United States Department of the Interior
Fish and Wildlife Service

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August 13, 2014

Mike Finissi
Sr. VP & Chief Operating Officer of NIPSCO Operations
NIPSCO
801 E. 86th Avenue
Merrillville, IN 46410

Re: Technical Assistance Letter (TAL)

Dear Mr. Finissi:

The purpose of this TAL is to acknowledge and respond to Northern Indiana Public Service Company's (NIPSCO's) request for technical assistance dated 13 August 2014 concerning the effects of NIPSCO's Oakdale Hydro Project on Endangered Species Act (ESA)-listed species under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS or Service).

Background

The Oakdale Dam is a hydroelectricity generating facility across the Tippecanoe River constructed in the 1920s and owned by NIPSCO. It is licensed by the Federal Energy Regulatory Commission (FERC). Along with its sister dam upstream (the Norway Dam), it impounds two in-line reservoirs, Lakes Shafer and Freeman. The presence of the Oakdale Dam and Norway Dam, including various operational protocols and certain regulatory constraints on the dams, can affect the volume of water and hydrograph of the Tippecanoe River downstream of the Oakdale Dam to its confluence with the Wabash River. Occasionally, the Tippecanoe watershed experiences drought conditions, which can lead to low water flow conditions in the Tippecanoe River.

Section 9(a)(1)(B) of the ESA, 16 U.S.C.§ 1538 (a)(1)(B), and 50 C.F.R. § 17.31, protect against the unlawful "take" of an endangered species. "Take" is defined by the ESA as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" 16 U.S.C. § 1532(19). Section 7(a)(2) of the ESA requires federal agencies to confer with the Secretary to ensure that their actions will not jeopardize the continued existence of or destroy or adversely modify the critical habitat of an endangered or threatened species. The ESA

defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of ESA section 4, upon a determination by the Secretary that such areas are essential for the conservation of the species.

There are six ESA-listed mussels in the Tippecanoe River: clubshell (*Quadrula cylindrica*), fanshell (Cyprogenia stegaria), sheepnose (*Plethobasus cyphyus*), rayed bean (*Villosa fabalis*), snuffbox (*Epioblasma triquetra),* and rabbitsfoot (*Quadrula cylindrica cylindrica*) and an extensive along with a diverse community of other unlisted mussels extant in the approximately 18-mile reach between the Oakdale Dam and the confluence of the Tippecanoe and Wabash Rivers. ESA critical habitat has also been proposed for the rabbitsfoot mussel in the Tippecanoe River and is currently under review (Figure 1).

The influence of the Oakdale Dam on the Tippecanoe River manifest in at least two important ways with respect to mussels. First, low water may expose mussel habitat to vulnerable conditions, particularly during periods of sustained low precipitation. Second, a hydrograph measured downstream of the Oakdale Dam can be much different than one measured upstream. Specifically, there are swings in the amount of flow that are more frequent than the Service would expect under "natural" conditions. Fluctuations of several hundred cfs can occur (occasionally multiple times) within a 24-hour period. ESA-listed mussels are poorly adapted to this level of instability especially during low to moderate flows.

The Indiana Department of Natural Resources, Division of Fish and Wildlife (IDNR) and the Service documented mortality of listed mussels related to low flows in the Tippecanoe River, downstream of the Oakdale Dam in 2012 and a second mussel die-off in 2013. Rapid changes in flow, whether naturally occurring or induced by man, can affect mussels by reducing available habitat, by limiting flow refuges where mussels often occur[1], by causing mussels to be dislodged and transported to less suitable or ecological sink habitat, and by contributing to sediment in the river, which can interfere with reproduction and disrupt the parasitic stage of mussels Low flows and rapid changes in flow effects can meet the definition of take (see above) including harm and kill.

The purpose of this TAL is to identify dam operational measures which the Service believes will, if implemented, create conditions for ESA-listed mussels sufficiently representative of natural run-of-the-river water flow so as to eliminate take of any ESA-listed mussel or adverse modification of critical habitat (should it be designated) due to the Oakdale Dam.

