STATE OF MINNESOTA

OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE ROUTE
PERMIT APPLICATION FOR
CAPX2020

DIRECT TESTIMONY OF

JEFFREY S. BROBERG

On Behalf of

INTERVENOR

ORONOCO TOWNSHIP

May 20, 2011

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I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Jeffrey S. Broberg, and my business address is McGhie & Betts Environmental Services, Inc., 1648 Third Avenue SE, Rochester, Minnesota 55904.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am employed by McGhie & Betts Environmental Services, Inc., where I am Vice President and a part owner. My duties include managing a staff of environmental professionals, Civil Engineers, Surveyors, Land Planners, and Scientists. I am a Minnesota Licensed Professional Geologist, and I am registered through the National Registry of Environmental Professionals as a Registered Environmental Manager. McGhie & Betts Environmental Services, Inc. is a 20-year old company, and I have been employed there since its inception. Our professional services range from environmental assessments and mitigation, to the design, assessment and local, state and federal permitting for development, natural resource and energy projects. Our work area is focused on an 80-mile radius from Rochester, MN and encompasses the Hampton-Rochester-La Crosse 345 kV transmission line.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I am a Licensed Professional Geologist in the State of Minnesota and a Registered Environmental Manager with the National Registry of Environmental Professionals. I

graduated with a Bachelor of Science degree in geology from the University of Minnesota in 1977. My primary consulting experience is in the area of environmental review and regulatory compliance for local, state and federal land-use and environmental regulations, including local land-use decisions related to comprehensive land-use plans, zoning ordinances and natural resource permits. I have 21 years of experience in these matters at McGhie & Betts, specializing in southeastern Minnesota. I am also an experienced geologist with 33 years of experience focused on the land development and energy sectors with specialties in wetlands, karst, geologic hazards and surface/groundwater interactions.

Q. DO YOU HAVE DIRECT KNOWLEDGE OF LAND-USE AND ZONING ISSUES THAT ARE RELEVANT TO THIS PROCEEDING?

A. Yes. I have been professionally engaged in environmental and land-use assessments in Oronoco Township and Olmsted County for 20 years. I am familiar with the local Township and County, the historic settlement patterns and current land-use patterns, Township and County land-use regulations, and land-use approval process. I have been professionally engaged in the design, permitting and construction of the following residential development projects within 1.5 miles of the White Bridge in Oronoco Township:

- The Landings at Sandy Point (NW/4 of the SE/4 sec 11, T108NR14W);
- Zumbro Haven (N/2 of the NW/4 sec 11 and the S/2 of the NW/4 sec 2, T108NR14W;
- Zumbro Sound (SE/4 of the NE/4 sec 3, T108NR14W); and

- Markham Farms (E/2 of the NE/4 sec 10 T108N R14W)

I have also prepared an Environmental Assessment Worksheet for an aggregate quarry on the SJC property (part of the NW/4 of the SW/4 sec 11, T108NR14W) and was professionally engaged in reviewing and providing an assessment and written comments into the official record for the proposed Rucker Feedlot expansion (SE/4 of sec 9, T108N R14W), both within the Modified Preferred Route.

Q. FOR WHOM ARE YOU TESTIFYING?

A. I am providing testimony on behalf of Intervenor Oronoco Township, which is opposed to Applicant's placement of the 345 kV line on the Modified Preferred Route.

Q. WHAT EXHIBITS ARE ATTACHED TO YOUR TESTIMONY?

A. **Exhibit 1**: Personal Resume of Jeffrey S. Broberg.

Exhibit 2: Minnesota Rule 7850.4100.

Exhibit 3: Parcel Count Analysis within 1,000-foot Corridor and 1.25-mile Variable Width Corridor.

Exhibit 4: Appendix E2: Mississippi River Crossing Design Options – Alma (Applicant's Minnesota Route Permit Application).

Exhibit 5: Randy Binder, Minn. Dept. of Natural Resources, Division of Fish and Wildlife, Lake Zumbro and Lower Zumbro River Creel Survey (May – Aug. 2007).

Exhibit 6: CapX2020 River Crossing Exhibit.

Exhibit 7: Feedlot Operators Within One-Quarter Mile of the Modified Preferred Route, Alternative Route, and Route Option.

Exhibit 8: Olmsted County Land-Use Designation Map; Olmsted County Future Land-Use Map; and Wabasha County Comprehensive Plan Map.

Exhibit 9: Minnesota Land Economics, Estimated Land Values Summary, http://www.landeconomics.umn.edu/mle/default.aspx (accessed Apr. 28, 2011).

II. SCOPE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. There are four distinct purposes to my testimony in this proceeding:

(1) The first purpose is to point out the fact that many of the environmental characteristics (including archaeological and historical resources, air and water quality resources, flora and fauna, rare and unique natural resources, transportation and public services, and electronic interference) are relatively similar between and among the Modified Preferred Route, Alternative Route, and the Route Option and, accordingly, the effects on these criteria are less noticeable. However, settlement pattern characteristics such as human settlement (*i.e.* population density), public health and safety, recreational resources, tourism, and agricultural uses vary greatly between the three proposed routes and the effects on these criteria account for larger disparities.

(2) The second purpose of this statement is to point out the fact that the DEIS and the RPA have failed to address the trends in land economics along the Modified

Preferred Route, Alternative Route and the Route Option. According to the Minnesota Land Economics, which has reported county assessor land value estimates by county, township or city from 1993 to present day, the land economic trends between Olmsted and Wabasha Counties is significantly different.

(3) The third purpose of this statement is to point out the fact that the development patterns and planned future land-use along the Modified Preferred Route were not considered in route siting. Development patterns within 0.25 miles to the west and 0.75 miles to the east of the Zumbro River crossing on the Modified Preferred Route is designated as Potential Suburban and Suburban Development in the Olmsted County General Land Use Plan, Amended March 8, 2011. Additionally, Potential Suburban and Suburban Developments are planned within a 1.0 – 1.5 mile corridor south (to the Rochester City Limits) and north (to the Olmsted County line).

(4) The fourth purpose of this statement is to point out the fact that the Modified Preferred Route will cross the Zumbro River at White Bridge where the population density is higher than any other route considered and recreational opportunities are abundant. At this location, the greatest impacts to residential and recreational receivers will be realized.

Q. ARE YOU INTENDING TO PROVIDE TESTIOMY IN SUPPORT OF A PARTICULAR ROUTE?

A. Yes. My testimony supports placement of the proposed transmission line along the Alternative Route, since it will have less impact to human settlement than the Modified Preferred Route or the Route Option.

Q. WHAT DOCUMENTS DID YOU REVIEW IN ORDER TO FORMULATE YOUR TESTIMONY?

A. I reviewed the Certificate of Need ("CON"), Applicant's Route Permit Application ("RPA"), the Draft Environmental Impact Statement ("DEIS"), applicable Minnesota Statutes and Rules governing the route permitting process, the Affidavit of Bruce McKay, P.E. (Apr. 20, 2011), and the Direct Testimony of Tom Hillstrom, Grant Stevenson, and Amanda King submitted on behalf of Applicant.

III. SUBSTANTIVE TESTIMONY

Q. HAS THE APPLICANT SELECTED A ROUTE THAT MINIMIZES IMPACTS ON EXISTING HUMAN SETTLEMENTS AND POPULATIONS ALONG THE MODIFIED PREFERRED ROUTE?

A. No. The Modified Preferred Route has a greater impact on human populations and human settlement than either the Alternative Route or the Route Option because Oronoco Township is more developed and is a more rapidly developing area for rural and suburban homesteads. Development in Oronoco Township is more closely linked to employment in Rochester, which is less than 12 minutes from the White Bridge. With good transportation links to Rochester, jobs and services are less than 15 miles away. Rural amenities, such as like Lake Zumbro, add to the compelling landscapes, which contain wooded valleys, small farm fields and historic farms that have largely been converted to non-farm residential homesteads. The many small hobby farms and rural residents have access to excellent schools, medical services and jobs.

Oronoco Township is a popular and desirable area for large lot parcels two to five acres is size and hobby farms smaller than 40 acres. This fact is recognized by the Township and County Plans, as well as the cities of Rochester, Oronoco and Pine Island. By contrast, Wabasha County is rural agricultural, and according to the adopted land-use plans, intends to stay that way. In Oronoco Township, each 40 acres of agricultural land can be split into a 5-acre non-farm parcel and a 35-acre farm parcel, but in Wabasha County, land division in the agricultural zone is limited to an overall density not to exceed one dwelling per 80-acres (or half quarter section). This pattern of development has existed since the Oronoco Dam created Lake Zumbro in the 1920s and is expected, and in fact has been encouraged, to continue by decades of planning and infrastructure development.

The agricultural parcels that are located along the Modified Preferred Route in Oronoco Township are, on average, smaller in size than the parcels located along the Alternative Route and Route Option in Wabasha County, which makes the large-scale farming of annual row crops more expensive. In current Olmsted County agricultural practices, farmers rent over 50% of the cropland they manage. When land is divided into smaller parcels, the number of required rental agreements climbs, and the negotiation of rental rates is more time consuming. Smaller fields are also more difficult for large equipment to navigate, which creates logistical challenges for farmers in Olmsted County. These challenges are not experienced by Wabasha County farmers, since they are farming larger fields. Inevitably, the smaller parcels closer to Rochester induce the conversion of large scale production agricultural land to hobby farms and residential properties that are more impacted by transmission lines like the one proposed here.

Investment in hobby farms and rural residential or suburban properties has remained solid in Oronoco Township despite the recession and is expected to react positively as economic conditions improve. However, landowners and residents fear that the transmission line will thwart land investment and development and will denigrate the existing amenities that draw residents to Oronoco Township. Because placement of the transmission line along the Modified Preferred Route will affect more people and will irrevocably change the rapidly developing corridor in and around Oronoco Township, the Modified Preferred Route should be rejected in order to avoid these human impacts and keep the impacts on rural farm land.

Our counts of the subdivisions, parcels and homes along the Modified Preferred Route, combined with our knowledge and experience of the settlement patterns and population density in Oronoco Township, show that the Modified Preferred Route has a much greater impact on current and future human settlement patterns than does either the Alternative Route or the Route Option in Wabasha County.

For our analysis of the route options, we have counted the number of parcels of record within 1,000-feet and within 1.25 miles of each alternative, setting the boundaries of analysis between US Highway 52 on the west and US Highway 63 on the east. This statistic is significant because it is an indicator of how the original settlement pattern of 160-acre homesteads has been either combined or split according to local practices for highest and best use. Areas with larger parcels and less population density typically reflect consolidation of land to accommodate larger farming operations, while smaller parcels and higher population density represent division for residential and hobby farming. The Modified Preferred Route clearly has a larger human impact, whether the

impact is for occupied homes within 500 feet (see Applicant's revised testimony) or whether you measure parcels within view of the proposed transmission lines. This is clearly documented in Schedule 8, Tables 3 and 4, of Tom Hillstrom's Direct Testimony submitted on April 18, 2011, where the Modified Preferred Route has seven residences within 300-feet of the proposed route centerline and the Alternative Route has four residences. The table below shows the dramatic difference in current settlement patterns:

		within 1,000 feet		within 1.25 mile	
US 52 to US 63	**Miles**	**Parcels**	**Parcels / Mile**	**Parcels**	**Parcels/Mile**
Alternative Route (North Route)	12.2	129	10.57	676	55.4
Route Option (Zumbro Dam Route)	11.7	98	8.37	1269	108.46
Modified Preferred Route (White Bridge Route)	15.3	252	16.47	3136	204.96

When also considering local planning and zoning and the proximity to jobs and services, placement of the transmission line along the Modified Preferred Route has a greater current and future impact on human settlement than placement along the Alternative Route or the Route Option. This is also demonstrated in **Exhibit 3** attached hereto.

Q. HAS THE APPLICANT SELECTED A ROUTE THAT MINIMIZES THE NUMBER OF PARCELS AFFECTED BY THE PROPOSED TRANSMISSION LINE?

A. No. In accordance with Minn. Stat. § 216E.01, subd. 8, the Applicant has the flexibility to design a high-voltage transmission line (HVTL) within a "variable width of up to 1.25 miles." Based on our review, the DEIS and the RPA designated a 1,000-foot route width, but failed to fully assess the criteria established under Minn. Rule 7850.4100 within the

1.25 mile variable route width. (See **Exhibits 2-3**.) A more adequate and complete assessment of the Modified Preferred Route would include an assessment of the effects on the criteria within the1.25 mile variable width.

The Applicant's assessment of the criteria within the RPA (Appendix H: Minnesota Route Matrix) for the Modified Preferred Route has been evaluated within a 1,000-foot route width, or less.

Based on our assessment provided in the table below and in **Exhibit 3**, which quantifies the number of affected parcels from HWY 52 to HWY 63 along the Modified Preferred Route, Alternative Route, and the Route Option within a 1,000-foot and 1.25-mile variable width, we have determined the Modified Preferred Route will affect the greatest number of parcels.

Route Description	**# of Parcels within 1,000-Foot Route Corridor**	**# of Parcels within 1.25-Mile Route Corridor**
Modified Preferred Route	2542	3,136
Alternative Route	129	676
Route Option	98	1,269

The Applicant's preferred route should be moved to either the Alternative Route or the Route Option, since both of these routes have significantly fewer affected parcels within both the 1000-foot and 1.25-mile route corridor than the Modified Preferred Route.

Q. WHAT IS THE RELATIVE IMPACT ON RECREATIONAL ACTIVITIES AMONG THE MODIFIED PREFERRED ROUTE, THE ALTERNATIVE ROUTE, AND THE ROUTE OPTION?

A. The Modified Preferred Route will cross the Zumbro River at White Bridge where the population density is higher than it is along the Alternative Route or the Route Option and recreational opportunities are more abundant.

