entire system.

2) SPFPOA is requesting WVIC provide and maintain an automated computer data electronic monitoring station to measure the flow of the water of the Wisconsin River in the area of Green Tree Drive, Junction City, Wisconsin.

3) Page 4, Communication with Public Officials. Table 3 lists the Rainbow, Willow, Rice, and Spirit Reservoirs with Trigger Flows, Area Affected, and Contact. However, "None" is listed for each category for Eau Pleine Reservoir. Since the Eau Pleine Reservoir minimums have been raised to retard adverse affects to fish and wildlife as well as increased recreational opportunities, this creates a dangerous flooding potential downstream between the DuBay Hydroplant and the Stevens Point Hydroplant. Therefore SPFPOA respectfully requests Table 3 be updated to read Eau Pleine "Trigger Flow" 5,000 cfs, "Area Affected" DuBay Hydroplant to Stevens Point Hydroplant, "Contact" SPFPOA Officer James Shippy, 1935 River Road, Junction City, Wisconsin 54443. Home phone 1-715-345-0575. Daytime phone 1-715-344-6993. Portage County Sheriff could be listed as "Contact" also.

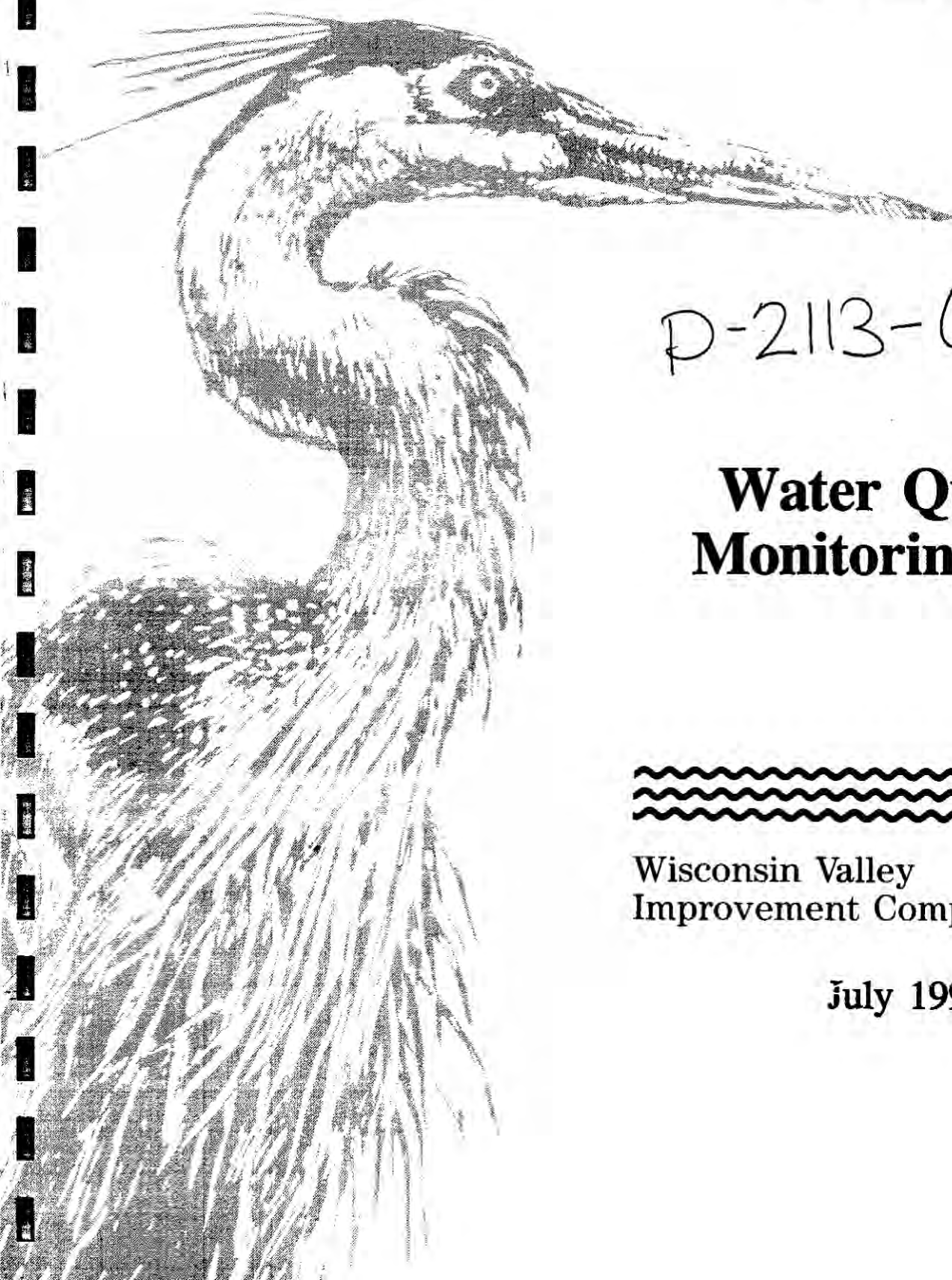
4) Page 4, 3.2 Computer-Generated Speech System - Dectalk. SPFPOA respectfully requests to have access to Dectalk through SPFPOA Officer James Shippy, 1935 River Road, Junction City, Wisconsin 54443. Home phone 1-715-345-0575. Daytime phone 1-715-344-6993.

Thank you for the opportunity to contribute to the Communications Plan. The proposed communications plan will indeed enhance the entire Wisconsin River system and its operation.

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OFFICE OF THE SECRETARY

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FEDERAL ENERGY
REGULATORY COMMISSION



D-2113-068

Water Quality Monitoring Plan

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Wisconsin Valley  
Improvement Company

July 1997



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# **WISCONSIN VALLEY IMPROVEMENT COMPANY**

## **Water Quality Monitoring Plan**

Prepared by  
**Wisconsin Valley Improvement Company**  
Wausau, Wisconsin

**July 1997**

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# CHAPTER 1 - INTRODUCTION

## 1.1 DESCRIPTION OF WWIC

Wisconsin Valley Improvement Company (WWIC), Wausau, operates the Wisconsin River Reservoir System under Federal Energy Regulatory Commission (FERC) License 2113. The Project is federally licensed because the Wisconsin River is a navigable waterway and the release of reservoir water contributes to the generation of electricity at 25 hydroelectric dams on the Tomahawk and Wisconsin rivers. WWIC dams do not generate electricity.

WWIC is a private corporation which was organized in 1907 under the laws of Wisconsin and granted authority by the state legislature to acquire and build a system to regulate the flow of the Wisconsin River. WWIC is owned by seven paper mill companies and four electric utility companies. These companies finance WWIC operations through a toll process, regulated by the Wisconsin Public Service Commission, because of the benefit of reservoir operation they receive at their hydroelectric facilities on the rivers. The 25 hydroelectric dams are not part of the WWIC Project. WWIC coordinates the operation of the Wisconsin River System (Figure 1-1) for flood control and low flow augmentation.

The purpose of the System, as stated in the authorizing legislation, is to "...produce as nearly a uniform flow of water as practicable in the Wisconsin and Tomahawk rivers by storing in reservoirs surplus water for discharge when water supply is low to improve the usefulness of the rivers for all public purposes and to reduce flood damage."