[1] See Strayer, David L. 1999. Use of flow refuges by unionid mussels in rivers. *Journal of the North American Benthological Society* 18:4, pp.468-476

I Key Concepts

- ***Suitable habitat*** for mussels occurs in shallow (and deep) microhabitats of rivers. Suitable, but ***vulnerable habitat*** (shoals, riffles, and other shallow habitats) under "natural" conditions exist below a generally consistent minimum elevation and provide stable habitat for mussels except during unusually dry years. Best available data indicate flows of approximately 500 cfs, as measured at the USGS Delphi gauge, roughly define the boundary between stable but vulnerable mussel habitat and ***ephemeral habitat*** that is likely downstream of the Oakdale Dam.[2]

- In addition to minimum flows, a stable flow regime during low-moderate flow is necessary to avoid take of mussels or impacts to mussel habitat.[3]

- Run-of-the-river during abnormal low flow conditions will be defined differently from run-of-the-river for the Oakdale Dam under license from FERC during normal flow conditions. During abnormal low flow ("ALF") conditions, the Oakdale Dam will be managed to achieve run-of-the-river operations that are based on a flow regime downstream of the Oakdale Dam discounting the influence of the dams and reservoirs. It is based on best available data and science looking at flows and flow regime upstream of the dams to estimate downstream flows as described more fully in Section II below.

- Linear Scaling[4] is the approach the Service and NIPSCO have used for this TAL to determine an approximation of run-of-the-river during ALF conditions. In sum, the Service and NIPSCO used Linear Scaling to predict that in a comparatively homogenous watershed (i.e., one without large changes in elevation, large urban areas, or major differences in land cover) flow in sub-watersheds scale to one another linearly. Simply put, if the above conditions prevail, a point in a river where the watershed is twice the area will have twice the flow as a point in the river upstream where the watershed is half the area (Figure 2).[5]

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[2] The recommended numbers are based on several different sets of information. The information includes: observations and data gained during and immediately after the 2012 drought by IDNR and Service biologists; records of flows from the Oakdale Dam and the USGS gauges; time-lapse images at three vulnerable sites; observations by the IDNR mussel biologist and a Service biologist on the Tippecanoe River during 2013; observations made by NiSource/NIPSCO biologists, IDNR biologists, Service biologists and others during a trial of the ALF. See NIPSCO Submittal to FERC 20140430-5304 Attachment C: US Fish & Wildlife Service Response to FERC Data Request #2

[3] These low-flow periods often correspond to "active" periods for mussels (reproduction, dispersal, etc.)

[4] See Galster, J.C., et al. 2007. Effects of urbanization on watershed hydrology: the scaling of discharge with drainage area. *Geology* 34:9, pp. 713-716; and Galster, J.C. 2007. Natural and anthropogenic influences on the scaling of discharge with drainage area for multiple watersheds. *Geosphere* 3:4, pp. 260-271.

[5] In this case we have multiple USGS gauges on the Tippecanoe River, some above the influence of the dams and some below that provide us with years of accurate flow measurements. Knowing that the watershed area at the USGS Winamac gauge is very nearly half the size of the watershed at the USGS Oakdale gauge allows use of the USGS Winamac gauge data (above the influence of the dams) to predict what the flow downstream of the dam would be were the dams and lakes not influencing that flow.

- In periods of ALF, mussel mortality is a possibility despite the implementation of the ALF operating protocols described in Section II below, however, because the run-of-the-river operations implemented during ALF conditions replicates what would be expected if the dams and resevoirs were not in place, mussel mortality by definition would not be a take because it is not caused by the applicant.

II TAL Requirements / ALF Plan

Overview of ALF Plan

The applicant and Service have developed the below-detailed set of conservative dam operating protocols (the "ALF Plan") which will be implemented during periods of ALF to protect against any take of ESA-listed mussels on the Tippecanoe River below the Oakdale Dam. The ALF Plan involves two primary actions: 1) early recognition of ALF events potentially harmful to mussels that will trigger the temporary cessation of power generation at the Oakdale Dam; and 2) subsequent release of water from the Oakdale Dam during ALF events that best matches the run-of-the- river as defined for ALF conditions based on linear scaling from the USGS Winamac gauge (USGS gauge 03331753).[6] This matching of the scaled-up USGS Winamac gauge flows will continue until the USGS Winamac gauge again reaches a 24-hour average above 300 cfs.