Lake Zumbro is the only recreational lake within Olmsted County and is known to have a higher fishing pressure per acre than most Minnesota lakes. According to a study conducted on Lake Zumbro in May and August of 2007, the MDNR, Division of Fish and Wildlife, reported the total estimated fishing pressure for boat and bank was 50.3 hours/acre, which is higher than the statewide mean of 33.1 hours/acre on similar lakes during the summer. (**Exhibit 5**.) Lake Zumbro is a recreational destination for residents within a nine-county area, including Rice, Goodhue, Wabasha, Winona, Olmsted, Dodge, Steele, Mower, Fillmore and Houston Counties. It is estimated that recreational sport fishing on Lake Zumbro alone generates approximately $1.65 million per year. (Id.) In addition, Lake Zumbro is the only lake in Olmsted County and supports a wide range of lake-dependent ecotomes and species that are uncommon in southeastern Minnesota, such as the migrating American White Pelicans and other water birds and game fish communities, that generate high levels of recreational use. Locating the proposed transmission line along the Modified Preferred Route or the Route Option will have a substantial negative impact to this recreational resource. The Zumbro River crossing to the north on the Alternative Route has no motor boat use and fishing pressure, water skiing, jet skiing, or swimming pressure as a common use.

Q. WHAT VISUAL IMPACTS WILL THE PROPOSED TRANSMISSION LINE HAVE ON THE MODIFIED PREFERRED ROUTE COMPARED TO THE ALTERNATIVE ROUTE?

A. Section 8.2.4.2 of the RPA states the Modified Preferred Route *"transmission line structures would extend above the tree canopy for over 50 feet and could be visible for over a mile away. . . . [D]ue to the width of the Zumbro River, the transmission line would be highly visible to boaters and anglers near the Zumbro River."* Further, the Applicant states the Alternative Route *"will cross the Zumbro River approximately 2.2 miles north of the Zumbro Dam where visibility of travelers and water-based recreationists will be more limited due to screening by bluffs and tree canopies."* Based on the Applicant's own admission, the greater negative visual impacts clearly will occur at the Zumbro River crossing on the Modified Preferred Route.

Furthermore, Section 6.1 of the DEIS failed to include a discussion about engineering challenges and visual impacts for the three Zumbro River crossings. From our assessment, the Zumbro River crossing on the Modified Preferred Route at White Bridge Road will require a 50% longer span width than the crossings on the Alternative Route and the Route Option. (See **Exhibit 6**.) Additionally, if 150-foot high transmission poles are located at the top of the bluffs along the Modified Preferred Route at White Bridge, the wires will be approximately 241 feet above the bridge and 283 feet above the water, and therefore, would require lighting to satisfy Federal Aviation Administration (FAA) requirements. (**Exhibit 4**.) Lighted transmission poles will increase the negative visual impacts occurring along the Modified Preferred Route.

Q. ARE THERE ANY HEALTH CONCERNS YOU HAVE RELATING TO PLACEMENT OF THE TRANSMISSION LINE ALONG THE MODIFIED PREFERRED ROUTE?

A. Yes. I have reviewed the Affidavit of Bruce McKay, P.E. ("McKay Affidavit") (Apr. 20, 2011), which was previously submitted in this matter. Mr. McKay, an electrical engineer and licensed professional engineer in the State of Minnesota, makes several troubling observations about the testimony submitted by the Applicant. He observes in his Exhibit C the computation done by the Applicant of the electric and magnetic fields generated by the proposed 345 kV transmission line. The Applicant calculates magnetic fields, as shown on Exhibit C, using a purported peak of 140 amps and an average of 112 amps in the year 2015.

Exhibit D to the McKay Affidavit replicates a portion of the Applicant's computations from the very top two lines of Exhibit C. As can be seen on "Step 1" of Exhibit D, the Applicant has calculated the magnetic fields in milligauss ("mG"), which sets forth the electromagnetic field ("EMF") that exists at certain distances from this line. The Applicant has set 150 feet as its easement width, 75 feet on each side of the line. In Step 1 of Exhibit D, the Applicant has computed the mGs at 75 feet as between 3.41 and 5.88 for the peak amps, and 2.73 and 4.71 for the average amps. I believe these measurements by the Applicant, while correct in and of themselves, are exceedingly misleading.

As shown in Step 3, this line is designed to carry 1,105.50 MVA (million volt amps) at peak, with an average of 884 MVA. Using that designed load and looking at Step 4 on Exhibit D, you will see that, at 75 feet from the centerline of the proposed line,

the mGs at peak design load vary from 45.11 to 77.79 mGs. At the average design use, those numbers range from 36.12 to 62.31 mGs. The bottom portion of Exhibit D tells us what happens when the line reaches its ultimate double-circuit use: at the 75 foot mark, peak amps generate between 90.23 and 155.59 mGs, and average amps generate 72.24 to 124.64 mGs. These are clearly numbers which create health concerns.

While this is a problem for anyone exposed to this level of EMF, it is especially problematic when those fields are going to be created in urban and suburban settings where we would expect lot lines to back up to the 75 foot mark on each side of the proposed transmission line. Placing this proposed transmission line in an area expected to develop as urban and suburban in nature would seem contrary to a goal of minimizing affects on human settlement both now, and particularly, in the future. Placement of the transmission line along the Alternative Route will have substantially less impact.

Q. WHAT IMPACT WILL STRAY VOLTAGE HAVE ON THE MODIFIED PREFERRED ROUTE IN COMPARISON TO THE ALTERNATIVE ROUTE AND THE ROUTE OPTION?

A. The DEIS states at Section 7.1.2, *"Stray voltage is not identified as a safety concern associated with the project; however, since transmission lines can induce stray voltage on distribution circuits that are parallel and immediately under a transmission line, mitigation measures may be necessary if the project transmission line parallels or crosses distribution lines."* Similarly, Section 3.7 of the RPA states, *"Transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line."*

Studies have shown that stray voltage can impact farm animals, especially dairy cattle. The direct effects farm animals experience when exposed to stray voltage include mild behavioral reactions indicative of nervousness, involuntary muscle contractions or twitching, and intense behavioral responses indicative of pain. Other effects include reproductive problems, decreased appetite, and reduced resistance to disease, which can lead to a loss of livestock. Dairy cattle exposed to stray voltage have also exhibited reduced milk production, leg and hoof problems, and an increase of mastitis (an udder infection resulting in high bacterial counts that makes milk unacceptable for sale).

The occurrence of HVTL-induced stray voltage is an important factor when considering transmission line placement. Ten feedlot operators are located within 0.25 miles of the Modified Preferred Route. In comparison, the Alternative Route only has five feedlot producers within 0.25 miles, and the Route Option only has two feedlot producers. (**Exhibit 7**.) The number of feedlot operators was calculated from Hwy 52 to Hwy 63. (Id.) Based on this assessment, the Modified Preferred Route would have the greatest impact on feedlot producers. Considering the Modified Preferred Route has the greatest number of residences (1.28 residences/mile) compared to the Alternative Route (0.89 residences/mile), along with a more prevalent settlement pattern, one would assume the frequency in which distribution lines would parallel or cross underneath the proposed transmission line would be greater along the Modified Preferred Route, thus increasing the levels of stray voltage and its harmful effects.

Q. DID THE APPLICANT FULLY CONSIDER ALL ROUTING SENSITIVITIES AND FUTURE DEVELOPMENT PLANS WHEN IT SELECTED THE MODIFIED PREFERRED ROUTE AS ITS PREFERRED ROUTE?

A. No. Section 4.3.2.1 of the RPA states, *"additional sensitivities screened by the Applicant in the preliminary macro-corridor phase include dense residential areas, and recreational areas."* Contrary to this statement, the Applicant has selected the Modified Preferred Route as its preferred route, which has more densely populated residential areas, as well as recreational areas.

The Olmsted County General Land Use Plan (Mar. 8, 2011) indicates that the future land-use along the Modified Preferred Route within 0.25 miles to the west and 0.75 miles to the east of the Zumbro River crossing is designated as Potential Suburban and Suburban Development. (**Exhibit 8.**) Additionally, Potential Suburban and Suburban Developments are planned within a 1.0 – 1.5 mile corridor south (to the Rochester City Limits) and north (to the Olmsted County line). (Id.) Future residential housing developments will be attractive to potential buyers for amenities such as proximity to the Zumbro River and Lake Zumbro, views of the Zumbro River Valley from their homes, and proximity to the City of Rochester. If the transmission lines are constructed at the Applicant's preferred location along the Modified Preferred Route, the proposed project will not conform to the current Olmsted County Land Use Plan.

In comparison, the Comprehensive Land Use Plan for Wabasha County (Aug. 4, 1998) identifies areas along the Alternative Route and the Route Option as Upper Valley and Upland Agricultural Area—*i.e.*, land-uses that encourage farming practices where farming has historically occurred. These land use designations are displayed in the

Wabasha County Comprehensive Land Use Map in **Exhibit 8**. The effects of siting the Alternative Route within agriculture land uses will be less disruptive than siting along the Modified Preferred Route.

Q. HOW ARE TRENDS IN LAND-BASED ECONOMICS AFFECTED BY PLACEMENT OF THE PROPOSED TRANSMISSION LINE IN OLMSTED COUNTY VS. WABASHA COUNTY?

A. Section 8.3.1 of the RPA is inadequate and fails to discuss the trends in land economics as they relate to the comparison between the Modified Preferred Route in Olmsted County and the Alternative Route and the Route Option, which are both in Wabasha County. According to Minnesota Land Economics, which has reported county assessor land value estimates by county, township or city from 1993 to present day, the land economic trends between Olmsted and Wabasha Counties are significantly different. A comparison in land values is depicted below:

Year	County	Township	Estimated value per acre
2009	Olmsted	Oronoco	6,509
	Wabasha	Zumbro	2,624
2010	Olmsted	Oronoco	5,792
	Wabasha	Zumbro	2,608

Estimated value per acre is based on the green acres taxable value.

Source: MN Land Economics (2009-2010)

(See **Exhibit 9**.)

A comparison of the property values in the table above shows that Wabasha County's estimated green acres taxable value for the year 2009 was 40 percent of that of

Olmsted County. In 2010, Wabasha County's estimated green acres taxable value was 45 percent of that of Olmsted County. This difference in taxable land values is significant and highlights the fact that properties in Olmsted County are considerably more expensive than those in Wabasha County, likely because the market recognizes that the Olmsted County property is more developable than the Wabasha County property. Based on this assessment, it would seem more reasonable to locate the proposed transmission line in Wabasha County instead of Olmsted County. (See id.)

III. CONCLUSION

Q. IN YOUR OPINION, AND BASED ON YOUR TESTIMONY ABOVE, WHICH ROUTE SHOULD BE SELECTED AS THE FINAL ROUTE FOR THE PROJECT?

A. The Alternative Route should be selected as the final route for the proposed transmission line.

Q. DOES THIS CONCLUDE YOUR PREFILED DIRECT TESTIMONY?

A. Yes.

Jeffrey S. Broberg, L.P.G., R.E.M.

Vice-President / Department Head: Environmental Services

Registration
Professional Geologist – MN No. 30019

Registered Environmental Manager – MN No. 3009

Education
Post Graduate, Geology, Masters Candidate, Minneapolis, MN, 1976-1978

Bachelor of Science, Geology, University of Minnesota, Institute of Technology, Minneapolis, MN 1978

Certification
Certified Professional Geologist – CPG-08184

Hazardous Waste Operations and Emergency Response (HAZWOPER)

MN Certified Asbestos Building Inspector – No. I3042

MN Certified Asbestos Mgmt Planner – No. M3042

MN Certified Asbestos Project Designer – No. D3042

Recognition and Mitigation of Indoor Air Quality Issues – CM Approval No. 3192

Professional Organizations
Minnesota Trout Association, President

Winona County Farm Bureau, Director

Minnesota Legislative-Citizens Commission on Minnesota Resources (LCCMR): Citizen Commissioner

MnDNR's Fishing Roundtable Steering Committee

Minnesota Groundwater Association

National Registry of Environmental Professionals

Publications
"Bellechester Minnesota Lagoon Collapse", e.c. Alexander Jr., Broger, Kehren, Graziani and Turri, in Applied Karst Geology, Beck (ed) 1993 Balkema Rotterdam ISBN 90 54103051

"The Lore of Louisiana: Shanty Boat on the Bayous by Harlan Hubbard; A Book Review in Rivers", Studies in Science, Environmental Policy and Law of Instream Flow, Volume 2, #2, April 1, 1991.

McGhie & Betts Environmental Services, Inc., Rochester, MN 1991 to Present
Responsible for directing and conducting environmental investigations and consulting on a wide range of environmental issues including: Environmental Site Assessments ranging from Transaction Screens to Environmental Assessment Worksheets, Leaking Underground Storage Tank investigation and remediation; Asbestos inspections, management plans and project design; Geologic Hazard Analysis (sinkholes, flooding, landslides, Decorah Shale); Storm Water Discharge permits; Wetland delineation, replacement plans and permitting (local, state and federal); Wastewater management, disposal and permitting; Animal Feedlot Permitting and Management; Agricultural Chemical Incident Response; Environmental Crime Investigations; OSHA Worker Right-to-Know Standards; Subsurface Sampling; Groundwater Monitoring; Water Quality Rules and Natural Resource Ordinances and Legislation.

McGhie & Betts Environmental Services, Inc., Rochester, MN 1990 to 1991
Project Manager. Supervising and conducting environmental audits and environmental remediation projects.

Rochester Drilling Co., Rochester, NY 1989 to 1990
Project Superintendent. Responsible for environmental remediation projects in landfills east of the Rocky Mountains. On-site Project Manager for construction of landfill gas and leachate collection systems.

Sunde Engineering, Bloomington, MN 1988 to 1989
Field inspector (temporary) conducting on-site inspection for an environmental remediation project at Pine Bend Landfill, Inver Grove Heights, MN.