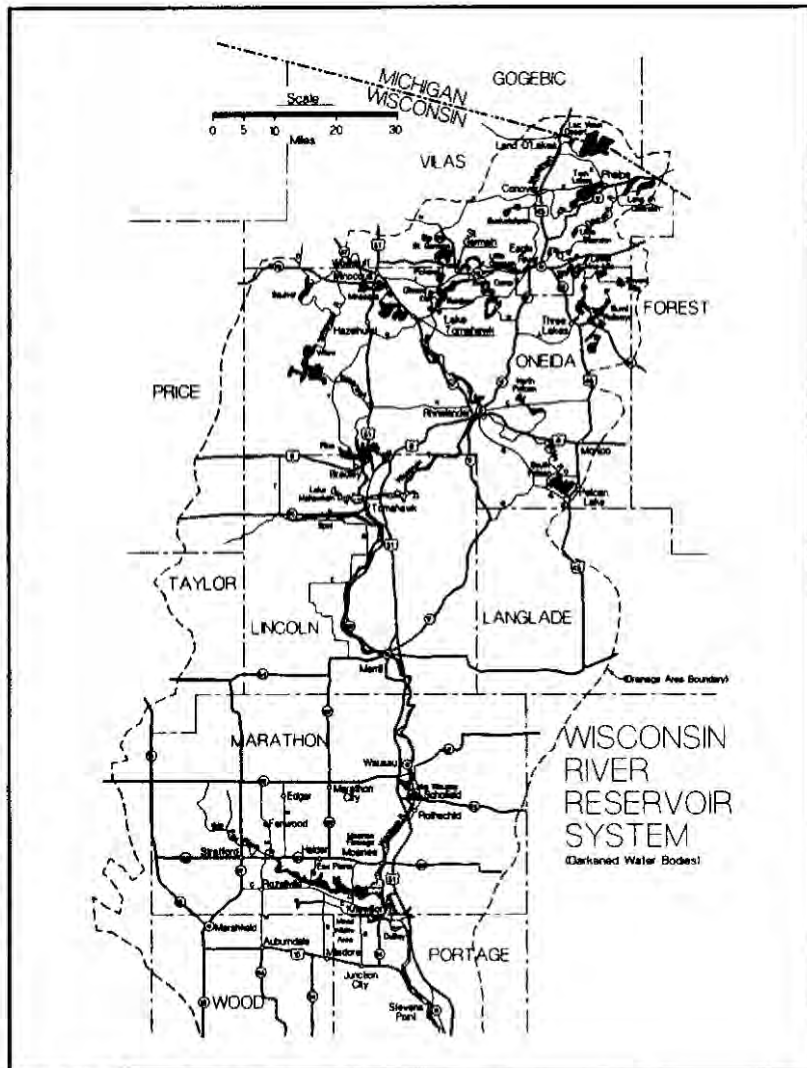


FIGURE 1-1. Wisconsin River Reservoir System

## 1.2 DESCRIPTION OF THE PROJECT

The Project components were put together in 1907 with the acquisition of 16 small dams from old improvement companies. These dams were previously used for transporting logs by causing artificial rises in river flow. They are all located at the outlet of natural lakes on streams that are tributary to the Wisconsin River except for Lac Vieux Desert, which is located on the main stem of the Wisconsin River. These 16 natural-lake reservoirs compose 27 percent of the storage available in the current Project.

From 1911 to 1937 WVIC constructed five man-made reservoirs to increase the capacity of the Project. Much larger than their natural-lake counterparts, the five man-made reservoirs—Rainbow, Willow, Rice, Spirit, and Eau Pleine— account for the remaining 73 percent of the total reservoir storage.

The WVIC System controls runoff from 1,931 square miles of the headwaters region of the basin, about one-sixth of the total basin area. Overall storage capacity is used, on the average, 1.2 times per hydrologic year (April-March). Project storage reduces flood flows by as much as 30 percent at some locations. Project release contributes approximately 14 percent to hydroelectric generation on the river.

In addition to enhanced hydroelectric operation and flood control, reservoir benefits include low flow augmentation and recreation. Augmentation increases river flow during dry periods—reservoir release can more than double low natural flows—and improves water quality. The man-made reservoirs added 23,043 acres of water surface and 403 miles of total shoreline, much of it in a wilderness state, to Wisconsin River valley recreation resources.

### 1.2.1 General Characteristics

The Wisconsin River is the largest river in the state and extends 430 miles from Lac Vieux Desert on the Wisconsin-Michigan boundary in the north to Prairie du Chien in southwestern Wisconsin, where it empties into the Mississippi River. The river originates in the area's highest land elevations, a geomorphic region known as the Northern Highlands, and then continues through the central and southwest portions of the state to the Mississippi River, draining a basin of 12,000 square miles (roughly one quarter of the state's surface area) (Figure 1-2). Over its length, the Wisconsin drops 1,050 vertical feet, an average of 2.4 feet per mile. The Northern Highlands include Gogebic County, Michigan, and Vilas, Forest, Oneida, Lincoln, and Marathon counties in north-central Wisconsin. This is the Wisconsin River's headwaters region in which WVIC operates its 21 developments for uniform stream flow.

The Wisconsin River basin is a major land form whose shape and character were molded by the Precambrian period of earth evolution. The final stage of this period, known as the Wisconsin Ice Age, had the most pronounced effect on the basin environs. The glacial action during this ice age produced a drainage basin with irregular topography and associated pitted outwash plain and ground and end moraines, and level topography associated with lakes and swamps of the outwash plains. The topography is generally rolling, with low to moderate relief (averaging 50 to 200 feet) and long gentle slopes.

The soils and drainage patterns associated with the Project area are characteristic of a glaciated region. Well drained sand and gravel soils associated with the glacial outwash plains are predominant in the northern portion of the Project area (Gogebic, Vilas, Oneida, and Forest counties). Sandy loam is also present in areas where glacial till occurs, with peat evident in the lowland areas. Soils in southern Lincoln and Marathon counties are characterized as sandy and silt loams and clay, with peat present in the lowlands. The clay soils occur primarily west of the Wisconsin River and greatly influence drainage patterns. These clay soils have higher runoff and lower permeability rates, resulting in faster and higher flood responses, compared to the northern permeable sand and gravel soils. The two southernmost reservoirs, the Spirit and Eau Pleine, are located in this area of clay soils. These reservoirs respond rapidly to precipitation and runoff events, whereas the other northern reservoirs experience a more gradual "buffered" response.

The abundance of streams, lakes, and wetlands in the Project area are a direct result of glaciation. There are

approximately 4,600 lakes within the six-county Project area and approximately 4,750 miles of streams. Wisconsin presently has over 5 million acres of wetlands. Over 700,000 acres occur within the Project area.

The climate is classed as continental and is characterized by marked weather changes common to its latitudes and the interiors of large land masses. The average annual temperature is 42 degrees. January is the coldest month with an average temperature of 12 degrees and July is the warmest month with an average temperature of 68 degrees. Average annual precipitation in the Wisconsin River basin is 31 inches; average annual runoff is 11 inches. Loss due to evapotranspiration averages 20 inches annually. The prevailing winds are from the west from mid-fall through late-spring and average 10 to 13 miles per hour. The remainder of the year the prevailing winds are from the south at an average speed of 8 to 11 miles per hour.

The lands in the northern Project area are predominantly (> 80%) second-growth forest dominated by aspen and mixed with pines and northern hardwoods; less than 5% percent are devoted to agriculture. This land character of forests, with interspersed lakes and streams, lends to the region's primary industry which is tourism. Lincoln County represents the transition between the northwoods character of the forest and lakes region and the agricultural-urban area of the upper Wisconsin River Valley. From Merrill southward to Marathon County, the landscape opens to sparse timber stands and large farms; Marathon County is predominantly agricultural.

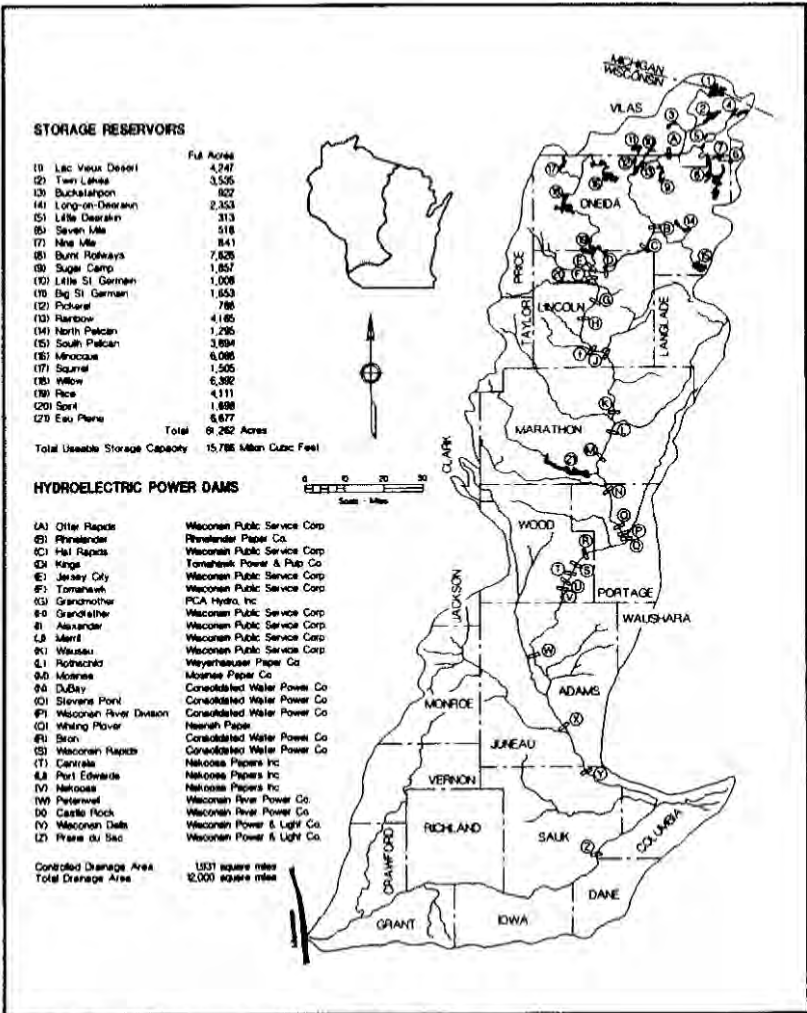


FIGURE 1-2. Wisconsin River Drainage Area

1.2.2 Reservoir Characteristics

WWIC operates 21 reservoirs (16 natural-lake and 5 man-made) located in Gogebic County, Michigan, and Vilas, Forest, Oneida, Lincoln, and Marathon counties in north-central Wisconsin. Many of the 16 natural-lake reservoirs form chains of lakes where several lakes are connected through a series of "thoroughfares". Collectively, 54 named lakes occur within the 16 natural-lake reservoirs totalling approximately 38,222 surface acres at full elevation. The 5 man-made reservoirs contain approximately 23,043 surface acres at full pool elevation, equalling a total of 61,265 surface acres controlled within the Project. An additional 4,600 lakes that collectively represent 186,400 surface acres, and approximately 4,750 miles of streams that collectively represent 13,500 surface acres, are located within the six-county Project area. Specific physical features, such as surface area, island acres, shoreline miles, and maximum depth for each of the Project reservoirs are presented in Table 1-1.