In addition, to avoid large fluctuations in downstream flow when mussels are especially vulnerable to such changes, NIPSCO will preclude spikes (hourly readings) below 500 cfs as measured at the USGS Oakdale gauge (USGS Gauge 03332605) from occurring at anytime during normal flows.

Initiation and Close of ALF Plan Protocols

The ALF Plan will be initiated by the onset of an ALF event, which is defined as either:

a. 24-hour daily average of $\leq$ 300 cfs at the USGS Winamac gauge; or
b. 24-hour daily average $\leq$ 600 cfs at the USGS Oakdale gauge.

NIPSCO will check the USGS calculated and published 24-hour daily average for the previous day at both the USGS Oakdale and USGS Winamac gauges and determine whether or not an ALF event has begun. If an ALF event is identified, NIPSCO will implement the ALF Plan protocols immediately.

Use of the USGS Winamac gauge to determine when an ALF event begins is expected to provide NIPSCO sufficient lead time to implement the ALF Plan protocols to avoid take of ESA-listed or proposed mussels or adverse modification of critical habitat. Monitoring of the USGS Oakdale

[6] Should another USGS gauge or other gauge of comparable reliability be installed on the Tippecanoe River downstream of the USGS Winamac gauge and a point upstream of the influence of Norway Dam, the Service and NIPSCO can mutually agree to amend the TAL to incorporate data from that gauge to supplement or replace data from the USGS Winamac gauge.

gauge will provide for the same protection of mussels and critical habitat should a dam operation action or problem (e.g., gate stuck closed) not associated with upstream weather reduce flows downstream of the dam.

An ALF event ends when the USGS calculated 24-hour daily average is > 300 cfs as measured at the USGS Winamac gauge and hourly readings at USGS Oakdale gauge read > 500 cfs. The ALF Plan protocols need not be continued once an ALF event ends. Use of the 300 cfs 24-hour daily average at the USGS Winamac gauge to determine when an ALF event ends is expected to ensure that flows have stabilized, signaling that operations can return to normal without causing any take.

For all ALF Plan protocols, USGS calculated and published 24-hour daily averages will be used.

Implementation of ALF Protocols

Protocol 1 – Recognizing Potential ALF Conditions and Ceasing Generation

NIPSCO will monitor flows at USGS Winamac and USGS Oakdale gauges. As flow is trending downward and approaching 300 cfs or 600 cfs, respectively, NIPSCO will implement the following steps to stop any generation at the Oakdale Dam facilities:

1. NIPSCO Operations will contact NIPSCO Generation Dispatch and inform them that all Oakdale units are being taken off line to comply with the ALF Plan.

2. NIPSCO Operations will adjust flood and trash gates in combination with stopping any operating unit to maintain a steady discharge flow

3. Discharge flow will be controlled using a combination of flood and trash gates to control USGS flows per TAL requirements (see Protocol 2)

4. When the USGS Winamac gauge 24 hour daily average is > 300 cfs, NIPSCO Operations may reestablish generation and adjust downstream flows in compliance with the FERC license.

These actions are expected to help reduce the large swings in flow out of Oakdale Dam because the Service believes that engaging the turbines affects the flow through the dam.

Protocol 2 – Water Release from Oakdale Dam Matching Run-of-the-River during ALF conditions.

1. Confirm that the 24-hour daily average at the USGS Winamac gauge is ≤ 300 cfs or the 24-hour daily average at the USGS Oakdale gauge is ≤ 600 cfs;

2. Calculate the 'run-of-the-river during ALF' discharge rate for the Oakdale Dam (1.9 times the flow of the previous 24-hour daily average flow measured at the USGS Winamac gauge);

3. Calculate maximum and minimum percent flow thresholds as specified in the TAL;

4. Adjust trash and flood gates in combination to match calculated flow;

5. Record hourly flow data at USGS Oakdale gauge and adjust trash and flood gates as needed to maintain flow within specified limits;

