

# **Oak Lake Field Station**

**National Science Foundation Planning Effort**

**A Vision for the Future**



**Nels H. Troelstrup, Jr., Director**

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## Executive Summary

Oak Lake Field Station is a 570 acre facility managed by South Dakota State University. Acquired in 1987, Oak Lake provides facilities, programs and opportunities for students and researchers throughout the Northern Plains. The station is a member of the Organization of Biological Field Stations (OBFS).

Funds were provided through the National Science Foundation Division of Marine Laboratories and Field Stations to conduct a planning effort. The objectives of this effort were to (1) define a research and instructional science agenda, (2) identify facility and equipment needs, (3) establish collaborative working relationships for research and instructional programs, (4) establish communication with other field stations to facilitate exchange of long-term monitoring data and instructional materials and (5) develop a strategic management plan for station improvements over the next 5-10 years.

Planning efforts were initiated with a facility review. Ten field station directors of OBFS affiliated field stations were invited to participate during June 1998. Directors were divided into three working groups (Administration and Funding, Facilities, Programs). One director (Dr. Susan Lohr) served as facilitator. Each working group conducted focused interviews with field station staff, university administration, Oak Lake Committee representatives, Community Advisory Group representatives and SDSU students. Information gathered from focus sessions was used to generate a set of management recommendations. These recommendations were reviewed by campus and community affiliates prior to development of strategic goals and objectives to carry Oak Lake into the next century. Architectural plans were developed by campus support services to complete Oak Lake's management plan.

This planning document provides strategic steps to reach objectives and goals commensurate with the field station mission. These steps are measurable and placed within a specified time frame. Planning information contained within this document is also dynamic. Progress toward specific objectives and goals will be evaluated and updated on an annual basis. The entire framework will be evaluated and revised every five years. New background information will be added annually. Thus, we view this effort as the beginning of a continuing process designed to improve administration, facilities and programs of our field station.

Field station improvements have already been realized as a result of this effort. University administration has allocated additional funds toward general operations. Two new research incentives programs have been implemented to attract faculty and students. A new field ecology course is now under development. Business and master plans are under development. New computers, field equipment, specimen cabinets, field library holdings, photocopier, fax machine and education resource materials have been acquired. A proposal was recently submitted to generate funding for renovations to our classroom and field laboratory. Thus, Oak Lake Field Station has taken advantage of this planning effort to enhance research and training facilities.

# Oak Lake Field Station Background Document

## National Science Foundation Planning Effort

The Northern Glaciated Plains provides a unique collection of habitats and species in the heart of the North American Continent. Historical home to a variety of plants and animals, this expanse of native prairie has largely been converted to agricultural production. Today, only small tracts of native and restored prairie remain. Like many ecosystems throughout the world, limited opportunities exist to study the ecology of prairie systems. The Oak Lake Field Station (South Dakota State University) provides a facility for research and instructional opportunities in a northern prairie environment.

### **Facility Description**

#### Access and Transportation

The Oak Lake Field Station is located 23 miles northeast of the South Dakota State University campus in Brookings County, South Dakota (Fig 1). The Twin Cities International Airport is located within 200 miles with regional connecting flights to the Sioux Falls Airport which is located only 70 miles from the Oak Lake Field Station. Interstate highway (I-29) provides a route to within 15 miles while state and county highways extend to the perimeter of the 570 acre field station. Gravel roads are maintained on the field station grounds to support maintenance and programming efforts.

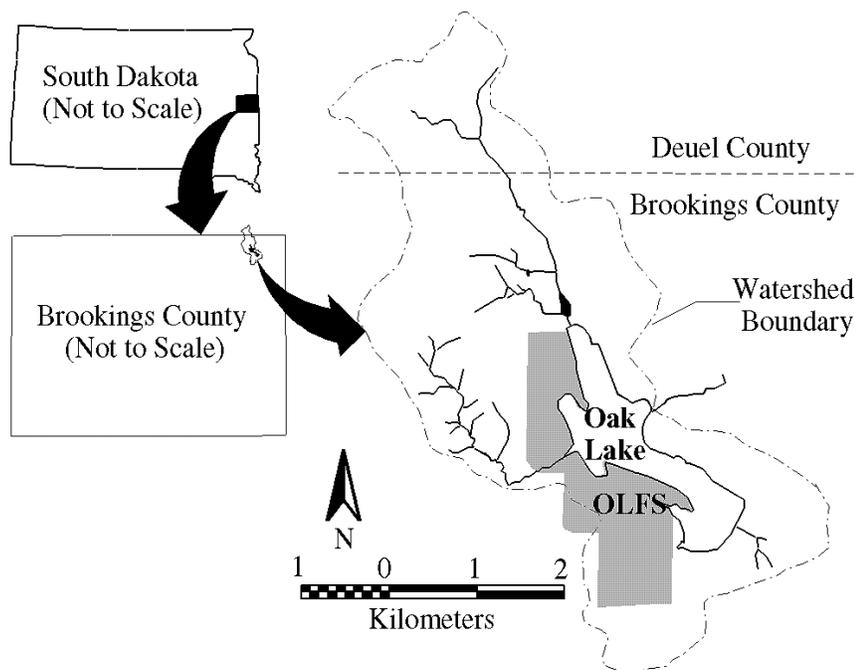


Figure 1. Relative location of Oak Lake and the Oak Lake Field Station (shaded gray) in eastern South Dakota.

## Oak Lake Landscape

Oak Lake Field Station is located along the western shoreline of Oak Lake within the Northern Glaciated Plains Ecoregion (Omernik 1986). This region is naturally dominated by tallgrass prairie vegetation with bur oak woodlands along lake shorelines and drainages. The landscape is flat to rolling with well drained loamy soils. One soil group (Singsaas Series) is so intensively worked by earthworms that there is complete disruption of soil horizons. A mixture of tallgrass prairie, oak woodlands, prairie marshes and deepwater habitats occur on the field station property (Table 1). Transition zones between these major habitat types occur abruptly due to significant topographic relief on the site. Thus, groups visiting the field station witness tremendous biological diversity over short spatial distances.