WVIC Water Quality Monitoring Plan - July 1997

| TABLE 1-1. WVIC Reservoir Physical Data (reservoir totals include thoroughfares) |                 |                            |                     |                            |                             |                          |                         |                      |
|----------------------------------------------------------------------------------|-----------------|----------------------------|---------------------|----------------------------|-----------------------------|--------------------------|-------------------------|----------------------|
| RESERVOIR                                                                        | LAKE            | WATER SURFACE AREA (acres) | ISLAND AREA (acres) | TOTAL SURFACE AREA (acres) | PERIMETER SHORELINE (miles) | ISLAND SHORELINE (miles) | TOTAL SHORELINE (miles) | MAXIMUM DEPTH (feet) |
| LAC VIEUX DESERT                                                                 |                 | 4274                       | 40.5                | 4288                       | 16.8                        | 2.0                      | 18.7                    | 42                   |
| TWIN                                                                             |                 | 3535                       | 6.9                 | 3542                       | 13.8                        | 0.4                      | 14.2                    |                      |
|                                                                                  | South           | 656                        | 0.0                 | 656                        | 3.6                         | 0.0                      | 3.6                     | 43                   |
|                                                                                  | North           | 2879                       | 6.9                 | 2886                       | 10.1                        | 0.4                      | 10.6                    | 60                   |
| BUCKATAHPON                                                                      |                 | 922                        | 9.6                 | 932                        | 12.9                        | 1.3                      | 14.2                    |                      |
|                                                                                  | Lower           | 416                        | 4.9                 | 421                        | 5.6                         | 0.7                      | 6.3                     | 27                   |
|                                                                                  | Upper           | 506                        | 4.7                 | 511                        | 7.3                         | 0.6                      | 7.9                     | 47                   |
| LONG-ON-DEERSKIN                                                                 |                 | 2353                       | 0.0                 | 2353                       | 18.9                        | 0.0                      | 18.9                    |                      |
|                                                                                  | Long            | 885                        | 0.0                 | 885                        | 8.1                         | 0.0                      | 8.1                     | 92                   |
|                                                                                  | Big Sand        | 1462                       | 0.0                 | 1462                       | 8.6                         | 0.0                      | 8.6                     | 59                   |
| LITTLE DEERSKIN                                                                  |                 | 313                        | 5.4                 | 318                        | 3.4                         | 0.6                      | 3.9                     | 20                   |
| SEVEN MILE                                                                       |                 | 518                        | 0.9                 | 519                        | 6.3                         | 0.3                      | 6.6                     | 45                   |
| NINE MILE                                                                        |                 | 841                        | 0.0                 | 841                        | 10.6                        | 0.0                      | 10.6                    | 7                    |
| BURNT ROLLWAYS                                                                   |                 | 7826                       | 34.2                | 7860                       | 106.4                       | 4.1                      | 110.5                   |                      |
|                                                                                  | Long            | 657                        | 0.2                 | 657                        | 10.1                        | 0.1                      | 0.0                     | 31                   |
|                                                                                  | Planting Ground | 1053                       | 0.9                 | 1054                       | 12.1                        | 0.2                      | 12.3                    | 38                   |
|                                                                                  | Round           | 153                        | 0.5                 | 154                        | 1.8                         | 0.2                      | 2.0                     | 15                   |
|                                                                                  | Range Line      | 123                        | 0.0                 | 123                        | 1.8                         | 0.0                      | 1.8                     | 28                   |
|                                                                                  | Town Line       | 168                        | 0.0                 | 168                        | 3.1                         | 0.0                      | 3.1                     | 19                   |
|                                                                                  | Island          | 299                        | 0.4                 | 299                        | 4.4                         | 0.1                      | 4.5                     | 26                   |
|                                                                                  | Little Fork     | 366                        | 0.0                 | 366                        | 5.2                         | 0.0                      | 5.2                     | 36                   |
|                                                                                  | Big Fork        | 705                        | 0.2                 | 705                        | 5.4                         | 0.0                      | 5.5                     | 37                   |
|                                                                                  | Fourmile        | 222                        | 1.3                 | 223                        | 3.9                         | 0.3                      | 4.2                     | 29                   |
|                                                                                  | Medicine        | 382                        | 11.8                | 394                        | 3.6                         | 0.6                      | 4.5                     | 45                   |
|                                                                                  | Laurel          | 239                        | 11.9                | 251                        | 5.3                         | 1.1                      | 7.1                     | 27                   |
|                                                                                  | Big Stone       | 553                        | 0.0                 | 553                        | 4.9                         | 0.0                      | 4.9                     | 57                   |
|                                                                                  | Spirit          | 371                        | 1.7                 | 373                        | 3.9                         | 0.2                      | 4.1                     | 39                   |
|                                                                                  | Moccasin        | 98                         | 0.0                 | 98                         | 1.8                         | 0.0                      | 1.8                     | 19                   |
|                                                                                  | Deer            | 182                        | 0.6                 | 183                        | 3.9                         | 0.2                      | 4.1                     | 20                   |
|                                                                                  | Crystal         | 157                        | 0.0                 | 157                        | 4.7                         | 0.0                      | 4.7                     | 9                    |
| Dog                                                                              | 218             | 0.0                        | 218                 | 3.6                        | 0.0                         | 3.6                      | 22                      |                      |
| Big                                                                              | 888             | 1.3                        | 889                 | 6.7                        | 0.6                         | 7.3                      | 27                      |                      |
| Whitefish                                                                        | 211             | 0.0                        | 211                 | 3.2                        | 0.0                         | 3.2                      | 33                      |                      |
| Virgin                                                                           | 300             | 3.6                        | 304                 | 6.1                        | 0.4                         | 6.5                      | 31                      |                      |
| SUGAR CAMP                                                                       |                 | 1857                       | 13.2                | 1870                       | 33.7                        | 2.6                      | 36.3                    |                      |
|                                                                                  | Dam             | 687                        | 5.2                 | 758                        | 6.8                         | 0.8                      | 7.6                     | 32                   |
|                                                                                  | Sand            | 497                        | 0.1                 | 497                        | 4.9                         | 0.1                      | 5.0                     | 25                   |
|                                                                                  | Stone           | 176                        | 0.0                 | 176                        | 4.3                         | 0.0                      | 4.3                     | 16                   |
|                                                                                  | Echo            | 98                         | 1.4                 | 99                         | 2.8                         | 0.2                      | 3.0                     | 19                   |
|                                                                                  | Chain           | 204                        | 0.0                 | 204                        | 3.5                         | 0.0                      | 3.5                     | 19                   |
| LITTLE ST. GERMAIN                                                               |                 | 1008                       | 0.8                 | 1008                       | 14.5                        | 0.2                      | 14.7                    | 53                   |
| BIG ST. GERMAIN                                                                  |                 | 1653                       | 1.3                 | 1654                       | 10.9                        | 0.3                      | 11.2                    |                      |
|                                                                                  | Fawn            | 25                         | 0.0                 | 25                         | 1.1                         | 0.0                      | 1.1                     | 10                   |
|                                                                                  | Big St. Germain | 1628                       | 1.3                 | 1629                       | 9.8                         | 0.3                      | 10.1                    | 42                   |
| PICKEREL                                                                         |                 | 786                        | 2.7                 | 789                        | 15.7                        | 0.5                      | 16.2                    | 18                   |
| RAINBOW                                                                          |                 | 4165                       | 150.3               | 4315                       | 50.4                        | 12.1                     | 62.5                    | 26                   |
| NORTH PELICAN                                                                    |                 | 1295                       | 5.8                 | 1301                       | 20.3                        | 0.5                      | 20.8                    |                      |
|                                                                                  | Fifth           | 255                        | 5.8                 | 261                        | 3.9                         | 0.5                      | 4.4                     | 15                   |
|                                                                                  | Fourth          | 289                        | 0.0                 | 289                        | 2.8                         | 0.0                      | 2.8                     | 14                   |
|                                                                                  | Third           | 94                         | 0.0                 | 94                         | 1.5                         | 0.0                      | 1.5                     | 14                   |
|                                                                                  | Second          | 107                        | 0.0                 | 107                        | 2.3                         | 0.0                      | 2.3                     | 14                   |
|                                                                                  | Moen            | 458                        | 0.0                 | 458                        | 4.5                         | 0.0                      | 4.5                     | 16                   |
|                                                                                  | Sunset          | 40                         | 0.0                 | 40                         | 1.1                         | 0.0                      | 1.1                     | 11                   |
| SOUTH PELICAN                                                                    |                 | 3694                       | 25.7                | 3720                       | 11.7                        | 1.1                      | 12.8                    | 39                   |