6. By monitoring the flows rates at USGS Winamac (24-hour daily average) and Oakdale gauges (hourly), determine when ALF period ends;

7. Then adjust flows from the NIPSCO Oakdale Dam to be in compliance with the then-current FERC license.

Flows will be maintained during ALF events as measured at the USGS Oakdale gauge that are at least 1.9 times the previous 24-hour daily average flow measured at the USGS Winamac gauge.[7]

Periodic Formal Review

The Service considers the protocols of this TAL to be preliminary in that such shall be re-evaluated after December of the first year that ALF Plan protocols are implemented. At the conclusion of that year, the Service will review implementation of the ALF Plan protocols described herein. Provided NIPSCO has complied with the requirements listed in this TAL and the process is working as expected (e.g., downstream flows are consistent with linear scaling predictions), the Service intends to subsequently issue a multi-year TAL. Upon issuance of a multi-year TAL, a formal review of the TAL will occur between the Service and NIPSCO four years from issuance, and subsequently every five years thereafter. This review will assess process, procedures, and compliance, and will use the best available data at the time of the review to evaluate the effectiveness of the ALF Plan on the federally listed mussels and their habitats downstream of the Oakdale Dam. It is the intention of the Service to reissue the TAL subsequent to the formal reviews provided the compliance record is satisfactory, mussels and their habitats (including critical habitat, should it be designated) remain protected, and NIPSCO requests reissuance. New information (e.g., delisting of species) could result in a review of the TAL in the interim.

III Compliance

Compliance with the ALF Plan will be defined as NIPSCO accomplishing each relevant item listed in (a), (b), (c), and (e) below during every ALF event and (d) below during normal flows.

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[7] The previous 24-hour daily average is used because we estimate that there is on average an approximately 24-hour lag time between the USGS Winamac and Oakdale gauges. This is based on evaluation of flows during the summer of 2013 between the USGS Delphi gauge and three downstream cameras placed by the Service and NIPSCO to evaluate the impacts of various flows on mussels and mussel habitat.

a. ceasing electric power generation at the Oakdale Dam when the 24-hour daily average at the USGS Winamac gauge is ≤ 300 cfs or the 24-hour daily average at the USGS Oakdale gauge ≤ 600 cfs;
b. discharging 1.9 times the flow of the previous 24-hour daily average flow measured at the USGS Winamac gauge out of the Oakdale Dam as measured at the USGS Oakdale gauge;
c. continuing the ALF Plan protocols until the 24-hour daily average at the USGS Winamac gauge is > 300 cfs;
d. maintaining flow above 500 cfs as measured hourly at the USGS Oakdale gauge.
e. meeting all monitoring and reporting requirements (detailed below).

The Service recognizes that the ALF Plan protocols have not been previously implemented and there may be an initial period of training, calibrating equipment, etc.[8] In order to address mechanical and other challenges inherent in implementing new procedures, provisional compliance requirements may be adhered to by NIPSCO during the first ALF event.

The provisional compliance requirements are as follows:

a. Discharge from the Oakdale Dam will be a maximum of 15 percent above and 15 percent below 1.9 times the 24-hour daily average flow at the USGS Winamac gauge as measured at the USGS Oakdale gauge on Days 1 and 2. Discharge from the Oakdale Dam may exceed the target of 15 percent above 1.9 times the 24-hour daily average flow at the USGS Winamac gauge as measured at the USGS Oakdale gauge if required by operating emergencies beyond the control of NIPSCO, such as flood or abnormal high flow conditions (as defined in the FERC license), that may arise during the measurement period.
b. Discharge from the Oakdale Dam will be a maximum of 15 percent above and 10 percent below on Days 3 to 5. Discharge from the Oakdale Dam may exceed the target of 15 percent above 1.9 times the 24-hour daily average flow at the USGS Winamac gauge as measured at the USGS Oakdale gauge if required by operating emergencies beyond the control of NIPSCO, such as flood or abnormal high flow conditions (as defined in the FERC license), that may arise during the meaurement period.
c. Discharge from the Oakdale Dam will be a maximum of 15 percent above and 5 percent below for the remainder of the first ALF period. Discharge from the Oakdale Dam may exceed the target of 15 percent above 1.9 times the 24-hour daily average flow at the USGS Winamac gauge as measured at the USGS Oakdale gauge if required by operating emergencies beyond the control of NIPSCO, such as flood or abnormal high flow conditions (as defined in the FERC license), that may arise during the measurement period.