Whitewater Thoroughbreds, St. Charles MN 1986 to 1988
Consulting Geologist / Owner.

Chevron USA, The Superior Oil Co. and Lane Exploration et al, All in Lafayette, LA 1978 to 1986
South Louisiana Petroleum Exploration Geologist.

Minnesota Geological Survey, St. Paul, MN 1976 to 1978
Geological Research Assistant.

EXHIBIT 1

Minnesota Administrative Rules

7850.4100 FACTORS CONSIDERED.

In determining whether to issue a permit for a large electric power generating plant or a high voltage transmission line, the commission shall consider the following:

A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services;

B. effects on public health and safety;

C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;

D. effects on archaeological and historic resources;

E. effects on the natural environment, including effects on air and water quality resources and flora and fauna;

F. effects on rare and unique natural resources;

G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;

H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries;

I. use of existing large electric power generating plant sites;

J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way;

K. electrical system reliability;

L. costs of constructing, operating, and maintaining the facility which are dependent on design and route;

M. adverse human and natural environmental effects which cannot be avoided; and

N. irreversible and irretrievable commitments of resources.

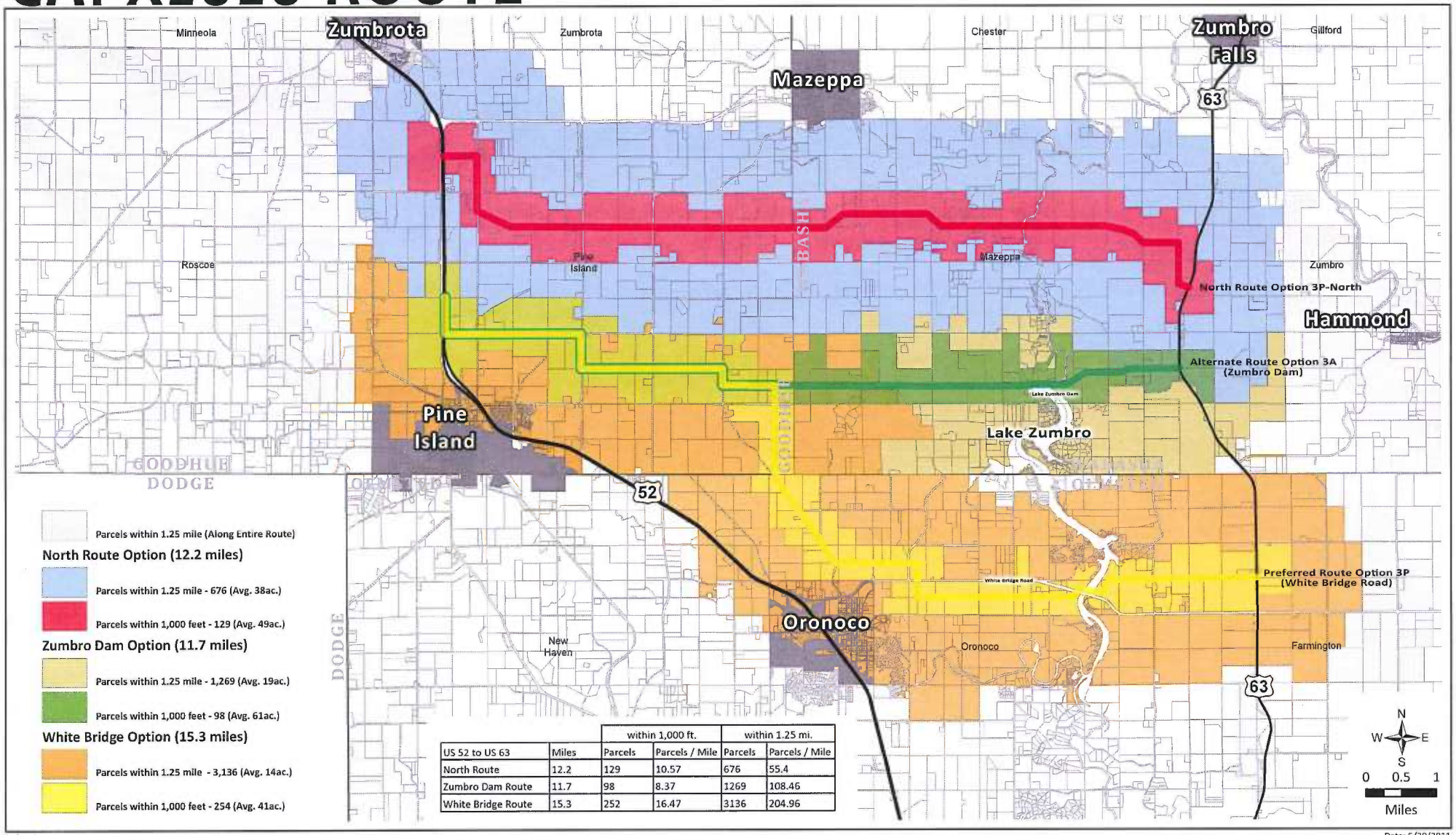
Statutory Authority: *MS s* 116C.66; 216E.16

History: 27 SR 1295; *L 2005 c 97 art 3 s 19*

Posted: *September 18, 2009*

EXHIBIT 2

CAPX2020 ROUTE



		within 1,000 ft.		within 1.25 mi.	
US 52 to US 63	Miles	Parcels	Parcels / Mile	Parcels	Parcels / Mile
North Route	12.2	129	10.57	676	55.4
Zumbro Dam Route	11.7	98	8.37	1269	108.46
White Bridge Route	15.3	252	16.47	3136	204.96

Date: 5/20/2011

McGhie & Betts Environmental Services, Inc.

EXHIBIT 3

Appendix E2:
Mississippi River Crossing Design Options – Alma

Appendix E2:

Mississippi River Crossing Design Drawings

The Mississippi River presents unique considerations that will require the use of multiple-circuit, specialty structures. A portion of this crossing is on Upper Mississippi River Wildlife Refuge (Refuge) lands managed by the U.S. Fish and Wildlife Service (USFWS). A Special Use Permit will be required to cross the Refuge and the Applicant will work closely with the USFWS to identify the most appropriate structure design.

An existing double-circuit transmission line crosses the Mississippi River and Refuge at the Project's proposed crossing location. The existing line crosses approximately 0.5 mile of Refuge lands and includes two structures on refuge property. The line is constructed on a 180-foot-wide permitted ROW. An area approximately 125 feet wide and 1,900 feet long is maintained cleared of trees. The two main river crossing structures are 180 feet tall.

Several possible designs for the proposed river crossing are described in this appendix. The design options demonstrate tradeoffs between structure height and easement width while maintaining only three structures on refuge lands. Minimum conductor clearance over the Mississippi River main channel in all instances is approximately 90 feet, per by US Army Corps of Engineers requirements.

- Option A: A design that stays within the existing 125-foot wide tree clearing. However, this results in main channel crossing structures of 275 feet in height. The Federal Aviation Administration (FAA) requires lighting of poles exceeding 200 feet above ground level, and may also require poles to be painted alternating red and white.
- Option B: The shortest possible pole design with horizontal circuit configuration. This keeps the main channel crossing structures less than 200 feet tall, avoiding FAA lighting requirements and keeps all the conductors in one plane, which is often preferred by those who are concerned about bird impacts. This design requires a 280-foot cleared ROW.
- Options C and D: A combination of options A and B keeps main channel crossing structures of less than 200 feet while using narrower structures elsewhere to minimize the need for additional ROW and tree clearing on refuge lands.

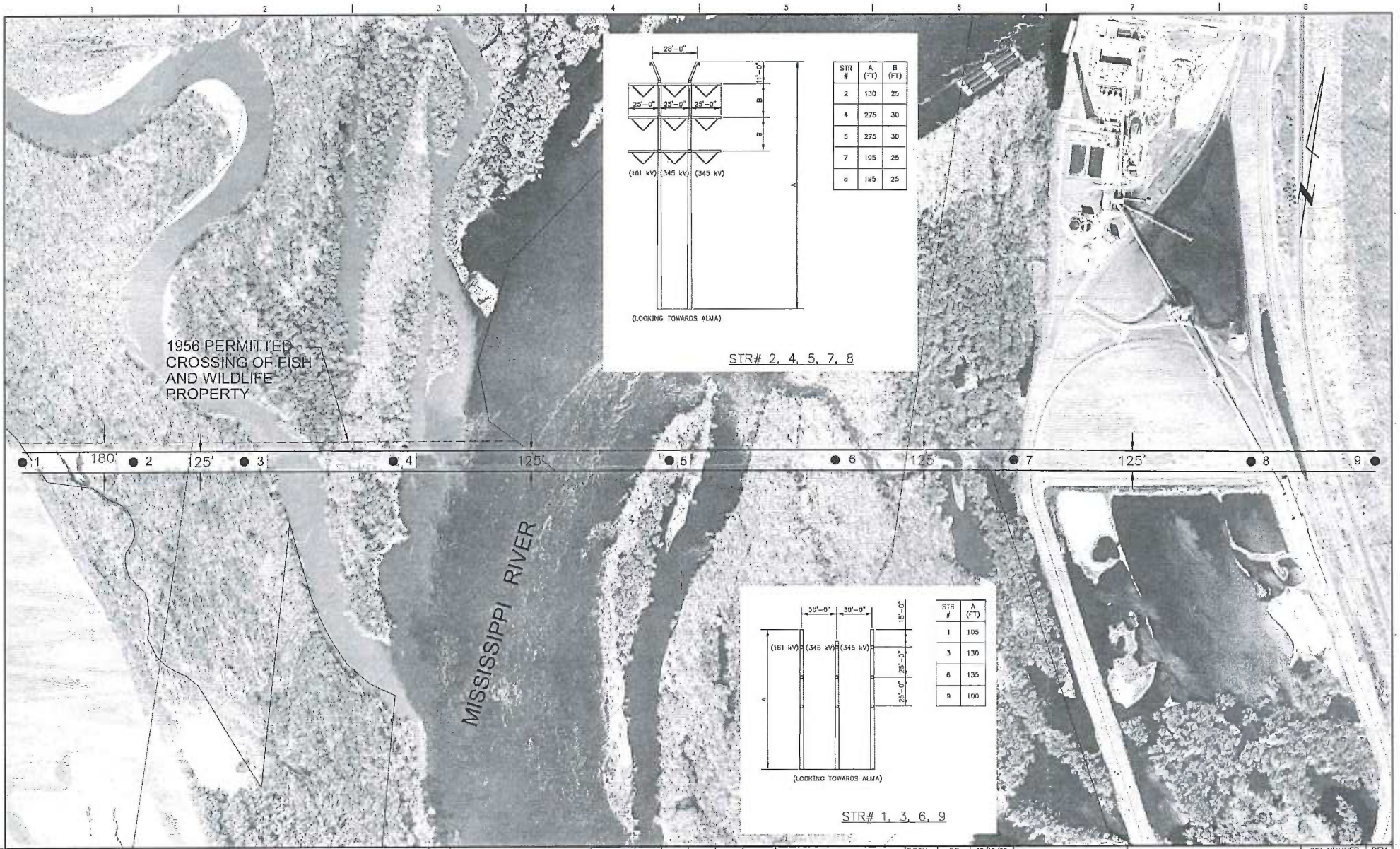
These overhead options are represented in the attached pages through the use of plan view, or aerial photo, drawings. These drawings incorporate black and white aerial photographs, obtained by the Applicant in November 2008, as a background. Numbered black dots represent transmission structure locations. Also noted on each drawing is the right-of-way width required by each option, and a black line with grey cross hatching that represents US Fish and Wildlife Service Upper Mississippi National Wildlife Refuge lands. The oval train tracks at Dairyland Power Cooperative's Alma generating station is at the bottom right. The distance between the western most structure, 1, and the eastern most structure, 9, is approximately 1.5 miles, or slightly wider than the river flood plane in this area. Sketches of the various structure types proposed for each design are inset in the drawings and are numbered and dimensioned. The following tables summarize structure height and right-of-way width for each option.

Table E3:
Option C - Mississippi River Crossing

Structure #	Height (feet)	Width of Right-of-Way at Structure (feet)	Location/Comment
1	105	125	Private property
2	130	125	Wildlife refuge
3	130	125	Wildlife refuge
4	199	280	Wildlife refuge; river crossing structure
5	199	280	Dairyland Power property; river crossing structure
6	80	280	Dairyland Power property
7	140	280	Dairyland Power property
8	140	280	Dairyland Power property
9	60	270	Private property

Table E4:
Option D - Mississippi River Crossing

Structure #	Height (feet)	Width of Right-of-Way at Structure (feet)	Location/Comment
1	105	125	Private property
2	130	125	Wildlife refuge
3	130	125	Wildlife refuge
4	196	180	Wildlife refuge; river crossing structure
5	196	180	Dairyland Power property; river crossing structure
6	130	125	Dairyland Power property
7	195	125	Dairyland Power property
8	195	125	Dairyland Power property
9	100	125	Private property



STR #	A (FT)	B (FT)
2	130	25
4	275	30
5	275	30
7	195	25
8	195	25

STR #	A (FT)
1	105
3	130
6	135
9	100

NOTE:
1. REFER TO DWG PO-1-1 FOR PLAN & PROFILE VIEW.
2. CROSS HATCH INDICATES FISH & WILDLIFE PROPERTY.