The landscape of eastern South Dakota falls within the Prairie Pothole region of the upper Midwestern United States. This landscape has a mid-continental climate and was glaciated several times during the Pleistocene Epoch. Temperatures may reach -30 (C) during winter months and 30 (C) during the summer. Glacial advances and retreats left undulating topography with numerous ice-formed depressions termed potholes. These potholes vary greatly in density, size and depth. The Oak Lake basin was formed approximately 14,000 years ago as one of these potholes during the recession of the Gary Substage of the Wisconsin glaciation (Table 2). The lake sits on the eastern ridge of the Coteau des Prairie, a wedge-shaped upland area formed between two lobes of glacial ice (Flint 1955). Numerous smaller potholes are also located on the field station property. Drainages to the west of the Field Station drain into the Big Sioux River and through the Missouri River drainage to the Mississippi River. Oak Lake and drainages to the east drain into the Minnesota River and hence to the Mississippi River.

Table 1. General land cover of the Oak Lake Field Station, Brookings County, South Dakota.

<b>Land Cover Class</b>	<b>Hectares</b>	<b>Percent</b>
Rangeland and Pasture	152	66%
Cropland	28	12%
Forest	30	13%
Wetland Basins	18	8%
Roads and Developed Land	2	1%

Table 2. Oak Lake and drainage basin attributes, Brookings County, South Dakota.

	Attribute	Value	Units <sup>d</sup>
<b>Oak Lake</b>	Surface Elevation	549.25 <sup>b</sup>	masl
	Area	162.8 <sup>2</sup> (160.3) <sup>a</sup>	ha
	Perimeter	9.8 <sup>b</sup>	km
	Volume	1.801x10 <sup>6a</sup>	m <sup>3</sup>
	Ave Depth	1.12 <sup>a</sup>	m
	Max Depth	2	m
	Relative Depth	0.14	%
	Basin Length	3,081 <sup>b</sup>	m
	Basin Width	988 <sup>b</sup>	m
	Shoreline Development	2.17 <sup>b</sup>	
	% Basin 0 to 1.52m	72.8% <sup>a</sup>	
% Basin >1.52m	27.2% <sup>a</sup>		
Note! Oak Lake basin was recorded as dry during the period 1933 through 1937.			
<b>Watershed</b>	Area	1,681.8 <sup>b</sup>	ha
	Perimeter	23.3 <sup>b</sup>	km
	Drainage Density	1.9 <sup>b</sup>	km/km <sup>2</sup>
<b>Field Station</b>	Area	231.8 <sup>b</sup>	ha
	Perimeter	10.9 <sup>b</sup>	km
<b>Drainages</b>	Major Drainage	Mississippi River	
	Minor Drainage	Minnesota River	
	Drainage Count	99 <sup>b</sup>	km
	Total Length	31.7 <sup>b</sup>	km
	Average Length	0.3 <sup>b</sup>	km
	Minimum	<0.1 <sup>b</sup>	km
Maximum	1.9 <sup>b</sup>	km	
<b>Wetlands</b>	Number	122 <sup>c</sup>	
	Total Area	267.1 <sup>c</sup>	ha
	Average Area	2.2 <sup>c</sup>	ha
	Minimum Area	<0.1 <sup>c</sup>	ha
	Maximum Area	163.1 <sup>c</sup> (Oak Lake)	ha

<sup>a</sup>South Dakota Department of Game, Fish and Parks. 1965. *Diagram of planimetric measurements of the Oak Lake Basin, Brookings County. Based upon Aerial Photography taken in 1956, water stage 1.5' below normal.*

<sup>b</sup>United States Geological Survey. 1970. *Astoria, South Dakota Quadrangle Map. 7.5', 1:24,000 Quadrangle Map based upon aerial photography taken in 1969.* Map digitized to create the Oak Lake Field Station Geographic Information System.

<sup>c</sup> United States Department of the Interior, United States Fish and Wildlife Service, National Wetlands Inventory. 1990. *Wetlands delineations for the USGS Astoria, South Dakota Quadrangle Map. 7.5', 1:24,000 Quadrangle Map based upon aerial photography taken in 1986 (CIR).* Digital wetlands coverage obtained from the National Wetlands Inventory and integrated within the Oak Lake Field Station Geographic Information System.

<sup>d</sup>All units converted to metric equivalents from original sources.

## Site History

The Oak Lake area was inhabited by Native Americans of the Dakota Sioux Tribe. European settlers first arrived from Minnesota and Scandinavia during the early 1870's (Olson 1974). A number of owners have claimed the five main land parcels over the last 100 years (Fig 2; Appendix I). Several of these parcels were divided and distributed as wood lots for firewood and building materials. Land was developed and privately managed for agricultural production until 1962 when The Girl Scouts of America purchased 570 acres along the western shoreline of Oak Lake (Appendix I). Outdoor instruction buildings, bunkhouses, administration building and dining hall were built during the period 1968-1972. The State of South Dakota acquired Oak Lake Field Station from The Girl Scouts of America through a land trade in 1988. South Dakota State University was given a 50 year lease from the South Dakota Department of Schools and Public Lands. Minor renovations have been made to the facility which is now managed as a multiple-use field station (Northern Plains Biological Field Station Committee 1989).



Figure 2. The Rue family homesteaded on the South Farm Unit in 1900. A descendant of John Rue (pictured standing) participates on the Oak Lake Community Advisory Group (with permission, Art Graslie, White, SD).

## Facilities and Equipment

Twelve building structures are maintained at Oak Lake Field Station. These include a dining hall, administration building, two farm houses, two barns, repair shed, two bunkhouses, canoe house and outdoor classroom (Fig 3). Facilities and equipment are available at Oak Lake Field Station to support a wide range of instructional and research efforts. Field and laboratory equipment to support basic studies in field ecology are available at the field station or through the main SDSU campus. A resource room is equipped with library, tables, counter top space, whiteboard and telephone line (Internet connection) to support small class meetings. A field laboratory, canoes and small research boat provide basic facilities to conduct limnological investigations on Oak Lake. Additional equipment is distributed among the different facilities present at the field station (Table 3; Appendix II). Limited cold storage space is available on

site. Analytical laboratories are available on the main campus of South Dakota State University, only 30 minutes travel from the field station.

Table 3. Facilities and equipment available to support programs at the Oak Lake Field Station.

