University of Minnesota Duluth
School of Business and Economics
Bureau of Business and Economic Research
Research Report

A Physical Inventory and Valuation of State-Owned Lands within the Boundary Waters Canoe Area Wilderness

Volume 1: Valuation Report, Volume 1 of 3

See also Volume 2: 2002 Appraisal Report, and
Volume 3: GIS Maps and Physical Inventory

January 2003

Minnesota State Legislature

BUREAU OF BUSINESS AND ECONOMIC RESEARCH

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BWCAW Land Valuation Project - January 2003

Letter of Transmittal

January 13, 2003

Minnesota State Legislature:

The Minnesota 81st Legislative Session passed an appropriations bill in the spring of May 2000 directing the University of Minnesota Duluth, acting through its Bureau of Economic Research (BBER) in the School of Business and Economics, to "conduct an inventory of state-owned land located within the Boundary Waters Canoe Area Wilderness (BWCAW) for the purpose of providing the legislature and state officers with more precise information as to the nature, extent, and value of this land." This inventory was to be submitted to the Legislature by January 15, 2002.

The status of the project was reviewed by the Minnesota Department of Natural Resources (DNR) and the state legislature in May 2001. An important motivation for the project was reiterated. Most of the state-owned tracts within the BWCAW have School Trust status, although they produce no School Trust revenue because no commercial extraction of natural resources is permitted within the BWCAW. One possible alternative to enhance School Trust fund revenues is for the state to exchange state lands it holds within the BWCAW for federal lands outside the BWCAW which would be subject to less restrictive uses. Before such an exchange can occur, however, the state-owned lands need to be appraised according to state and federal standards. Thus, while the legislature remained interested in an estimate of the value of all lands held within the BWCAW, it was seen as more important to appraise as many acres as possible. The lands actually appraised could then be used in a possible exchange.

The project's end date was extended one year to January 15, 2003 to allow for appraisals to be made in the summer of 2002, however, no additional funds were allocated to the project. This necessitated a new approach for the project in light of insufficient funds for the statistical approach that had been proposed (even with only 20 sample tracts).

On behalf of the members of the research team and our partners it is my pleasure to transmit this report, *A Physical Inventory and Valuation of State-Owned Lands within the Boundary Waters Canoe Area Wilderness, including three volumes as follows. Volume 1: Valuation Report, Volume 2: 2002 Appraisal Report, and Volume 3: GIS Maps and Physical Inventory.*

The UMD BBER appreciates the excellent cooperation of the Minnesota Department of Natural Resources, Division of Lands and Minerals, as well as the University of Minnesota Natural Resources Research Institute GIS Laboratory. BBER is looking forward to making a presentation of these findings and reports to the legislature at their convenience. Please contact the Bureau to arrange this presentation.

Respectfully,

Richard W. Lichty

Richard W. Lichty
Principal Investigator

A Physical Inventory and Valuation of State-Owned Lands within the Boundary Waters Canoe Area Wilderness

Volume 1: Valuation Report, Volume 1 of 3

Table of Contents

Index of Tables

PROJECT SUMMARY

Charge

Provide a legal and physical inventory and valuation of all state-owned lands within the Boundary Waters Canoe Area Wilderness.

Components

(1) Maps and an inventory of legal and physical characteristics of target lands produced by the Geographic Information Systems (GIS) lab of the Natural Resources Research Institute using land records provided by the Minnesota Department of Natural Resources.

(2) Complete and self-contained 2002 appraisal of approximately 5280 acres of target lands jointly produced by Tom Turner & Associates and Ramsland & Vigen, Inc.

(3) Valuation report produced by the University of Minnesota Duluth Bureau of Business and Economic Research using (1) and (2) above, as well as, appraisal results from 1978-1998 U.S. Forest Service appraisal reports.

Findings

Acreage of target lands by land category:

Land Category		*Description*	*Acres*
Waterfront	A	Islands	5,192.83
	B	Large Lake Frontage	13,161.24
	C	Large-Medium Lake Frontage	2,886.28
	D	Medium-Small Lake Frontage	4,554.14
	E	Small Lake Frontage	14,000.14
Non-Waterfront	F	Major Flowage	41,932.47
	G	Flowage Influence	14,869.63
	H	Wetlands	2,213.25
	I	Uplands	17,748.99
	A-I	Total	116,558.97

Source: UMD Bureau of Business and Economic Research

Estimated value of all target lands as of September 2002:

Based on 2002 Vigen-Turner appraisal:
$88.80 - $96.84 million with a "medium" value of $91.71 million

Based on 1978-1998 U.S. Forest Service appraisals:
$78.17 - $99.26 million with a "medium" value of $90.39 million

Acreage and 2002 valuation of target lands by county and land type:

		COUNTY			
		St. Louis	**Cook**	**Lake**	**TOTALS**
LAND TYPE	School Trust Fund	34672.1 **$29,478,531**	25982.7 **$19,737,211**	25640.7 **$23,088,565**	86295.5 **$72,304,306**
	University Trust Fund	390.2 **$172,760**	2070.0 **$1,672,878**	0.0 **$0**	2460.1 **$1,845,637**
	DNR Acquired	17804.5 **$10,198,843**	0.0 **$0**	0.0 **$0**	17804.5 **$10,198,843**
	County Tax Forfeit	3662.1 **$2,082,243**	2262.3 **$2,187,592**	4074.6 **$3,092,863**	9999.0 **$7,362,698**
	TOTALS	56528.7 **$41,932,376**	30315.0 **$23,597,680**	29715.3 **$26,181,427**	116559.0 **$91,711,483**

Source: UMD Bureau of Business and Economic Research

PROJECT HISTORY AND DEVELOPMENT

Project Charge

The Minnesota 81st Legislative Session passed an appropriations bill (Exhibit 1) in the spring of May 2000 directing the University of Minnesota Duluth, acting through its Bureau of Economic Research (BBER) in the School of Business and Economics, to "conduct an inventory of state-owned land located within the Boundary Waters Canoe Area Wilderness (BWCAW) for the purpose of providing the legislature and state officers with more precise information as to the nature, extent, and value of this land." More specifically, the inventory of all state-owned tracts within the BWCAW was to include: (1) legal description of each tract, (2) acreage of each tract, (3) a general description of any existing shoreline within the tract, (4) a general description of the predominant vegetation cover and topography of the tract, and (5) an estimated value for each tract based on established real estate valuation techniques (exclusive of mineral interests). This inventory was to be submitted to the Legislature by January 15, 2002.

The principal focus of this project was to be the completion of (5) above, an assessment of the fair market value of approximately 116,500 acres of state-owned lands comprising roughly 11.2% of all lands within the BWCAW. The "fair market value" is generally defined as that amount of cash, or terms equivalent to cash, for which in all probability the property would be sold by a knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy. Fair market value is usually determined with reference to the land's "highest and best use," that is, the highest valued use for which the property is adaptable and needed or likely to be needed in the near future.

How land is used determines the type and amount of goods and services generated by it. This includes goods such as minerals, timber, and agricultural products and services such as recreational, residential and/or recreational housing, industrial siting, and ecological. The value of these goods and services is based on how much people are willing and able to pay for them and ultimately determines the value of the land itself (Hartwick and Olewiler, 1998). For those goods and services which are marketable, such as timber or housing, these values may be determined from direct market observation. For others, such as recreational or ecological, other valuation techniques must often be employed.

This project proposed to assess two general use categories: development and natural (Pearce and Moran, 1994). Development uses would include logging, mining, agriculture, residential/recreational housing, commercial/industrial siting, golf courses, and other recreational facilities such as lodges. Natural uses are basically those that leave the land in its natural state. The benefits derived from this natural state include recreational (hiking, camping, wilderness experiences), ecological (habitat preservation, climate stabilization, bio-remediation of chemicals), and non-use (option, existence, and

bequest values). It seems reasonable to assume that the establishment of the BWCAW itself was based on the belief that these benefits were and are significant.

Clearly the value of both development and natural uses depends on the physical characteristics of the land itself (topology, productivity/fertility, geology, hydrology, and accessibility, to name a few). Thus, in order to complete (5) above (the valuation of state-owned lands), an inventory of the physical characteristics of these lands, (1) through (4) above, would be required.

Initial Project Plan and Methodology

Most development uses of land are private in nature in that only the owner or user receives any direct benefit from the ownership. In such cases, there are often well-established markets and observable sales. The proposed valuation methodology for assessing land for development purposes involved essentially two steps: (1) a professional appraisal of a systemized random sample of tracts and (2) development of a tract valuation model based on these appraisals and tract characteristic data collected from the physical inventory.

Depending upon how one wishes to define "contiguous," there are more than 750 contiguous tracts of state-owned land with the BWCAW. Appraising each and every one of these tracts was clearly beyond the budget of this project. Thus, only a representative sample of all these tracts was to be appraised. Instead of selecting a truly random sample (one in which each tract has an equal probability of being in the sample), it was considered desirable to choose a stratified random sample to be sure all relevant physical characteristics were being accounted for. In such a sample, certain characteristics of the tracts are identified and then the sample is chosen so that the proportion of tracts in the sample with a given characteristic is roughly the same as the proportion of all tracts that have that characteristic. For example, if 40% of all tracts had some sort of shoreline on them, then roughly 40% of the sample tracts should also have some shoreline on them. Depending on the tracts chosen and their size, 75-100 tracts would be needed to ensure a sample size of roughly 10% of the total acreage (which was considered desirable for statistical analysis). Thus, step (1) would require first an inventory of tract characteristics (acreage, topology, vegetation, accessibility, etc.) and then selection of the sample tracts to be appraised. The chosen tracts would then be professionally appraised according to the *Uniform Standards of Professional Appraisal Practice* (USPAP), *Uniform Standards for Federal Land Acquisitions* (USFLA) and Minnesota state statute, including on-site inspection of each sample tract. It was anticipated that these appraisals would largely be based on analysis of sales of comparable lands near the BWCAW.

Step (2) would develop a multiple regression model using each of the sample tracts as an observation. The dependent variable in the model would be the appraised value of the tract as determined by the professional appraisers, while the independent variables would

be the physical characteristics of the tract itself (determined from the initial inventory and adjusted as necessary from additional information provided by the professional appraisers' on-site inspection). With this model, an estimate of the appraised value of tracts outside the sample could be obtained using information about their physical characteristics (provided by the physical inventory).

Assessing the value of leaving land in its natural state is more difficult in that natural uses of the land tend to be more public in nature. A use is public when the benefits of it accrue to more than just the owner and when it is difficult to exclude people who don't pay for these benefits from receiving them anyway (Field and Field, 2002). For example, everyone in the world presumably benefits from forests absorbing carbon dioxide or the ecological stabilization provided by preserving bio-diversity, regardless of whether they pay for it or not. It is well-known that markets for these types of use generally do not develop and thus, there is no observable flow of income from which to make value estimates. Nevertheless, there are established methodologies for assessing the value of natural uses. Originally, this project proposed to assess these uses by (1) utilizing travel-cost methodology and (2) making extrapolations from secondary data sources which utilized contingent valuation techniques to assess these.

Very early in the project, however, it was discovered that the Interagency Land Acquisition Conference in April 1995 (Exhibit 2) established a position that "a *non-economic* highest and best use is not a proper basis for the estimate of market value and, accordingly, that a highest and best use of conservation, preservation, or other use that requires property to be withheld from economic production in perpetuity, is not a valid use upon which to estimate market value. Such an estimate is, therefore, not in conformance with the *Uniform Appraisal Standards for Federal Land Acquisitions*." While the project investigators might wish to disagree with this ruling, it made any further assessment of natural uses a moot point. Thus, the project focused solely on the development use methodology described earlier.

Given this constraint, the project was to proceed in five phases: (1) Summer/Fall 2000—determination of physical characteristics relevant to valuation (including useful measures of such characteristics) and development of basic physical inventory of all state-owned tracts, (2) Winter 2000/Spring 2001—selection of sample tracts and development of request for bids for professional appraisal services, (3) Summer 2001— appraisal of sample tracts by professional appraisers, (4) Fall 2001— development of multiple-regression valuation model from appraisal information and estimation of values for all tracts, (5) Winter 2001— writing final report for delivery by January 15, 2002.

Project Realities

Phase (1) required identifying and measuring physical characteristics that would be relevant in the valuation of tracts. This phase began with discussions with professional

appraisers, as well as, a review of appraisal reports involving similar types of lands. In particular, this review included appraisal reports on the market value of all lands in the BWCAW prepared for the U.S. Forest Service in 1978 (Ash, 1978), updated in 1987 and 1988 (Brasch, 1987 and 1988), and then most recently updated in 1998 (Steigerwaldt, 1998). These reports segregated all lands into two basic categories—those with water frontage (referred to as "frontage," "shoreland," and "waterfront," respectively, in these reports) and those without (referred to as "woodland," "non-shoreland," and "timberland"). From the position that the regression valuation model might be more robust in terms of characteristics, discussions with professional appraisers led to a much wider set of potential characteristics which might reasonably affect the valuation of a tract. These are described in greater detail in Volumes 2 and 3 of this project report but include factors such as size and shape of the tract; accessibility to the tract (distance to nearest road and/or trail, potential for float plane access, distance to nearest utilities, distance to nearest portage, etc.); topology of the tract (percent upland/lowland, steepness); type of water frontage (lake, perennial stream, marsh, amount of shoreline); type of vegetation (type/quantity of timber); and others (sediment type, geomorphology, and any unusual features).

Unfortunately, some disconcerting information also surfaced from these discussions. This involved Phase (3), the actual appraising of the sample tracts. There was widespread concern that the cost of professionally appraising such a large number of separate tracts (75-100 tracts) in an area as remote as the BWCAW could well be prohibitive, and certainly beyond the budget for this project ($120,000 of the project's total budget of $200,000 had been designated solely to cover appraisal costs). This necessitated two changes in the project in an attempt to keep the project within budget. First, the physical inventory would have to be less detailed than originally planned, relying primarily on readily available data and digital maps. Second, the number of tracts in the sample would have to be reduced and yet still be sufficient to yield statistically useful results.

Originally, a systemized random sample of contiguous tracts of varying sizes representing roughly 10% of all tracts was desired. But as noted above, this would have involved 75-100 different tracts (depending on the size of the tracts chosen). To reduce the costs of appraising the sample tracts it was necessary to reduce the number of tracts to be appraised, which, if 10% of the lands were still to be appraised, meant that each tract appraised needed to be larger. To accomplish this, instead of considering all possible state-owned tracts within the BWCA, only sections wholly-owned by the state (all 16 of the 40-acre parcels) or near-wholly-owned by the state (at least 12 out of 16 of the 40-acre parcels) were considered as possible sample candidates. This amounted to 100 sections, 86 wholly-owned and 14 near-wholly-owned. This strategy would constitute the population from which a stratified sample of 20 would be chosen. This would reduce the sample size (and number of separate tracts to be appraised) from 75-100 down to 20 and yet still have roughly 10% of all state-owned lands appraised (20 sections x 640 acres per section = 12,800 acres). Of course, there is not necessarily 640 acres in each section.

The actual number of acres in the sample chosen was approximately 11,740 acres, or 10.1% of all state-owned lands. Given the project's budget, this allowed for a per-section appraisal cost of $6000 ($120,000/20).

The characteristics used to stratify the sample were amount of lakeshore, type of vegetation, type of sediment, and accessibility. Lakeshore is essentially the characteristic used in the U.S. Forest Service appraisal reports, and vegetation and sediment were easy to ascertain for each section from available maps. While accessibility was considered an important characteristic to include, developing accessibility measures at this point in the project appeared to be too costly. Instead, the sample was chosen to ensure locations all throughout the BWCAW were represented. Exhibit 3 shows all state-owned lands within the BWCAW, as well as the sections selected for appraisal. Exhibit 4 illustrates that the percent of a given characteristic in the sample chosen was roughly equal to the percent of this characteristic within the population of all 100 sections, making the sample reasonably representative of the whole. A map of the 20 sections chosen, as well as, their legal descriptions was included in the Request for Bids (RFB) sent to professional appraisers in December 2000 (Exhibit 5). Bids were requested on or before February 28, 2001 so that a bid could be accepted and appraisals could occur in the summer of 2001.