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD	REFERENCE DRAWINGS
A	ISSUED FOR REVIEW	12/16/09	BW	PG	RC		

DSGN	PG	12/16/09
DRN	BW	12/16/09
CKD	RC	12/16/09

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MISSISSIPPI CROSSING NEAR ALMA
345/345/161 kV CROSSING
ROW PLAN VIEW
OPTION A

JOB NUMBER 113642
REV A
DRAWING NUMBER P0-1-2

Minnesota
F-29-R(P)-27
Study IV
Job 796
March 2008

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF FISH AND WILDLIFE

LAKE ZUMBRO AND LOWER ZUMBRO RIVER CREEL SURVEY

MAY – AUGUST 2007

Randy Binder

Funded Under Federal Aid by the Sport Fish Restoration Act F-29-R (P)-27

EXHIBIT 5

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INTRODUCTION

This report summarizes an open water creel survey of Lake Zumbro and a 24-mile reach of the Zumbro River, Olmsted and Wabasha Counties, during the summer of 2007 by the Minnesota Department of Natural Resources (MNDNR), Section of Fisheries. The surveys were conducted to provide additional information regarding the special regulations and fishery on the Zumbro River and to provide baseline data on the open water angling effort, catch and harvest for Lake Zumbro. A secondary goal was to obtain angling information on the muskellunge fishery. The creel survey was originally scheduled to run through the Labor Day weekend (Sept. 1, 2007), but due to heavy rainfall and extensive flooding on the lake and river, the survey was terminated early, on August 21, 2007.

STUDY AREA

Lake Zumbro

Lake Zumbro is a 606-acre impoundment on the South Fork of the Zumbro River in Wabasha and Olmsted counties (Figure 1). The Lake Zumbro dam was built in 1919 and is a hydroelectric generating facility operated by Rochester Public Utilities. The Middle Fork Zumbro River is a tributary, entering the lake near the upper end. The lake is located within 15 miles of Rochester, MN, a large urban area with very little surface water available for recreation. Lake Zumbro is one of the few bodies of water in the area large enough to offer recreational boating and fishing, so it receives high levels of recreational use for boating and angling. Dense residential development on the lake adds to high recreational surface use.

Lake Zumbro provides a quality fishery for black crappie and bluegill, as well as largemouth and smallmouth bass. Northern pike are available in fair numbers with some quality size fish present. Walleye and sauger are not present in the lake. Muskellunge have been stocked on a regular basis since 1994. Very little is known about the existing muskellunge population, as standard fisheries techniques have not been effective in sampling them. Angling pressure and success for muskellunge was believed to be low.

Zumbro River

The study area included approximately 24 miles of the Zumbro River, beginning immediately downstream of the Lake Zumbro dam and continuing downstream to Millville, MN. The river reach immediately below the dam is commonly referred to as the "Plunge Pool." The study area is popular for angling, canoeing and tubing. A wide variety of game and non-game fish are available for anglers, but smallmouth bass are the primary gamefish species sought by anglers. A catch-and-release regulation for smallmouth bass is in effect from the Lake Zumbro dam downstream to the State Highway 63 road crossing in Zumbro Falls (approx. 12 miles). Muskellunge are also present in the river, having moved downstream after being stocked in Lake Zumbro. Most of the shoreline is privately owned. Public access sites are available at the CSAH 7 bridge crossing, and in Zumbro Falls, Hammond, and Millville. Private access sites are located at the Plunge Pool and a campground near Zumbro Falls. Canoe and tube rental is available at several private campgrounds within the study area.

METHODS

The creel survey began on May 11, 2007, just prior to the opening of walleye/northern pike season and two weeks prior to open season for bass species. The creel design was a stratified random type that included a portion of each sampling day spent on the river and the lake with differences in how each was sampled. Only one seasonal strata (summer), was defined. Strata were further defined by day type (Weekday or Weekend/Holiday). All Weekend days were sampled, but only one of two Holidays during the survey period was sampled (Memorial Day). Fourth of July was not sampled due to scheduling problems. The creel survey ended before the Labor Day holiday. The weekdays sampled were randomly selected, usually two days per week.

The fishing day was based on hours of daylight available and was defined as a 14-hour period. One of two time periods was sampled each selected day. Creel shift times were 7 hours long and were either Early (7:00 a.m. to 2 p.m.) or Late (2 p.m. to 9 p.m.). Early or late shift times were randomly selected. One 3-hour period during each sampling day was spent on the lake doing counts and interviews and the other 4 hours were spent on the river. The time period spent at each site was determined by a random start location and travel pattern (up or downstream). All sites were given an equal probability for start times. The clerk measured total length (TL) of harvested fish to the nearest 0.1 inch during interviews. Fish lengths were converted to millimeters (mm) for data entry and analysis with the Creel Analysis Software (CAS; Soupir and Brown, 2002).

Lake Zumbro

The lake was treated as a roving type survey, with interviews and counts conducted by boat. Counts and interviews included "boat" and "bank" anglers. Interviews could be conducted for either incomplete or complete trips. On the lake, the clerk completed a count in either an up or down lake pattern during each sampling day. Counts were conducted either at the beginning or end of the shift, determined by either a late or early shift start. Each count took approximately 20 minutes to complete. A summary of strata statistics for the lake is presented in Table 2. Data from the lake creel survey were entered into the CAS program and analyzed as a "Roving" type survey.

Zumbro River

The river portion of the creel utilized an access-based design. Five access sites, or "stations" were identified, including the plunge pool below the dam. All stations were sampled each sampling day. The plunge pool has historically been a very high use fishing area but recent changes in ownership significantly curtailed public fishing access. Because of the limited public access, no sampling time was assigned for conducting interviews at the plunge pool. However, angling use was observed from an overlook owned by Rochester Public Utilities property at the dams' electrical generating station. Therefore, the only information collected from the plunge pool was counts of angler use (bank and boat anglers). Ten minutes each day were allotted to conduct counts at the plunge pool. The creel clerk spent approximately 50 minutes at each of the other four stations each day and counted and interviewed boat and bank anglers at each site. Boat anglers were counted if they started or ended their trip at that station or passed by it during the time spent at each site. Bank anglers were only counted if they were within

sight of the access point during the time period. This creel design likely underestimated bank angling pressure compared to previous creel surveys that included bank anglers anywhere they were observed along the river (Hayes 1988, Schmidt 2000). Interviews were conducted for either incomplete or complete trips. All anglers observed during the time spent at each site were included in the count, and the counts at each site were considered "instantaneous counts" for analysis purposes. Pressure estimates were calculated for each individual sampling site and summed for total pressure estimates. The river survey data was entered in the CAS program and analyzed as an "Aerial" type survey.

RESULTS AND DISCUSSION – Lake Zumbro

Angling Effort

Angling effort on Lake Zumbro was estimated for "boat" and "bank" angling (Table 3). Total estimated boat angling pressure (angler hours) during the creel survey period was 25,158 hours and estimated bank angling pressure was 5,312 hours. Total estimated fishing pressure per acre (boat and bank) on Lake Zumbro for the creel season was 50.3 hours/acre. For comparison, the statewide mean on similar lakes (Lake Class 25, 1951 - 2003) for the "summer" period is 33.1 hours/acre (Cook and Younk 1994). Bank anglers were not separated by type (i.e. residential docks versus public fishing areas). The lake has a high number of homes with docks and only a few public shore-angling areas, so it is assumed most bank angling pressure was from homeowner's docks.

Anglers targeting "Any species" accounted for most of the fishing pressure (28%), followed by anglers targeting bluegill and black crappie specifically (22% and 19%, respectively). Anglers targeting "panfish" collectively accounted for an additional 12%

of pressure. Anglers targeting "bass" (smallmouth and largemouth combined) accounted for an additional 12% of the targeted pressure. Only one angler was targeting muskellunge at the time of the interview, although other anglers indicated they have fished for them in the lake. One party of anglers indicated they were targeting walleye, which are not present in the lake. Primary and secondary species sought are presented in Tables 4 and 5.

Catch and Harvest

Catch rates of all anglers for bluegill and black crappie were 0.61 and 0.25 fish per hour, respectively. Catch rates for anglers specifically targeting bluegill were 3.77/hr and 1.48/hr for anglers targeting black crappie. Anglers often lumped smallmouth and largemouth bass species together during interviews and catch rates of all anglers for "bass spp." was 0.13 fish per hour. Catch rates of all anglers for smallmouth and largemouth individually were 0.12 and 0.05 fish per hour, respectively. Catch rates of anglers targeting "bass spp." were 1.41 fish per hour. Catch rates of anglers specifically targeting bass were higher for smallmouth bass (1.24/hr) than for largemouth bass (0.61/hr). Catch rates were generally higher for boat anglers than bank anglers. Angler catch, harvest and release rates and comparison to the Lake Class 25 "summer" mean are presented in Tables 6 - 8.

Bluegill and black crappie accounted for the largest portion of the harvest during the summer creel season (Tables 9, 10). Anglers caught an estimated 18,329 bluegill during the creel season, of which an estimated 9,275 (51%) were harvested. Mean length of harvested bluegill was 186 mm (7.3 inches). An estimated 6,980 black crappie were caught and the harvest estimate was 3,717 fish (53%). Mean length of harvested black

crappie was 250 mm (9.8 inches). Length distribution and mean lengths and weights of harvested fish are presented in Tables 11 and 12.

Angler Demographics

Information was collected regarding angler age, gender and distance traveled (Appendix A). Males comprised 80% of anglers and nearly 70% of the anglers were between the ages of 21 and 50. Nearly 50% of the anglers were from Rochester, MN.

Angling Questions

Anglers were asked a series of questions regarding the muskellunge fishery in Lake Zumbro (Appendix B). Question 1 asked if the anglers knew muskellunge were present/stocked in Lake Zumbro. A "No" response resulted in no further questions. If anglers responded "Yes", they were then asked if they had ever fished for muskellunge in Lake Zumbro. Approximately 2/3 of the anglers interviewed knew that muskellunge had been stocked. Of the anglers who knew they were present, approximately 10% had fished for muskellunge. Anglers that indicated they had fished for muskellunge were then asked if they had ever caught a muskellunge in Lake Zumbro. Nine percent of anglers who said they had specifically fished for muskellunge indicated they had caught at least one muskellunge in Lake Zumbro.

RESULTS AND DISCUSSION – Zumbro River

Angling Effort

Angling effort by "boat" and "bank" anglers was estimated for each station on the surveyed reach of the Zumbro River. Total estimated fishing pressure (all stations)

during the creel survey period was 2,625 angler-hours from boat anglers and 2,789 angler-hours from bank anglers. Bank angling estimates only included anglers in the immediate vicinity of each sampling station. Since the clerk was unable to contact anglers in the plunge pool the only information available from that site were angler counts. To calculate a pressure estimate for boat angling in the plunge pool, we used the mean number of anglers per boat calculated from a 1999 creel survey of that area (Schmidt 2000). Total fishing pressure estimated in the plunge pool station was 1,948 angler-hours, which was higher than estimates at all other creel stations (Table 14). However, the estimated fishing pressure in the plunge pool station was substantially lower than observed in previous creel surveys. Hayes (1988), estimated fishing pressure in the plunge pool station during the late 1980's ranging from 6,000 to 9,000 angler-hours for the creel season. A creel survey in 1999 estimated total fishing pressure in the plunge pool of 5,247 angler-hours (Schmidt 2000). The reduction in fishing pressure in the plunge pool is the result of ownership changes and operating procedures at the private campground bordering this area. The total fishing pressure estimate for the entire surveyed reach for the season was 5,414 hours.

Anglers targeting smallmouth bass accounted for most of the fishing pressure (52%), and anglers fishing for "Any species" accounted for an additional 25%. Of the anglers that indicated they were fishing for a secondary species, 67% indicated they were targeting channel catfish. Angler's species preferences are presented in Table 15.

Catch and Harvest

Catch, harvest, and release rates were calculated for all stations except the plunge pool (Table 16). Overall catch rates for all fish ranged from 0.17 to 1.33 fish per hour.

Catch rates of smallmouth bass for all anglers ranged from 0.17 to 1.15 fish per hour. Catch rates of anglers specifically targeting smallmouth bass ranged from 2.17 to 4.72 fish per hour. Anglers caught an estimated 1,917 smallmouth bass during the survey, with another 450 "bass spp." reported (Table 17). Largemouth bass are present in low numbers in the river, but it's likely that most of the "bass spp." reported were smallmouth bass. An estimated 31 muskellunge were caught during the survey period. Of the anglers interviewed, only sucker species were reported harvested during the creel survey.

Angler Demographics

Information was collected regarding angler age, gender and distance traveled (Appendix D). Angler demographics were similar to those on the lake. Males comprised 86% of the anglers, 81% of the anglers were between the ages of 21 and 50, and a high number were from the local area. Over 40% of the anglers were from Rochester, MN.

Angling Questions

Anglers were asked a series of questions regarding the fishery in the Zumbro River (Appendix E). Question #1 asked if the anglers were aware of the catch and release regulation for smallmouth bass from the dam downstream to Zumbro Falls. If anglers responded "Yes", they were then asked their opinion of the regulation (Like, Dislike, Don't care). In response to Question 1, 76% of the anglers surveyed were aware of the regulation. Of the anglers that were asked Question 2 (only anglers that were aware of the regulation), 95% responded that they "Liked" the regulation. No anglers "Disliked" it and 5% "Didn't Care". Question 3 asked anglers if they have ever fished for muskellunge in the Zumbro River. Nearly one-third of the anglers indicated they had fished for muskellunge.

Figure 1. Map of Study Area. Lake Zumbro and Zumbro River Creel Survey.