**TABLE 1-1. WWIC Reservoir Physical Data (reservoir totals include thoroughfares)**

| RESERVOIR  | LAKE            | WATER SURFACE AREA (acres) | ISLAND AREA (acres) | TOTAL SURFACE AREA (acres) | PERIMETER SHORELINE (miles) | ISLAND SHORELINE (miles) | TOTAL SHORELINE (miles) | MAXIMUM DEPTH (feet) |
|------------|-----------------|----------------------------|---------------------|----------------------------|-----------------------------|--------------------------|-------------------------|----------------------|
| MINOCQUA   |                 | 6069                       | 95.2                | 6164                       | 67.1                        | 9.4                      | 76.5                    |                      |
|            | Kawaguesaga     | 698                        | 26.7                | 722                        | 9.5                         | 2.1                      | 11.6                    | 44                   |
|            | Minocqua        | 1405                       | 41.1                | 1446                       | 17.0                        | 3.7                      | 20.8                    | 60                   |
|            | Mid             | 224                        | 0.5                 | 225                        | 3.2                         | 0.2                      | 3.4                     | 13                   |
|            | Tomahawk        | 3437                       | 21.6                | 3459                       | 28.4                        | 2.8                      | 31.1                    | 84                   |
|            | Mud             | 45                         | 1.7                 | 47                         | 1.6                         | 0.2                      | 1.8                     | 28                   |
|            | Little Tomahawk | 210                        | 1.7                 | 212                        | 4.1                         | 0.2                      | 4.3                     | 49                   |
| SQUIRREL   |                 | 1505                       | 37.0                | 1542                       | 18.0                        | 1.8                      | 17.6                    |                      |
|            | Squirrel        | 1350                       | 37.0                | 1387                       | 13.6                        | 1.8                      | 15.2                    | 46                   |
|            | Diamond         | 119                        | 0.0                 | 119                        | 2.4                         | 0.0                      | 2.4                     | 18                   |
| WILLOW     |                 | 6392                       | 231.5               | 6623                       | 93.3                        | 34.0                     | 127.3                   | 30                   |
| RICE       |                 | 4111                       | 132.3               | 4243                       | 63.0                        | 16.6                     | 79.6                    |                      |
|            | Rice/Nokomis    | 3505                       | 95.2                | 3600                       | 50.5                        | 12.6                     | 63.2                    | 33                   |
|            | Bridge          | 443                        | 36.7                | 480                        | 9.5                         | 3.7                      | 13.3                    | 17                   |
|            | Deer            | 163                        | 0.3                 | 163                        | 2.9                         | 0.2                      | 3.2                     | 62                   |
| SPIRIT     |                 | 1698                       | 60.8                | 1759                       | 45.2                        | 9.6                      | 54.8                    | 25                   |
| EAU PLEINE |                 | 6677                       | 34.1                | 6711                       | 72.0                        | 6.9                      | 78.9                    | 48                   |
| TOTAL      |                 | 61265                      | 888.2               | 62152                      | 702.8                       | 104.2                    | 807.0                   |                      |

Natural-lake reservoirs range in size from 313 acres at Little Deerskin Reservoir to 7,626 acres at the Burnt Rollways Reservoir, which is comprised of 20 lakes. Little Deerskin Reservoir also has the smallest gross storage volume of 1,882 acre-feet, whereas Minocqua Reservoir has the largest gross storage volume of 166,276 acre-feet. The man-made reservoirs range in size from 1,698 surface acres at Spirit Reservoir to 6,677 surface acres at the Eau Pleine Reservoir. Gross storage volumes range from 15,427 acre-feet at Spirit Reservoir to 98,140 acre-feet at the Eau Pleine Reservoir.

The natural-lake reservoirs are predominantly oligotrophic to mesotrophic, with water quality characteristics similar to those of other comparable north temperate glacial lakes. Water quality is influenced by runoff and land use characteristics of the forested watersheds. Thermal stratification occurs in the deeper reservoirs, such as Twin, Long-on-Deerskin, and Minocqua, with weaker stratification in the shallower reservoirs. An anoxic hypolimnion typically develops when stratification occurs. The natural-lake reservoirs are slightly acidic to neutral, generally clear, soft-water lakes that are relatively low in productivity. Algal blooms periodically occur in the shallow mesotrophic reservoirs, such as Little St. Germain, that have watersheds rich in phosphorus.

Of the 5 man-made reservoirs, the Eau Pleine is the most dynamic in terms of water quality and is classed as highly eutrophic, responding to the inflow from municipal wastewater discharges and an agricultural watershed. The other four man-made reservoirs, located in forested areas, are mesotrophic. The man-made reservoirs are relatively shallow (25-to-40-foot maximum depths) and weakly stratify in the summer. More pronounced stratification occurs during the winter and hypolimnetic anoxia occurs. The man-made reservoirs have soft water. Algal blooms can occur on all the man-made reservoirs. However, the Eau Pleine experiences the most "massive" blue-green algae blooms, with blooms occurring from May into October and creating dissolved oxygen, aesthetic, and odor problems. The Spirit Reservoir is the least productive with very soft waters.

The natural-lake and man-made reservoirs provide diversified sport fisheries, with the primary focus on the walleye and musky fisheries. Many of the natural-lake reservoirs, such as Lac Vieux Desert, Twin, Buckatahpon, and Minocqua support trophy walleye and musky fisheries. Walleye, musky, northern pike, and panfish are equally popular on the man-made reservoirs.

The natural-lake reservoirs are moderately to highly developed with resorts, motels, restaurants, marinas, summer cottages, and year-around homes. The Rice man-made reservoir is also highly developed, with the Spirit and Eau Pleine reservoirs having a more moderate amount of development. The Rainbow and Willow man-made

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reservoirs are unique from all other WWIC reservoirs, including the natural-lake reservoirs, since they have very little development and are, in fact, characterized as semi-wilderness.

### 1.2.3 Reservoir Operations

The Project is operated for the purpose of making the flow of the Wisconsin River as uniform as possible. It is operated in an annual cycle, in response to seasonal changes in hydrologic conditions, maximizing the uniform flow objective within the physical constraints of the Project. Each reservoir is also operated to maintain a minimum instream flow in the downstream area. These flows, termed "public interest flows", were developed in part to help protect water quality.

The normal annual hydrologic cycle begins in the spring (March). Natural river flow in the spring is normally very high and can reach flood levels as a result of the snowmelt and rainfall runoff. To produce a more uniform river flow, as much water as possible is stored in the reservoirs, thus decreasing naturally high flows. The reservoirs generally attain full or near full levels in normal precipitation years.

During the summer, as plants become active and ground temperatures rise, evapotranspiration increases. During these months, the amount of runoff and groundwater inflow available to support river flow declines; as a result natural river flow declines. To produce a more uniform river flow, water is released from the Project to augment the naturally decreased flows. Summer augmentation is generally taken from the man-made reservoirs. Water levels in the natural-lake reservoirs are therefore relatively stable during the summer months, whereas water levels in the man-made reservoirs can fluctuate several feet.

In the fall, natural water losses from plants and evaporation decline as a result of cooler temperatures and shorter days. Natural river flow increases as fall rains produce more runoff. Some of this excess flow is used to replenish reservoir storage, especially the man-made reservoirs, that was used during the summer.

During the winter, precipitation turns to snow and runoff ceases. Natural river flow again drops. Reservoir water is released from all reservoirs throughout the winter season to augment river flow. Reservoir storage is normally lowered to the minimum allowable level by early-March. This maximizes winter flow augmentation and at the same time provides maximum reservoir storage for reducing spring flood flows. Winter water levels in the natural-lake reservoirs are drawn down 2 to 5 feet below full elevation. Winter water levels in the man-made reservoirs can range from 12 feet below full at Rice Reservoir to 27 feet below full at the Eau Pleine Reservoir.

## 1.3 PURPOSE OF THE PLAN

Wisconsin Valley Improvement Company's Environmental Affairs Department was formed in 1972 as a result of the company's recognition that continued efficient operation of the reservoir system would require a more thorough understanding of the water quality and the various aquatic, terrestrial and wildlife resources within the system.