Activity Area	Facilities and Equipment
Dining Hall 3 Bedrooms 2 Bathrooms Kitchen Dining Area	Dishes and utensils Beds Telephone Tables and benches Projection screen and overhead projector
Administration Building Administrative Office Field Laboratory Resource Room	Desks, telephones, computer Countertops/Sink Lab Glassware, Balance, Microscopes Field Meters Quadrats, Field Tapes Corers, Nets, Traps Field Station Library
South Farm Unit Caretaker's Home Large Bunkhouse Small Bunkhouse Barn Shop	Weather Monitoring Equipment Bunk Beds Refrigeration, Microwave, Tables Wood Burning Stoves Tools Pick-up Truck Tractor with Loader
North Farm Unit Pioneer House Barn	Wood burning stove, Furniture Storage space
Canoe House and Outdoor Classroom	Storage and Work Space 8 Canoes 12' Research Boat Storage

\* see Appendix II for listing of additional available equipment.



Figure 3. Field station administration building (left) and dining hall (right) receive the greatest demands for use.

### Communications

The administration building, dining hall and caretaker's home have been connected with telephone service. No ethernet connections are available at this time. However, modem connection to e-mail and the Internet is possible over existing telephone lines.

An Internet Home Page has been developed for the Oak Lake Field Station under the Department of Biology and Microbiology's home page (<http://www.abs.sdstate.edu/bio/Oaklake/index.htm>). Field Station programs and reservations are announced via Internet, local television, radio, written brochures and newsletters.

### Data Management

Data to summarize station use, budget, facilities maintenance, climate and water quality monitoring are maintained in digital files. These files have been developed using standard spreadsheet software (QUATTRO PRO) to facilitate use by a variety of public school, agency and campus groups. Basic database structure and maintenance were designed following the guidelines provided in Goenter (1992). All data are maintained in the laboratory of the station director and the Department of Biology and Microbiology. Data requests are managed through a central IBM compatible minicomputer. Data can also be downloaded as Macintosh text and spreadsheet files.

### Automated Data Acquisition Systems

A Geographic Information System and Informational Database have been developed for Oak Lake Field Station to support instruction and research efforts (Appendix III). The spatial scope of the GIS is based upon the surficial watershed boundaries of the Oak Lake Basin and includes the field station property. This design is intended to provide a biophysical framework to support research and instructional activities. Development of the Oak Lake GIS has been supported by SDSU Central Administration, Department of Geography and South Dakota Agricultural

Experiment Station. Computer hardware (IBM microcomputer, color plotter, digitizing table) and PC ARC/INFO (GIS) software were purchased in 1992 and have been used to develop this system.

In addition to GIS capability, the Oak Lake Field Station has implemented a climatic and water resources monitoring effort. Daily temperature and precipitation data are recorded using National Weather Service equipment. These data are maintained in a computer database on campus and are provided to instructors and researchers upon request (Appendix IV). Water quality monitoring data for Oak Lake are collected biweekly during the ice-free months. These data are also provided upon request to instructors and researchers interested in projects at the station.

### Site Administration

Oak Lake Field Station is administered by an academic committee appointed by the President of South Dakota State University (Table 4). The Oak Lake Committee meets three times during the academic year to make policy decisions, approve an annual budget and develop programming and planning activities. Standing subcommittees have been defined for funding, programming, research and membership program. The station director serves as chair of the Oak Lake Committee and coordinates day to day operations. Station maintenance, cleaning and repair activities are the responsibility of an on-site caretaker.

A community advisory group was established in 1995 to (1) serve as liaison between the general public and Oak Lake Committee and (2) provide recommendations regarding station finances, programming and policies. This committee meets quarterly and is chaired by an elected member of the community. Advisory Group composition includes bankers, retired politicians, farmers, housewives and business persons from the communities surrounding the field station.

Oak Lake Field Station is presently maintained and managed by two part-time staff (caretaker (33%) and director (20%)). The caretaker has been employed with the field station since 1988 while the director has served five years. Additional, part-time seasonal employees are hired during the summer to assist with grounds maintenance and programming. Secretarial support is provided through the Department of Biology and Microbiology on the SDSU campus.

Table 4. Current composition of Oak Lake Field Station Committee, Spring 1998.

<b>Name</b>	<b>Affiliation</b>	<b>Years on Committee</b>
Dr. Nels H. Troelstrup, Jr., Chair	Biology & Microbiology	5
Dr. Charles McMullen	Biology & Microbiology	10
Dr. Gary Larson	Biology & Microbiology	10
Ms. Linda Sandness*	Health, Physical Education and Recreation	>10
Dr. Pat Johnson	Animal & Range Sciences	5
Dr. Janet Gritzner	Geography	5
Dr. Donna Hess	Rural Sociology	5
Mr. Dick Waldner	Physical Plant	10
Dr. Tim Steele	Art	6
Mr. Tim Nichols	College of Ag/Bio	2
Mr. Jim Welch	Instructional Technologies	2
Dr. Jim Doolittle	Plant Science	< 1
Dr. Anne Marie Bahr	Philosophy & Religion	6

\* Ms. Sandness experience with Oak Lake Field Station includes previous appointment as Camp Director with Girl Scouts of America.

### Missions of the Oak Lake Field Station

Projects and programs fall within missions defined in the Oak Lake Management Plan (Northern Plains Biological Field Station Committee 1989).

<b>Missions of the Oak Lake Field Station</b>
<i>Provide educational opportunities for citizens and students in professional fields represented by South Dakota State University,</i>
<i>Provide facilities and environment for interdisciplinary research to enhance the quality of life in the Northern Great Plains region through the beneficial use of human and natural resources,</i>
<i>Provide the facilities and environment for colloquia, symposia, conclaves, conventions, seminars and gatherings related to the community and university,</i>
<i>Conserve the property in an environmentally sensitive way so as to enhance and protect the unique and valuable natural resources of the area.</i>

## Field Station Use

The Oak Lake Field Station is a multiple-use facility managed by South Dakota State University. Overall use of the facility has increased dramatically since acquisition in 1988 (Fig 4). The number of groups using the field station annually has increased from less than 10 to nearly 85 while number of user-days has increased to nearly 3,700 per year.