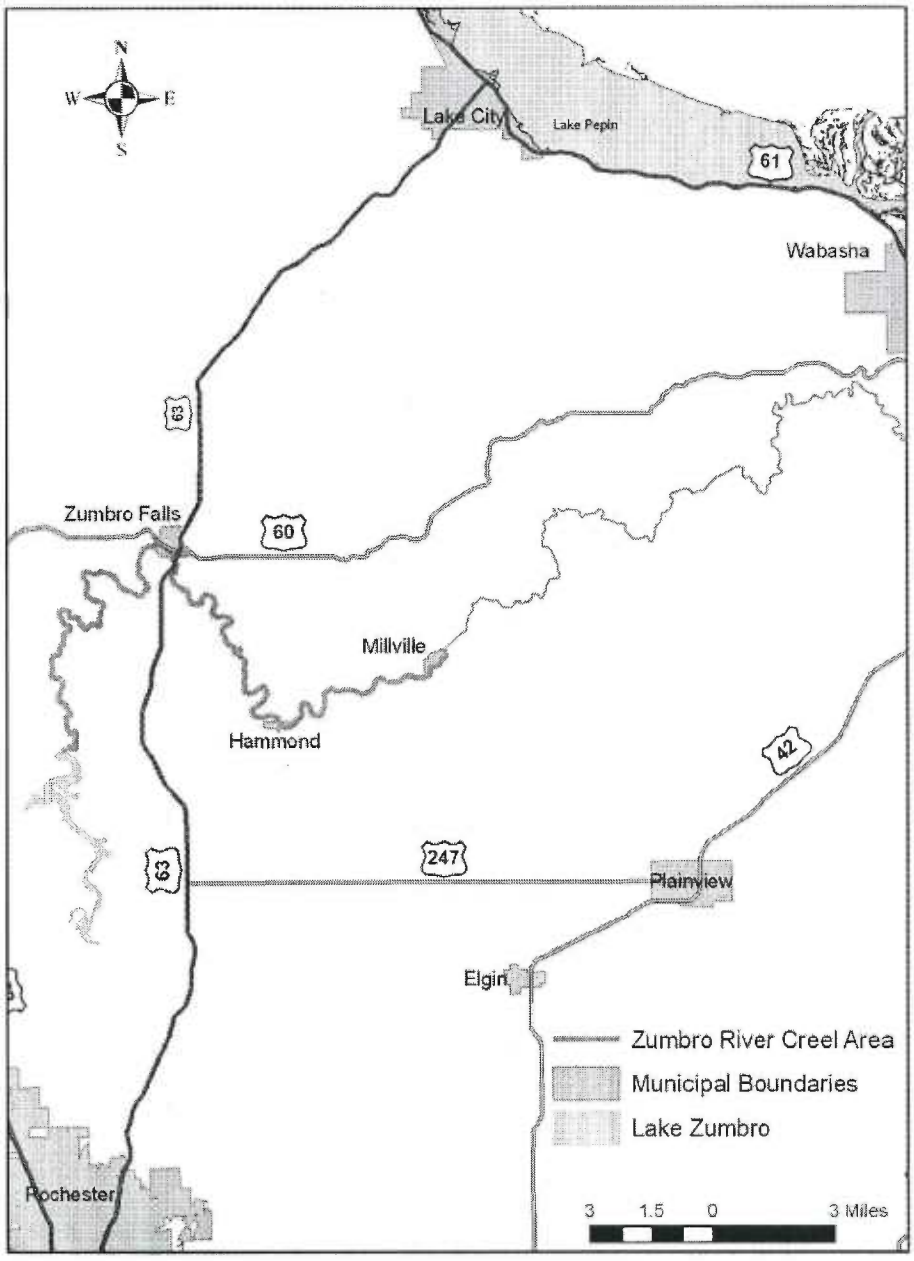

Figure 2. Lake Zumbro.

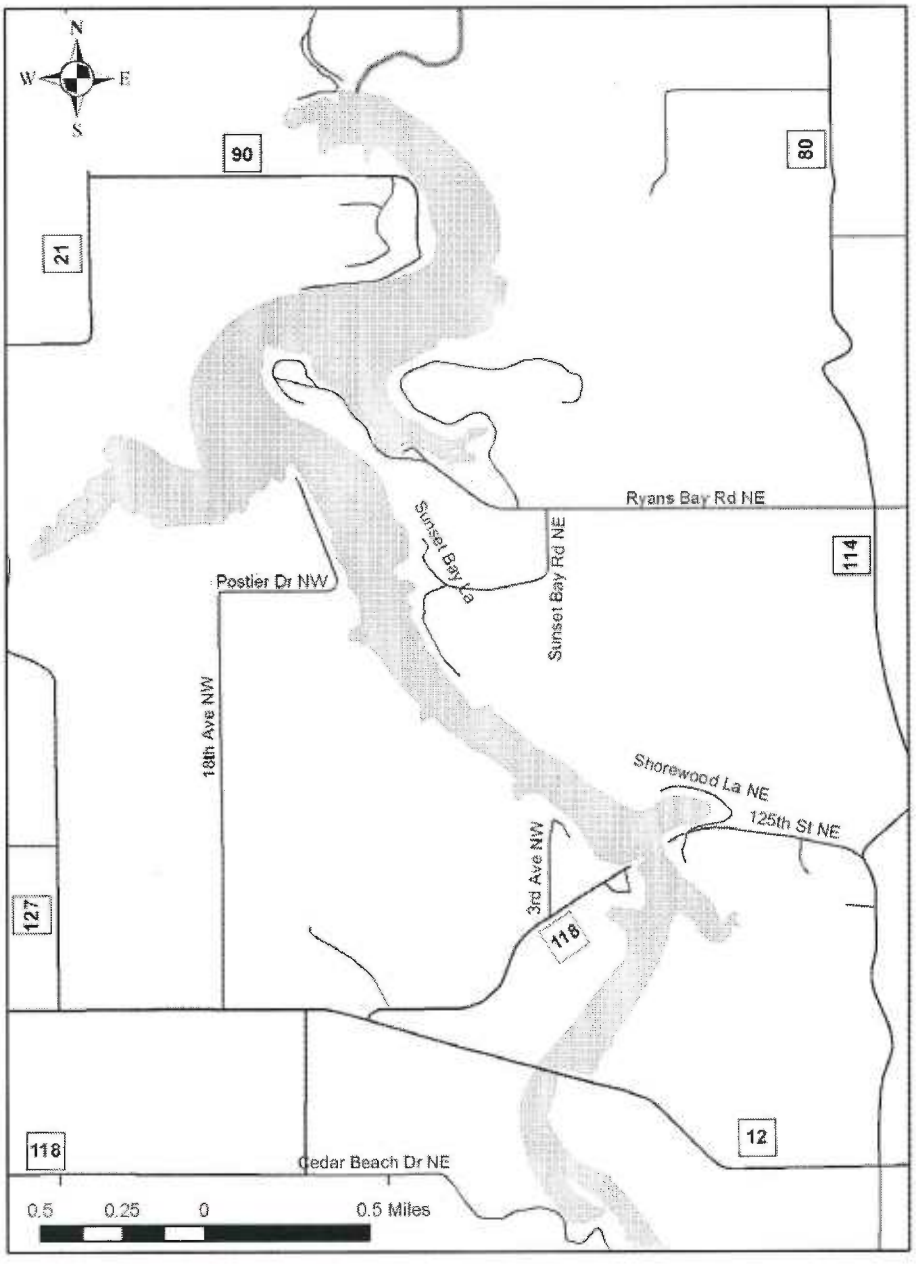

Figure 3. Zumbro River Creel Area and Station Locations

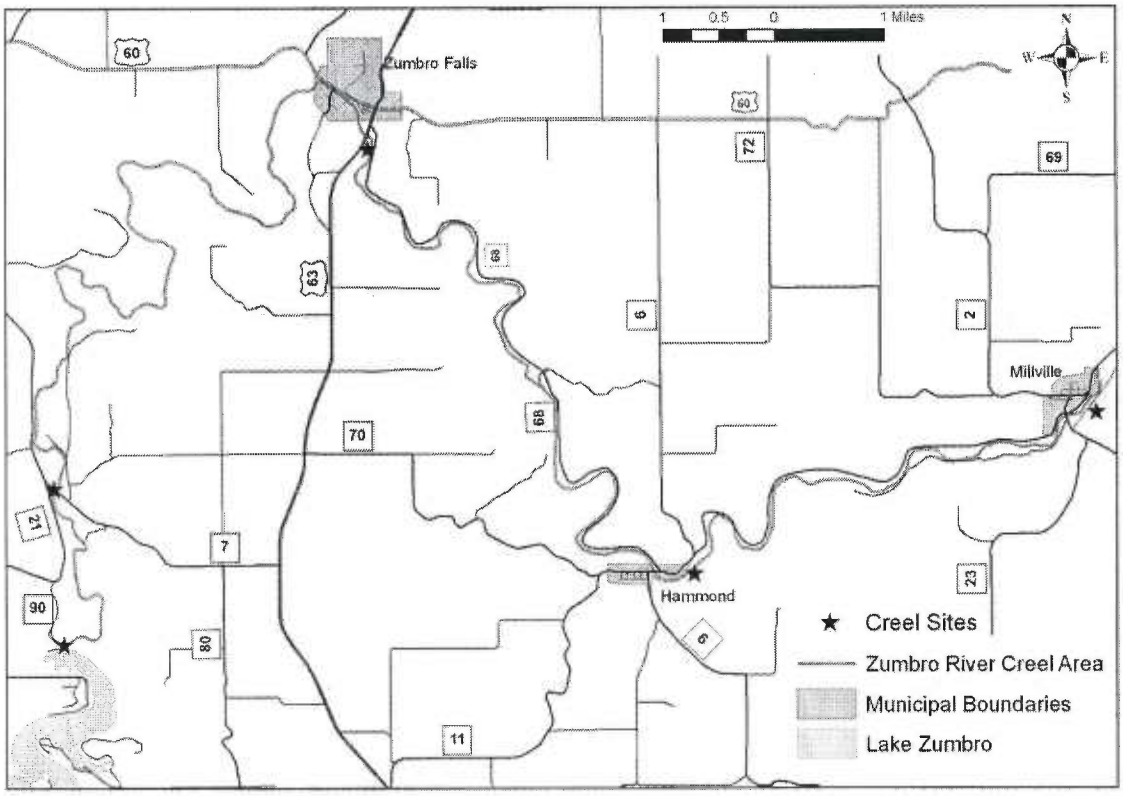

Table 1. Selected characteristics of Lake Zumbro, MN.

Characteristic	
DOW #	55-0004-00
Lake class	25
Total surface area (acres)	606
Maximum depth (ft)	43
Percent littoral area	43

Table 2. Summary of strata statistics for the summer creel survey of Lake Zumbro, MN. May 11 – August 21, 2007. Standard errors are in parentheses.

	Stratum (Season)
Start date of stratum	05/11/07
End date of stratum	08/21/07
Length of fishing day (hr)	14
Number days in stratum	103
Number Weekdays sampled	41
Number Weekend/Holidays sampled	30
Number of counts	71
Boat anglers	
Angler hours	25,158 (2,735)
Mean party size	2.3 (0.2)
Number of interviews	260
Number of completed trips	3
Mean completed trip length (hrs)	4.69 (0.60)
Bank anglers	
Anglers hours	5,312 (710)
Mean party size	1.8 (0.4)
Number of interviews	17
Number of completed trips	0 (---)
Mean completed trip length (hrs)	---

Table 3. Creel season fishing pressure estimates for Lake Zumbro, MN. May 11 – August 21, 2007.

Season		
Angler Type	Angler-hours	SE
Boat anglers	25,158	2,735
Bank anglers	5,312	710
All anglers	30,470	3,005

	Agler-hours per acre	SE
Boat anglers	41.5	4.5
Bank anglers	8.8	1.2
All anglers	50.3	5.0

Table 4. Primary and secondary species sought by anglers (%) in Lake Zumbro, MN. May 11 – August 21, 2007.

	Percent (%)	
Species	**Primary**	**Secondary**
Any species	28	4
Bass spp.	12	10
Black crappie	19	34
Bluegill	22	30
Channel catfish	1	1
Common carp	0	1
Largemouth bass	1	1
Muskie	<1	0
Northern pike	2	7
Panfish	12	6
Smallmouth bass	2	1
Sucker spp.	1	5
Walleye	<1	0
Interviews (n)		682
Secondary Responses		217
Total Responses		899

Table 5. Primary and secondary species sought (%) by angler type (boat and bank) in Lake Zumbro, MN. May 11 – August 21, 2007.

Boat anglers			Bank anglers		
Species	**Primary**	**Secondary**	**Species**	**Primary**	**Secondary**
Any spp.	28	4	Any spp.	18	-
Bass spp.	13	10	Bass spp.	5	-
Black crappie	19	34	Black crappie	15	29
Bluegill	23	30	Bluegill	5	42
Channel catfish	<1	1	Channel catfish	8	-
Common carp	-	<1	Northern pike	3	29
Largemouth bass	1	1	Panfish	31	-
Muskie	<1	0	Walleye	15	-
Northern pike	2	6			
Panfish	10	6			
Smallmouth bass	2	1			
Sucker spp.	1	5			
Interviews (n)	643		Interviews (n)	39	
Secondary Responses	210		Secondary Responses	7	
Total Responses	853		Total Responses	46	

Table 6. Angler catch, harvest and release rates (fish/hour) for Lake Zumbro, MN. May 11 – August 21, 2007.

		Catch		Harvest		Release	
Estimate Type	**Species**	**Catch/hour**	**SE**	**Harvest/hour**	**SE**	**Release/hour**	**SE**
All Anglers	Bass spp.	0.135	0.045	0.002	0.001	0.133	0.045
	Black bullhead	0.013	0.009	0.001	0.002	0.012	0.005
	Black crappie	0.229	0.108	0.122	0.053	0.107	0.076
	Bluegill	0.602	0.160	0.304	0.094	0.297	0.066
	Channel catfish	0.033	0.013	0.002	0.001	0.031	0.013
	Largemouth bass	0.043	0.018	0.002	0.002	0.041	0.017
	Northern pike	0.013	0.008	0.003	0.002	0.010	0.006
	Panfish	0.032	0.032	0.000	0.000	0.032	0.032
	Smallmouth bass	0.119	0.031	0.002	0.001	0.117	0.031
	Sucker spp.	0.018	0.011	0.000	0.000	0.018	0.011
	Overall	1.238	0.295	0.438	0.127	0.801	0.175
Targeting anglers	Bass spp.	1.408	2.831	0.000	0.000	1.408	2.831
	Black crappie	1.463	1.362	0.798	1.137	0.665	0.722
	Bluegill	3.770	3.881	2.083	3.049	1.687	2.269
	Channel catfish	0.401	0.711	0.134	0.237	0.267	0.474
	Largemouth bass	0.611	1.303	0.000	0.000	0.611	1.303
	Northern pike	0.127	0.231	0.016	0.012	0.111	0.230
	Smallmouth bass	1.242	1.988	0.031	0.046	1.212	2.022
	Sucker spp.	0.064	0.076	0.000	0.000	0.064	0.076

Table 7. Catch, harvest and release rates (fish/hour) by angler type for Lake Zumbro, MN. May 11- August 21, 2007.