On January 17, 2001 a public informational briefing on the project was held on the University of Minnesota Duluth campus (Exhibit 6) to update participants and stakeholders on the project's purpose and progress to date, to answer any questions, and listen to any concerns. All appraisers who were sent a RFB were also invited so they could get any necessary clarifications. Appraisers raised numerous issues related to the project, none the least of which was that even 20 sections, spatially separated throughout an area as remote as the BWCAW, would be very time-consuming and costly to assess as individual tracts. None of the appraisers present felt they had sufficient information or time to prepare for a summer appraisal. These concerns led to a follow-up forum with interested appraisers in February 2001. Informational needs, estimates of appraisal costs, and time lines to complete such a task were discussed. Two things became clear: (1) given the informational requirements by the appraisers to even develop a reasonable proposal, the time necessary to fulfill those needs, and the time required to physically inspect and appraise 20 tracts "spread from one end to the other of the BWCAW," a summer 2001 appraisal was probably not feasible and (2) even if it were possible, it would likely cost more than the budget allowed for this project given the need for experienced guides and the number of days in the field that would be required (per section estimates as high as $10,000, depending on accessibility, were expressed informally). A decision was subsequently made to recall the original RFB.

The status of the project was reviewed by the Minnesota Department of Natural Resources (DNR) and the state legislature in May 2001. An important motivation for the project was reiterated. Most of the state-owned tracts within the BWCAW have School Trust status, although they produce no School Trust revenue because no commercial extraction of natural resources is permitted within the BWCAW (see Exhibit 7). One

possible alternative to enhance School Trust fund revenues is for the state to exchange state lands it holds within the BWCAW for federal lands outside the BWCAW which would be subject to less restrictive uses. Before such an exchange can occur, however, the state-owned lands need to be appraised according to state and federal standards. Thus, while the legislature remained interested in an estimate of the value of all lands held within the BWCAW, it was seen as more important to appraise as many acres as possible. The lands actually appraised could then be used in a possible exchange.

The project's end date was extended one year to January 15, 2003 to allow for appraisals to be made in the summer of 2002, however, no additional funds were allocated to the project. This necessitated a new approach for the project in light of insufficient funds for the statistical approach that had been proposed (even with only 20 sample tracts).

Revised Project Plan and Methodology

The revised plan was primarily designed to reduce the anticipated appraisal costs, while still appraising a significant number of acres that could be potentially exchanged in the future. This necessitated looking for a reasonably contiguous group of larger tracts that were relatively easy to access and could reasonably be thought of as a good candidate in whole or part for possible exchange. Since value estimates for all state-owned tracts within the BWCAW would be generated by extrapolating from the appraisals of these tracts, it was also important that it have a mix of natural features. The DNR took the responsibility for selecting the tracts to be appraised.

Since the tracts to be selected could not reasonably be viewed as any kind of random selected sample of all state-owned tracts, no statistical approach or analysis to estimating the value of all state-owned tracts would be possible. However, it would still be possible to estimate these values by extrapolating from appraisal results. Of course, no confidence levels could be placed on these estimates as would have been the case with the statistical approach. Two extrapolations were suggested: one based on the primary data provided by the 2002 appraisal of the selected tracts, and another based on the secondary data provided by the 1978-1998 U.S. Forest Service appraisals of all lands with the BWCAW.

A simple extrapolation model would be utilized. The physical inventory would be used to identify the land characteristics of each state-owned tract. Based on these characteristics, the tract would then be classified according to land categories established in the above appraisals. Finally, each tract would be valued according to the per acre values identified in these appraisals for each land category. The details of this process are described later in this report.

The project was thus revised to proceed as follows: (1) Summer 2001—DNR selection of tracts to be appraised and continued development of physical inventory by BBER, (2) Fall/Winter 2001— preparation of appraisal RFB, including necessary maps and data

requested by appraisers, and analysis of U.S. Forest Service appraisal reports on all lands within the BWCAW, (3) Spring/Summer 2002— appraisal of selected tracts by professional appraisers and development of extrapolation model based on physical inventory, (4) Fall 2002— estimation of values of all state-owned tracts with extrapolation model, (5) Winter 2002— writing of final report for delivery by January 15, 2003.

Project Process

The project proceeded through the steps described above with some minor, but recoverable, delays. In September 2001 the DNR provided BBER with the tracts to be appraised. The tracts, amounting to 5,281 acres, are located in the "island-like" W-SW part of the BWCAW, that part which is separated from the rest of the BWCAW by the Echo Trail corridor. Based on these tracts, maps and other data from the physical inventory were developed and a new RFB was prepared (Exhibit 8). Bids were requested on or before March 15, 2002. Subsequently, a joint proposal by John M. Vigen, SRA (representing Ramsland & Vigen, Inc.) and Tom Turner, MAI (representing Tom Turner & Associates) was accepted.

An April 2001 meeting with the selected appraisers emphasized the need to be able to link their prospective appraisal with the extrapolation process to be conducted utilizing the physical inventory already being developed. To incorporate these needs, the deadline for their work was extended from September 30, 2002 to October 31, 2002. This raised concern about the having sufficient time to perform the necessary extrapolations from the physical inventory before the project deadline. The inventory was not in a form that would make it easy to classify and re-classify tracts into different land categories. This led to one last major revision of the project. Since the cost of appraising was to be less than originally budgeted, this allowed for additional funds to upgrade the physical inventory. So, in the summer of 2002, BBER contracted with GIS (Geography Information Systems) specialists at NRRI (Natural Resources Research Institute) to not only summarize all the data collected for the physical inventory, but also to put it into a form that would allow for easy classification and re-classification of tracts into different land categories. This not only would make the extrapolation task much more manageable, but more importantly, would allow for sensitivity analysis related to this classification. This was completed during November and December 2002.

PROJECT DELIVERABLES AND FINDINGS

This project has three deliverables: (1) a 2002 professional appraisal of approximately 5280 acres of state-owned lands within the BWCAW (Volume 2: 2002 Appraisal Report), (2) a legal and physical inventory of all state-owned lands within the BWCAW produced by the GIS lab at the Natural Resources Research Institute (Volume 3: GIS Maps and Physical Inventory), and (3) a valuation report based on extrapolating appraisal values from (1) and from 1978-1998 U.S. Forest Service appraisal reports to all state-owned lands in the inventory (Volume 1: Valuation Report). Volumes 2 and 3 are briefly summarized below with respect to information relevant to the valuation process. The valuation methodology and results are contained below in this report.

Summary of Volume 2: 2002 Appraisal Report

During the summer of 2002, Tom Turner (representing Tom Turner and Associates) and John Vigen (representing Ramsland and Vigen, Inc.) conducted field and comparables analysis of approximately 5,280 acres of state-owned lands within the BWCAW. In November 2002 they delivered the attached document, "Appraisal Report of State of Minnesota Lands Located in the BWCAW" (Volume 2: 2002 Appraisal Report).

The subject of the appraisal is a 5,281-acre tract of non-contiguous but geographically near, undeveloped land in the W-SW part of the BWCAW (that "island-like" section of the BWCAW which is separated from the remainder of the BWCAW by the Echo Trail corridor). The subject acreage is characterized as School Trust Fund land owned in fee by the state of Minnesota. The purpose of the appraisal was to estimate the most probable market value of these lands under the guidelines of the *2002 Uniform Standards of Professional Appraisal Practice* and subject to the hypothetical condition that the BWCAW regulatory standards did not exist.

The subject was divided into six marketable units based on potential use opportunity, location, size, physical/functional characteristics, and other factors. In addition, five land categories were identified based on physical characteristics. These land categories served as the basis for acreage classification used in the valuation model based on this appraisal. The categories are:

Category 1: Lands characterized by a dominance of river flowage, extensive adjacent wetlands, intermittent tributary streams and undulating perimeter uplands.

Category 2: Lands characterized by an undulating topography of low wetlands, intermittent ponds, and moderate uplands of general interior forest.

Category 3: Lands characterized by their close proximity to a regional (larger) natural

environment lake and featuring mixed coastline characteristics of low wetland and moderate uplands. Use opportunities focus toward lakeshore subdivisions.

Category 4: Lands characterized by remote forest locations which benefit from the proximity to small natural environment lakes. Mixed topographic characteristics afford development opportunities.

Category 5: Lands characterized by a developable island location accessible by boat or floatplane.

Three to five comparables were selected for each category. The analysis of these comparables took into consideration quantifiable adjustments for date of sale and regional location as well as qualitative allocations applicable to accessibility, size, physical/functional characteristics and eco-quality. Based on this analysis, an estimated value per acre for each category was developed as follows:

Category 1, Flowage Influence:	*$350*
Category 2, Interior Forest/Wetlands:	*$450*
Category 3, Lakeshore Development:	*$1,200*
Category 4, Remote Small Lake:	*$950*
Category 5, Developable Island:	*$5,000*

These values led to an estimated value for the subject property as of September 1, 2002 of $3,916,000.

Summary of Volume 3: GIS Maps and Physical Inventory

The task of producing a legal and physical inventory of all state-owned lands within the BWCAW was delegated to the GIS (Geography Information Systems) lab at the Natural Resources Research Institute. Using land records data provided by the Minnesota Department of Natural Resources and GIS data sets, they produced Volume 3: GIS Maps and Physical Inventory (attached to this report). This volume includes topological maps, as well as, legal and physical data for 3253 identified parcels of state-owned land with the BWCAW. Each parcel in general is a 40-acre government lot, although due to legal and geographic irregularities, some are larger while others are smaller. The combined acreage of all the parcels is 116,559 acres.

Legal characteristics identified for each parcel include the following:

Location (Range, Township, Section, Quadrant)
County (St. Louis, Cook, Lake)
Land Type (School Trust, University Trust, DNR Acquired, County Tax Forfeit)

Land Administrator (Division of Forestry, County, etc.)
Lseqky code (link to other DNR data sets)

Physical characteristics identified for each parcel include the following:

Acreage
Land category (A-I, see next section)
Land use (% wetlands, % forest, % grassland, % open water)
Shoreline feet
Distance to nearest road
Distance to nearest lake
Distance to nearest perennial stream
Steepness
Acreage of lake on which shoreline exists

The physical characteristics above were used to assign each parcel to a specific land category for valuation purposes. This is described in the following section.

Valuation Based on 2002 Vigen and Turner Appraisal Report

Vigen and Turner (2002) classified lands in the appraised tracts into five categories and provided an estimated value per acre for each of those categories. To extrapolate these results to the remaining state-owned lands in the BWCAW largely requires placing these lands into the categories suggested by Vigen and Turner (VT). This presented two issues which needed to be resolved. The first was to decide upon a reasonable level of analysis, in other words, how big or small an area would be classified. Clearly, the larger the area chosen, the more likely it would exhibit characteristics of more than one category, while the smaller the area chosen, the more difficult it would be to get accurate physical information. Since classification would be based on the physical characteristics of the lands, the unit of analysis of the physical inventory, government lots (parcels of approximately 40 acres each), seemed most reasonable.

Classification of parcels into land categories
This step basically amounted to developing a system to classify each of the 3253 parcels identified in the inventory into one of VT's five land categories (Categories 1-5). This raised the second issue of how to classify parcels that may exhibit characteristics of more than one of the categories. In looking at the VT categories, there are three general types of lands identified: islands (Category 5), lands with lake frontage (Categories 3 and 4), and then all other lands (Categories 1 and 2). Ultimately, a nine-category system (Categories A-I) was devised.

Island acreage is the least ambiguous. Thus, the first category established was:

Category A: Island acreage.

This category is essentially the same as VT's Category 5.

The distinction between VT's Categories 3 and 4 is largely based on remoteness and size of the lake the land fronts. Development opportunities are enhanced the more recreational activities a lake can support and the more accessible it is. Both of these are in turn associated with the size of the lake—larger lakes not only provide greater recreational opportunities, but also are more accessible by float planes. Based on this, we decided to use lake size (acreage) as the measure for classifying lands with lake frontage into either Category 3 or Category 4. There was still the question of what the dividing line should be between a "large" and "small" lake. Due to the subjectivity of this question, we decided to divide these lands into four categories so that we might assess the sensitivity of the valuation to different classification scenarios. Thus, lands with lake frontage were divided into the following four categories:

Category B: Large lake (frontage on lakes of more than 320 acres).
Category C: Large-medium lake (frontage on lakes of more than 160 but less than or equal to 320 acres).
Category D: Medium-small lake (frontage on lakes of more than 80 but less than or equal to 160 acres).
Category E: Small lake (frontage on lakes of more than 10 but less than or equal to 80 acres).

With respect to all remaining lands (Categories 1 and 2), the principal distinction made by VT was the degree to which flowage and wetlands were present. Again, a clear dividing line is not apparent. Thus, we again decided to divide these lands into four categories so that we might assess the sensitivity of the results to various classification scenarios. As such, these lands were divided in the following four categories:

Category F: Significant flowage (includes a perennial stream or is less than or equal to 0.25 miles from one)
Category G: Flowage influence (greater than 0.25 but less than 0.50 miles from a perennial stream)
Category H: Wetlands (greater than or equal to 50% wetlands)
Category I: Uplands (less than or equal to 50% wetlands).

The classification of each parcel into one of these categories was done based on the hierarchy established above. Each parcel was classified according to the first category for which it satisfied the stated conditions (starting with Category A and moving through to Category I). In other words, any parcel with island acreage was classified in Category A. Then all remaining parcels with lake frontage were classified in Categories B-E

according to the size of the largest lake on which it had frontage. Next, all remaining parcels were checked for their distance from a perennial stream. If they were within 0.50 miles, then they were classified into either Category F or G, depending on the distance. Finally, all remaining parcels (basically all non-island lands without lake frontage or having insignificant flowage) were classified according the percentage of wetlands present into Categories H and I.

Given this classification methodology, Table 1 shows the breakdown of all state-owned acreage by the categories A-I above. The largest category is Category F which includes parcels with significant flowage, while the smallest is wetlands without significant flowage.

Table 1. Total Acreage of State-Owned Lands within the BWCAW by Land Category

Land Category		*Description*	*Acres*
Waterfront	A	Islands	5,192.83
	B	Large Lake Frontage	13,161.24
	C	Large-Medium Lake Frontage	2,886.28
	D	Medium-Small Lake Frontage	4,554.14
	E	Small Lake Frontage	14,000.14
Non-Waterfront	F	Major Flowage	41,932.47
	G	Flowage Influence	14,869.63
	H	Wetlands	2,213.25
	I	Uplands	17,748.99
	A-I	Total	116,558.97

Source: UMD Bureau of Business and Economic Research

Assigning appraisal values to each land category

As described by VT, Category A above is clearly the same VT's Category 5 and hence, such acreage will be assigned a value of $5000/acre. With respect to the other "waterfront" categories (Categories B-E), Category B parallels VT's Category 3, while Category E most closely matches their Category 4. Thus, all Category B acreage will be assigned a value of $1200/acre, while all Category E acreage will be assigned a value of $950/acre. Categories C and D include lake frontage that falls between these two extremes. As such, acreage in these categories will be assigned a value of $950 or $1200/acre based on the following scenarios:

Low: *Both Category C and D acreage assigned a value of $950/acre.*
Medium: *Category C acreage assigned a value of $1200/acre, Category D acreage assigned a value of $950/acre.*
High: *Both Category C and D acreage assigned a value of $1200/acre.*

A similar procedure was used to assign values to the "non-waterfront" categories (Categories F-I). Here Category F most closely resembles VT's Category 1, while Category I and their Category 2 are most alike. Thus, all Category F acreage will be assigned a value of $350/acre, while all Category I acreage will be assigned a value of $450/acre. Categories G and H represent those lands that are more difficult to classify as either Category 1 or 2 lands. As such, acreage in these two categories will be assigned a value of $350 or $450/acre based on the following scenarios:

Low: *Both Category G and H acreage assigned a value of $350/acre.*
Medium: *Category G acreage assigned a value of $350/acre, while Category H acreage assigned a value of $450/acre.*
High: *Both Category G and H acreage assigned a value of $450/acre.*

What these scenarios allow us to do is see how sensitive the valuation results are to where the lines are drawn with respect to categorizing acreage within the waterfront and non-waterfront general classes. Vigen and Turner provide two values for each of these general classes. The scenarios above provide a systematic method to assign these values to that acreage which is between the two extremes described for each class.