One aspect to achieving this goal was a long-term water quality monitoring program. The purpose of the program was to define the water quality characteristics of the man-made and natural-lake project reservoirs. The program was also designed to:

1. Establish a datum for detecting change or rate of change in water quality parameters;
2. Provide a basis for determining further studies with state, county and federal resource agencies;
3. Provide insight and direction for decisions on reservoir operations;
4. Augment the water quality data base on northern Wisconsin reservoirs and lakes; and
5. Meet regulatory requirements on license agreements and for FERC license renewal.

## CHAPTER 2 - HISTORIC WATER QUALITY STUDIES

Reservoir water quality has been measured by WWIC through various monitoring programs since 1958. Reservoir water quality data have also been collected by the Wisconsin Department of Natural Resources, the University of Wisconsin-Stevens Point, the Environmental Protection Agency, and the Army Corp of Engineers. In addition to routine monitoring, special studies were designed and implemented by WWIC to fulfill specific requirements as needed.

### 2.1 GENERAL RESERVOIR MONITORING PROGRAMS

A major WWIC water chemistry data collection program on Project reservoirs was initiated in 1973. The primary water quality parameters that characterize reservoir water quality included in most of the individual studies in this program are listed in Table 2-1. Parameters not likely to be affected by WWIC operations or that have limited value in an understanding of the limnology of the reservoirs, such as coliforms and toxics, were not collected.

Sampling stations were chosen in a similar manner for man-made and natural-lake reservoirs. The location of the sampling stations on the natural-lake reservoirs was selected as the point of maximum depth, provided the point was not overly influenced by other factors. In the event that the maximum depth was not representative of the reservoir, or access to the station was hazardous, an alternate site was chosen. Most lakes were sampled individually on reservoirs composed of multiple lakes. Primary sampling stations on the man-made reservoirs were placed at the deepest point representative of the main pool of the reservoir and downstream from the confluences of all tributaries.

Reservoir samples were collected at two depths where possible, a surface sample at 1.0 meter below the surface and a bottom sample at 1.0 meter above the bottom.

Where the total depth was less than 4.0 meters, only a mid-depth sample was collected. A dissolved oxygen/temperature profile was measured at each reservoir sampling station. Readings were obtained at 1.0 meter intervals from surface to bottom in addition to 0.1 meter, 0.5 meter, and 1.0 meter from the bottom.

TABLE 2-1. Parameter Description

| Parameter                        | Units       | Instrument or Method and Reference                                                     |
|----------------------------------|-------------|----------------------------------------------------------------------------------------|
| Alkalinity                       | mg/l        | Method 101, APHA etal. 1971                                                            |
| Acidity                          | mg/l        | Method 102, APHA etal. 1971                                                            |
| CO <sub>2</sub>                  | mg/l        | HACH Field Kit - measured <i>in situ</i>                                               |
| Color                            | Color Units | Method 118, APHA etal. 1971                                                            |
| Chloride                         | mg/l        | Corning pH/ion meter 135 - laboratory                                                  |
| Hardness                         | mg/l        | Method 122B, APHA etal. 1971                                                           |
| pH                               |             | American Porta pH2 - measured <i>in situ</i>                                           |
| Secchi Depth                     | Meters      | Standard Secchi Disc - measured <i>in situ</i>                                         |
| Turbidity                        | NTU         | Aminco J47440 Flouro/Colorimeter<br>Method 183A APHA etal. 1971                        |
| Nitrogen                         | µg/l        | Van Nostrand Rheinhold microdistillation<br>Method 132B Nesslerization APHA etal. 1971 |
| NO <sub>2</sub> /NO <sub>3</sub> | µg/l        | Method 213C APHA etal. 1971                                                            |
| Total Phosphorus                 | µg/l        | Method 223E APHA etal. 1971                                                            |
| Ortho Phosphate                  | µg/l        | Method 223E APHA etal. 1971                                                            |
| BOD (5-Day)                      | mg/l        | Method 219 APHA etal. 1971                                                             |
| Conductivity                     | µmhos/cm    | Beckman Model RC-16C                                                                   |
| Dissolved Oxygen                 | mg/l        | YSI Model 57 - measured <i>in situ</i>                                                 |
| Water Temperature                | °C          | YSI Model 57 - measured <i>in situ</i>                                                 |

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In most of the studies, the tailwater of each reservoir and selected major tributaries to the reservoir were sampled in conjunction with reservoir samples. The tailwater was sampled within 500 feet below the dam at each reservoir. Major tributaries to each reservoir were sampled at predetermined points of convenient access and above any influence from the reservoir.

2.1.1 Quarterly Sampling Studies

Quarterly sampling included water samples taken four times per year, once during each season. Water quality seasons are defined as:

- Spring . . . March-May
- Summer . . June-August
- Fall . . . . September-November
- Winter . . . December-February

Sampling locations included in the three Quarterly sampling studies conducted by WWIC are summarized in Tables 2-2 and 2-3. After completion of the three studies, all natural-lake reservoirs had been sampled. Of the

| RESERVOIR        | LAKE            | Quarterly |   |   | RESERVOIR          | LAKE            | Quarterly |   |   |
|------------------|-----------------|-----------|---|---|--------------------|-----------------|-----------|---|---|
|                  |                 | 1         | 2 | 3 |                    |                 | 1         | 2 | 3 |
| LAC VIEUX DESERT |                 | *         | * | * | SUGAR CAMP         | Dam             | *         | * | * |
| TWIN             | South           | *         | * | * |                    | Sand            | *         | * | * |
|                  | North           | *         | * | * |                    | Stone           | *         | * | * |
| BUCKATAHPON      | Lower           | *         | * | * |                    | Echo            | *         | * | * |
|                  | Upper           | *         | * | * |                    | Chain           | *         | * | * |
| LONG-ON-DEERSKIN | Long            | *         | * | * | LITTLE ST. GERMAIN | East Bay        | *         | * | * |
|                  | Big Sand        | *         | * | * |                    | West Bay        | *         | * | * |
| LITTLE DEERSKIN  |                 | *         | * | * |                    | South Bay       | *         | * | * |
| SEVEN MILE       |                 | *         | * | * | BIG ST. GERMAIN    |                 | *         | * | * |
| NINE MILE        |                 | *         | * | * | PICKEREL           |                 | *         | * | * |
| BURNT ROLLWAYS   | Long            | *         | * | * | RAINBOW            |                 | *         | * | * |
|                  | Planting Ground | *         | * | * | NORTH PELICAN      | Fifth           | *         | * | * |
|                  | Range Line      | *         | * | * |                    | Fourth          | *         | * | * |
|                  | Town Line       | *         | * | * |                    | Third           | *         | * | * |
|                  | Island          | *         | * | * |                    | Second          | *         | * | * |
|                  | Little Fork     | *         | * | * |                    | Moen            | *         | * | * |
|                  | Big Fork        | *         | * | * |                    | Sunset          | *         | * | * |
|                  | Fourmile        | *         | * | * | SOUTH PELICAN      |                 | *         | * | * |
|                  | Medicine        | *         | * | * | MINOCQUA           | Kawaguesaga     | *         | * | * |
|                  | Big Stone       | *         | * | * |                    | Minocqua        | *         | * | * |
|                  | Spirit          | *         | * | * |                    | Mid             | *         | * | * |
|                  | Moccasin        | *         | * | * |                    | Tomahawk        | *         | * | * |
|                  | Deer            | *         | * | * |                    | Little Tomahawk | *         | * | * |
|                  | Crystal         | *         | * | * | SQUIRREL           | Squirrel        | *         | * | * |
|                  | Dog             | *         | * | * |                    | Diamond         | *         | * | * |
|                  | Big             | *         | * | * | WILLOW             |                 | *         | * | * |
|                  | Whitefish       | *         | * | * | RICE               |                 | *         | * | * |
|                  | Virgin          | *         | * | * | SPIRIT             |                 | *         | * | * |
|                  |                 | *         | * | * | EAU PLEINE         |                 | *         | * | * |

54 lakes comprising the natural-lake reservoirs, 50 were included in at least one of the sampling studies.

Quarterly 1 (JUL74 - JUL76)

The first quarterly sampling study "Quarterly 1" began in July 1974 and ended in July 1976. The primary goal of the sampling program was to provide the data base on 15 reservoirs and 10 control lakes in order to detect



changes over time and to be able describe differences between reservoirs and control lakes. The sites were sampled quarterly (once each season as defined above). This study revealed that there were no significant differences between reservoirs and control lakes. The non-Project control lakes included in this study were:

- Big Arbor Vitae Lake
- Buckskin Lake
- Carrol Lake
- Fence Lake
- Horsehead Lake
- Kentuck Lake
- Little Arbor Vitae Lake
- Shishebogema Lake

They were chosen as lakes similar in size and location, and with surrounding features similar to the natural-lake reservoirs. The lakes were sampled at maximum depth following the same procedures used on WVIC natural-lake and man-made reservoirs. Of the parameters listed in Table 2-1, conductivity, nitrogen, and turbidity were not included in this study.

This study also indicated that the man-made reservoirs were more dynamic than the natural-lake reservoirs and required further water quality study. This resulted in the development of a new study, "Monthly Large Reservoir 1", which would include only the five man-made reservoirs.