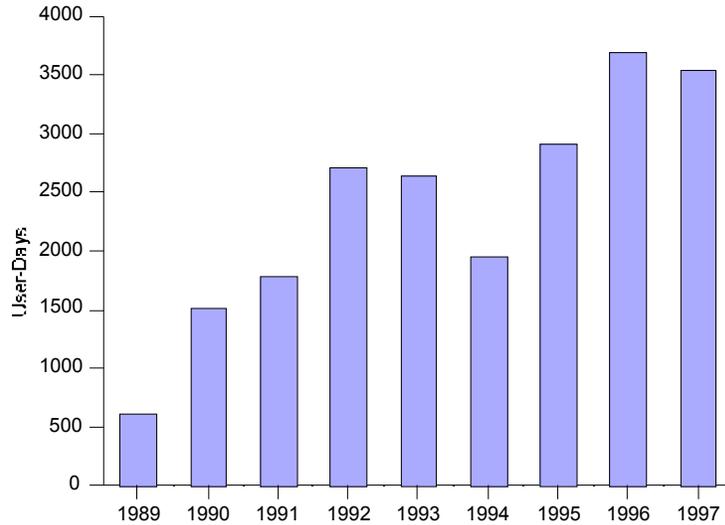


Figure 4. Changing use patterns for the Oak Lake Field Station (1989-1997).

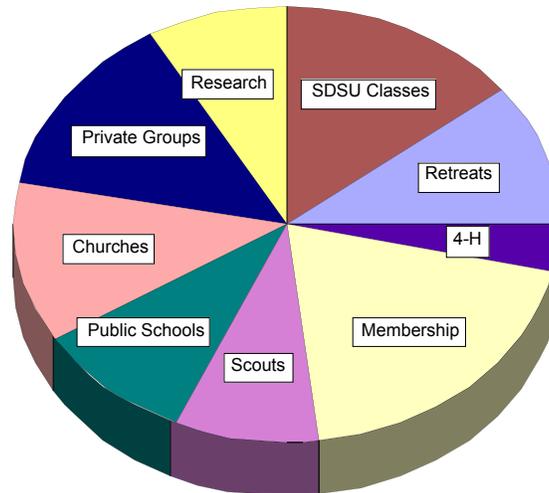


Figure 5. Oak Lake Field Station user composition, 1997.

Field station users represent a diverse group of interests (Fig 5). Approximately one-third of field station use is directed toward instructional and research activities from the university community. Research efforts have increased from 0 user-days in 1989 (first year managed by SDSU) to 309 user-days of activity in 1997. Five-year management goals have been established to triple research activity by the year 1999. Realization of this goal would be facilitated through improved facilities and collaborative ties with other field stations (Lohr et al. 1995).

Instructional activity has also increased tremendously over the past seven years. University instruction, field courses provided through public schools, continuing education and outreach programs all utilize facilities at the field station. Instructional use by these groups has increased from 50 user-days in 1990 to 1645 user-days of instructional activity in 1997. Continuing education programs in environmental science are presently linked with funded research to investigate post-instructional retention of environmental science concepts. In addition, Oak Lake Membership activities include Saturday instructional programs on prairie vegetation, bird life and cultural history of the northern plains region to civic organizations and the general public.

### Research at the Oak Lake Field Station

Research efforts at Oak Lake Field Station are focused in the area of prairie ecology (Appendix V). Over its brief ten year history, Oak Lake Field Station has provided facilities and equipment to support five different post-graduate theses and a number of faculty research projects. Research topics have included studies on physiological ecology of purple coneflower (*Echinacea angustifolia*), foraging activities of blue jays (*Cyanocitta cristata*), habitat utilization of white-tailed deer (*Odocoileus virginianus*), influence of littoral zone disturbance on invertebrate, bird and mammal communities, studies of ornamental traits in prairie wetland invertebrates, extended limnological studies (>20yrs) of prairie pothole lakes, influence of fire on prairie vegetation and assessment of environmental education programs.

Active research efforts focus on ecological pattern and process on the Northern Plains. Long-term studies (> 20 yrs) of factors influencing the dynamics of phytoplankton in prairie lakes are being examined at Oak Lake and other nearby prairie pothole basins (Haertel and Jongsma 1982; Haertel and Tucker 1993). Physiological ecology of native prairie plants (i.e., purple coneflower, *Echinacea angustifolia*) is the focus of both undergraduate and graduate research in the Department of Biology and Microbiology (Feghahati 1995; Feghahati and Reese 1994; Viles and Reese 1996). Foraging behavior of blue jays (Dixon 1994) and habitat utilization by white-tailed deer (Oehler et al. 1994) have been topics of recent undergraduate and graduate research projects through the Department of Wildlife and Fisheries at South Dakota State University. Recently funded projects focus on community responses to disturbance within the land-water interface of prairie lakes. These efforts integrate the utilization of GIS technology and manipulative field experiments to investigate response/recovery patterns of littoral zone communities in prairie pothole environments. Other newly funded efforts focus on development and assessment of hands-on, inquiry based environmental education materials for public school systems.

## Representative Research Products

Bakker, K. and N.H. Troelstrup, Jr. 1998. Patterns in avian community structure and non-point source disturbance potential along the land-water interface of a prairie pothole lake. *Proceedings of the South Dakota Academy of Science* 77: 221-230.

Bakker, K. 1996. *Bird community attributes in critical and non-critical areas within the land-water interface of a prairie lake*. MS Thesis, Department of Biology and Microbiology, South Dakota State University, Brookings, SD. 134p.

Dixon, M.D. 1994. *Acorn caching and consumption of weevil-infested nuts: Possible means of tannin circumvention for the Blue Jay*. MS Thesis, Department of Wildlife and Fisheries, South Dakota State University, Brookings, SD. 98p.

Feghahati S.M.J. and R. N. Reese. 1994. Ethylene, light and prechill enhanced germination of *Echinacea angustifolia* seeds. *Journal of the American Horticultural Society* 119: 853-858.

Haertel, L. and N.H. Troelstrup, Jr. 1998. Transport of nutrients and phytoplankton into two glacial prairie lakes. *Proceedings of the South Dakota Academy of Science* 77: 13-25.