Valuation of state-owned lands with the BWCAW

Using the values assigned above, nine scenarios may be considered, as shown in Table 2. As shown in the table, the valuation results are not very sensitive to the alternative value assignments. The estimated value of all state-owned land ranges from a low of $90.77 million (low-low scenario) to a high of $94.34 million (high-high scenario). The most reasonable scenario (medium-medium), which essentially draws the classification line where Vigen and Turner seem to draw it in their appraisal analysis, yields a **value of $91.71 million.**

Table 2. Valuation of State-Owned Lands within the BWCAW Based on 2002 Appraisal Report

Non-Waterfront Value/Acre	*Waterfront Value/Acre*		
	low A: $5,000 B: $1,200 C-E: $950	*medium* A: $5,000 B, C: $1,200 D, E: $950	*high* A: $5,000 B-D: $1,200 E: $950
low F-H: $350 I: $450	$90.77m[1]	$91.49m	$92.63m
medium F, G: $350 H, I: $450	$90.99m	**$91.71m**	$92.85m
high F: $350 G-I: $450	$92.48m	$93.20m	$94.34m

[1] "m" : millions of dollars

Source: UMD Bureau of Business and Economic Research

It might also be noted that for every 10% of the total acreage in Category A (islands) that is reclassified as Category B (large lake), the total valuation falls by $1.973 million (this is equivalent, to valuing all the original 5192.83 acres of island lands at $4,620 or a 7.6% reduction in Vigen and Turner's appraised value). Also, for every 5% of Category B acreage that could be considered unique enough to be placed in Category A, the total valuation rises by $2.501 million (an equivalent change would result from valuing all island acreage at $5,482 or a 9.6% increase in Vigen and Turner's appraised value). We offer these calculations to provide additional information on the sensitivity of the valuation results to the classifications. Even with these considerations, however, the range remains fairly tight, **$88.80 to $96.84 million.**

Finally, Table 3 provides a breakdown of acreage and valuation by county, land category, and land type. The valuation estimates are based on the medium-medium classification of lands described above. For example, the amount of School Trust lands in St. Louis County within the BWCAW with lake frontage on a large or medium-large lake (Categories B and C combined) is 4396.9 acres with an estimated value of $5,276,256.

Table 3. Acreage and Valuation by County and Land Type

LAND TYPE		COUNTY						Land Category	TOTALS	
		St. Louis		Cook		Lake				
		Acres	*Value*	*Acres*	*Value*	*Acres*	*Value*		*Acres*	*Value*
	School Trust Fund	**34672.1**	**$29,478,531**	**25982.7**	**$19,737,211**	**25640.7**	**$23,088,565**		**86295.5**	**$72,304,306**
		2383.4	$11,916,750	792.6	$3,963,100	1471.3	$7,356,450	A	4647.3	$23,236,300
		4396.9	$5,276,256	3587.1	$4,304,568	5454.0	$6,544,812	BC	13438.0	$16,125,636
		3519.6	$3,343,601	5951.5	$5,653,878	3533.7	$3,356,987	DE	13004.7	$12,354,465
		20255.8	$7,089,544	12275.0	$4,296,254	10014.7	$3,505,135	FG	42545.5	$14,890,932
		4116.4	$1,852,380	3376.5	$1,519,412	5167.1	$2,325,182	HI	12659.9	$5,696,973
	University Trust Fund	**390.2**	**$172,760**	**2070.0**	**$1,672,878**	**0.0**	**$0**		**2460.1**	**$1,845,637**
		0.0	$0	23.5	$117,500	0.0	$0	A	23.5	$117,500
		30.8	$36,900	505.7	$606,840	0.0	$0	BC	536.5	$643,740
		0.0	$0	628.1	$596,648	0.0	$0	DE	628.1	$596,648
		258.8	$90,563	588.3	$205,888	0.0	$0	FG	847.0	$296,450
		100.7	$45,297	324.5	$146,003	0.0	$0	HI	425.1	$191,300
	DNR Aquired	**17804.5**	**$10,198,843**	**0.0**	**$0**	**0.0**	**$0**		**17804.5**	**$10,198,843**
		281.3	$1,406,500	0.0	$0	0.0	$0	A	281.3	$1,406,500
		682.0	$818,340	0.0	$0	0.0	$0	BC	682.0	$818,340
		2732.0	$2,595,400	0.0	$0	0.0	$0	DE	2732.0	$2,595,400
		9705.4	$3,396,897	0.0	$0	0.0	$0	FG	9705.4	$3,396,897
		4403.8	$1,981,706	0.0	$0	0.0	$0	HI	4403.8	$1,981,706
	County Tax Forfeit	**3662.1**	**$2,082,243**	**2262.3**	**$2,187,592**	**4074.6**	**$3,092,863**		**9999.0**	**$7,362,698**
		0.0	$0	120.8	$603,850	120.0	$600,000	A	240.8	$1,203,850
		605.1	$726,096	332.8	$399,312	453.3	$543,900	BC	1391.1	$1,669,308
		331.8	$315,229	893.4	$848,683	964.4	$916,142	DE	2189.5	$2,080,054
		1854.0	$648,914	762.1	$266,718	1088.1	$380,825	FG	3704.2	$1,296,456
		871.1	$392,004	153.4	$69,030	1448.9	$651,996	HI	2473.4	$1,113,030
	TOTALS	**56528.7**	**$41,932,376**	**30315.0**	**$23,597,680**	**29715.3**	**$26,181,427**		**116559.0**	**$91,711,483**

Source: UMD Bureau of Business and Economic Research

Valuation Based on 1978-1998 U.S. Forest Service Appraisal Reports

Since 1978, four appraisals have been conducted for the U.S. Forest Service on all lands within the BWCAW: Ash (1978); Brasch (1987); Brasch (1988); and Steigerwaldt (1998). Ash conducted a standard appraisal, while Brasch and Steigerwaldt primarily focused on updating this appraisal by estimating the growth in value of comparable tracts and then applying the estimated increase to Ash's appraised values. While these studies employed multiple approaches, a common feature is the broad categorization of all lands into essentially two categories: those with water frontage (referred to as "lake and river frontage," "frontage," "shorelands," and "waterfront," respectively, in these reports) and those without water frontage (referred to as "non-shore lands" and "timberland"). The basic findings of these appraisals for waterfront and non-waterfront lands are summarized in Table 4.

Table 4. Estimated Value of Lands within the BWCAW from U.S. Forest Service Appraisal Reports

Report (Year)		Waterfront ($/acre)	Non-waterfront ($/acre)	$Ratio = \frac{Waterfront\ Value}{Non\text{–}waterfront\ Value}$
Ash	(1978)	$214.50 [1]	$70.00 [2]	3.1
Brasch	(1987)	$384.90 [3]	$70.04 [4]	5.5
Brasch	(1988)	$384.90 [5]	$74.59 [6]	5.2
Steigerwaldt	(1998)	$586.30 [7]	$165.45 [8]	3.5

[1] Ash (1978), pg. 59, "Lake and River Frontage" estimate ($69,049,803/321,926 acres)
[2] Ash (1978), pg. 59, "Timberland" estimate
[3] Brasch (1987), pg. 45, "Frontage" estimate, line I.F.
[4] Brasch (1988), pg. 45, "Non-shore Lands" estimate, line II.E.
[5] Brasch (1988), pg.14, "Shorelands" estimate, 0.0% increase from 1987 estimate
[6] Brasch (1988), pg. 14, "Non-shore" estimate, 6.5% increase from 1987 estimate, or $70.04 X 1.065
[7] Steigerwaldt, pg.39, "Waterfront" estimate
[8] Steigerwaldt, pg. 39, "Timberland" estimate

Source: UMD Bureau of Business and Economic Research/MN Department of Natural Resources

Establishing the base values

To obtain estimated values for these two types of lands in 2002, it is necessary not only to extrapolate beyond 1998, but also to be sure the base for those extrapolations are reasonable and consistent with the data. The most robust and recent data appears in the Steigerwaldt report, especially for the years from 1988 to 1998. Given this, we note that he did not base his extrapolations on the 1988 Brasch estimates; instead he revised the

1978 estimates of Ash and extrapolated from them over a 20-year period. Generally, the longer the extrapolation period, the less reliable are estimates derived from them. We might speculate that a concern about the Brasch estimates was the lack of increase in the non-waterfront estimate from 1978 to 1987 and then, somewhat suddenly, an estimated change of 6.5% from 1987 to 1988. It appears that Steigerwaldt may have had some concerns about using the Brasch non-waterfront estimate as his base. This concern may be reinforced by considering the ratio between the waterfront and non-waterfront estimates provided in these reports. Note that the ratios for the Brasch reports are over five, while the other reports place this closer to three (Vigen and Turner's 2002 estimates also place this closer to three). So, while we would like to use the Steigerwaldt data to extrapolate over the 1988-1998 period and beyond, using the Brasch estimates as a base may be problem. Thus, we considered a revision of the Brasch estimates based on the Steigerwaldt data.

Steigerwaldt provides three important data sets. First, he tracked the Estimated Market Value (EMV) per acre for 60 selected waterfront and timberland tracts in Cook, Lake, and St. Louis Counties. Although these are not actual appraisals or sale prices (in fact, they are usually quite conservative relative to these other indicators), the EMV indicated on the tax rolls is based upon county wide sales information and other value criteria. Thus, changes in these over time should provide reasonable information about value trends. Second, he collected sales data for this 20-year period based on Certificates of Real Estate Value (CRVs) for both waterfront and timberland tracts. Considering only the data from 1988 and beyond, this involved 785 sales of timberland tracts (an average of 71 per year) and 171 sales of waterfront tracts (an average of 15.5 per year). Finally, he included 11 "sale and resale" cases. These three data sets are reproduced in Exhibit 9.

Analysis of the sales data provided some interesting comparisons to Brasch's 1988 estimates. For 1988 the average sales price per acre of waterfront tracts was $371.25. The figure for 1987 was $383.28 and for 1990, $407.07. The simple average for these three years "around 1988" is $387.20, which is remarkably similar to Brasch's estimate of $384.90. The data for the timberland tracts told a different story. For 1988 the average sales price per acre of timberland was $137.15. The figures for years "around 1988" were $142.44 for 1986 and $143.65 for 1989. The simple average for these years is $141.08. This is twice Brasch's 1987 and 1988 estimates ($70.00 and $74.59, respectively). However, it is important to note that Brasch's 1987 $70.00 estimate was based on his conclusion that there was no definitive evidence that the value of timberland tracts had increased from 1978 to 1987, and so, he simply ended up using the 1978 Ash estimate of $70.00 per acre. His willingness to do this invites inquiry, given that his own sales data indicated an average sales price per acre for such tracts in 1987 of $138.17 (Brasch (1987), pg.15), while his own multiple regression analysis indicated a price of $148.39/acre. It was this same regression which indicated that this did not represent a significant change from 1978 ($154.42), and so, Brasch concludes essentially that such values had remained reasonably flat since 1978. It is our view that while these values may have indeed remained somewhat constant between 1978 and 1988 (which is strongly

supported by Steigerwaldt's EMV and CRV data), they were not constant around Ash's estimate of $70, but instead around $140. It is noteworthy that Ash's $70/acre figure was based on a highest and best use for non-waterfront lands of timber production and harvest, while in later appraisals recreational and residential uses are highlighted.

Given the Brasch 1988 estimate of $384.90 (based on a 80% indicated increase from Ash's 1978 estimate) and the Steigerwaldt 1988 sales data estimate of $371.25, we chose to use **$380.00/acre as the base estimate of the value of waterfront tracts in 1988**. Given the Steigerwaldt 1988 sales data estimate of $137.15 and Brasch's sales data estimate of $138.17 (along with his multiple regression estimate of $148.39), we chose to use **$140.00/acre as the base estimate of the value of non-waterfront tracts in 1988.** The ratio of these waterfront and non-waterfront values, 2.7, is also more in line with what would be expected.

Establishing the annual rate of growth in values from 1988 to 1998
The next step was to extrapolate these figures to 2002. This was accomplished in two steps. First, Steigerwaldt's data was used to estimate the annual growth rate indicated for each of these values for the period 1988-1998. These were then used to obtain revised 1998 values. Second, these 1998 values were extrapolated to create 2002 estimates based on various growth assumptions about that period.

The equation for a variable growing at a fixed rate over time is given by the following exponential equation:

$$Y = a\,(1 + r)^t,$$

where Y is the variable in question, a is the variable's beginning or initial value (at t = 0), r is the rate of growth of Y, and t is the number of time periods. This may also be written in logarithm form as:

$$\log Y = \log a + [\log(1 + r)]t\ .$$

In this form the growth rate of Y, r, may be estimated by simple linear regression using t, or time, as the independent variable and log Y as the dependent variable. Four such regressions were run with the 1988-98 Steigerwaldt data on EMV values and sales information (see Exhibit 10). The results of this analysis are given in Table 5.

Table 5. Estimated Annual Growth Rates Based on Steigerwaldt 1988-1998 Data[1]

EMV		Sales	
Waterfront	*Timberland*	*Waterfront*	*Timberland*
7.81%	6.22%	11.10%	7.31%

[1] Steigerwaldt (1998), EMV waterfront and timberland values, pg. 14, Waterfront Sales, pg. 31, Timberland Sales pg. 30.

Source: UMD Bureau of Business and Economic Research

As shown, the estimated annual increases in the value of waterfront and timberland tracts from the EMV data are 7.81% and 6.22%, respectively. The estimated annual increases from the sales data are 11.10% and 7.31, respectively. These estimates are different from those reported by Steigerwaldt for two reasons. First, we only considered the period from 1988 to 1998. Second, the "annual percentage increases" reported by Steigerwaldt are based on simply dividing the total percentage increase over twenty years by 20. This ignores the effect of compounding and as such, overstates the actual annual growth rate for any time period greater than one year.

Additional trend information was provided by Steigerwaldt's resale information. Once again Steigerwaldt's calculations of the indicated annual growth are incorrect. Determining this requires solving the following equation for r, the rate of annual growth:

$$R = S\,(1 + r)^t,$$

where R is the resale price of a tract, S is its original sale price, and t is amount of time between these two events (measured in years if one wishes to obtain an annual rate for r). To find r, the above equation may be equivalently expressed as:

$$r = e^{\{[\ln (R/S)]/t\}} - 1.$$

Table 6 shows Steigerwaldt's original resale data and the indicated annual rate of growth based on the formula above. Taking the simple average these eleven growth rates yields 9.06%. This differs significantly from the 5.9% figure reported by Steigerwaldt. One reason is again due to the way Steigerwaldt chose to inappropriately calculate annual percentage increases. However, even though our indicated rates are *less* than those reported by Steigerwaldt for most cases (those where the time period was greater than 12 months), our average turns out to be *higher*. This anomaly lies in how Steigerwaldt calculated his "weighted average" of 5.9% (which he unfortunately does not explain). This appears to be an oversight, since virtually every value he is averaging is *greater* than 5.9%.

Table 6. Revised Annual Growth Rates for Steigerwaldt's Resales[1]

Resale #	Sale	Resale	Time Span (in months)	Indicated Annual Rate of Growth
1	$ 10,000	$ 22,000	196	4.9
2	$ 3,000	$ 7,500	73	16.3
3	$ 15,000	$ 20,000	32	11.4
4	$ 38,000	$ 39,000	6	5.3
5	$ 25,000	$ 29,000	38	4.8
6	$ 9,000	$ 14,000	37	15.4
7	$ 17,200	$ 18,500	9	10.2
8	$ 15,000	$ 16,000	8	10.2
9	$ 8,500	$ 9,500	33	4.1
10	$ 10,000	$ 12,000	20	11.6
11	$ 10,000	$ 11,700	35	5.5

[1] Steigerwaldt (1998), pg. 37.

Source: UMD Bureau of Business and Economic Research

Based on the estimates shown in Table 5, **an annual growth rate of waterfront values around 9% between 1988 and 1998 seems reasonable.** Not only is this value between the EMV estimate of 7.81% and the sales estimate of 11.1%, but is also supported by the resale estimate of 9.06%. **For non-waterfront tracts an annual growth rate in value from 1988 to 1998 of 7% appears appropriate.** This is supported by both the EMV estimate of 6.22% and the sales estimate of 7.31%.

Applying these growth rates on a compound basis to the base figures for 1988 yields an estimated waterfront value in 1998 of $275/acre and an estimated non-waterfront value in 1998 of $900/acre. These are both higher than those indicated by Steigerwaldt, but based on what we believe is more detailed analysis not only of his data, but also that of Brasch.

Establishing the annual rate of growth in values between 1998 and 2002

None of these appraisals provide any information on trends since 1998. Thus, as a final step to arrive at estimated values for 2002, we will consider a few reasonable scenarios, providing low, medium, and high estimates. The low scenario assumes the growth rates established from 1988 to 1998 have simply continued. Thus, the growth rate in the value of waterfront tracts has increased annually by 9% since 2002, while the rate for non-waterfront tracts has been 7%. The medium scenario assumes that growth rates in values have increased since 1998. Here we will utilize information in Vigen and Turner (2002) with respect to adjusting comparable sales data for time. Based on information gathered

from queries to several local county assessors Vigen and Turner decided it was reasonable to adjust comparable data dating from 1998 by 8% per annum from 1998 to 2000, and then by 18% per annum from 2000 to 2002. This represents an annual rate of increase (with compounding) of approximately 13% from 1998 to 2002. Thus, the medium scenario will assume a growth rate in the value of waterfront tracts of 13%, while the rate for non-waterfront will be 11% (note that it has been generally acknowledged in several of these appraisals that waterfront values are rising faster than non-waterfront values). Finally, the high scenario will consider the possibility that values have accelerated even more than suggested above since 1998. Vigen and Turner (2002) mention this very real possibility on page 40. They report the high end of estimates of annual price increases from county assessors to be in the range of 18% and 25%, while the low end estimates were around 12% to 15%. For the high scenario we will use conservative estimates, 16% for waterfront tracts and 13% for non-waterfront tracts.