		Catch		Harvest		Release	
Type of Fishing	Species	Catch/hour	SE	Harvest/hour	SE	Release/hour	SE
Boat anglers	Bass spp.	0.16	0.06	0.00	0.00	0.16	0.06
	Black bullhead	0.02	0.01	0.00	0.00	0.01	0.01
	Black crappie	0.27	0.10	0.14	0.06	0.12	0.05
	Bluegill	0.72	0.23	0.37	0.12	0.36	0.12
	Channel catfish	0.02	0.01	0.00	0.00	0.02	0.01
	Largemouth bass	0.05	0.02	0.00	0.00	0.05	0.02
	Northern pike	0.01	0.01	0.00	0.00	0.01	0.01
	Panfish	0.04	0.04	0.00	0.00	0.04	0.04
	Smallmouth bass	0.14	0.04	0.00	0.00	0.14	0.04
	Sucker spp.	0.02	0.02	0.00	0.00	0.02	0.02
	Overall	1.46	0.38	0.52	0.15	0.94	0.25
Bank anglers	Black crappie	0.04	---	0.02	0.01	0.02	0.01
	Bluegill	0.02	0.01	0.01	0.02	0.01	0.00
	Channel catfish	0.08	0.06	0.00	0.00	0.08	0.06
	Largemouth bass	0.01	0.02	0.00	0.00	0.01	0.02
	Northern pike	0.01	0.01	0.00	0.00	0.01	0.01
	Smallmouth bass	0.01	0.01	0.00	0.00	0.01	0.01
	Overall	0.18	0.07	0.04	0.02	0.14	0.06

Table 8. Comparison of angler catch and harvest rates (fish/hour) for Lake Zumbro, MN. May 11 – August 21, 2007, to Statewide Lake Class 25 Summer Mean.

		Lake Zumbro mean		Lake class mean	
Estimate type	Species	Catch/hour	Harvest/hour	Catch/hour	Harvest/hour
All Anglers	Black bullhead	0.013	0.001	0.001	0.012
	Black crappie	0.229	0.122	0.257	0.102
	Bluegill	0.602	0.304	0.872	0.345
	Channel catfish	0.033	0.002	0.081	0.024
	Largemouth bass	0.043	0.002	0.122	0.026
	Northern pike	0.013	0.003	0.140	0.091
	Smallmouth bass	0.119	0.002	0.012	0.002
Targeting Anglers	Black crappie	1.463	0.798	0.941	0.547
	Bluegill	3.770	2.083	2.059	1.324
	Channel catfish	0.401	0.134	0.365	0.305
	Largemouth bass	0.611	0.000	0.387	0.102
	Northern pike	0.127	0.016	0.323	0.129
	Smallmouth bass	1.242	0.031	0.172	0.004

Table 9. Estimated numbers of fish caught, harvested and released for creel season, Lake Zumbro, MN. May 11 – August 21, 2007.

		Catch		Harvest		Release	
Estimate Type	**Species**	**N**	**SE**	**N**	**SE**	**N**	**SE**
All Anglers	Bass spp.	4,109	1,146	49	36	4,060	1,144
	Black bullhead	386	215	21	21	365	214
	Black crappie	6,980	1,906	3,717	1,085	3,263	1,807
	Bluegill	18,329	3,568	9,275	2,254	9,055	1,315
	Channel catfish	1,014	346	74	38	940	340
	Largemouth bass	1,297	419	53	30	1,244	412
	Northern pike	398	118	91	47	307	92
	Panfish	985	983	0	0	985	983
	Smallmouth bass	3,622	813	53	31	3,569	809
	Sucker spp.	547	176	0	0	547	176
	White bass	21	21	0	0	21	21
	Yellow perch	37	27	0	0	37	27
	Overall	37,726	5,256	13,333	2,819	24,393	2,679

Table 10. Estimated numbers of fish caught, harvested and released by angler type for creel season, Lake Zumbro, MN. May 11 – August 21, 2007.

		Catch		Harvest		Release	
Type of Fishing	**Species**	**N**	**SE**	**N**	**SE**	**N**	**SE**
Boat anglers	Bass spp.	4,109	1,146	49	36	4,060	1,144
	Black bullhead	386	215	21	21	365	214
	Black crappie	6,741	1,377	3,597	975	3,144	778
	Bluegill	18,210	3,751	9,195	2,312	9,015	1,857
	Channel catfish	571	169	74	38	497	157
	Largemouth bass	1,218	410	53	30	1,164	404
	Northern pike	358	117	91	47	267	91
	Panfish	985	983	0	0	985	983
	Smallmouth bass	3,582	811	53	31	3,529	807
	Sucker spp.	547	176	0	0	547	176
	White bass	21	21	0	0	21	21
	Yellow perch	37	27	0	0	37	27
	Overall	36,765	5,626	13,134	2,739	23,631	3,653
Bank anglers	Black crappie	239	218	119	73	119	155
	Bluegill	119	50	80	31	40	54
	Channel catfish	443	302	0	0	443	302
	Largemouth bass	80	83	0	0	80	83
	Northern pike	40	16	0	0	40	16
	Smallmouth bass	40	52	0	0	40	52
	Overall	960	419	199	62	761	391

Table 11. Length frequency distribution of fish harvested and measured, Lake Zumbro, MN. May 11 – August 21, 2007.

Length Group (mm)	Black crappie	Bluegill	Channel catfish	Largemouth bass	Northern pike	Smallmouth bass
110 - 119						
120 - 129						
130 - 139		1				
140 - 149		4				
150 - 159		5				
160 - 169		7				
170 - 179		15				
180 - 189		15				
190 - 199	1	35				
200 - 209	6	17				
210 - 219	5	2				
220 - 229	6	2				
230 - 239	9					
240 - 249	8					
250 - 259	10					
260 - 269	14		1			
270 - 279	7					
280 - 289	3					
290 - 299	4					
300 - 324	1			1		1
325 - 349						
350 - 374				1		1
375 - 399			1			1
400 - 424						
425 - 449						
450 - 474			1	1		
475 - 499						
500 - 524						
525 - 549					1	
550 - 574					1	
575 - 599						
600 - 624					1	
625 - 649						
Total (N)	74	103	3	3	3	3
Mean length (mm)	250	186	372	377	568	352
Standard Error (SE)	3.1	1.8	55.7	43.2	22.6	18.3
Minimum length (mm)	196	130	267	315	533	318
Maximum length (mm)	305	229	457	460	610	381
Mean length (inches)	9.8	7.3	14.6	14.8	22.4	13.9

Table 12. Mean length and estimated mean weight of harvested fish, Lake Zumbro, MN. May 11 – August 21, 2007.

	Length		Estimated Weight	
Species	**mm**	**inches**	**grams**	**pounds**
Black crappie	250	9.8	277	0.61
Bluegill	186	7.3	175	0.39
Channel catfish	372	14.6	509	1.12
Largemouth bass	377	14.8	1,058	2.33
Northern pike	568	22.4	1,267	2.79
Smallmouth bass	352	13.9	689	1.52

Table 13. Summary of strata statistics for the summer creel survey of the Zumbro River, MN. May 11 – August 21, 2007. Standard errors are in parentheses.

Parameter	Stratum (Season)
Start date of stratum	05/11/07
End date of stratum	08/21/07
Length of fishing day (hr)	14
Number days in stratum	103
Number Weekdays sampled	41
Number Weekend/Holidays sampled	30
Number of counts	71
Boat anglers	
Angler hours	2625 (1055)
Mean party size	2.9 (0.3)
Number of interviews	8
Number of completed trips	8
Mean completed trip length (hrs)	3.9 (---)
Bank anglers	
Anglers hours	2789 (724)
Mean party size	1.6 (0.3)
Number of interviews	8
Number of completed trips	8
Mean completed trip length (hrs)	1.5 (---)

Table 14. Creel season fishing pressure estimates by site for Zumbro River, MN. May 11 – August 21, 2007.

	Angler hours	SE
Plunge Pool	1948	364
Green bridge	1673	355
Zumbro Falls	762	309
Hammond	656	197
Millville	375	216
Total	5414	1441

Table 15. Primary and secondary species sought by anglers (%) in Zumbro River, MN. May 11 – August 21, 2007.

	Percent (%)	
Species	**Primary**	**Secondary**
Anything	25	
Bass spp.	6	
Musky	3	
Sauger	8	
Smallmouth bass	52	
Sucker spp.	6	
Channel Catfish		67
Trout		33
Interviews (n)		36
Secondary responses		3
Total responses		39

Table 16. Angler catch, harvest and release rates (fish/hour) for Zumbro River, MN. May 11 – August 21, 2007.

Station		**Catch**		**Harvest**		**Release**	
Green Bridge	**Species**	**Catch/hour**	**SE**	**Harvest/hour**	**SE**	**Release/hour**	**SE**
All Anglers	Bass spp.	0.08	0.09	0.00	0.00	0.08	0.09
	Muskellunge	0.01	---	0.00	---	0.01	---
	Smallmouth bass	0.39	0.56	0.00	0.00	0.39	0.56
	White bass	0.05	---	0.00	---	0.05	---
Overall		0.53	---	0.00	0.00	0.53	---
Targeting anglers	Bass spp.	1.82	---	0.00	---	1.82	---
	Smallmouth bass	2.17	0.32	0.00	0.00	2.17	0.32
Zumbro Fall							
All Anglers	Bass spp.	0.42	---	0.00	---	0.42	---
	Muskellunge	0.01	---	0.00	---	0.01	---
	Smallmouth bass	0.59	---	0.00	---	0.59	---
Overall		1.02	---	0.00	---	1.02	---
Targeting anglers	Smallmouth bass	4.72	---	0.00	---	4.72	---
Hammond							
All Anglers	Bluegill	0.07	0.06	0.00	0.00	0.07	0.06
	Smallmouth bass	1.15	4.28	0.00	0.00	1.15	4.28
	Sucker spp.	0.12	---	0.12	---	0.00	---
Overall		1.34	3.05	0.12	0.04	1.22	2.90
Targeting anglers	Sucker spp	1.33	---	1.33	---	0.00	---
	Smallmouth bass	3.63	3.26	0.00	0.00	3.63	3.26
Millville							
All Anglers	Smallmouth bass	0.17	---	0.00	---	0.17	---
Overall		0.17	---	0.00	---	0.17	---
Targeting anglers	Smallmouth bass	4.15	---	0.00	---	4.15	---

Table 17. Estimated numbers of fish caught, harvested and released for creel season, Zumbro River, MN. May 11 – August 21, 2007.

		Catch		Harvest		Release	
Location	**Species**	**N**	**SE**	**N**	**SE**	**N**	**SE**
Green Bridge	Bass spp.	130	146	0	0	130	146
	Muskellunge	22	---	0	---	22	---
	Smallmouth bass	653	385	0	0	653	385
	White bass	89	---	0	---	89	---
Total		894	404	0	0	893	404
Zumbro Fall	Bass spp.	320	---	0	---	320	---
	Muskellunge	9	---	0	---	9	---
	Smallmouth bass	446	---	0	---	446	---
Total		775	---	0	---	775	---
Hammond	Bluegill	44	39	0	0	44	39
	Smallmouth bass	754	313	0	0	754	313
	Sucker spp.	82	---	82	---	0	---
Total		880	339	82	0	798	339
Millville	Smallmouth bass	64	---	0	---	64	---
Total		64	---	0	---	64	---
Total All Sites	Bass spp.	450	---	0	---	450	---
	Bluegill	44	---	0	---	44	---
	Muskellunge	31	---	0	---	31	---
	Smallmouth bass	1917	---	0	---	1917	---
	White bass	89	---	0	---	89	---
	Sucker spp.	82	---	82	---	0	---
Total		2613	---	82	---	2531	---

APPENDICES

Appendix A. Angler demographics: Angler Gender (%) and % per Age Group, Lake Zumbro, MN. May 11 – August 21, 2007.

Male	Female
80	20

Age group	% of Total
0 - 10	8
11 - 20	12
21 - 30	31
31 - 40	21
41 - 50	17
51 - 60	10
61 +	1

Appendix B. Questions/responses (% of Total) to muskellunge angling questions, Lake Zumbro, MN. May 11 – August 21, 2007. N = 381.

Q. 1). Are you aware that muskellunge have been stocked into Lake Zumbro?
Yes – 67%
No – 33%

Q. 2). If yes, have you ever fished for muskellunge in Lake Zumbro?
Yes – 10%
No – 90%

Q. 3). If yes, have you ever caught a muskellunge in Lake Zumbro?
Yes – 9%
No – 91%

Appendix C. Regression parameters for length-weight regression equations used to estimate fish weight from total length measurements. Equation takes the form: $\log_{10} W = a + b \log_{10} TL$, where W is weight (gm) and TL is total length (mm).