Haertel, L. and W.L. Tucker. 1993. Long-term changes in prairie lake water clarity and plankton composition as an indicator of stress to prairie lake ecosystems. Pages 96-101, in Nels H. Granholm (ed.). *Biostress*. Proceedings of the Stress Mechanisms Symposium, South Dakota State University, Brookings, SD.

Kraft, C.K. 1996. *Mammals inhabiting the land-water interface of Oak Lake as indicators of disturbance*. MS Thesis, Department of Biology and Microbiology, South Dakota State University, Brookings, SD. 181p.

McCart, C.D. 1996. *Effectiveness of an environmental education workshop for secondary science and agricultural teachers in eastern South Dakota*. MS Thesis, Department of Biology and Microbiology, South Dakota State University, Brookings, SD. 79p.

Oehler, M.W., Sr., J.A. Jenks, R.T. Bowyer. 1994. Antler rubs by white-tailed deer: the importance of trees in a prairie environment. *Canadian Journal of Zoology* 73: 1383-1386.

Troelstrup, N.H., Jr. and G.A. Myers. 1994. K-16 outdoor classroom at the Oak Lake Field Station. *Principally Speaking* 6: 18-21.

Viles A.L. and R.N. Reese. 1996. Allelopathic potential of *Echinacea angustifolia* D.C. *Environ Exper Bot* (In Press).

## Instructional Activities at the Oak Lake Field Station

Instructional activities at the Oak Lake Field Station include field courses presented by public school groups and university faculty. In addition, continuing education and outreach programs in the area of environmental science have been conducted at Oak Lake Field Station for several years. These have included Woodrow Wilson Science Institutes for Science Teachers, Project Learning Tree, Project SAVE and Project WILD training workshops for science teachers and a Summer Science Camp for middle school children. Newly funded efforts link instruction using hands-on, inquiry based environmental education activities with research on student understanding and retention of environmental concepts.

In addition, field components of several university classes have been offered at Oak Lake Field Station (Appendix V). Classes utilizing the station have included General Biology, Vertebrate Zoology, Introduction to Range Management, Disturbance Ecology, Biomonitoring and Assessment, Big Game Management, Mammology, Natural Resource Measurements, Integrated Natural Resources Management, Camping Skills and Canoeing Basics.

### Hosted Special Activities

The Oak Lake Field Station has hosted several special workshops and society functions. These include a 1993 Special GIS Training Workshop, the 1994 Meeting of the Great Plains Limnological Conference and banquet for the 1995 Meeting of the North Central Division of the American Phytopathological Society. Oak Lake Field Station also hosts an annual Native American Writers Colloquia. Authors of Native American short stories meet each fall to share ideas and discuss Native American writing styles.

### New Opportunities

Oak Lake Field Station has initiated prairie reclamation and fire management projects to restore and/or improve tall grass prairie stands. Two small crop fields were recently re-seeded to native prairie grasses. In addition, fire has been reintroduced as a management tool to manage invasion of woody vegetation and exotic grasses. Reclamation burns were conducted in 1996 and 1997 in three different patches with excellent results. These management efforts provide research opportunities for university faculty and students. For example, Dr. Pat Johnson (Animal and Range Sciences) has initiated an experimental study to examine the influence of prairie fire on dominant grass species. Her project was initiated as a result of our management burns.

### Existing and Future Support

Oak Lake Field Station is presently supported through a combination of funding sources (administrative, endowment, self-generated). The annual operating budget of the field station is currently \$12,000. Administrative support accounts for 50-70% while remaining revenues are self-generated through user-fees, crop land sales and station programs.

Administrative support of the field station has increased over the last several years. Operating and maintenance allocations for 1997 and 1998 were \$7,820 and \$8,660, respectively. SDSU Administration has provided support to establish the Oak Lake Geographic Information System, implement over \$42,000 of renovations to the facilities over the past 4 years and fund faculty research projects in disturbance ecology.

The Oak Lake Capital Campaign has set a goal to generate \$2.5 million for an endowment to support operations and programming at the field station. Efforts to establish endowment funds have so far generated \$100,000. These funds will provide continued support for maintenance, renovations and programming support into the foreseeable future.

## Statements of Support

The Oak Lake Field Station provides a facility to meet research and instructional needs of a variety of user groups in the Northern Plains. Past and current efforts have included participation by university faculty and students from institutions throughout the region. In addition, our facility addresses current research and instructional needs of natural resource agencies and local civic organizations. The statements provided below attest to the value of the facility and demonstrate the scope of user-groups served by our facility.

President Robert Wagner (South Dakota State University)

*South Dakota State University is committed to the development of facilities and programs at the Oak Lake Field Station to support research and instructional activities within the Northern Plains Region. The field station presently serves research, instructional and service needs of several colleges within our university system. In addition, participation in field station programs by outside institutions and agencies demonstrates efforts by South Dakota State University to take a leadership role in sciences within the region. Existing research efforts in prairie ecology and environmental science are strongly linked to classroom instruction on the South Dakota State University campus and the public school system. We anticipate future strengthening and broadening of these programs through collaboration with other field stations and institutions. Support for this facility and its programs will continue to be a priority of this institution as we move into a new era of opportunities in the Northern Plains.*

Dr. James A. Perry (University of Minnesota)

*Thank you for the information about your NSF proposal for the Oak Lake Field Station. I am quite familiar with the programs at Oak Lake and have participated in some of those programs. I see great opportunity for further collaboration and for both research and graduate education at the Station. The combinations of lake and wetland environments, lab and residential facilities, agricultural and "less intensively managed landscapes" all provide excellent opportunities for growth. I would strongly support your request to NSF for planning funds to better understand how the Station can play a central role in your research and education program within the Upper Midwest. If I can be of further assistance as your planning proceeds, please contact me.*

Dr. Patricia Johnson (South Dakota State University)

*Opportunities to study and conduct ecological experiments in tallgrass prairie ecosystems in this area are very limited. This is one important reason that the Oak Lake Field Station is an invaluable asset to the region. The station encompasses a wide variety of ecosystem types, including wetlands, tallgrass prairie and oak woodlands. These natural attributes and the proximity of the station to regional campuses provide incentives for researchers and instructors to utilize the facility.*