Table 7 summarizes the results of this section. **The estimated value of waterfront tracts is between $1,270 and $1,630/acre, while for non-waterfront tracts it is between $360 and $448/acre.** These compare well to those of Vigen and Turner, especially for the non-waterfront tracts (Categories 1 and 2, $350 and $450, respectively). The waterfront value is also quite comparable if we reduce the Vigen and Turner estimates for Categories 3-5 to a single, average value. Taking the estimated value in each category ($1200, $950, and $5000, respectively) and weighting them by the number of total acres in each category (16047.52, and 18554.28, and 5192.83, respectively) yields a weighted average for waterfront tracts of $1,579.

Table 7. Estimated Values of Waterfront and Non-Waterfront Tracts

Year	*Waterfront Value ($/acre)*	*Non-Waterfront ($/acre)*
1988	$380	$140
1998 (9%, 7%)[1]	$900	$275
Low-2002 (9%, 7%)[2]	$1,270	$360
Medium-2002 (13%, 11%)[2]	$1,467	$417
High-2002 (16%, 13%)[2]	$1,630	$448

[1] Assumed annual growth rates for waterfront and non-waterfront tracts, respectively, from 1988 to 1998.

[2] Assumed annual growth rates for waterfront and non-waterfront tracts, respectively, from 1998 to 2002.

Source: UMD Bureau of Business and Economic Research

Valuation of state-owned lands within the BWCAW

The next step is to categorize all state-owned tracts as either "waterfront" or "non-waterfront." Ash (1978, pgs. 12-13) provides the basis for this categorization upon which all the U.S. Forest Service appraisals were subsequently based. Ash considers both lake and river frontage, but notes that virtually all (98.55%) of the "useable" (for development) frontage is lake frontage. All non-useable frontage, which includes virtually all river frontage, is classified in the "woodland" (non-waterfront) category. Applying this classification to the categories we have established in the physical inventory essentially means Categories A-E (a total of 39,794.63 acres) represent the waterfront tracts and Categories F-I (a total of 76,764.34 acres) represent the non-waterfront tracts.

Multiplying the acreage figures above by the values generated in the last section yields the estimates shown in Table 8. This table is designed to illustrate the sensitivity of the estimated value of the state-owned lands with the BWCAW to the various assumptions made about the 2002 value per acre estimates. As shown, **the estimates range from a low of $78.17 million to a high of $99.26 million with a "medium" estimate of $90.39 million.**

Table 8. Valuation of State-Owned Lands within the BWCAW Based on 1978 - 1998 U.S. Forest Service Appraisal Reports

Non-Waterfront Value/Acre (76,764.34 acres)	Waterfront Value/Acre (39,794.63 acres) $1,270	$1,460	$1,630
$360	$78.17m[1]	$86.01m	$92.50m
$417	$82.55m	**$90.39m**	$96.88m
$448	$84.93m	$92.77m	$99.26m

[1] "m" : millions of dollars

Source: UMD Bureau of Business and Economic Research

CONCLUSIONS

The valuation range provided by using Vigen and Turner's land classifications and appraisal values, $88.80 to $96.84 million, is entirely within the range produced by using the land classifications and appraisal values derived from the U.S. Forest Service appraisals, $78.17 to $99.26 million. Moreover, the "medium" estimates in these two cases are virtually identical, $91.71 million versus $90.39 million. This suggests a high degree of reliability with respect to these values. Since the methodology used in this project is based on a more current appraisal and a more discriminating classification of lands, we believe an **estimated 2002 value of $91.71 million for all state-owned lands within the BWCAW** is both reasonable and supportable. We further note that, given recent trends in the values of such lands, this value could easily exceed $100 million as early as 2003 (this would only require a 9% annual increase in values).

REFERENCES

Ash, Wayne R., "Superior National Forest: Appraisal Report," U.S. Forest Service, October 1978.

Brasch, Raymond L., "BWCA Market Value Study (1978 to 1987)," U.S. Forest Service, October 1987.

Brasch, Raymond L., "BWCA Market Value Study Update (1987 to 1988)," U.S. Forest Service, October 1988.

Field, Barry C. and Martha K. Field, *Environmental Economics: An Introduction*, McGraw-Hill/Irwin, 2002.

Hartwick, John and Nancy Olewiler, *The Economics of Natural Resource Use*, Addison-Wesley Educational Publications, Inc., 1998.

Pearce, D.W. and D. Moran, *The Economic Value of Biodiversity*, Earthscan (London), 1994.

Steigerwaldt, William M., "Boundary Waters Canoe Area Wilderness Market Value Study," USDA/U.S. Forest Service, May 1998.

Vigen, John M. and Tom Turner, "Appraisal Report of State of Minnesota Lands Located in the BWCAW," prepared for UMD Bureau of Economic Research, September 2002.

EXHIBITS

Exhibit 1: Legislative Charge

Exhibit 2: Interagency Land Acquisition Conference Position Paper

Exhibit 3: Map: State-Owned Lands Administered by DNR and Counties

Exhibit 4: Initial Sample Stratification Data

Exhibit 5: Original Request for Bids for Professional Appraisal Services

Exhibit 6: Informational Briefing Handouts

Exhibit 7: School Trust Fund Lands: Some Facts

Exhibit 8: Final Request for Bids for Professional Appraisal Services

Exhibit 9: Steigerwaldt (1998) Data Sets

Exhibit 10: EMV and SALES Regression Analysis

See separate Acrobat file for this appendix material at http://www.d.umn.edu/sbe/departments/bber/projects/BWCAWLandValuation/BWCAWreport.htm

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Project Partners:

Minnesota Department of Natural Resources
University of Minnesota Natural Resources Research Institute
Ramsland & Vigen, Inc.
Tom Turner & Associates

EXHIBITS

Exhibit 1: Legislative Charge

S.F No. 1288, 3rd Engrossment: 81st Legislative Session (1999-2000)
Posted on May 10, 2000

Sec. 21. [APPROPRIATIONS.]
$200,000 is appropriated from the state forest suspense account to the commissioner of natural resources for transfer to the University of Minnesota Duluth for the purpose of funding the inventory conducted pursuant to this section and is available until expended. Because the University of Minnesota is a land grant university, and because most of the state-owned land to be inventoried is granted land, the chancellor of the University of Minnesota Duluth is requested to direct the School of Business and Economics to conduct an inventory of state-owned land located within the Boundary Waters Canoe Area for the purpose of providing the legislature and state officers with more precise information as to the nature, extent, and value of the land. The inventory must include the following: (1) a list of the tracts of state-owned land within the area, together with the available legal description by government tract, insofar as possible; (2) the number of linear feet of shoreline in each tract, together with a general description of that shoreline, whether it is rocky, sandy, or swampy, or some other descriptive system that generally describes the shoreland; (3) the acreage of each tract; (4) a general description of the surface of each tract, including topography and the predominant vegetative cover for each tract and any known unique surface features, such as areas of virgin and other old growth timber; and (5) using available real estate market value information and accepted real estate valuation techniques, assign estimates of the value for each tract, exclusive of minerals and mineral interests, using each of the real estate valuation techniques adopted for the inventory. For the purposes of this section, "state-owned land" is defined as any class of state-owned land, whether it is granted land such as school, university, swampland, or internal improvement, or whether it is tax-forfeited, acquired, or state-owned land of any other classification. At the request of the university, the commissioner of natural resources shall promptly provide the university with all published maps, whether federal, state, or county, together with a descriptive list of state-owned land in the area, using available legal descriptions, forest inventories, and other factual information, published data, and photographs that are necessary for the university's inventory. From these maps, lists, data, and other information, the university is requested to prepare a report of its inventory. The legislature requests that the University of Minnesota submit the report to the legislature by January 15, 2002.

Source: http://www.senate.leg.state.mn.us/departments/scr/billsumm/SF1288.htm

Exhibit 2: Interagency Land Acquisition Conference Position Paper

INTERAGENCY LAND ACQUISITION CONFERENCE

POSITION PAPER

On the issue whether a non-economic highest and best use can be a proper basis for the estimate of market value.

INTRODUCTION

The Interagency Land Acquisition Conference is an organization composed of representatives of federal agencies engaged in the acquisition of real estate for public uses. The Conference was established on November 27, 1968, by invitations issued by the Attorney General. The Conference chairperson is the Assistant Attorney General of the Environment and Natural Resources Division, Department of Justice, and the Conference Executive is the Chief of the Land Acquisition Section of the Environment and Natural Resources Division, Department of Justice.

The Conference conducts its business by *ad hoc* committee called into session as land acquisition issues arise that affect the federal land acquiring agencies. For example, when the Freedom of Information Act (FOIA) was enacted, the Conference was called into session and developed a position paper regarding the release of government appraisal reports under FOIA. The Conference was also responsible for the development of the *Uniform Appraisal Standards for Federal Land Acquisitions* published in 1972, as well as the 1973 and 1992 revisions thereof, which establish guidelines for appraisals prepared for the purpose of federal land acquisition. When the subject under Conference consideration is valuation, as here, the agencies are generally represented on the Conference by their Chief Appraisers.

The member agencies of the Conference whose representatives participated in this project are:

U.S. Department of Justice
U.S. Army Corps of Engineers
General Services Administration, FPRS
General Services Administration, PBS
Housing and Urban Development, MF
Housing and Urban Development, SF
Bureau of Land Management
U.S. Fish and Wildlife Service
U.S. Forest Service
Department of Transportation, FHWA
National Park Service
U.S. Navy
Western Area Power Administration
U.S. Postal Service
Bureau of Indian Affairs
Bureau of Reclamation

Pennsylvania Avenue Development Corporation
Bonneville Power Administration
Federal Aviation Administration

The Conference convened in late 1994 to consider the issue that is the subject of this paper. It was decided by the Conference that a committee should be appointed to study the issue and draft a position paper for consideration by the Conference. The committee appointed consisted of the representatives of the following Conference members:

U.S. Department of Justice
U.S. Forest Service
U. S. Fish and Wildlife Service
Bureau of Land Management
Bonneville Power Administration
U.S. Army Corps of Engineers
Department of Transportation, FHWA
National Park Service

The committee developed a draft position paper and submitted it to the members of the Conference. Following receipt of comments and suggestions from Conference members, a modified final version of the paper was presented to the Conference members and approved.

THE ISSUE

Is a non-economic highest and best use a proper basis for the estimate of market value?

This question has been analyzed by the Conference with reference to the *Uniform Appraisal Standards for Federal Land Acquisitions*, (Washington, D.C.: U.S. Printing Office, 1992).

BACKGROUND

Public concern over the environment the past several years has resulted in legislatively mandated land acquisitions for the sole purpose of conservation, wildlife habitat, or preservation of the lands in their natural state. Because of the nature of these acquisition programs and the goals they are intended to achieve, much of the land acquired is held in large ownership blocks, is remotely located, has suffered little human encroachment, and is of minimal economic utility or value.

Historically, the appraisal of such lands would bring about such economic highest and best use estimates as timber production, grazing, marginal recreation, or hold for speculative

appreciation. Recently however, a small group of appraisers and others have advocated that the highest and best use of such lands is for the very purpose for which the government is acquiring them - such as preservation in their natural state, or other non-economic uses.

The validity of appraisals, based on non-economic highest and best uses, as legitimate estimates of market value has been the subject of numerous articles in professional journals, and has been the subject of committee research and/or forums at the national meetings of the International Right-of-Way Association, the American Society of Farm Managers and Rural Appraisers, and the Appraisal Institute. In many of these articles and forums it has been suggested that estimates of such value are not estimates of market value, but rather estimates of value in use, value to the government or public, natural value, or public interest value.[1]

Value estimates and appraisal reports have been developed on this premise of "preservation" as a property's highest and best use. Legal counsel for some property owners have submitted these reports to Conference members urging that they be accepted as reliable opinions of market value. They have argued that such reports are in conformance with the *Uniform Appraisal Standards for Federal Land Acquisitions*, (Washington, D.C.: U.S. Printing Office, 1992), the *Uniform Standards of Professional Appraisal Practice*, and are in keeping with generally accepted definitions of highest and best use and market value.

Conference members, to whom such reports have been submitted, have found within them a common thread. Authors of these reports have adopted a definition of highest and best use that encompasses consideration of non-economic uses. The appraisals develop an indication of value that clearly falls outside of the traditionally accepted definition of market value.

Under established law the criterion for just compensation is the fair market value of the property at the time it is acquired.[2] Because the purpose of the *Uniform Appraisal Standards for Federal Land Acquisitions* is to set forth the principles applicable to the appraisal of property for Federal

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[1] The Conference finds the term "public interest value" inappropriate and misleading. After a review of several of these reports the Conference has concluded that what is being estimated is not a value, but a prediction of the price at which a transaction will be consummated between two specific parties rather than market value. *The Dictionary of Real Estate Appraisal*, 3d. ed. (The Appraisal Institute, 1993) defines "price" as "The amount a particular purchaser agrees to pay and a particular seller agrees to accept under the circumstances surrounding their transaction."

[2] *Uniform Appraisal Standards for Federal Land Acquisitions*, (Washington, D.C.: U.S. Printing Office, 1992), §A-2, p. 3, citing *United States v. 50 Acres of Land*, 469 U.S. 24, 29 (1984); *Kirby Forest Industries, Inc. v. United States*, 467 U.S. 1, 9 (1984); *United States v. Miller*, 317 U.S. 369, 373-378 (1943); *Olson v. United States*, 292 U.S. 246, 255 (1934); *United States v. Petty Motor Co.*, 327 U.S. 372, 377-378 (1946).

land acquisitions by both direct purchase and condemnation,[3] only estimates of market value are applicable to federal land acquisitions. Absent legislative mandate, any other type of value estimate is unacceptable for Federal land acquisition purposes.

HIGHEST AND BEST USE

> Fair market value is to be determined with reference to the property's "highest and best use" - that is, the highest and most profitable use for which the property is adaptable and needed or likely to be needed in the near future.[4]
>
> A proposed highest and best use requires a showing of a reasonable probability that the land is both physically adaptable for such use **and** that there is a need or demand for such use in the reasonably near future; physical adaptability alone is insufficient.[5]
>
> Highest and best use cannot be predicated on a demand created solely by the project for which the property is taken (*e.g.*, rock quarry, when only market is highway project for which property was taken). A proposed highest and best use cannot be the use for which the government is acquiring the property (*e.g.*, missile test range, airfield, park), unless there is a prospect and demand for that use by others than the government.[6]
>
> The use to which the government will put the property after it has been taken is, as a general rule, an improper highest and best use. It is the value of the land taken which is to be estimated, not the value of the land to the taker. If it is solely the government's need which creates a market for the land, this special need must be excluded from consideration by the appraiser. Only on the rare occasion that a private demand for the land exists, for the same use for which it is being acquired by the government, is it proper for the appraiser to conclude that the highest and best use of the property is that use for which it is being acquired by the government.[7]

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[3] *Ibid.*, p. 1.

[4] *Ibid.*, §A-3, p. 8, citing *Olson v. United States,* 292 U.S. 246, 255 (1934).

[5] *Ibid.*, p.9, citing *Olson*, *supra*, 292 U.S. at 256; *United States v. 341.45 Acres of Land*, 633 F.2d 108, 111 (8th Cir. 1980), cert. denied, 451 U.S. 938 (1981).

[6] *Ibid.*, pp. 9-10 (citations omitted).

[7] *Ibid.*, §B-1 14, pp. 73-74.

From the above it is clear that highest and best use, as used in the *Uniform Appraisal Standards for Federal Land Acquisitions*, is to be estimated in economic terms. Implied in the forgoing is that highest and best use is an economic concept, not a social concept. This position is supported by modern appraisal textbooks.

> Therefore, the analysis and interpretation of highest and best use is an *economic* study of market forces focused on the subject property.[8] The benefit a real estate development [or non-development in the case of preservation] produces for a community or the amenity contribution provided by a planned project (*i.e.*, the public space in a park-like area) are not considered in the appraiser's analysis of highest and best use.[9]

CONCLUSIONS

For the above reasons, it is the Conference's position that a non-economic highest and best use is not a proper basis for the estimate of market value and, accordingly, that a highest and best use of conservation, preservation, or other use that requires the property to be withheld from economic production in perpetuity, is not a valid use upon which to estimate market value. Such an estimate is, therefore, not in conformance with the *Uniform Appraisal Standards for Federal Land Acquisitions*.