[8] Note that the Service expects NIPSCO to test the ALF Plan protocols prior to an ALF event if practical to avoid possible problems.

d. No more than three (3) spikes (hourly readings) below 500 cfs measured at the USGS Oakdale gauge can occur during the first six months after the TAL is issued.

If the first ALF event is brief (less than the five days of provisional compliance) NIPSCO may inform the Service and implement a second consecutive provisional period and still be in compliance.

If at the end of the first full ALF event (or two consecutive abbreviated periods) the provisional targets have not been met, the result will be a meeting between NIPSCO and the Service within two weeks to evaluate compliance problems. At that point, provided there are revised compliance procedures in place and both parties agree, another provisional period can be implemented during the next ALF event. If agreement cannot be reached on revised procedures, NIPSCO can temporarily remain in provisional compliance by releasing a minimum of 500 cfs from the Oakdale Dam as measured hourly at the USGS Oakdale gauge for one additional ALF event only while revised procedures are developed and a second provisional period is implemented. If agreement cannot be reached by the conclusion of the second full ALF event, NIPSCO and the Service will meet within one month and the Service will subsequently determine whether or not the TAL can remain in effect. Compliance other than during this (these) provisional period (s) will require maintaining flow within, and including, 15 percent above and 5 percent below 1.9 times the 24-hour daily average flow at the USGS Winamac gauge as measured at the USGS Oakdale gauge for every 24-hour period of every ALF event[9]. In addition, compliance will require flows be $\geq$ 500 cfs measured hourly at the USGS Oakdale gauge during normal river flows.The Service recognizes that third parties outside of NIPSCO's control may, from time to time, cause unanticipated water withdraws from the river downstream of the USGS Winamac gauge but upstream of the USGS Oakdale gauge, and those third party withdraws may result in flows at or below 600 cfs at the USGS Oakdale gauge notwithstanding a measured 24-hour daily average flow above 300 cfs at the USGS Winamac gauge. Compliance with the TAL does not include a requirement for NIPSCO to police third parties. Recognition of this, however, does not absolve NIPSCO of complying with the requirements of the TAL. The Service also recognizes that in the event of a flood or other operating emergency, NIPSCO will take actions necessary to protect the Oakdale Dam facilities and surrounding communities including, but not limited to, releasing water at a rate more than that specified above. The Service also recognizes that NIPSCO's existing FERC license requirements applicable to abnormal high flows do not employ a 24-hour average and therefore, NIPSCO may need to take action to release water at a rate higher than the rate specified above to comply with the requirements of Article 403 of the FERC license during abnormal high flow conditions.

[9] The Service recognizes that NIPSCO will need to rely on the USGS gauges as part of the compliance protocols. If the USGS gauges identified herein are not functioning properly or timely updates to the USGS websites are not made for any reason, the Service will not hold NIPSCO accountable for acting in good faith in accordance with data from USGS gauges. NIPSCO will use the NIPSCO gauges for compliance if it determines USGS gauges are not functioning properly. Under these circumstances, NIPSCO can also choose to coordinate with the Service.

IV Monitoring and Reporting

Monitoring

NIPSCO will monitor the USGS Winamac and USGS Oakdale gauges daily and download the USGS 24-hour daily average flows each day as defined above.

NIPSCO will also monitor the USGS Delphi gauge, NIPSCO Oakdale gauge, Freeman lake level, Dissolved O_2 levels, whether the Oakdale Dam generation is on/off, gate positions, and any changes made in operation.