Species	Factor a	Factor b
Black crappie *	-5.1776	3.1708
Bluegill *	-5.4755	3.3934
Channel catfish	-5.9664	3.3485
Largemouth bass	-5.2814	3.1966
Northern pike	-4.9535	2.9241
Smallmouth bass	-5.2390	3.1549

* Bluegill and black crappie parameters were calculated from fish captured in Lake Zumbro during a survey in summer 2007. Regression parameters for other species are from Lake Pepin, MN. Sample size from Lake Zumbro was considered to low for other species.

Appendix D. Angler demographics: Angler Gender (%) and % per Age Group, Zumbro River, MN. May 11 – August 21, 2007.

Male	Female
86	14

Age group	% of Total
0 - 10	5
11 - 20	11
21 - 30	31
31 - 40	39
41 - 50	11
51 - 60	3
61 +	-

Appendix E. Responses to angling questions on the Zumbro River, MN. May 11 – August 21, 2007

Q. 1) Are you aware of the catch and release regulation for smallmouth bass on the Zumbro River from the dam downstream to Zumbro Falls? (Yes or No)

Q. 2) If Yes, What do you think of the regulation? (Like, Dislike, Don't Care)

Q. 3) Have you ever fished for muskellunge in the Zumbro River? (Yes or No)

		% (n)	% (n)	% (n)
	N	Yes	No	Don't Care
Question #1	25	76 (19)	24 (6)	
Question #2	19	95 (18)	0	5 (1)
Question #3	25	32 (8)	68 (17)	

ACKNOWLEDGEMENTS

I would like to thank the creel clerk Jessica Schein for collecting the survey data and Kevin Stauffer for editorial assistance and review. Jon Meerbeek's assistance with set-up and use of the CAS program was invaluable. I would especially like to thank Alan Schmidt for designing and initiating this creel survey.

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Soupir, C. A., and M.L. Brown. 2002. Creel Application Software (CAS), Creel survey data entry and analysis software. Pages 42 - 101 in Comprehensive evaluation and modification of the South Dakota angler creel program. South Dakota Department of Game, Fish, and Parks, Wildlife Division, Completion Report 02-10, Pierre.

Minnesota
F-29-R(P)-27
Study IV
Job 796
March 2008

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF FISH AND WILDLIFE

LAKE ZUMBRO AND LOWER ZUMBRO RIVER CREEL SURVEY

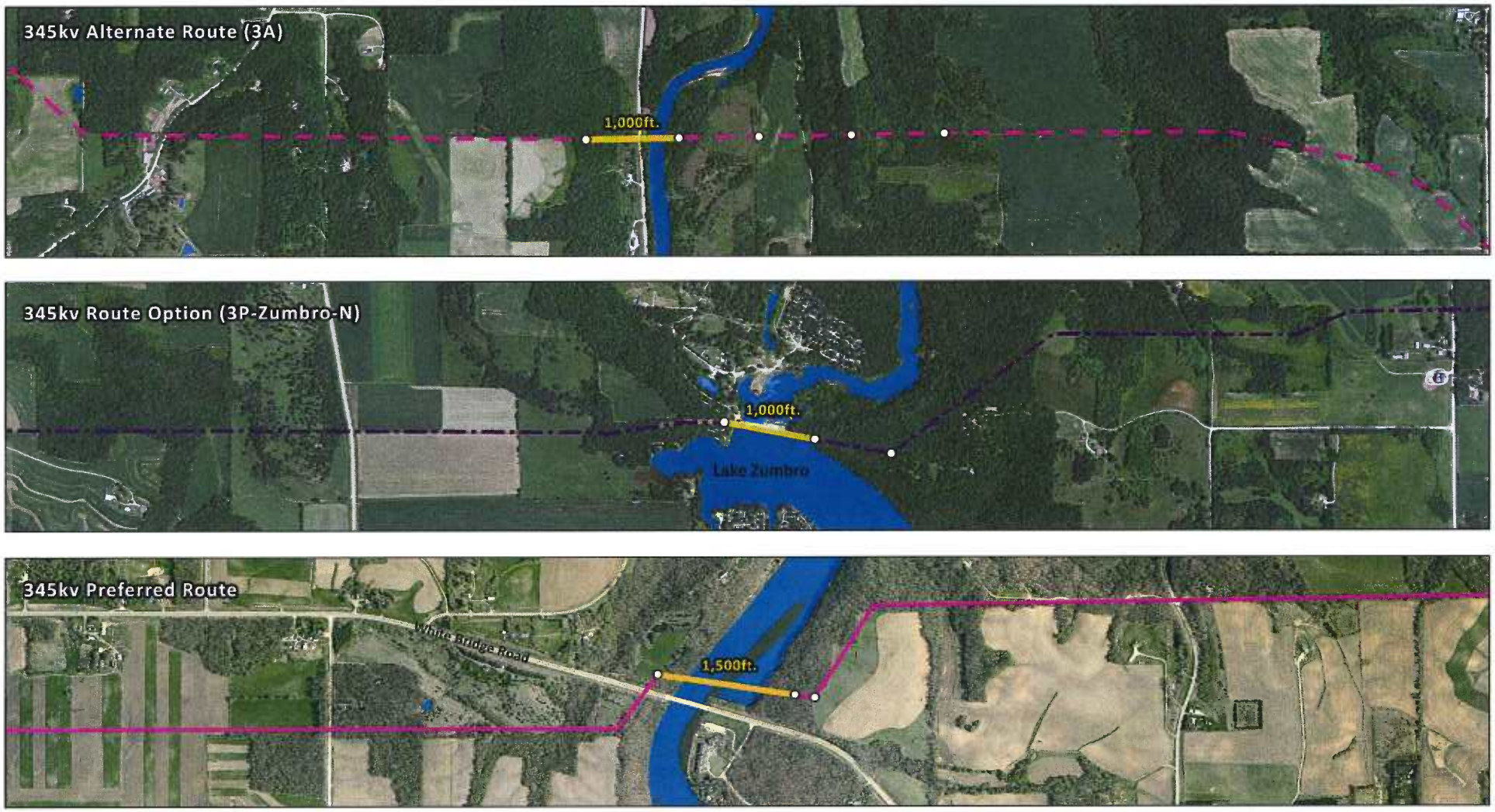
MAY – AUGUST 2007

Prepared by: Randy Binder — Fisheries Specialist — 5-28-08 — Date

Approved by: [signature] — Area Fisheries Supervisor — 5-28-08 — Date

Approved by: Dirk L. Peterson — Regional Fisheries Supervisor — 06/09/08 — Date

EXHIBIT 6



CapX2020 River Crossing Exhibit

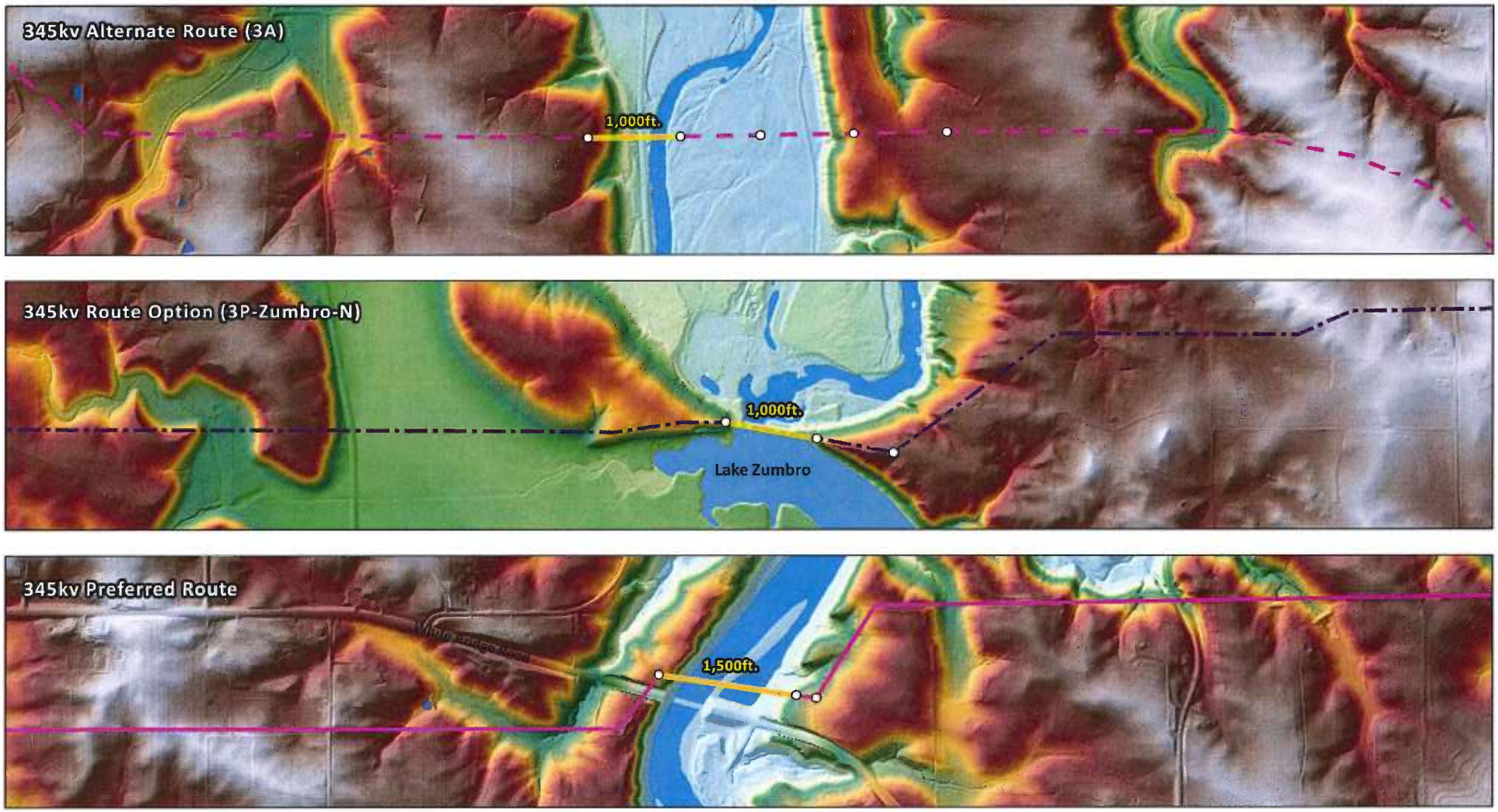
0 1,000 2,000
Feet

- Potential Pole Locations

CapX2020 Route Options (w/ .25mi Buffer)

- 345kV Preferred Route (3P)
- 345kV Alternative Route (3A)
- 345kV Route Option (3P-Zumbro-N)
- River Crossings

Date: 5/16/2011



CapX2020 River Crossing Exhibit

0 1,000 2,000
Feet

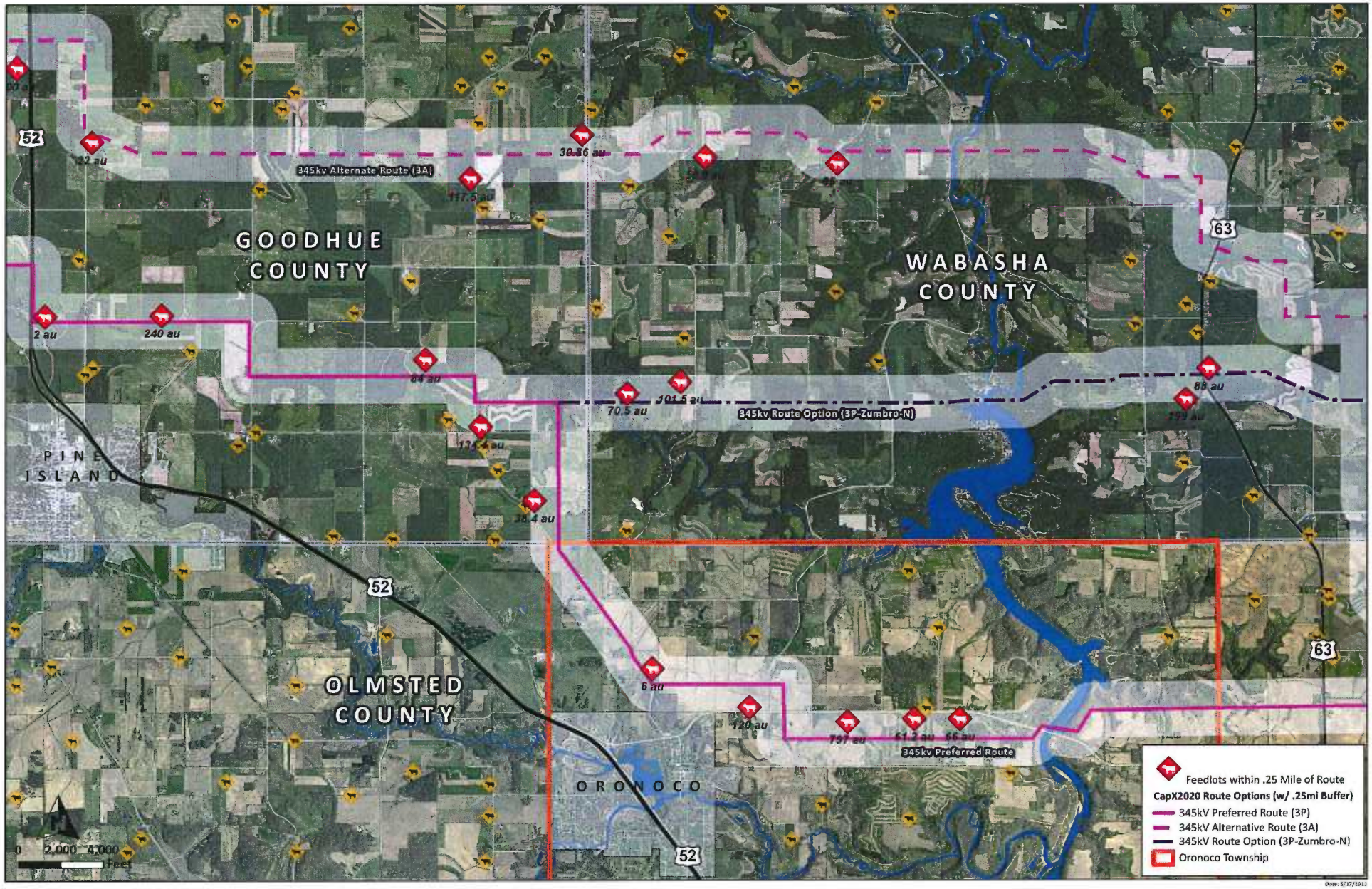
- Potential Pole Locations

CapX2020 Route Options (w/ .25mi Buffer)