ADOPTED this 14th day of April, 1995.

Interagency Land Acquisition Conference

By: _____
Lois J. Schiffer, Conference Chairperson

By: _____
William J. Kollins, Conference Executive

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[8] *The Appraisal of Real Estate*, 10th ed., (Chicago: Appraisal Institute, 1992), 276-277 (emphasis added).

[9] *Ibid.*, 276. fn. 1.

Exhibit 3: Map: State-Owned Lands Administered by DNR and Counties

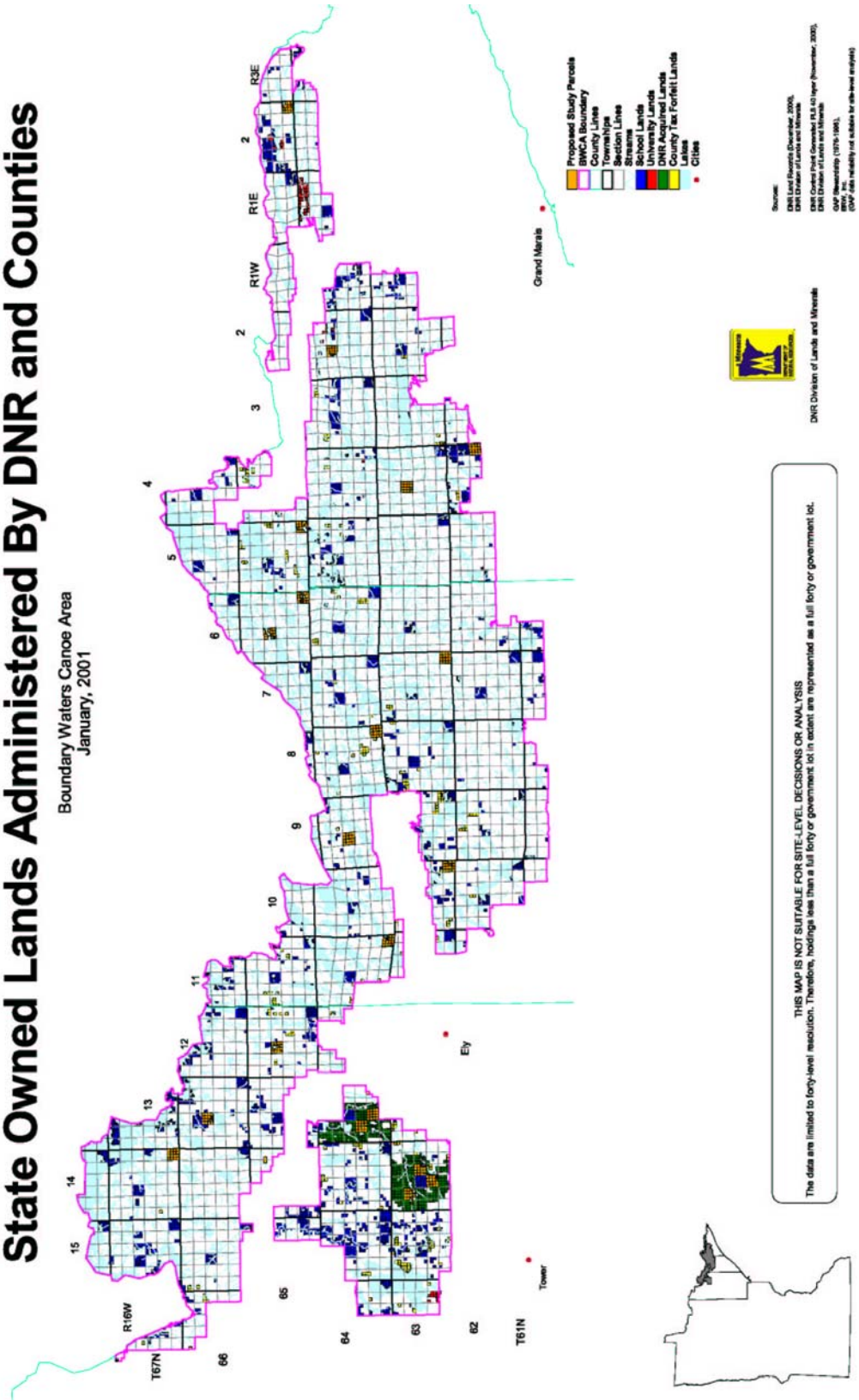


Exhibit 4: Initial Sample Stratification Data

VARIABLES USED TO STRATIFY THE SAMPLE

LAKESHORE

CODE	DESCRIPTION	# IN POPULATION	% IN POPULATION	# IN SAMPLE	% IN SAMPLE
0	NOT SIGNIFICANT	49	**49.0**	9	**45.0**
1	SIGNIFICANT	51	**51.0**	11	**55.0**

VEGETATION

CODE	DESCRIPTION	# IN POPULATION	% IN POPULATION	# IN SAMPLE	% IN SAMPLE
1	ASPEN-BIRCH(CONIFER)	33	**33.0**	6	**30.0**
2	ASPEN-BIRCH(HARDWOOD)	9	**9.0**	2	**10.0**
3	JACK PINE BARRENS	40	**40.0**	7	**35.0**
4	MIXED WHITE/RED PINE	38	**38.0**	8	**40.0**
5	OPEN WATER/MARSH	16	**16.0**	5	**25.0**
9	UNKNOWN	3	**3.0**	0	**0.0**

SEDIMENT

CODE	DESCRIPTION	# IN POPULATION	% IN POPULATION	# IN SAMPLE	% IN SAMPLE
1	GRANTSBURG LOBE	80	**80.0**	15	**75.0**
2	UPPER MISSISSIPPI	9	**9.0**	3	**15.0**
3	DISSECTED BEDROCK	16	**16.0**	3	**15.0**
4	PRE-WISC. TILL PLAIN	2	**2.0**	0	**0.0**
5	UNDIFFERENTIATED	3	**3.0**	1	**5.0**

SECTION/OWNERSHIP/LAKESHORE/VEGETATION/SEDIMENT
(*denotes a section chosen for the stratified sample

1	1	1	34	1
2	1	0	34	1
3	1	1	3	1
*4	1	1	4	1
5	1	1	4	1
6	1	1	9	1
7	1	1	9	1
8	1	0	4	1
*9	1	0	5	1
10	1	1	1	1
11	1	0	13	1
12	1	0	13	1
13	1	1	4	1
14	1	0	4	1
*15	1	1	34	1
16	1	1	4	1
17	1	0	4	1
18	1	0	45	1
19	1	1	1	1
20	1	0	15	14
21	1	1	3	1
22	1	0	13	1
23	1	0	3	1
24	1	0	3	1
25	1	0	3	1
26	1	0	34	1
27	1	0	13	1
28	1	1	34	1
*29	1	1	34	1
30	1	0	3	1
*31	1	1	13	1
*32	1	0	35	3
33	1	1	13	3
34	1	1	3	3
35	1	0	3	13
36	1	0	3	1
*37	1	0	3	1
38	1	0	13	3
39	1	1	34	1
*40	1	0	3	1
41	1	1	5	1
*42	1	1	45	1
43	1	1	43	13
*44	1	0	4	13
45	1	0	45	1
46	1	0	15	1
47	1	1	15	1
48	1	1	1	1
*49	1	0	15	1
50	1	1	5	1
51	1	1	3	3
52	1	1	3	3
53	1	0	12	1
54	1	0	12	3
55	0	0	5	3
*56	1	0	3	1
57	1	1	14	1
*58	1	1	15	1
59	1	0	5	5
*60	1	1	4	25
61	1	1	4	2
62	1	1	24	2
63	1	0	4	15
64	1	1	4	1
65	2	1	4	1
66	1	1	4	12
*67	1	1	24	2
68	1	1	2	1
69	1	1	12	1
70	1	1	25	1
*71	1	1	1	1
72	1	0	12	1
*73	1	0	2	1
74	1	1	1	1
75	1	0	3	1
76	0	0	3	13
77	0	0	3	3
*78	1	0	34	3
79	0	0	14	3
*80	1	1	1	1
81	1	0	1	1
82	1	1	1	1
83	1	1	14	1
84	1	1	4	1
85	1	1	1	1
86	1	0	4	1
87	1	1	4	2
88	0	1	4	2
*89	1	1	14	2
90	2	0	4	2
91	1	1	4	1
92	0	0	13	13
93	0	0	3	14
94	0	0	3	1
95	0	0	13	1
96	0	0	3	1
97	1	1	9	1
98	0	0	35	1
99	0	0	13	1
100	0	1	1	1

REQUEST FOR BIDS
FOR PROFESSIONAL APPRAISAL SERVICES

SECTION 1. Statement of Objectives

The University of Minnesota Duluth, School of Business and Economics, Bureau of Business and Economic Research is seeking to contract a qualified, professional appraiser to appraise state-held lands in the Boundary Waters Canoe Area. The selected appraiser will be asked to appraise twenty pre-selected sections and provide a report on each section subject to the conditions and standards detailed in Attachment A. This work is to be completed during the period of (approximately) April 1, 2001 to September 30, 2001. Joint proposals are welcomed.

This request for bids does not obligate the University to complete the proposed project and the University reserves the right to cancel this solicitation if it is considered to be in its best interest.

SECTION 2. Structure of Responses

Interested parties are asked to submit responses for each of the following items:

1. Company Identifiers. Provide the full company name and address, a principal contact person with title, phone and fax numbers, and e-mail address (if available). Also provide Federal Employer ID # and Minnesota Tax ID # (if applicable).

2. Company Work History. Summarize the last five years of your work experience, highlighting any work comparable to the objectives of this request.

3. Resumes of Key Personnel. Provide resumes (including a listing of licenses currently held) for each lead professional and/or project team leader.

4. Work Plan. Describe briefly the work plan and time table that will be used to complete the objectives of this request.

5. Bid. Provide a bid for the work outlined above.

SECTION 3. Evaluation of Responses

All proposals will be reviewed for completeness. Only completed proposals will be given further consideration. Proposals will be evaluated using the following criteria:

1. **Company work experience in general and with respect to the specific needs of this project.**
2. **Qualifications and credentials of key personnel.**
3. **Reasonableness of the work plan to complete the objectives given the remote and unusual properties to be appraised and a deadline of September 30, 2001. Should these appraisals be received after the agreed-upon delivery date, a daily penalty will be assessed equal to 1.5% of the agreed upon maximum not to exceed fee.**
4. **Bid.**

SECTION 4. Submission of Bids

Bids should be submitted to Professor Richard W. Lichty at the address given below.

All bids must be received on or before **February 28, 2001** to be considered. A contract will be offered on or before **March 31, 2001**.

Prospective responders having questions regarding this Request for Bids may contact:

Professor Curt L. Anderson
Department of Economics
171 School of Business and Economics
University of Minnesota Duluth
Duluth, MN 55812-2496
(218) 726-7568
canderso@d.umn.edu

or

Professor Richard W. Lichty, Director
Bureau of Business and Economic Research
19 School of Business and Economics
University of Minnesota Duluth
Duluth, MN 55812-2496
(218) 726-7219
rlichty@d.umn.edu

ATTACHMENT A

SECTION 1. Properties to be Appraised
Twenty state-owned sections within the Boundary Waters Canoe Area (see attached map):

Section 36, R.14 W., T. 67 N.
Section 16, R.13 W., T. 66 N.
Section 16, R.12 W., T. 65 N.
Section 8, R. 13 W., T. 64 N.
Section 20, R. 13 W., T. 64 N.
Section 28, R. 13 W., T. 64 N.
Section 15, R. 14 W., T. 63 N.
Section 21, R. 14 W., T. 63 N.
Section 36, R.11 W., T. 64 N.
Section 16, R. 9 W., T. 64 N.
Section 36, R. 10 W., T. 63 N.
Section 36, R. 8 W., T. 64 N.
Section 36, R. 7 W., T. 63 N.
Section 16, R. 6 W., T. 65 N.
Section 36, R. 6 W., T. 65 N.
Section 36, R. 5 W., T. 65 N.
Section 16, R. 4 W., T. 63 N.
Section 16, R. 2 W., T. 64 N.
Section 13, R. 4 W., T. 62 N.
Section 36, R. 2 E., T 65 N.

The University reserves the right, after consultation and agreement with the successful respondent, to substitute other sections within the BWCA for any of the above.

SECTION 2. Nature of the Appraisal Process
The appraisal process for each section shall be **complete** (according to Uniform Standards of Professional Appraisal Practice (USPAP), Uniform Standards for Federal Land Acquistions (USFLA) and Minnesota state statute). The process should include an on-site inspection.

SECTION 3. Nature of the Appraisal Report
The appraisal report for each section shall be **self-contained** (according to USPAP, USFLA, and Minnesota state statute) following Minnesota DNR Appraisal Report Guidelines (as of 7/00)

SECTION 4. Special Needs of the Research Project
ONLY for the purposes of a statistical valuation model being developed, a supplementary appraisal report on each section is to include a breakdown by 40-acre parcels of the total appraised value of each section appraised. This shall be based on the appraiser's best professional opinion. It is expected (and desired) that the sum of the estimated (but "unofficial") values of the 16 40-acre parcels of each section equal the "official" appraised value of the section.

BWCA
N
Township Lines
Section Lines
Sections to be Appraised (20)

"Informational Briefing on Inventory of State-Owned Lands in the BWCAW"

Kirby Ballroom, University of Minnesota - Duluth Campus

Wednesday, January 17, 2001, 7:00 to 8:30 p.m.

PURPOSE OF THIS BRIEFING

- *To provide information about the inventory of state-owned lands in the BWCAW.*
- *To learn what concerns and questions people have; answer questions if possible.*
- *To find out about recommended sources of information for the inventory.*
- *To ask what kind of communications are wanted as this matter progresses.*

PROGRAM

7:00-7:10 p.m.....Welcome and program overview by Moderator

7:10-7:40 p.m.....Briefing by UMD representative

7:40-7:55 p.m.....Perspectives from key decision makers

7:55-8:25 p.m.....Moderated Q&A

8:25-8:30 p.m.....Wrap-Up

FOR MORE INFORMATION, CONTACT:

UMD

Richard Lichty, Director
U of MN Bureau of Business & Economic Research
19 School of Business & Economics
10 University Drive
Duluth, MN 55812-2496
218-726-7219 phone
218-726-6555 fax
rlichty@d.umn.edu

DNR

Jim Lawler, Assistant Director
Division of Lands & Minerals
MN Department of Natural Resources
500 Lafayette Road, Box 30
St. Paul, MN 55155-4030
651-297-2572 phone
651-297-3517 fax
jim.lawler@dnr.state.mn.us

BWCA Land Ownership Summary

DNR Division of Lands and Minerals

Data Accurate as of December, 2000

Note: All numbers are estimates based on GIS analysis of most current DNR Land Records and BWCA boundary files)

Land Ownership by County

St. Louis County	
School Trust Fund	34,712 Acres, 953 parcels
University Trust Fund	390 Acres, 11 parcels
DNR Acquired	17,804 Acres, 481 parcels
County Tax Forfeit	3,622 Acres, 106 parcels
Total	***56,528 Acres,1,551 parcels***
Lake County	
School Trust Fund	25,530 Acres, 738 parcels
County Tax Forfeit	4,000 Acres, 103 parcels
Total	***29,530 Acres, 841 parcels***
Cook County	
School Trust Fund	26,087 Acres, 730 parcels
University Trust Fund	2,070 Acres, 63 parcels
County Tax Forfeit	2,262 Acres, 67 parcels
Total	***30,419 Acres,860 parcels***
Total for all Counties	***116,477 Acres, 3,252 parcels***

Land Ownership by Land Type

School Trust Fund	86,329 Acres, 2,421 parcels
University Trust Fund	2,460 Acres, 74 parcels
DNR Acquired	17,804 Acres, 481 parcels
County Tax Forfeit	9,884 Acres, 276 parcels
Total by Land Type	***116,477 Acres, 3,252 parcels***

Selected Parcels

St. Louis County	
School Trust Fund	1,810 Acres, 51 parcels
DNR Acquired	2,930 Acres, 76 parcels
County Tax Forfeit	66 Acres, 2 parcels
Lake County	
School Trust Fund	4,102 Acres, 106 parcels
Cook County	
School Trust Fund	2,832 Acres, 77 parcels
Total Selected Parcels	***11,740 Acres, 312 parcels***

January 17, 2001

Boundary Waters Canoe Area Wilderness (BWCAW) inventory and evaluation project -some facts

How much land are we talking about?

The BWCAW covers approximately 1.09 million acres. There are 122,247 acres (about 11.2 percent of the total) in state ownership, both DNR-managed and county-managed. Of this, approximately 93,260 acres (8.5 percent) are Trust Fund lands, 18,450 (1.7 percent) are acquired lands, and 10,513 (1 percent) are tax-forfeited lands. These acreage amounts may be adjusted in the course of updating maps.