The Service will oversee structured monitoring of a minimum of three sites downstream of the Oakdale Dam during the first four years of the TAL. The results of this study will be used as one component to assess the effectiveness of the TAL (ALF Plan protocols). IDNR will lead this effort in coordination with the Service and develop protocols specifically to assess federally listed mussels and any vulnerable mussel critical habitat designated downstream of the Oakdale Dam.[10]

Reporting

NIPSCO will provide an informal notice to the Service within three business days after the completion of an ALF event. In addition, NIPSCO will provide to the Service an Annual Report by 31 March of each project year detailing all of the ALF events that occurred during the prior calendar year. Reports will contain at minimum:

a. the beginning and end date of each ALF event;
b. the relevant USGS gauge readings including those used to determine the 24-hour daily averages;
c. the recorded 24-hour daily averages;
d. all measures that were implemented and when each began and ended;
e. any problems associated with implementation.
f. any deviations from ALF Plan protocols necessitated by emergency conditions as described above in this document.

By April 30 at the conclusion of each 5-Year TAL period, an in-person meeting between the Service and NIPSCO will occur to ensure that the TAL continues to be efficient and effective in avoiding take of federally listed mussels downstream of the Oakdale Dam.

V Determination

The Service has reviewed the information NIPSCO has provided regarding the presence of the aforementioned ESA-listed mussels and their habitat downstream of the Oakdale Dam, and the

[10] Note that this is not compliance and will used by the Service and NIPSCO at the first 5-Year meeting to determine if revisions are needed to the TAL to ensure NIPSCO is avoiding take by properly implementing the TAL.

measures set forth under the ALF Plan that NIPSCO intends to implement to best avoid any potential take of such species and their habitat. Based on Service's review of this information, the ALF Plan including, measures to maintain natural run-of-the-river flows and preclude large swings in flow during low flow periods, will serve to address Service concerns with respect to take of federally-listed mussels in the Tippecanoe River downstream of the Oakdale Dam from adverse impacts associated with the Oakdale and Norway Dams. That is, compliance with the ALF Plan is anticipated to result in river conditions during ALF events sufficiently equivalent to those afforded by nature. Consequently, if operated in accordance with the ALF Plan, the Service will presume that the Oakdale Dam will not serve as a cause of any take of the downstream listed mussel population or habitat.

This office is not authorized to provide guidance in regards to the Service Office of Law Enforcement (OLE) investigative priorities involving federally listed species. However, we understand that OLE carries out its mission to protect ESA-listed species through investigation and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of listed species, and by encouraging others to implement measures to avoid take of listed species. It is not possible to absolve individuals or companies from liability for unpermitted takes of listed species, even if such takes occur despite the implementation of appropriate take avoidance measures. However, the Office of Law Enforcement focuses its enforcement resources on individuals and companies that take listed species without identifying and implementing all reasonable, prudent and effective measures to avoid such takes. As of this date, Bloomington Field Office concludes that the proposed project will not or is unlikely to result in take of ESA listed species and based on preliminary identification of critical habitat for rabbitsfoot mussels, would avoid adverse modification of critical habitat should it be designated for rabbitsfoot mussel. It will be necessary to evaluate this preliminary determination should designation of critical habitat occur.

Conclusion

We appreciate NIPSCO's efforts to coordinate with our office in determining what measures can be implemented to avoid take of any ESA-listed species or their habitat at the project site. Should new information become available, we request that NIPSCO promptly notify the Service. Please contact me at (812) 334-4261 or scott_pruitt@fws.gov if you have any questions.

Sincerely,

Scott E. Pruitt
Field Supervisor

Definitions

Ephemeral Habitat – for this TAL this is habitat that mussels may occupy, but that under natural run-of-the-river conditions would be exposed for periods of time in most years sufficient to kill virtually all mussels living there. Mussels may occupy this habitat opportunistically (e.g., mussels carried to higher elevation sites during high flows).

Suitable Habitat – for this TAL mussel habitat that under natural run-of-the-river conditions would remain sufficiently wet for multiple years to allow mussels to survive and permit growth, reproduction, and other aspects of mussel life history to be completed.

Vulnerable Habitat – for this TAL this is suitable mussel habitat occurring on higher elevation substrates within the Tippecanoe channel – these sites include shoals, bars, and shoreline edge. They are vulnerable because they are the first sites exposed as cfs and associated water level in the river drops. A number of the likely covered species (e.g., rayed bean, snuffbox, rabbitsfoot, and sheepnose) typically or often occupy these sites.