Ms. Maggie Hachmeister (South Dakota Game, Fish & Parks)

*As the Education Services Coordinator of the Division of Wildlife, SD Department of Game, Fish & Parks, I am closely involved with all those in the state who work in environmental education. The Oak Lake Field Station provides an exceptional facility for teacher continuing education and K-12 school field experiences. Each instructional activity is unique because of the wide array of outdoor, research-based activities that can be conducted on the site. Our agency has utilized the facility to conduct environmental education workshops and is presently planning a research effort to investigate environmental education programs within the state.*

### **Description of Planning Effort**

During 1993, the Oak Lake Committee conducted a review of field station programs and use. Both long-term and 5-year programming goals were established to guide management of the field station (Troelstrup 1995). This review led to a proposed planning effort funded through the National Science Foundation. The objectives of our NSF planning effort are to (1) define the research and instructional science agenda for the Oak Lake Field Station, (2) identify facility and equipment needs of the Oak Lake Field Station, (3) establish collaborative working relationships for research and instructional programs with other biological field stations, (4) establish communication with other field stations for the exchange of long-term monitoring data and instructional materials and (5) develop a physical plan and cost estimates for proposed changes in the facility to be used in subsequent funding requests (Lohr et al. 1995). These objectives will be addressed through a combination of interactive workshops and intensive planning efforts over a two year period.

### **Establishing a Science Agenda**

Oak Lake Field Station is a member of the Organization of Biological Field Stations (OBFS). This proposed effort will utilize the experience of field station directors from several OBFS facilities to help guide planning and design efforts for the Oak Lake Field Station. The first step of this planning process is to define the science agenda for the Oak Lake Field Station. By definition, an agenda is a list of tasks to be accomplished. In strategic planning, this list might correspond to specific strategies undertaken to accomplish particular goals and objectives. Our science agenda has both instruction and research components.

***Education Mission: Provide educational opportunities for citizens and students in professional fields represented by the University,***

***Research Mission: Provide facilities and environment for colloquia, symposia, conclaves, conventions, seminars and gatherings related to the community and university.***

**Instruction Goal: Strengthen science education opportunities for public school, undergraduate, graduate and post-graduate citizens of the Northern Plains.**

Objective #1. Provide facilities and environment for public school and university classes.

Strategy #1: Develop an indoor classroom facility for use by public schools and university courses by the year 2000.

Strategy #2: Winterize dining hall and administration building by the year 2010.

Strategy #3: Improve housing facilities to support visiting instructors and students by the year 2010.

Strategy #4: Develop Internet and multimedia capabilities for use by instructors by the year 2000.

Strategy #5: Develop on-site library to support studies of Northern Prairie environments by the year 2000.

Strategy #6: Develop collaborative distance education offerings in natural resources and environmental science by the year 2005.

Objective #2. Develop a natural resources monitoring program.

Strategy #1: Work with the National Weather Service to develop a climate monitoring data base by the year 1995 [Monitoring Underway].

Strategy #2: Design and implement a water quality monitoring program for the Oak Lake Basin by the year 1994 [Monitoring Underway].

Strategy #3: Inventory Oak Lake flora and fauna by the year 2005.

Objective #3. Develop and maintain data related to natural and human resources of the Oak Lake Field Station.

Strategy #1: Construct a geographic information system for Oak Lake Field Station by the year 1995. Basic GIS coverages should be developed on a 1:24,000 base map and include soils, land cover, drainages, basins, building structures and transportation corridors [Functional GIS Constructed].

Strategy #2: Develop spreadsheet data sets of monitoring and inventory information. Such data sets should be constructed to allow easy access to

public schools and university students/faculty [Database Files Established].

Strategy #3: Define land and cultural history of Oak Lake parcels by the year 1998 [Land Ownership Research Complete].

Objective #4. Provide incentives and marketing to improve instructional use of Oak Lake Field Station.

Strategy #1: Establish a visiting scholars program to enhance summer course offerings at Oak Lake Field Station by the year 2005.

Strategy #2: Establish collaborative linkages with state agency and tribal education programs to provide funding to support environmental education courses by the year 1996 [Current Funding Available for Environmental Education Programs].

Strategy #3: Develop and offer weekend education programs on natural resources by the year 1996 [Oak Lake Membership Programs Developed].

Strategy #4: Develop an Internet home page to advertise station programs and facilities by the year 1998 [Internet Home Page Constructed].

Strategy #5: Utilize newsletters, press releases and brochures to advertise educational offerings at Oak Lake Field Station.

Objective #5. Improve instructional funding to support instructional programs and facilities at Oak Lake Field Station.

Strategy #1: Identify instructional facility, equipment and programming needs to support our instructional science agenda by the year 1999.

Strategy #2: Utilize university new instructional ideas fund to support acquisition of equipment and small building renovations in support of our instructional science agenda by the year 1999.

Strategy #3: Submit funding requests to the National Science Foundation (Division of Marine Laboratories and Field Stations) in support of large building renovations by the year 2000.

**Research Goal: Enhance scientific understanding of Northern Plains ecosystems through collaborative, interdisciplinary research and scientific interaction.**

Objective #1. Improve field station facilities and equipment available for prairie research.

Strategy #1: Identify research facility and equipment needs to support collaborative, interdisciplinary research efforts by the year 1999.

Strategy #2: Improve housing facilities to support visiting research scientists and students by the year 2005.

Strategy #3: Expand field laboratory space to support visiting research scientists and faculty by the year 2005.

Strategy #4: Develop library reference collection focusing on prairie environments by the year 2000.

Strategy #5: Purchase two dedicated IBM compatible workstations to support research efforts at Oak Lake Field Station by the year 2000.

Objective #2. Provide incentives to increase research productivity at Oak Lake Field Station.

Strategy #1: Develop a mechanism to generate "seed money" to support a competitive research fund for on-site projects by the year 2000.

Strategy #2: Increase collaborative research efforts with tribal colleges, public universities and state/federal agencies by the year 2000.

Strategy #3: Develop natural resources data base and geographic information system in support of research efforts by the year 1999 [GIS and Structure Defined].

Strategy #4: Provide opportunities for on-line publishing of student research results on Oak Lake home page by year 1999.