Under Minnesota's State Constitution and state laws, state-held mineral rights cannot be exchanged or sold, so mineral rights are immaterial in estimating the market value of state lands.

Why is this land being studied by UMD?

The Legislature wants to know the quantity, nature and approximate value of the state land within the BWCAW. Although these lands have School Trust status, they produce no School Trust revenue because no commercial extraction of natural resources is permitted inside the BWCAW. The Legislature needs this appraisal information in order to examine alternatives for enhancing School Trust fund revenues.

It directed UMD to conduct an inventory and evaluation of state-owned land within the BWCAW. This inventory will include legal and physical descriptions of the lands. A valuation of these lands, based on a stratified random sampling of the state land tracts, will be estimated. The inventory and evaluation report must be submitted to the Legislature by January 15, 2002. Questions about public policy and ownership implications are not within the scope of UMD's study and eventual report.

Why is there state land in a federal wilderness area?

The state land was there before the wilderness area was designated. The federal Wilderness Act of 1964 designated the BWCA as a unit of the National Wilderness Preservation System. In 1978, Congress passed the BWCA Wilderness Act which ended logging activities. Since that time, there have been thousands of acres of land in Permanent School Trust Fund status within the Boundary Waters, where federal laws prohibit management for timber. School Trust land was established so that the revenue from that land could benefit the public school system of the state in which that land lies. However, since the BWCAW founding, the School Trust land within the Boundary Waters has not been earning money for the Trust, as specified in Minnesota law.

Will state land outside the BWCAW get Trust status designation?

It is possible that the land will be "traded" for land outside the BWCAW boundary; if this happens, the

acquired land will get trust status. Alternatively, the U.S. Congress could appropriate funds to compensate the state for putting this land in wilderness status; in that case, the compensation funds would go to the School Trust fund. Some combination of these two approaches is yet another possibility.

What is the DNR's role in this process?

The DNR has a threefold role in this study: 1) to provide maps and data bases to UMD so that those doing the research have all available information with which to conduct the study; 2) to manage the contract timeline and deliverables, so that the project is complete and ready for Legislative review by January 15, 2002; and 3) to provide licensed appraisers on staff to advise UMD on federal and state appraisal standards.

DNR is not the sole source of data and information for this study. Other sources are being sought by UMD and recommendations of additional sources are welcome. See below for UMD contact.

What information will be available about how the study is done?

A public information briefing is scheduled for January 17, 2001, at the UMD campus in Duluth. Interested persons will receive updates on the study's status; contact the DNR if you want to be added to the project mailing list; see below for DNR contact.

What is the timeline for the study?

During the first quarter of 2001, researchers at UMD will complete their initial research and inventory of the state land in the BWCAW, and establish land type classifications on which the value estimate will be based. During the second and third quarter of the year, appraisals of sample parcels (10 percent of the total) will be completed. During the fourth quarter, an economic model will be created to estimate value using that sampling. The target date for completing the study for review by the DNR staff is December 1, 2001. The report is due to the Legislature by January 15, 2002.

Who can I contact for more information?

For more information about the study, contact Richard Lichty, Bureau of Business and Economic Research, School of Business and Economics, 10 University Drive, Duluth, MN 55812-2496. Phone: (218) 726-7219; Fax: (218) 726-6555; e-mail: rlichty@d.umn.edu

For other information, contact Jim Lawler, DNR Division of Lands and Minerals, 500 Lafayette Road, St. Paul, MN 55155-4030. Phone: (651) 297-2572; Fax: (651) 297-3517; e-mail: jim.lawler@dnr.state.mn.us

Minnesota Department of Natural Resources
Division of Lands and Minerals
May 2002

School Trust Fund Lands
Some Facts

When Minnesota became a state in 1858 the federal government granted it millions of acres of land specifically designated for particular purposes. One such purpose was for the establishment of a public school system. The U.S. Congress granted Minnesota sections 16 and 36 within each township, for the use of schools. Where these sections had already been disposed of, or were covered by lakes or rivers, an equivalent acreage of land was made available. At the time of statehood, 2.9 million acres of land, referred to as School Trust Land, was dedicated for public school use.

On October 13, 1857 the citizens of Minnesota accepted the school trust land grant by voting to adopt the state's constitution. An important part of the state constitution is a section that establishes a Permanent School Fund (PSF). The main purpose of the PSF is to ensure a long-term source of funds for public education in the state. The fund basically consists of the accumulation of cash generated from land and timber sales, land leases, and mineral royalties earned off school trust lands. As income continues to accumulate, it forms a perpetually growing principal that is invested. The interest and dividends earned off the principal is available for school use.

By the mid 1880's much of the original school trust lands had been sold. However over the next several decades the State Legislature dedicated additional income earned from other federally granted lands to the PSF. Today the number of acres associated with the school trust is about 2.5 million acres of land and an additional 1 million acres of "severed" mineral rights. Mineral rights can be "severed" by a landowner during a land sale, if the seller of the land specifically states in the deed that the minerals are being retained for possible future removal by the seller. The Department of Natural Resources is the agency that currently manages the School Trust's lands and minerals.

There are approximately 150,000 acres of School Trust Fund land within areas that restrict or prohibit revenue generation. About 5000 acres lie within State Park boundaries and another 51,000 are within Peatland Scientific and Natural Areas that were designated by the Legislature in 1991. The department submitted capital bonding and LCMR funding requests to the legislature to compensate the school trust for these lands. The remaining 93,000 acres of restricted lands lie within the federally managed BWCAW. Currently activity within the BWCAW is restricted mainly to primitive camping and non-motorized recreation. As a result, the DNR is unable to manage the school trust lands located in the wilderness area in a manner that provides revenue generation.

During the 2000 Legislative Session the Minnesota Legislature determined that compensation for the School Trust lands located within the BWCAW should be considered. In order to provide basic information about the lands (value, use potential, income generating capacity, etc) the legislature provided funds for the University of Minnesota – Duluth to complete a research study. The information developed by the research study is expected to be valuable to the ultimate resolution of how Minnesota can meet its obligation to the PSF for School Trust lands

located within the BWCAW.

To this point the main emphasis of this fact sheet has been on the school trust lands and their income generating importance. However what is done with the income is equally important. The State Board of Investment (SBI) is the agency that manages the Permanent School Fund (PSF). Income earned from the School Trust lands is added to the PSF principal, which is then invested by the SBI. In accordance with the state constitution, the principal of the PSF cannot be spent; it must remain perpetual and inviolate. Since the fund's origination in the 1850's the market value of the principal within the PSF has grown to about $549 million, nearly all generated from land and timber sales, land leases, and mineral taxes and royalties. During the past fiscal year (ending June 30, 2001) income to the PSF from school trust lands was about $9.8 million.

Each year the SBI distributes interest and dividends earned from investment of the PSF to the public schools. This is accomplished by using the PSF income to offset the State's general fund education appropriation. Last fiscal year $24 million of spendable income was distributed in this manner. This represents about 0.7% of Minnesota's $3.36 billion in school aid that was appropriated by the legislature during 2001.

REQUEST FOR BIDS
FOR PROFESSIONAL APPRAISAL SERVICES

SECTION 1. Statement of Objectives

The University of Minnesota Duluth, School of Business and Economics, Bureau of Business and Economic Research is seeking to contract a qualified, professional appraiser to appraise state-held lands in the Boundary Waters Canoe Area. The selected appraiser will be asked to appraise, as a whole, approximately 5000 acres as pictured and described in Attachment A and to provide a report subject to the following conditions and standards:

(1) The appraisal process shall be **complete** (according to Uniform Standards of Professional Appraisal Practice (USPAP), Uniform Standards for Federal Land Acquisitions (USFLA) and Minnesota state statute). The process should include an on-site inspection.

(2) The appraisal report for shall be **self-contained** (according to USPAP, USFLA, and Minnesota state statute) following Minnesota DNR Appraisal Report Guidelines (as of 7/00)

(3) A timber appraisal is not required.

This work is to be completed during the period of **April 1, 2002 to September 30, 2002.** Joint proposals are welcomed.

This request for bids does not obligate the University to complete the proposed project and the University reserves the right to cancel this solicitation if it is considered to be in its best interest.

SECTION 2. Structure of Responses

Interested parties are asked to submit responses for each of the following items:

1. Company Identifiers. Provide the full company name and address, a principal contact person with title, phone and fax numbers, and e-mail address (if available). Also provide Federal Employer ID # and Minnesota Tax ID # (if applicable).

2. Company Work History. Summarize the last five years of your work experience, highlighting any work comparable to the objectives of this request.

3. Resumes of Key Personnel. Provide resumes (including a listing of licenses currently held) for each lead professional and/or project team leader.

4. Work Plan. Describe briefly the work plan and time table that will be used to complete the objectives of this request.

5. **Bid.** Provide a bid for the work outlined above.

SECTION 3. Evaluation of Responses

All proposals will be reviewed for completeness. Only completed proposals will be given further consideration. Proposals will be evaluated using the following criteria:

1. **Company work experience in general and with respect to the specific needs of this project.**
2. **Qualifications and credentials of key personnel.**
3. **Reasonableness of the work plan to complete the objectives given the remote and unusual properties to be appraised and a deadline of September 30, 2002. Should these appraisals be received after the agreed-upon delivery date, a daily penalty will be assessed equal to 1.5% of the agreed upon maximum not to exceed fee.**
4. **Bid.**

SECTION 4. Submission of Bids

Bids should be submitted to Professor Richard W. Lichty at the address given below.

All bids must be received on or before **March 15, 2002** to be considered. A contract will be offered on or before **March 31, 2002.**

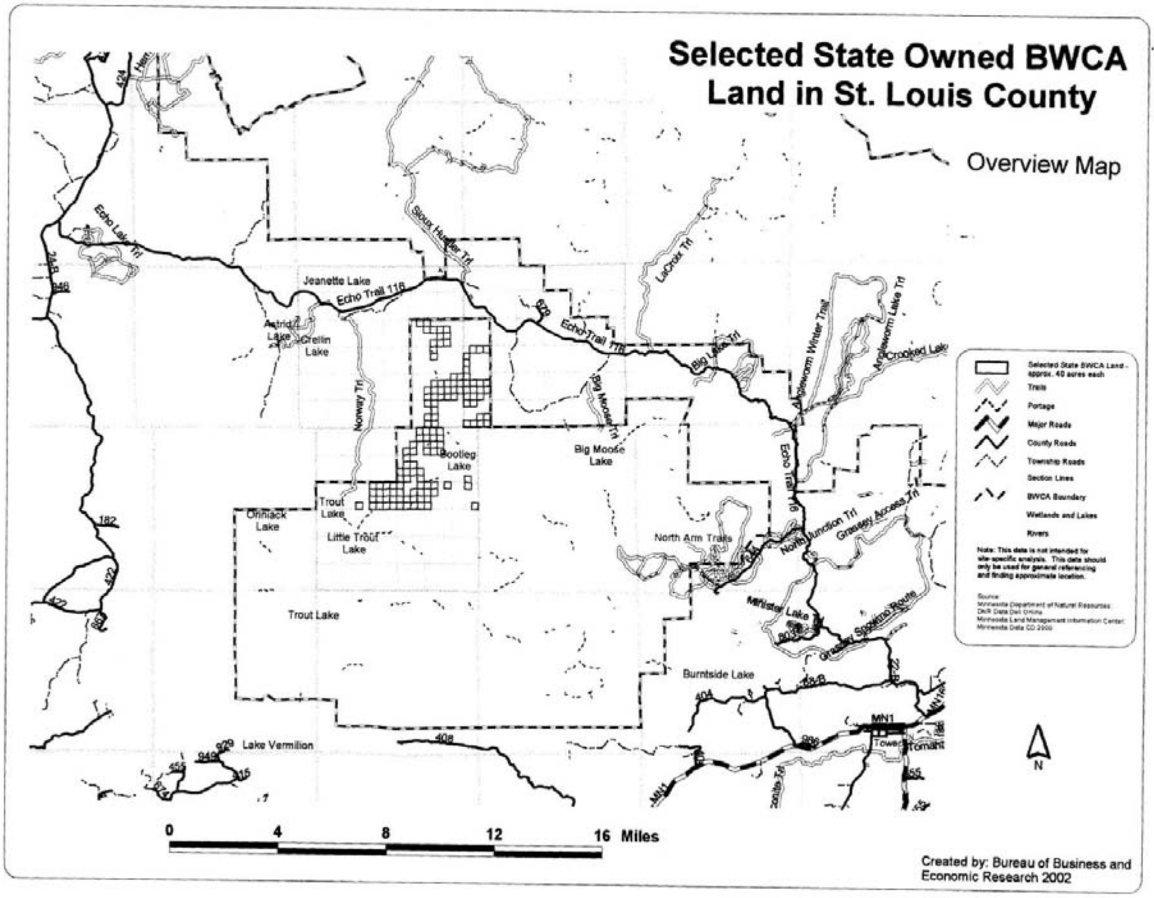
Prospective responders having questions regarding this Request for Bids may contact:

Professor Richard W. Lichty, Director
Bureau of Business and Economic Research
19 School of Business and Economics
University of Minnesota Duluth
Duluth, MN 55812-2496
(218) 726-7219
rlichty@d.umn.edu

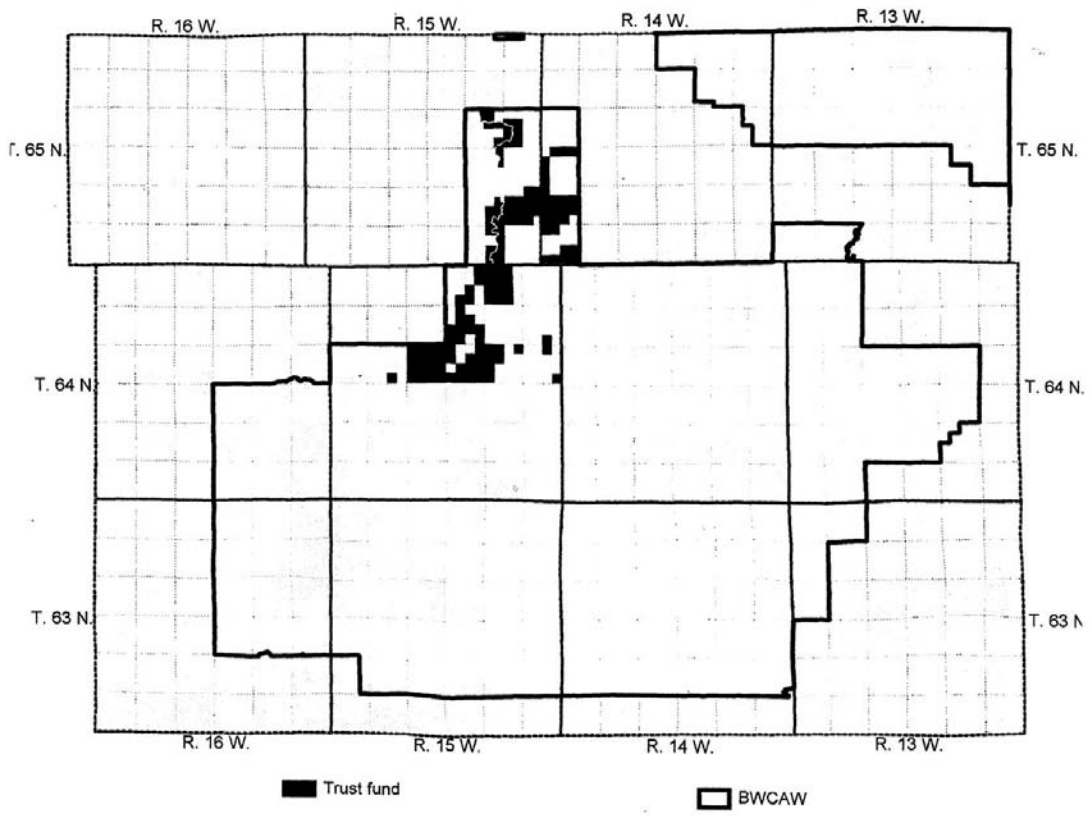
Attachment A

Access, Location, and Topographic Maps of
Selected Stated Owned Land in the
Boundary Waters Canoe Area Wilderness