Quarterly 2 (JUL79 - OCT83)

The second quarterly sampling study "Quarterly 2" began in July 1979 and ended in October 1983. The primary goal of this sampling program was to expand the data base to include more of the natural-lake reservoirs. Because "Quarterly 1" showed natural variability between lakes, even lakes connected in the same chain-of-lakes, it was concluded that obtaining water quality data on all natural-lake reservoirs could be beneficial.

To test the theory that water at the outlet of the reservoir reflects the water quality within the reservoir, the tailwater of all reservoirs being sampled were included in the study. To test the theory that water at inlets may give a hint to sources of problems or evidence that a problem actually exists, major inlets to the lakes being sampled were also included.

This study found that the tailwater of a reservoir is a good indicator of water quality within the reservoir. It also confirmed that sampling major tributaries is important for determining sources of problems or variations in natural water characteristics.

Quarterly 3 (MAY84 - APR86)

The third quarterly sampling study "Quarterly 3" began in May 1984 and ended in April 1986. The goal of obtaining baseline water quality data on all the lakes contained in the natural-lake reservoirs was continued with

| RESERVOIR          | INFLOW/OUTFLOW                                                                          | Quarterly |   |   |
|--------------------|-----------------------------------------------------------------------------------------|-----------|---|---|
|                    |                                                                                         | 1         | 2 | 3 |
| LAC VIEUX DESERT   | Tailwater                                                                               |           | * |   |
| TWIN               | Military Creek<br>Tailwater                                                             |           | * |   |
| BUCKATAHPON        | Burnt Bridge Creek<br>Buckatahpon Creek<br>Tailwater                                    |           | * | * |
| LONG-ON-DEERSKIN   | Tailwater                                                                               |           | * | * |
| LITTLE DEERSKIN    | Tailwater                                                                               |           |   | * |
| SEVEN MILE         | Haymeadow Creek<br>Tailwater                                                            |           | * |   |
| NINE MILE          | Nine Mile Creek<br>Tailwater                                                            |           | * | * |
| BURNT ROLLWAYS     | Crystal Lake inlet<br>Eagle River<br>Four Mile Creek<br>Tailwater<br>Virgin Lake outlet |           | * | * |
| SUGAR CAMP         | Echo/Chain channel<br>Indian Creek<br>Tailwater                                         |           | * | * |
| LITTLE ST. GERMAIN | Muskellunge Creek<br>Tailwater                                                          |           | * |   |
| BIG ST. GERMAIN    | Lost Creek<br>Plum Creek<br>Tailwater                                                   |           | * | * |
| PICKEREL           | Tailwater                                                                               |           | * |   |
| RAINBOW            | Wisconsin River above<br>Wisconsin River below                                          | *         |   |   |
| NORTH PELICAN      | Gudegast Creek<br>Tailwater                                                             |           | * | * |
| SOUTH PELICAN      | Tailwater                                                                               |           | * |   |
| MINOCQUA           | Tailwater                                                                               |           | * | * |
| SQUIRREL           | Tailwater                                                                               |           | * | * |
| WILLOW             | Tailwater<br>Tomahawk River above                                                       | *         |   |   |
| RICE               | Tomahawk River above<br>Tomahawk River below                                            | *         |   |   |
| SPIRIT             | Spirit River above                                                                      | *         |   |   |
| EAU PLEINE         | Big Eau Pleine River above<br>Tailwater                                                 | *         |   |   |



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this study. All parameters listed in Table 2-1 were included.

After the completion of "Quarterly 3", baseline data for all of the natural-lake reservoirs had been obtained.

### 2.1.2 Man-made Reservoir Sampling Studies

Four major man-made reservoir sampling studies were conducted by WVIC. All four studies were restricted to the man-made reservoirs, their tributaries, and tailwaters. Frequency of sampling varied with the study. Sampling locations included in each of the man-made reservoir studies conducted by WVIC are identified in Table 2-4.

#### Monthly Large Reservoir 1 (JUL79 - OCT83)

The first monthly sampling study "Monthly Large Reservoir 1" began in July 1979 and ended in October 1983. The primary goal of the sampling program was to begin building historic records of reservoir water quality. The frequency of sampling was monthly when feasible. During unsafe ice conditions, sampling was not conducted. All parameters listed in Table 2-1 were included.

#### Monthly Large Reservoir 2 (MAY84 - OCT90)

The second monthly sampling study "Monthly Large Reservoir 2" began in May 1984 and ended in October 1990. This study continued establishing a record of water quality for each reservoir. This would help detect chemical changes that could lead to potential problems, and help answer queries by riparians and agencies. All parameters listed in Table 2-1 were included.

#### Rice Water Quality (JAN83 - SEP88)

The "Rice Water Quality" study was started in January 1983 and ended in September 1988. This study was designed to characterize the Rice Reservoir water quality in more detail, determine if any significant water quality problems existed, and if so, establish their severity. This study was also designed to address the question of how many sampling sites were necessary to adequately characterize a man-made reservoir. Sixteen sites were sampled within Rice Reservoir. All parameters listed in Table 2-1 were included.

| MAN-MADE RESERVOIR                        | SITES                                        | Monthly |   | Rice | Qty |
|-------------------------------------------|----------------------------------------------|---------|---|------|-----|
|                                           |                                              | 1       | 2 | WQ   |     |
| RAINBOW                                   | Wisconsin River at Hwy O                     | *       | * |      | *   |
|                                           | Swamp Creek at Hwy D                         | *       | * |      | *   |
|                                           | Rainbow Reservoir ¼ mile northeast of dam    | *       | * |      | *   |
|                                           | Rainbow Reservoir tailwater                  | *       | * |      | *   |
| WILLOW                                    | Tomahawk River above Cedar Falls             | *       | * |      | *   |
|                                           | Willow River at Willow Road                  | *       | * |      | *   |
|                                           | Willow River arm of reservoir                | *       | * |      | *   |
|                                           | Tomahawk River arm of reservoir              | *       | * |      | *   |
|                                           | Willow Reservoir ¼ mile west of dam          | *       | * |      | *   |
|                                           | Willow Reservoir tailwater                   | *       | * |      | *   |
| RICE                                      | Tomahawk River at Prairie Rapids             | *       | * | *    | *   |
|                                           | Kilarney Lake outlet                         | *       | * | *    | *   |
|                                           | Little Rice Creek at Hwy N                   | *       | * | *    | *   |
|                                           | Center of the south arm of Bridge Lake       |         |   | *    | *   |
|                                           | Bay west of Cozy Point subdivision           |         |   | *    | *   |
|                                           | Center of Deer Trail Park bay                |         |   | *    | *   |
|                                           | Middle of bay (NWSW 36-36-6)                 |         |   | *    | *   |
|                                           | Northeast of Out Post Campground             |         |   | *    | *   |
|                                           | Little Rice Creek inlet to Rice Reservoir    |         |   | *    | *   |
|                                           | Little Rice River west of Hwy Y fill         |         |   | *    | *   |
|                                           | Little Rice River at mile 3.3 (SENE 36-36-6) |         |   | *    | *   |
|                                           | Center of main body (NWNW 33-36-6)           |         |   | *    | *   |
|                                           | Bay north of Point O'Pines Rd.               |         |   | *    | *   |
|                                           | ¼ mile above dam in the river channel        |         |   | *    | *   |
|                                           | Tomahawk River arm of Rice (NWNW 33-36-6)    |         |   | *    | *   |
|                                           | Center of White Bros. subdivision bay        |         |   | *    | *   |
| Center of Zients Bay                      |                                              |         | * | *    |     |
| Deer Lake at maximum depth*               |                                              |         | * | *    |     |
| Rice Reservoir northeast of Hwy N landing | *                                            | *       | * | *    |     |
| Rice Reservoir ¼ mile northeast of dam    | *                                            | *       | * | *    |     |
|                                           | Rice Reservoir tailwater                     | *       | * | *    | *   |
| SPIRIT                                    | Spirit River at Spirit Falls bridge          | *       | * |      | *   |
|                                           | Squaw Creek at Hwy 88                        | *       | * |      | *   |
|                                           | Spirit River below Squaw Creek confluence    | *       | * |      | *   |
|                                           | Armstrong Creek at Hwy O                     | *       | * |      | *   |
|                                           | Coffee Creek at Hwy O                        | *       | * |      | *   |
|                                           | Spirit Reservoir ¼ mile northwest of dam     | *       | * |      | *   |
|                                           | Spirit Reservoir tailwater                   | *       | * |      | *   |
| EAU PLEINE                                | Big Eau Pleine River at Hwy 97               | *       | * |      | *   |
|                                           | Fenwood Creek at Hwy 153                     | *       | * |      | *   |
|                                           | Freeman Creek 1 mile south of Hwy 153        | *       | * |      | *   |
|                                           | Eau Pleine Reservoir at mile 12.4            | *       | * |      | *   |
|                                           | Eau Pleine Reservoir at mile 8.0             | *       | * |      | *   |
|                                           | Eau Pleine Reservoir ¼ mile west of dam      | *       | * |      | *   |
|                                           | Eau Pleine Reservoir tailwater               | *       | * |      | *   |

Quarterly Man-made Reservoir (MAY91 - SEP 94)

Realizing that water quality in the man-made reservoirs could be characterized by seasonal sampling, the monthly monitoring was reduced to four times per year. "Quarterly Man-made Reservoir" monitoring began in May 1991 and ended in September 1994. Only critical parameters were collected including: alkalinity, color, pH, secchi depth, turbidity, total phosphorus, 5-day BOD, conductivity, dissolved oxygen, and water temperature. Future water quality monitoring of the man-made reservoirs has been designed the same as this study.