Strategy #5: Develop research opportunities profiles for societal bulletins and OBFS newsletter by the year 1999.

Objective #3. Increase visibility of Oak Lake facilities and research opportunities.

Strategy #1: Publish and distribute summary articles describing research efforts in field station newsletter and home page [Newsletter and Home Page Developed].

Strategy #2: Encourage student and faculty publication of research results.

Strategy #3: Require published and presented research deliverables from field station funded research efforts.

### Anticipated Benefits of Planning Effort

Information developed from this planning effort will be used to refine and guide station management and fund raising efforts for the next 5-10 years. Current efforts to generate funds for station programs and facilities will be enhanced through the development of detailed planning information for the Oak Lake Field Station. Requests for facility and equipment needs will be viewed with greater confidence based upon the collective recommendations of established field station directors representing a number of institutions.

In addition to facilities planning, this project will serve to enhance instruction and research programs at the Oak Lake Field Station through greater collaborative ties with other field stations. New student exchange programs and interactive media (video and Internet) will provide means for interbiome projects and learning experiences for students and faculty. Faculty at other institutions will become aware of facilities and opportunities at Oak Lake Field Station. This increased awareness will enhance our ability to serve a broader group of scientists and students interested in prairie environments.

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Troelstrup, N.H., Jr. 1995. *The Oak Lake Prairie Learning Center. A concept for the future*. Planning Document, Oak Lake Field Station, South Dakota State University, Brookings, SD.

**Appendix I. Oak Lake Field Station History of Ownership**

	<b>North Farm Lots 1-4</b>	<b>South Farm E1/2 of NW1/4</b>	<b>South Farm SE1/4</b>	<b>South Farm NE1/4</b>	<b>Peninsula Lot 6 of NW1/4</b>
Legal Description	T112N 48WS12	T112N R48WS13	T112N R48WS13	T112N R48WS13	T112N R47WS18
First Homesteaded	July 19, 1886	September 27, 1881	September 27, 1881	September 27, 1881	February 20, 1897
First Owner	Ms. Kristin Lunde	Winona & St. Peter Railroad Company	Winona & St. Peter Railroad Company	Winona & St. Peter Railroad Company	Mr. Ole Bogen
Number of Owners	28	20	20	34	23
Girl Scout Purchase	June 6, 1963	September 21, 1965	January 11, 1973	January 11, 1973	July 16, 1966
SDSU Acquisition	December 8, 1988	December 8, 1988	December 8, 1988	December 8, 1988	December 8, 1988

Complete listings of land ownership for each parcel have been transferred to the Oak Lake database. File entries include dates of transactions and names of individuals to whom land was transferred. Land use history is currently under investigation by the history subcommittee of the Oak Lake Advisory Group.

## Appendix II. Laboratory and Classroom Equipment Inventory

Location	Equipment List
Field Laboratory	<p style="text-align: center;">           IBM Pentium Microcomputer with 28.8/33 Mhz Fax/Modem (1)            IBM Pentium II Microcomputer (1)            Gateway Colorbook II Microcomputer (1)            Laboratory Glassware            Measuring Tapes            Top Loading Balance (1)            Max/Min Thermometers (2)            Clinometer and Compass (1)            Field Filtration Apparatus (1)            Compound Microscope (2)            Zoom Dissecting Microscope (1)            Hach DREL 2010 Field Spectrophotometer (1)            Orion pH Wand (1)            Speedtech Depth Sounder (1)            Magellan Field Pro V Global Positioning System (1)            Magellan Pro Mark XCP Global Positioning System (1)            Marsh-McBirney Current Meter (1)            LICOR Quantum Sensor and Data Logger (1)            YSI Model 54 Dissolved Oxygen Meter (1)            YSI Model 33 Salinity, Conductivity and Temperature Meter (1)            Secchi Disks (2)            Clarke-Bumpus Plankton Sampler (1)            Wisconsin Plankton Net            Benthic Sediment Corer (1)            Van Dorn Bottle (1)            Wetland Activity Traps (17)            Kicknets (3)            Seines (2)            Benthic Sampling Sled            Assorted Sieves            Plant Presses (2)            Vegetation Sampling Quadrats (4)            Vegetation Density Board            Refrigerators (2)            Cabin Tent            Screen Tent         </p>
Resource Room	<p style="text-align: center;">           Field Sampling Bottles, Dishes and Trays            Miscellaneous Small Mammal Traps            Folding Field Tables (2)            Student Van Dorn Bottle (1)            Student Invertebrate Samplers            Decomposition Activity Kit (1)            Soil Studies Teaching Kit (1)            Soybean Teaching Kit (1)            LaMotte Water Testing Kit (1)            Enviroscope Modules (4)            A/O Dissecting Microscopes (19)            A/O Compound Microscopes (21)            TV/VCR/Scope Camera Unit            Multimedia Projector            Assorted Writing, Drawing &amp; Craft Supplies         </p>

### **Appendix III. Geographic Information System**

#### Status

Development of the Oak Lake Field Station geographic information system was supported by South Dakota State University Administration, South Dakota Agricultural Experiment Station and the Department of Geography. Nine base coverages have been developed. Attribute tables are more developed for soils and wetland coverages. Global Positioning System technology is currently being used to support individual research efforts. Station maps are produced to facilitate planning, instruction and research efforts. Additional coverages should be developed for subsurface geology, spring locations, temporal changes in land cover and utility lines.