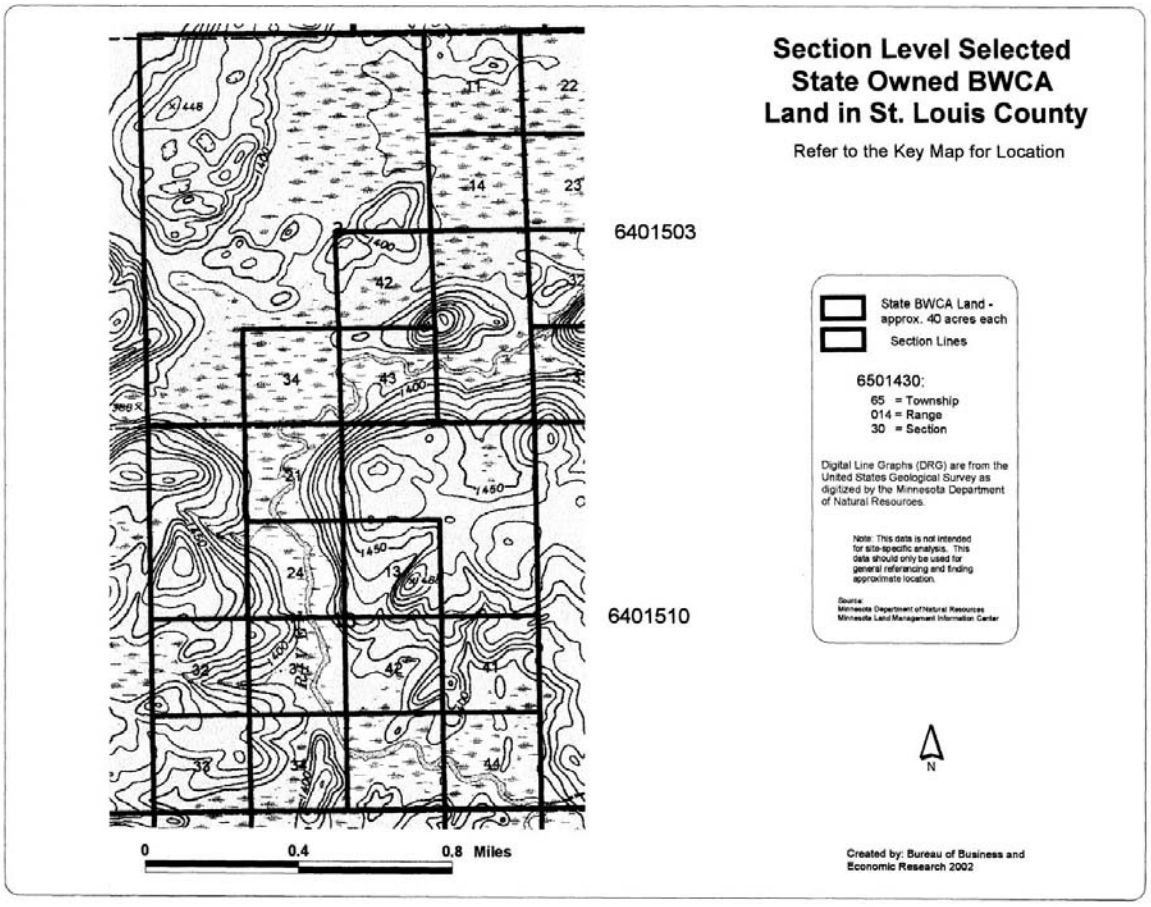
January 9, 2002
Bureau of Business and Economic Research

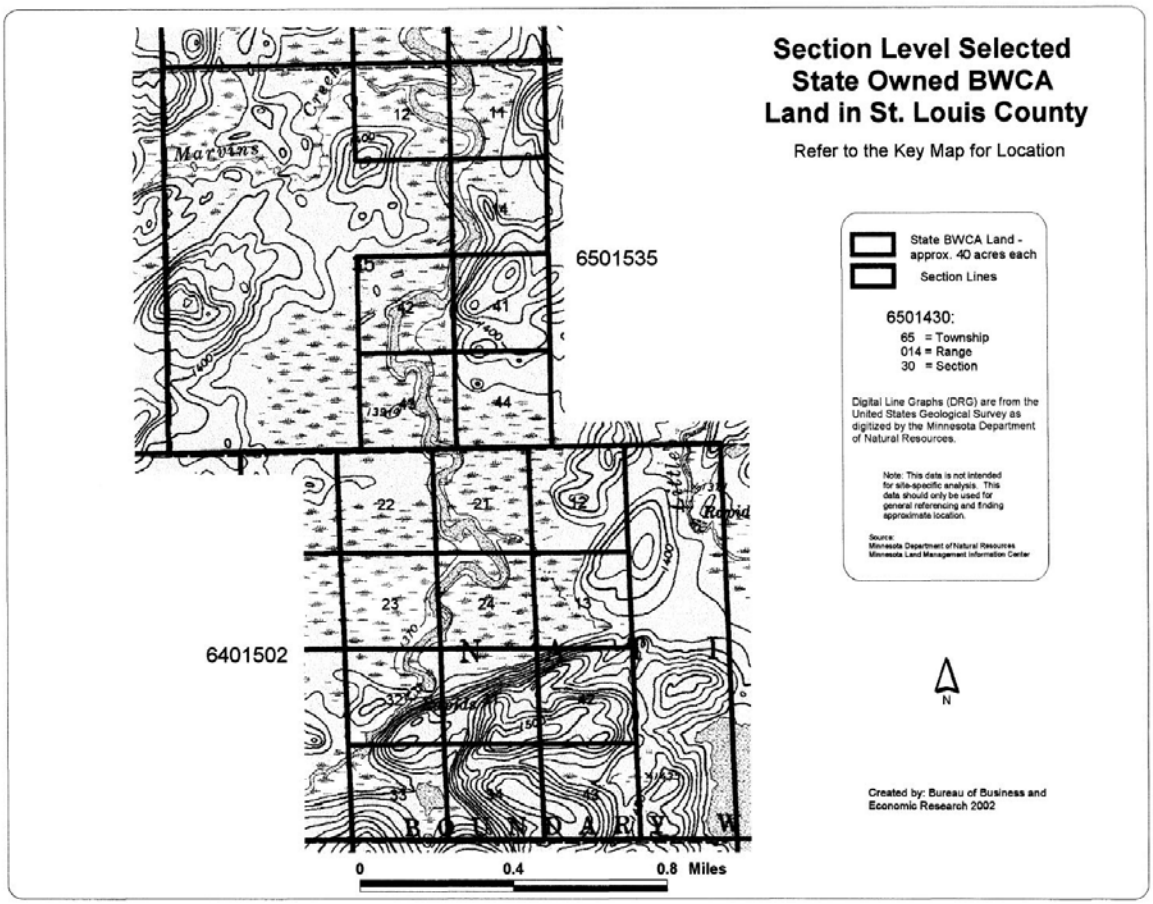

Selected State Owned BWCA Land in St. Louis County
Overview Map
Jeanette Lake
Echo Trail 116
Echo Lake Trl
Crellin Lake
Norway Trl
Bootleg Lake
Trout Lake
Little Trout Lake
Big Moose Lake
Big Moose Trl
Sioux Hustler Trl
LaCroix Trl
Echo Trail
North Arm Trails
North Junction Trl
Grassy Access Trl
Burntside Lake
Lake Vermilion
Crooked Lake
0 4 8 12 16 Miles
Created by: Bureau of Business and Economic Research 2002

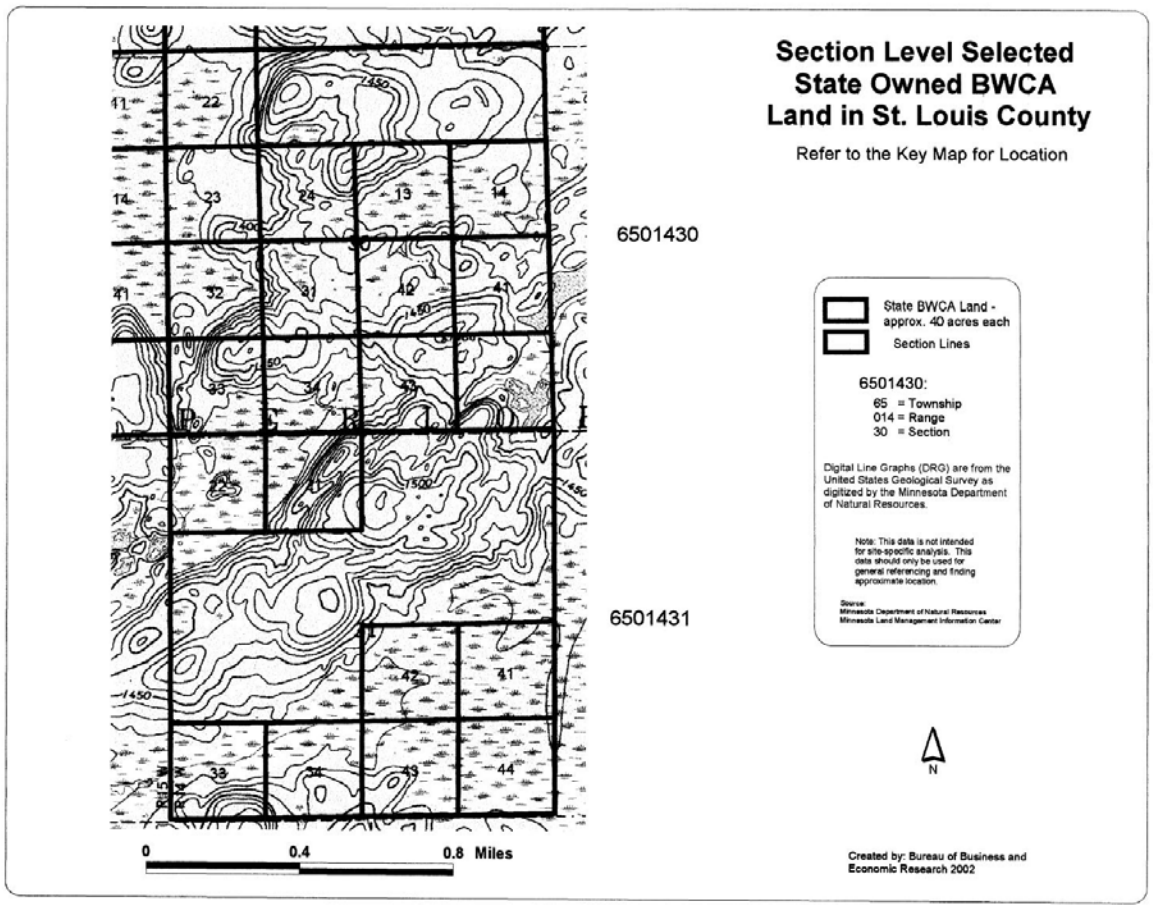
BWCAW Land Appraisal Sites for UMD Land Value Analysis

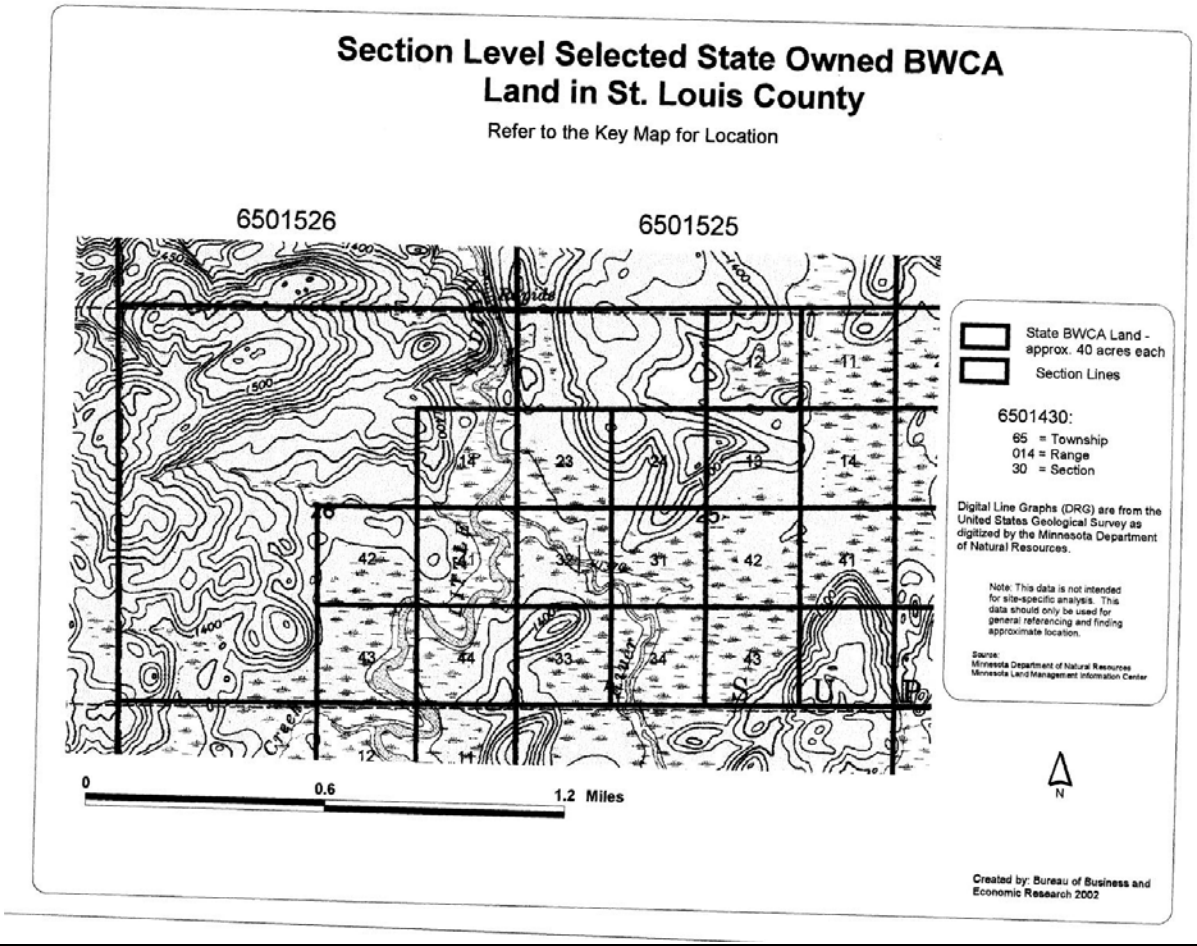


Selected State Owned BWCA Land in St. Louis County
Key Map
State BWCA Land - approx. 40 acres each
Trails
Portages
County Roads
Township Roads
BWCA Boundary
Township Lines
Section Lines
Wetlands and Lakes
Rivers
6501430:
65 = Township
014 = Range
30 = Section
Note: This data is not intended for site-specific analysis. This data should only be used for general referencing and finding approximate location.
Source: Minnesota Department of Natural Resources, Minnesota Land Management Information Center
N
Created by: Bureau of Business and Economic Research 2002
Big Moose Trail
Big Moose Lake
North Arm Trail
Echo Trail - 116
Jonathan Lake
Bootleg Lake
Jeanette Lake
Norway Trail
Little Trout Lake
Trout Lake
Ormack Lake
6501419
6501430
6501431
6501513
6501514
6501523
6501525
6501526
6501535
6401502
6401503
6401510
6401512
6401513
6401514
6401515
6401516
6401517
0
2
4
6
8 Miles


Section Level Selected
State Owned BWCA
Land in St. Louis County
Refer to the Key Map for Location
6401503
6401510
State BWCA Land - approx. 40 acres each
Section Lines
6501430:
65 = Township
014 = Range
30 = Section
Digital Line Graphs (DRG) are from the United States Geological Survey as digitized by the Minnesota Department of Natural Resources.
Note: This data is not intended for site-specific analysis. This data should only be used for general referencing and finding approximate location.
Source:
Minnesota Department of Natural Resources
Minnesota Land Management Information Center
N
0
0.4
0.8 Miles
Created by: Bureau of Business and Economic Research 2002


Section Level Selected
State Owned BWCA
Land in St. Louis County
Refer to the Key Map for Location
6501535
6401502
State BWCA Land - approx. 40 acres each
Section Lines
6501430:
65 = Township
014 = Range
30 = Section
Digital Line Graphs (DRG) are from the United States Geological Survey as digitized by the Minnesota Department of Natural Resources.
Note: This data is not intended for site-specific analysis. This data should only be used for general referencing and finding approximate location.
Source:
Minnesota Department of Natural Resources
Minnesota Land Management Information Center
N
Created by: Bureau of Business and Economic Research 2002
0
0.4
0.8 Miles
BOUNDARY W


Section Level Selected
State Owned BWCA
Land in St. Louis County
Refer to the Key Map for Location
6501430
6501431
State BWCA Land - approx. 40 acres each
Section Lines
6501430:
65 = Township
014 = Range
30 = Section
Digital Line Graphs (DRG) are from the United States Geological Survey as digitized by the Minnesota Department of Natural Resources.
Note: This data is not intended for site-specific analysis. This data should only be used for general referencing and finding approximate location.
Source:
Minnesota Department of Natural Resources
Minnesota Land Management Information Center
N
0
0.4
0.8 Miles
Created by: Bureau of Business and Economic Research 2002