- 345kV Preferred Route (3P)
- 345kV Alternative Route (3A)
- 345kV Route Option (3P-Zumbro-N)
- River Crossings

Date: 5/18/2011

EXHIBIT 7


GOODHUE COUNTY
WABASHA COUNTY
PINE ISLAND
OLMSTED COUNTY
ORONOCO
52
63
345kv Alternate Route (3A)
345kv Route Option (3P-Zumbro-N)
345kv Preferred Route
2 au
240 au
64 au
70.5 au
101.5 au
88 au
6 au
120 au
757 au
61.2 au
66 au
0 2,000 4,000 Feet
Feedlots within .25 Mile of Route
CapX2020 Route Options (w/ .25mi Buffer)
345kV Preferred Route (3P)
345kV Alternative Route (3A)
345kV Route Option (3P-Zumbro-N)
Oronoco Township

CAPX2020 3P ROUTE

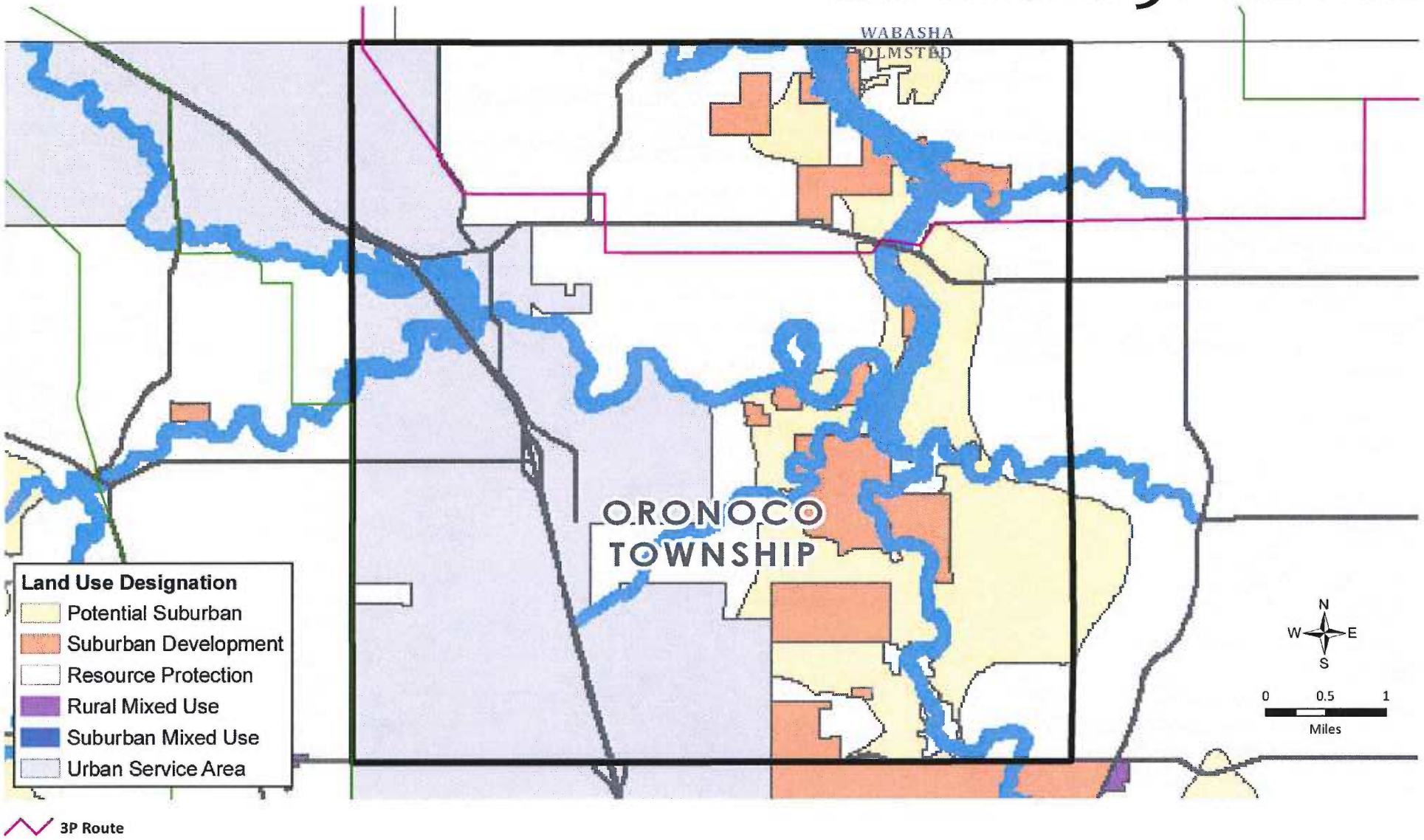
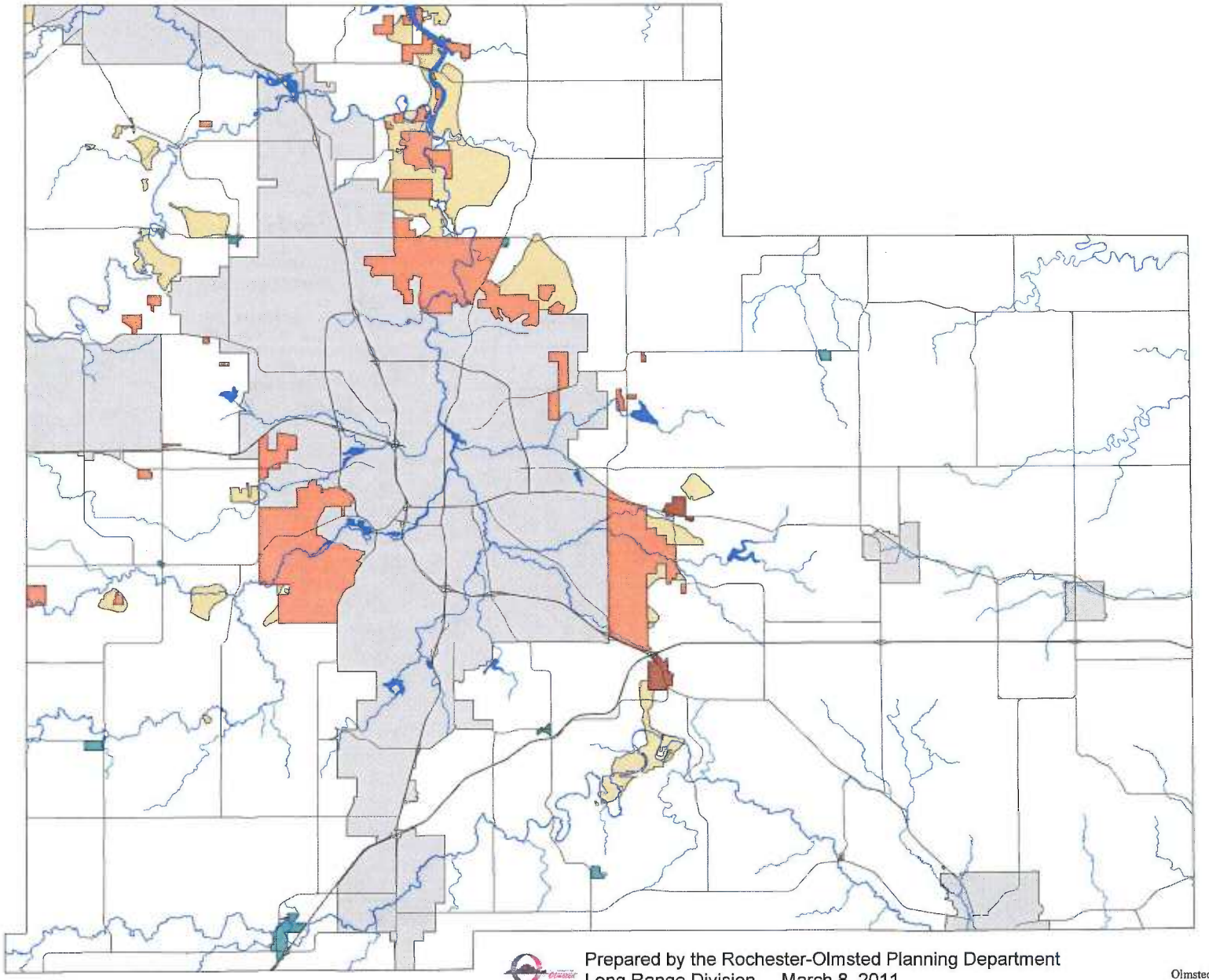


EXHIBIT 8

Olmsted County Future Land Use Map



Legend

- Major Roads
- Public Waters

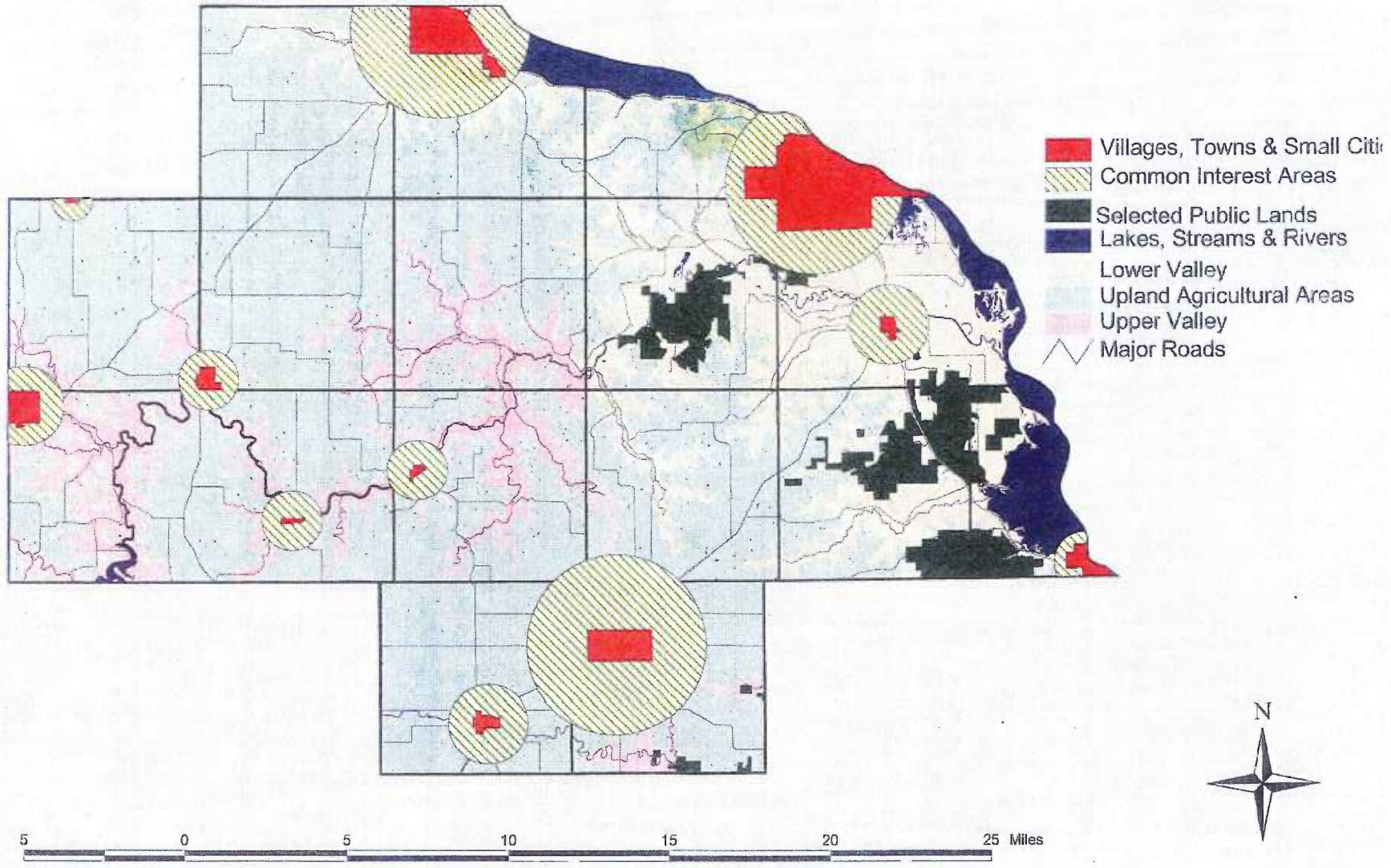
Land Use Designation

- Potential Suburban
- Suburban Development
- Resource Protection
- Rural Mixed Use
- Suburban Mixed Use
- Urban Service Area

0 1 2 4 6 8 10 12 Miles

Prepared by the Rochester-Olmsted Planning Department
Long Range Division March 8, 2011

Wabasha County Comprehensive Plan Map



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Here are the statistics you requested for green acres market value:

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County	Township/City	Year	Number of jurisdictions reporting	Total acres	Total estimated value	Estimated value per acre
Wabasha	Zumbro township	2009	1	239	627,224	2,624
Wabasha	Zumbro township	2010	1	239	623,228	2,608

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Olmsted	Oronoco township	2009	1	9,457	61,556,151	6,509
Olmsted	Oronoco township	2010	1	9,212	53,352,506	5,792

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