Figure 1 - Map of Unit RF26 of Proposed Critical Habitat for Rabbitsfoot Mussel

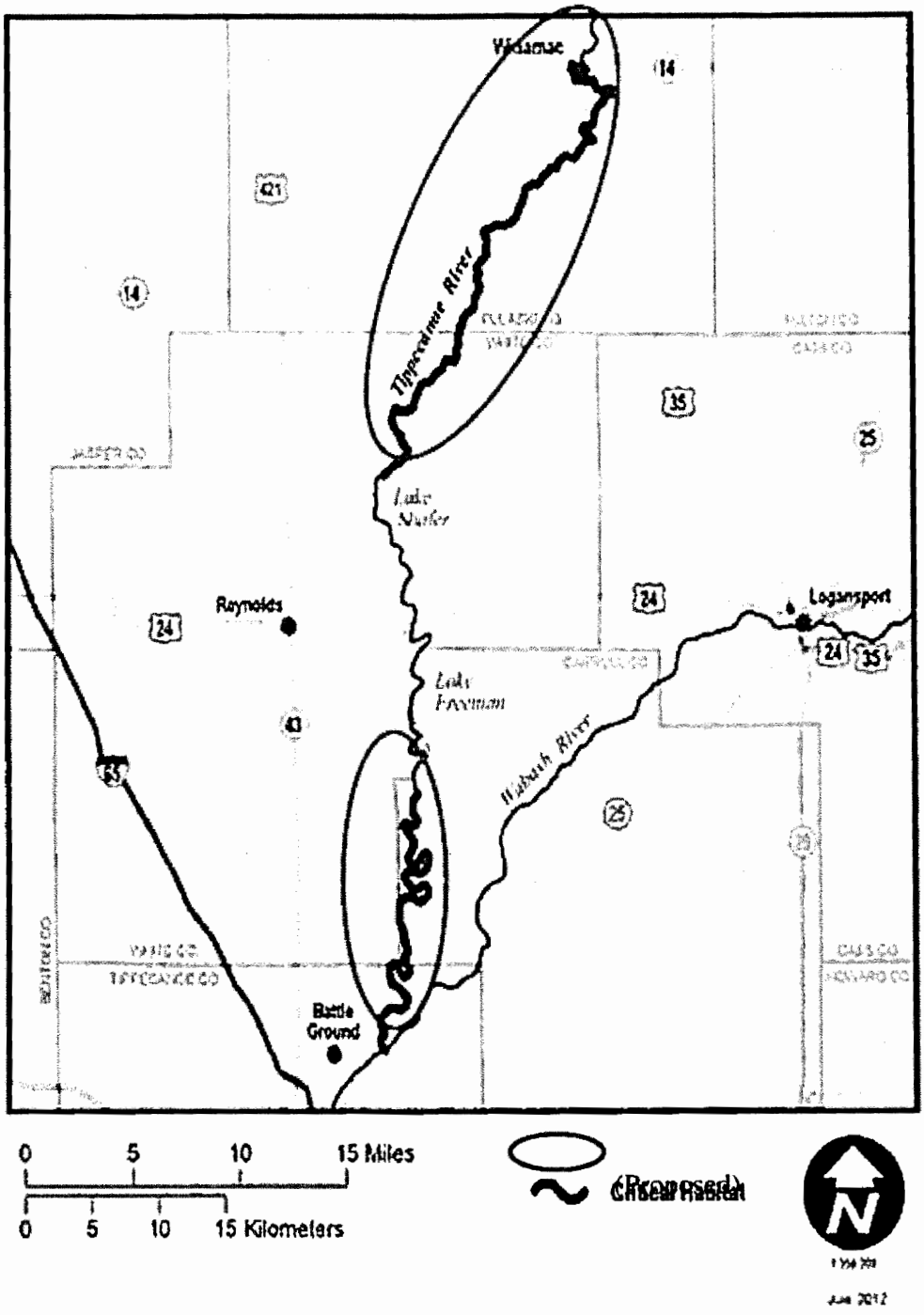

Figure 2 – Hypothetical Example of Linear Scaling