Section Level Selected State Owned BWCA Land in St. Louis County
Refer to the Key Map for Location
6501526
6501525
State BWCA Land - approx. 40 acres each
Section Lines
6501430:
65 = Township
014 = Range
30 = Section
Digital Line Graphs (DRG) are from the United States Geological Survey as digitized by the Minnesota Department of Natural Resources.
Note: This data is not intended for site-specific analysis. This data should only be used for general referencing and finding approximate location.
Source:
Minnesota Department of Natural Resources
Minnesota Land Management Information Center
0
0.6
1.2 Miles
N
Created by: Bureau of Business and Economic Research 2002

Section Level Selected State Owned BWCA Land in St. Louis County

Refer to the Key Map for Location

0 0.4 0.8 Miles

N

Created by: Bureau of Business and Economic Research 2002

State BWCA Land - approx. 40 acres each

Section Lines

6501430:
65 = Township
014 = Range
30 = Section

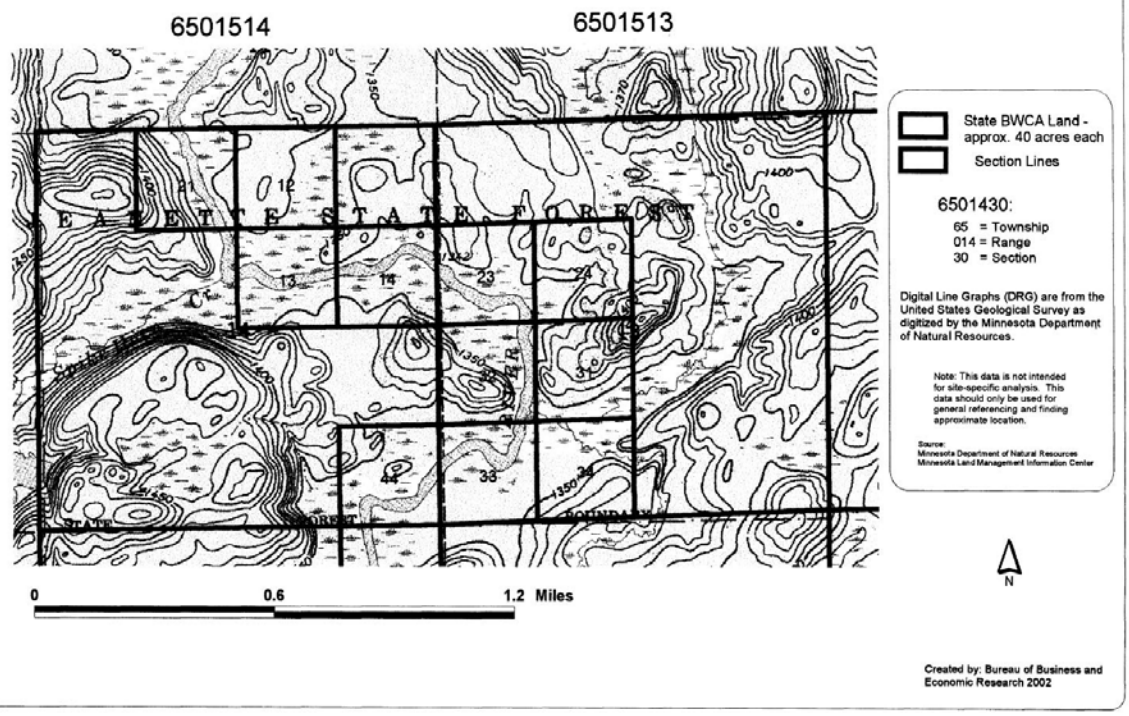
Digital Line Graphs (DRG) are from the United States Geological Survey as digitized by the Minnesota Department of Natural Resources.

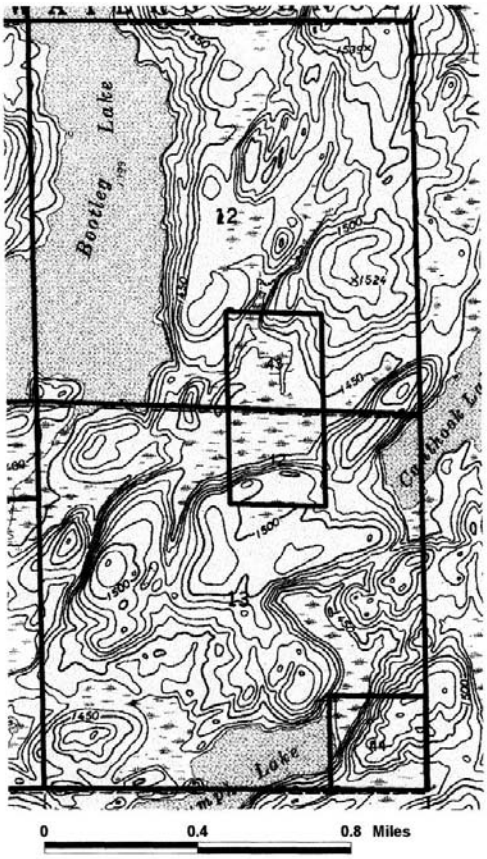
Note: This data is not intended for site-specific analysis. This data should only be used for general referencing and finding approximate location.

Source: Minnesota Department of Natural Resources Minnesota Land Management Information Center

Section Level Selected State Owned BWCA Land in St. Louis County

Refer to the Key Map for Location





6401512

6401513

Section Level Selected State Owned BWCA Land in St. Louis County

Refer to the Key Map for Location

State BWCA Land - approx. 40 acres each

Section Lines

6501430:

65 = Township
014 = Range
30 = Section

Digital Line Graphs (DRG) are from the United States Geological Survey as digitized by the Minnesota Department of Natural Resources.

Note: This data is not intended for site-specific analysis. This data should only be used for general referencing and finding approximate location.

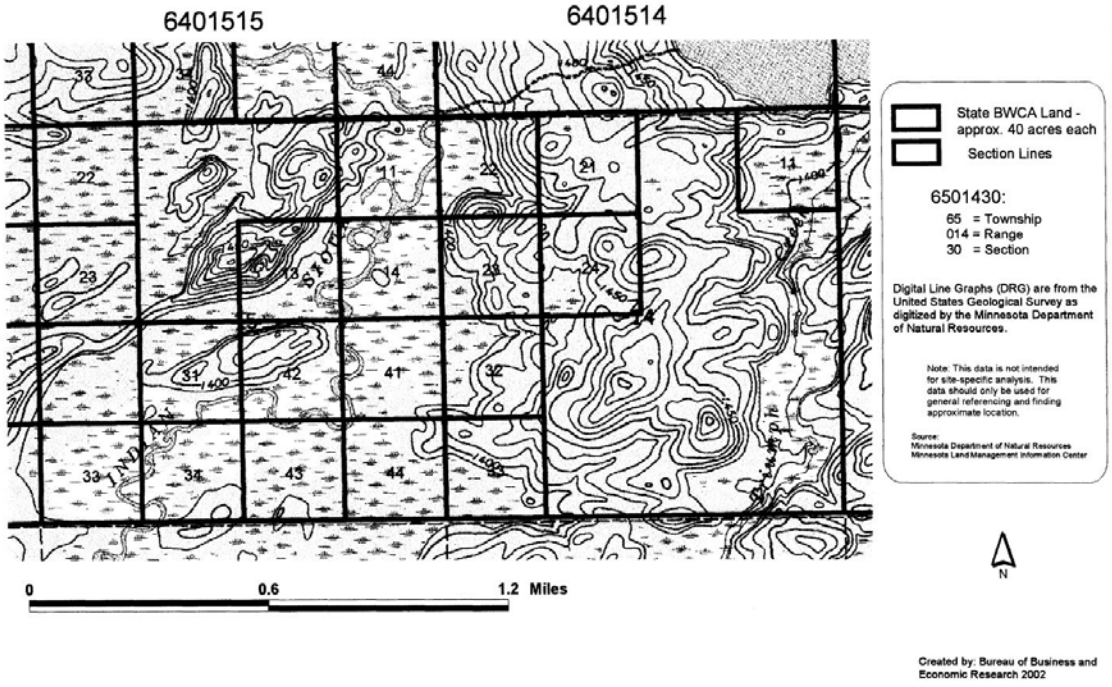
Source:
Minnesota Department of Natural Resources
Minnesota Land Management Information Center

N

Created by: Bureau of Business and Economic Research 2002

Section Level Selected State Owned BWCA Land in St. Louis County

Refer to the Key Map for Location



EMV Analysis

Average EMV Per Acre of 60 Selected Timberland and Waterfront Tracts
Located in Cook, Lake, and St. Louis Counties

Year	Timberland	Waterfront
1979	$ 77.42	$274.99
1980	$ 72.80	$283.60
1981	$ 72.54	$244.35
1982	$ 75.25	$261.92
1983	$ 75.73	$258.44
1984	$ 86.81	$333.46
1985	$103.51	$343.99
1986	$103.88	$343.99
1987	$104.20	$362.21
1988	$103.95	$370.71
1989	$101.70	$375.40
1990	$101.38	$376.21
1991	$ 97.19	$388.17
1992	$ 92.94	$395.04
1993	$ 93.00	$437.72
1994	$104.26	$463.21
1995	$120.21	$514.19
1996	$138.85	$607.99
1997	$153.36	$651.28
1998	$201.45	$809.86

LAND CLASS - WATERFRONT

Revised Sales Information 1978 - 1998

Year	Cook County		Lake County		St. Louis County		Region	
	# Sales	$/Acre	# Sales	$/Acre	# Sales	$/Acre	# Sales	$/Acre
1978	1	$ 264.98	1	$1,035.71	2	$1,921.87	4	$ 840.70
1979	1	$1,000.00	2	$1,087.28	0	$ ----	3	$1,072.93
1980	0	$ ----	3	$ 373.83	2	$1,278.05	5	$ 658.64
1981	1	$ 558.08	4	$ 771.35	2	$ 362.23	7	$ 538.79
1982	1	$3,931.20	3	$ 676.67	1	$ 476.19	5	$ 857.79
1983	0	$ ----	3	$ 616.33	2	$1,210.16	5	$ 840.65
1984	4	$1,049.07	2	$1,142.24	4	$1,006.35	10	$1,066.44
1985	2	$ 661.64	1	$ 698.33	5	$ 619.97	8	$ 641.77
1986	3	$2,008.05	4	$ 573.00	4	$ 794.48	11	$ 750.53
1987	0	$ ----	2	$ 203.83	4	$ 610.21	6	$ 383.28
1988	3	$ 547.02	2	$ 184.32	3	$ 399.66	8	$ 371.25
1989	2	$ 306.41	3	$ 513.32	7	$ 668.24	12	$ 599.40
1990	4	$ 244.89	8	$ 481.84	13	$ 554.24	25	$ 407.07
1991	6	$ 445.06	6	$ 294.07	13	$ 730.96	25	$ 521.48
1992	3	$ 345.43	3	$1,039.79	6	$ 364.57	12	$ 476.55
1993	3	$ 521.21	1	$2,097.50	2	$ 701.33	6	$ 758.82
1994	7	$ 615.29	5	$ 513.37	9	$ 709.82	21	$ 643.66
1995	3	$1,054.85	1	$ 915.22	17	$ 623.61	21	$ 676.78
1996	3	$ 905.38	4	$ 289.19	7	$ 869.66	14	$ 644.64
97-98	4	$3,200.49	8	$1,430.95	15	$1,433.62	27	$1,636.72

LAND CLASS - TIMBERLAND

Revised Sales Information 1978 - 1998

Year	Cook County		Lake County		St. Louis County		Region	
	# Sales	$/Acre	# Sales	$/Acre	# Sales	$/Acre	# Sales	$/Acre
1978	4	$149.28	3	$ 87.50	1	$212.50	8	$ 99.22
1979	1	$159.98	1	$ 27.02	2	$162.02	4	$114.76
1980	4	$267.09	1	$137.50	5	$141.26	10	$183.32
1981	4	$245.13	0	$ ----	3	$172.53	7	$215.89
1982	1	$ 83.33	4	$394.44	2	$116.74	7	$180.14
1983	1	$116.28	5	$302.81	3	$163.11	9	$231.80
1984	2	$163.82	0	$ ----	4	$182.50	6	$177.97
1985	4	$247.97	2	$287.50	6	$151.52	12	$215.22
1986	7	$162.74	6	$114.00	21	$154.03	34	$142.44
1987	7	$275.43	2	$231.54	13	$128.07	22	$207.80
1988	17	$172.33	5	$137.89	19	$102.54	41	$137.15
1989	19	$210.54	5	$126.47	29	$121.30	53	$143.65
1990	13	$165.64	6	$207.33	57	$141.52	76	$148.91
1991	21	$281.33	6	$268.06	52	$149.17	79	$185.20
1992	16	$159.60	8	$159.60	42	$136.80	66	$146.99
1993	19	$192.43	9	$168.39	63	$163.15	91	$168.59
1994	26	$209.66	6	$169.65	57	$137.64	89	$161.35
1995	22	$285.60	9	$224.43	74	$153.83	105	$188.39
1996	10	$204.57	15	$177.49	46	$199.63	71	$195.86
97-98	32	$511.28	18	$541.35	64	$239.63	114	$355.34

Resale #	First Sale	Resale	$ Increase	% Increase	Time Span	Annual % Increase
1	$ 10,000.00	$ 22,000.00	$12,000.00	120.0%	196 months	7.3%
2	$ 3,000.00	$ 7,500.00	$ 4,500.00	150.0%	73 months	24.7%
3	$ 15,000.00	$ 20,000.00	$ 5,000.00	33.3%	32 months	12.5%
4	$ 38,000.00	$ 39,000.00	$ 1,000.00	2.6%	6 months	5.2%
5	$ 25,000.00	$ 29,000.00	$ 4,000.00	16.0%	38 months	5.0%
6	$ 9,000.00	$ 14,000.00	$ 5,000.00	55.5%	37 months	18.0%
7	$ 17,200.00	$ 18,500.00	$ 1,300.00	7.6%	9 months	10.1%
8	$ 15,000.00	$ 16,000.00	$ 1,000.00	6.7%	8 months	10.0%
9	$ 8,500.00	$ 9,500.00	$ 1,000.00	11.7%	33 months	4.3%
10	$ 10,000.00	$ 12,000.00	$ 2,000.00	20.0%	20 months	12.0%
11	$ 10,000.00	$ 11,700.00	$ 1,700.00	17.0%	35 months	5.8%
Totals	**$160,700.00**	**$199,200.00**	**$38,500.00**	**24.0%**	**487 months**	**5.9%**

Exhibit 10: EMV and SALES Regression Analysis

Regression

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TIME[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: EMVW

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.940[a]	.883	.870	4.158E-02

a. Predictors: (Constant), TIME

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.117	1	.117	67.870	.000[a]
	Residual	1.556E-02	9	1.729E-03		
	Total	.133	10			

a. Predictors: (Constant), TIME

b. Dependent Variable: EMVW

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.512	.023		107.101	.000
	TIME	3.266E-02	.004	.940	8.238	.000

a. Dependent Variable: EMVW

Regression

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TIME[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: EMVT

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.817[a]	.667	.630	6.473E-02

a. Predictors: (Constant), TIME

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.565E-02	1	7.565E-02	18.057	.002[a]
	Residual	3.770E-02	9	4.189E-03		
	Total	.113	10			

a. Predictors: (Constant), TIME

b. Dependent Variable: EMVT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.939	.037		53.117	.000
	TIME	2.622E-02	.006	.817	4.249	.002

a. Dependent Variable: EMVT

Regression

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TIME97[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: SALESW

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.817[a]	.668	.626	.1096

a. Predictors: (Constant), TIME97

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.193	1	.193	16.076	.004[a]
	Residual	9.611E-02	8	1.201E-02		
	Total	.289	9			

a. Predictors: (Constant), TIME97

b. Dependent Variable: SALESW

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.579	.063		41.023	.000
	TIME97	4.572E-02	.011	.817	4.010	.004

a. Dependent Variable: SALESW

Regression

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TIME97[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: SALEST

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.819[a]	.671	.630	7.287E-02

a. Predictors: (Constant), TIME97

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.681E-02	1	8.681E-02	16.348	.004[a]
	Residual	4.248E-02	8	5.310E-03		
	Total	.129	9			

a. Predictors: (Constant), TIME97

b. Dependent Variable: SALEST

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.104	.042		50.347	.000
	TIME97	3.065E-02	.008	.819	4.043	.004

a. Dependent Variable: SALEST