**2.2 HEADWATER/TAIWATER DISSOLVED OXYGEN MONITORING**

A second major program providing water quality data is the Headwater/Tailwater (HW/TW) Dissolved Oxygen Monitoring Program. This program provided dissolved oxygen and temperature readings at the headwaters and tailwaters of WWIC dams. The primary reason for this monitoring program was to detect benefits and immediate or short-term problems. Three HW/TW studies were conducted from 1958 - present. The locations that were sampled are listed in Table 2-5. The only parameters collected were dissolved oxygen and water temperature (DO/temp).

| RESERVOIR          | HW/TW |            |   |
|--------------------|-------|------------|---|
|                    | Hist  | 1          | 2 |
| LAC VIEUX DESERT   | *     | *          | * |
| TWIN               | *     | *          | * |
| BUCKATAHPON        | *     | *          | * |
| LONG-ON-DEERSKIN   | *     | *          | * |
| SEVEN MILE         | *     | *          | * |
| NINE MILE          | *     | *          | * |
| BURNT ROLLWAYS     | *     | *          | * |
| SUGAR CAMP         | *     | *          | * |
| LITTLE ST. GERMAIN | *     | *          | * |
| BIG ST. GERMAIN    | *     | *          | * |
| PICKEREL           | *     | *          | * |
| RAINBOW            | *     | *          | * |
| NORTH PELICAN      |       | 1"<br>half |   |
| MINOQUA            |       | 1"<br>half |   |
| SQUIRREL           |       | 1"<br>half |   |
| WILLOW             | *     | *          | * |
| RICE               | *     | *          | * |
| SPIRIT             | *     | *          | * |
| EAU PLEINE         | *     | *          | * |

Historic HW/TW Monitoring (1958-1961)

Historic HW/TW Monitoring began in 1958 and ended in 1961. Other sampling locations away from the dam, such as bridges, were also included in this study. Frequency of sampling was approximately monthly. Oxygen concentrations were determined with Winkler titrations.

HW/TW 1 (1979-1988)

A major effort to obtain dissolved oxygen data at all WWIC dams began in 1979. Dam tenders were used at many dams to collect DO/temp data using a field kit to do a Winkler titration. At other locations, a YSI Dissolved Oxygen meter was used. Only one headwater sample was taken at a depth of 3 feet (0.9 meters) from the surface. Frequency of sampling was every other week.

HW/TW 2 (1989-present)

The current Headwater/Tailwater Monitoring program involves only the 5 man-made reservoirs. All readings are obtained using a YSI Dissolved Oxygen meter. Frequency of sampling is twice-per-month. Headwater profiles are taken with readings recorded every meter from the surface and a reading 0.1 meter off the bottom. This monitoring schedule continues to the present and is part of WWIC's continuing Water Quality Monitoring Plan.

**2.3 EAU PLEINE DISSOLVED OXYGEN SAG MONITORING**

The Eau Pleine Reservoir was studied extensively by WWIC since 1974 to determine the cause of the annual DO sag in the Eau Pleine Reservoir. Multiple studies were conducted.

A system for monitoring the dissolved oxygen in the reservoir was developed that assists in making operational decisions and continues. During the winter, DO/temp profiles are recorded at every river mile from the Eau Pleine dam upstream for 18 river miles. In addition to the profiles, water samples are taken for laboratory analysis. Parameters measured are conductivity, 5-day BOD, and turbidity.

## 2.4 OTHER MISCELLANEOUS STUDIES

Other water quality studies have been conducted by WWIC to address specific problems or questions. Locations, frequency and parameters varied with individual studies. The more important studies are listed below but are not detailed in this plan.

**Tomahawk River Water Quality** - This study was conducted to quantify chemical and biological changes in the Tomahawk River from the Minocqua dam to the Willow Reservoir from July 1979 to November 1983.

**New Reservoir Stream Study** - The purpose of this study was to characterize water quality on 5 streams proposed for reservoir development by collecting seven years (1981-88) of monthly data.

**Reservoir Effect on Streams** - This study was conducted from 1977 through 1979 and was designed to compare water flowing into reservoirs to water discharged from reservoirs to determine if there are common changes caused by reservoirs.

**Dill Creek** - The purpose of this study was to quantify and locate the source of phosphorus entering the Eau Pleine Reservoir from this tributary.

**Halder Bridge Study** - This was an early attempt in 1979 to help determine temporal changes in water quality in the Eau Pleine Reservoir during winter drawdown by using automatic samplers.

**Willow Back Bay Study** - This study was conducted to collect baseline water quality data in isolated areas of Willow Reservoir to determine if additional sampling sites were needed and to compare the data to that collected in Rice Reservoir during the 1983-88 Rice Water Quality Study.

## **CHAPTER 3 - PROPOSED WATER QUALITY MONITORING STUDIES**

The following outline represents WWIC's proposed Water Quality Monitoring Plan for the new FERC license period extending from July 1, 1996 to July 1, 2026. The plan comprises three parts designed to provide for continued protection of water quality in the WWIC reservoir system.

The first part outlines long-term monitoring for both natural-lake and man-made reservoirs, applying the Trophic State Index (TSI) concept and related methodology. It is designed to (a) provide a continued comparison of Project reservoirs/lakes with non-regulated impoundments/lakes, (b) detect long-term limnological changes, and (c) enhance the Wisconsin Department of Natural Resources (WDNR) statewide TSI program. The WDNR monitors 50 lakes statewide for similar parameters on a continuing basis.

The second part represents a modified continuation of the existing long-term Water Quality Monitoring Plan specific to the five man-made reservoirs. This part is proposed in consideration of the dynamic nature, operational, and structural differences of these reservoirs compared to the natural-lake reservoirs.

The third part addresses headwater and tailwater dissolved oxygen/temperature monitoring at the five man-made reservoirs and is designed to serve as an indicator of more immediate or short-term potential problems in these reservoirs.

The overall goal of the Plan is to protect the fish, wildlife and botanical resources and recreational uses of waters associated with the Project. The Plan is considered to be a "dynamic" Plan that allows for flexibility, considering the long-term nature of WWIC's operating license and understanding the potential need to modify water quality monitoring programs in the future, since external factors influencing water quality are continually changing. Where conditions warrant and following consultation with the appropriate agencies and FERC, the program may be changed. Similarly, sampling and analytical methodologies may require reevaluation to consider any changes in state-of-the-art technologies for water chemistry monitoring. Any significant proposed changes will be submitted to FERC for approval.

### **3.1 TROPIC STATE INDEX (TSI) MONITORING**

#### **3.1.1 Monitoring Period**

The reservoirs (natural-lake and man-made) listed in Table 3-1 will be monitored for three consecutive years in each 10-year period of the 30-year license. During the first period (1996 through 2005), sampling for TSI parameters will be conducted from 2000 through 2002. Similarly, sampling will be conducted from 2010 through 2012 and 2020 through 2022 for the second and third periods.

Sampling will occur during June, July, August, and the fall turnover in each monitoring year. Each monthly sampling event is estimated to take six to seven WWIC field days.

#### **3.1.2 TSI Parameters and Methods**

The parameters to be measured during each sampling event will be total phosphorus (TP), chlorophyll "a," and secchi depth (transparency). A dissolved oxygen/temperature (DO/temp) profile will also be measured at each sampling station at least once during the summer months (July or early-August) and during the fall turnover sampling event. Sampling will be conducted at the point of maximum depth or the historical sampling station(s)



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in each of the reservoirs/lakes.

TP and chlorophyll "a" whole water samples (one sample for each parameter), representing a composite sample of the top meter of water, will be collected and preserved with appropriate fixatives in the field for later analysis. The "composite sample" is defined as a "tube" sample of surface water one meter deep that will be mixed in the field prior to aliquotting to the sample bottles. DO/temp profiles (measured at 1-meter intervals) and Secchi depth will be recorded on site with a portable DO/temp meter and standard Secchi disc.

### 3.1.3 Responsibilities

WVIC will be responsible for all field sampling and measurements and at the end of each sampling day will mail the TP and chlorophyll "a" samples to the Wisconsin State Laboratory of Hygiene (WSLH) for analysis in prepaid mailing containers (provided by the WDNR). The WDNR will be responsible for coordinating the TP and chlorophyll "a" laboratory analyses with the WSLH and for performing the TSI calculations and data compilations.

WVIC will provide copies of the field data annually to the WDNR, the US Fish and Wildlife Service (USFWS), and the Michigan Department of Natural Resources (MDNR) (Lac Vieux Desert Reservoir data only). The WDNR will provide copies of the laboratory results to WVIC annually. WVIC will forward copies of the laboratory data to the MDNR. WVIC will also forward copies to the USFWS if it requests such data.

### 3.1.4 Contingencies

At any time during the license period, WVIC, the WDNR, the USFWS, and the MDNR may jointly reevaluate this methodology (TSI) in the event that the state-of-the-art for monitoring long-term water quality trends warrants reassessment. Similarly, the need to add or remove reservoirs/lakes or stations may change over time and therefore require reevaluation. Any significant proposed changes will be submitted to FERC for review and approval.

## 3.2 MAN-MADE RESERVOIR QUARTERLY MONITORING

### 3.2.1 Monitoring Period

The man-made reservoirs and associated stations listed in Table 3-2 will be monitored during the same three TSI monitoring years in each 10-year period (2000-2002, 2010-2012, and 2020-2022).

Sampling will occur on a seasonal/quarterly basis at each reservoir station in each monitoring year. Each

| TABLE 3-1. Reservoir Sampling Stations for TSI Monitoring |                                                                                                          |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| NATURAL-LAKE RESERVOIR                                    | Lake (or Bay) Sampled at Maximum Depth                                                                   |
| LAC VIEUX DESERT                                          | Lac Vieux Desert                                                                                         |
| TWIN                                                      | South Twin<br>North Twin                                                                                 |
| BUCKATAHPON                                               | Lower Buckatahpon<br>Upper Buckatahpon                                                                   |
| LONG-ON-DEERSKIN                                          | Long<br>Big Sand                                                                                         |
| LITTLE DEERSKIN                                           | Little Deerskin                                                                                          |
| SEVEN MILE                                                | Seven Mile                                                                                               |
| NINE MILE                                                 | Lower Nine Mile                                                                                          |
| BURNT ROLLWAYS                                            | Long<br>Planting Ground<br>Range Line<br>Big Fork<br>Medicine<br>Big Stone<br>Spirit<br>Big<br>Whitefish |
| SUGAR CAMP                                                | Dam<br>Sand<br>Chain                                                                                     |
| LITTLE ST. GERMAIN                                        | West bay of Little St. Germain<br>South bay of Little St. Germain                                        |
| BIG ST. GERMAIN                                           | Big St. Germain                                                                                          |
| PICKEREL                                                  | Pickerel                                                                                                 |
| NORTH PELICAN                                             | Fifth<br>Moen                                                                                            |
| SOUTH PELICAN                                             | Pelican                                                                                                  |
| MINOCQUA                                                  | Kawaguesaga<br>Tomahawk<br>Little Tomahawk                                                               |
| SQUIRREL                                                  | Squirrel                                                                                                 |
| MAN-MADE RESERVOIR                                        | Sampling Station within Reservoir                                                                        |
| RAINBOW                                                   | ¼ mile northeast of dam                                                                                  |
| WILLOW                                                    | ¾ mile west of dam<br>Willow River arm<br>Tomahawk River arm                                             |
| RICE                                                      | ¾ mile northeast of dam<br>Deer Lake at maximum depth*<br>Northeast of Hwy N landing                     |
| SPIRIT                                                    | ½ mile northwest of dam                                                                                  |
| EAU PLEINE                                                | ¾ mile west of dam<br>Mile 8.0<br>Mile 12.4                                                              |

\*when accessible



quarterly sampling event is estimated to take three to four WWIC field days.

### 3.2.2 Water Quality Parameters and Methods

The parameters to be measured during each sampling event are listed in Table 3-3. Field collections and laboratory analysis will follow procedures in WWIC's Water Chemistry Quality Assurance Manual (December 1995).

Sampling will be conducted at the locations listed in Table 3-2. Whole water samples will be collected at each reservoir station from 1 meter below the surface and 1 meter above the bottom when the total water depth is >4.0 meters and at mid-depth when total water depth is ≤4.0 meters. Whole water samples will be stored and preserved following procedures in WWIC's Water Chemistry Quality Assurance Manual.

### 3.2.3 Responsibilities

WWIC will be responsible for all field sampling and laboratory analysis and will provide copies of the data to the WDNR and the USFWS annually.

### 3.2.4 Contingencies

At any time during the license period, WWIC, the WDNR, and the USFWS may jointly reevaluate the monitoring plan in the event that the state-of-the art analytical method(s) for measuring these parameters or the specific

| MAN-MADE RESERVOIR | Sampling Station                                                                                                                                                                                                                                          |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RAINBOW            | Wisconsin River at Hwy O<br>Rainbow Reservoir ¼ mile northeast of dam<br>Rainbow Reservoir tailwater                                                                                                                                                      |
| WILLOW             | Tomahawk River above Cedar Falls<br>Willow River at Willow Rd.<br>Willow River arm of reservoir<br>Tomahawk River arm of reservoir<br>Willow Reservoir ¼ mile west of dam<br>Willow Reservoir tailwater                                                   |
| RICE               | Tomahawk River at Prairie Rapids<br>Kilamey Lake outlet<br>Little Rice Creek at Hwy N<br>Deer Lake at maximum depth*<br>Rice Reservoir northeast of Hwy N landing<br>Rice Reservoir ¼ mile northeast of dam<br>Rice Reservoir tailwater                   |
| SPIRIT             | Spirit River below Squaw Creek confluence<br>Spirit Reservoir ¼ mile northwest of dam<br>Spirit Reservoir tailwater                                                                                                                                       |
| EAU PLEINE         | Big Eau Pleine River at Hwy 97<br>Fenwood Creek at Hwy 153<br>Freeman Creek 1 mile south of Hwy 153<br>Eau Pleine Reservoir at mile 12.4<br>Eau Pleine Reservoir at mile 8.0<br>Eau Pleine Reservoir ¼ mile west of dam<br>Eau Pleine Reservoir tailwater |

\*when accessible

| Parameter          | Rationale                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alkalinity (Total) | Good overall indicator of buffering capacity and in determining stability of water quality with respect to chemical or biological impacts (acid rain, algae blooms, etc). |
| BOD (5-Day)        | Important for analyzing possible dissolved oxygen problems.                                                                                                               |
| Color              | Important parameter affecting light intensity and primary productivity. May also relate to origin of water.                                                               |
| Conductivity       | Good general indicator of the ion concentration of water.                                                                                                                 |
| Dissolved Oxygen*  | Directly critical to aquatic biota and the oxidation/decomposition processes.                                                                                             |
| pH*                | Of general limnological importance; useful in acid rain impact trends/assessments.                                                                                        |
| Phosphorus (Total) | Measures nutrient loading to identify sources of changes to the Trophic State Index (TSI).                                                                                |
| Secchi Depth*      | Important measure of transparency, and effects of plankton blooms, sediment resuspension.                                                                                 |
| Water Temperature* | Fundamental to suitability of habitat for aquatic biota and limnological reactions.                                                                                       |
| Turbidity          | Important with respect to light penetration and effects on primary productivity; sediment resuspension.                                                                   |

\* DO, pH, Secchi Depth, and Temperature measured *in situ*

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parameters measured warrants reassessment. Similarly, the need to add or remove stations within reservoirs may change over time and therefore require reevaluation. Any significant proposed changes will be submitted to FERC for review and approval.

### **3.3 MAN-MADE RESERVOIR HW/TW MONITORING**

#### **3.3.1 Monitoring Period**

The headwater/tailwater at each of the five man-made reservoirs will be monitored for the duration of the license period. Sampling will occur on a twice-per-month schedule. Each twice-per-month sampling event is estimated to take one WWIC field day.

#### **3.3.2 Water Quality Parameters and Methods**

The parameters to be measured during each sampling event will include dissolved oxygen and water temperature. DO/temp will be measured (at 1-meter intervals) in the headwater except when personal safety factors (dangerous ice conditions, gate openings, or other hazardous conditions) preclude sampling. DO/temp will be measured 0.1 meter off the bottom in the tailwater (within 500 feet of the dam) the same sampling day as the headwater measurement. DO/temp profiles will be recorded on site using a portable DO/temp meter.

#### **3.3.3 Responsibilities**

WWIC will be responsible for all field sampling and will provide copies of the data to the WDNR and the USFWS annually.

#### **3.3.4 Contingencies**

At any time during the license period, WWIC, the WDNR, and the USFWS may jointly reevaluate the monitoring plan if the methods for measuring these parameters warrant reassessment. Any significant proposed changes will be submitted to FERC for review and approval.

## LITERATURE CITED

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