<b>Platform</b>	IBM Compatible, Windows NT Pentium II		
<b>Type</b>	Vector		
<b>Software</b>	PC ARCINFO		
<b>Base Map</b>	1:24,000 USGS Quad Sheets		
	<b>Name</b>	<b>Type</b>	<b>Source</b>
<b>Coverages</b>	Watershed Boundary	Polygon	USGS Quad Sheet
	Field Station Boundary	Polygon	USGS Quad Sheet
	Building Structures	Point	USGS Quad Sheet
	Roads & Trails	Line	USGS Quad Sheet
	Soils	Polygon	NRCS Mylar Overlays
	Elevation Contours	Line	USGS Quad Sheet
	Drainages	Line	USGS Quad Sheet
	Wetland Basins	Polygon	NWI Aerial Photography
	Land Cover	Polygon	BW Aerial Photography

### **Appendix IV. Monitoring Database for Oak Lake Field Station**

<b>Monitoring Effort</b>	<b>Parameter</b>	<b>Method</b>	<b>Data Density</b>
Weather & Climate	Air Temperature	Thermistor Thermometer	Daily since 1994.
	Ambient		Daily since 1994.
	Minimum		Daily since 1994.
	Maximum		Daily since 1994.
	Daily Precipitation	NWS Rain Gauge	Daily since 1994.
Oak Lake	Water Depth	Graduated Rod	Bimonthly since 1994. <sup>1</sup>
	Stream Flows	0.6x Depth	Bimonthly since 1994. <sup>1</sup>
	Water Temperature	Thermistor	Bimonthly since 1994. <sup>1</sup>
	Dissolved Oxygen	YSI Model 54	Bimonthly since 1994. <sup>1</sup>
	Conductance	YSI Model 33	Bimonthly since 1994. <sup>1</sup>
	Water Transparency	Secchi Depth	Bimonthly since 1994. <sup>1</sup>
	Phytoplankton	1 Minute Tow	Monthly since 1994. <sup>1</sup>
	Zooplankton	1 Minute Tow	Monthly since 1994. <sup>1</sup>
	Zoobenthos	Eckman Grab & Kicknet	Monthly since 1994. <sup>1</sup>
		Fecal Coliforms	MPN/100ml
	Ice-up/Ice-out	Dates Recorded	Annually since 1994.

<sup>1</sup>Samples collected during ice-free season.

### **Appendix V. Oak Lake Instruction and Research Summary**

Course	Instructor	Term	Year(s)
Aquatic Ecology	Droge	Fall	1996
General Biology	Peterson	Summer	1991-92, 98
Mammalogy	Dieter	Fall	1995-96
Vertebrate Zoology	Haertel	Fall	1992-93
Big Game Management	Jenks	Spring	1996
Disturbance Ecology	Troelstrup	Spring	1995-97
Integrated Natural Res. Mgt.	Scalet et al.	Spring	1994
Natural Resources Measurements	Johnson	Fall	1992-96
Entomology	Johnson	Fall	1993
Introduction to Range Science	Kronberg	Fall	1995-97
Flora of the Northern Plains	Larson	Summer	1996
Geographic Information Systems	Gritzner & Troelstrup	Summer	1993
Basic Project WILD	Troelstrup	Summer	1996-98
WILD - Exotic Species	Troelstrup	Summer	1996
Project Learning Tree	Troelstrup	Summer	1997
Project SAVE	Troelstrup	Summer	1995
Project WET	Lewis	Summer	1997-98
Environmental Classroom	Troelstrup	Summer	1996-98
Woodrow Wilson Institute	McMullen, Peterson & Hein	Summer	1992,1993 &1994
Canoeing Basics	Sandness	Fall	1989-98
Camping Skills	Sandness	Fall	1989-98

Investigators	Department	Title
L. Haertel	Biology & Microbiology	Limnological studies of prairie lakes.
N. Troelstrup	Biology & Microbiology	Disturbance in the land-water interface.
N. Reese	Biology & Microbiology	Physiological studies of prairie coneflowers.
J. Jenks	Wildlife & Fisheries	Habitat utilization of whitetail deer.
P. Johnson	Animal and Range Sciences	Effects of fire on native prairie grasses.
W.C. Johnson	Horticulture, Forestry, Landscape & Parks	Foraging behavior of bluejays.

**Recently Funded Field Station Efforts:**

Troelstrup, N.H., Jr. 1997. Enhancement of research and training facilities at the Oak Lake Field Station, South Dakota. National Science Foundation - \$13,000.

Troelstrup, N.H., Jr. 1997. Assessment of Project WILD in South Dakota: Implementation and understanding at the middle-school level. South Dakota Department of Game, Fish & Parks - \$66,216.

**Review Team Recommendations (June 1998)  
with Responses from the Oak Lake Committee (February 1999)**

**Oak Lake Field Station Planning Effort**

Funding was received from the National Science Foundation Division of Marine Laboratories and Field Stations to conduct a review of Oak Lake Field Station and its programs. This review session was held June 8-11, 1998. Ten field station directors participated in this planning session. One director (Dr. Susan Lohr) served as facilitator. Focused interviews were conducted with Oak Lake staff, Advisory Group, university faculty and university administration to acquire the necessary information for the development of recommendations. The director panel was divided into three groups to evaluate and develop recommendations in the areas of Administration & Funding, Facilities and Programs.

Table 1. Director panel participating in NSF planning session for the Oak Lake Field Station, June 1998.

<b>Director</b>	<b>Affiliation</b>	<b>Panel Participation</b>
Susan Lohr	Formerly Rocky Mountain Biological Station	Facilitator
David Biesboer	Lake Itasca Forestry and Biological Station, MN	Administration & Funding
Michael Klug	Kellogg Biological Station, MI	Administration & Funding
Robert Stine	Cloquet Forestry Center, MN	Administration & Funding
Dan Dawson	Sierra Nevada Aquatic Research Laboratory, CA	Facilities
Kenneth Lang	Iowa Lakeside Laboratory, IA	Facilities
Chris Wasser	Shortgrass Steppe Field Station, CO	Facilities
Mary Batterson	Cedar Point Biological Station, NE	Programs
Steven Moshier	Wheaton College Science Station, IL	Programs
Stephen Tonsor	Pymatuning Laboratory of Ecology, PA	Programs

Review team recommendations were submitted July 1998. Copies of these recommendations were distributed to the Community Advisory Group and Oak Lake Field Station Committee for review. The Oak Lake Planning Subcommittee conducted an item by item review of team recommendations during fall and winter 1999. Each recommendation was considered in light of the field station mission and user community. Upon review, each recommendation was (1) accepted as presented within the review, (2) modified to fit within the context of the field station mission and user community or (3) eliminated. Listed below is an overview of review team recommendations (normal font) and comments provided by the review committee (*italicized*).

**Oak Lake Field Station  
NSF Planning Session  
8-11 June 1998**

*Panel of Outside Visitors:*

Susan Lohr, Facilitator

Mary Batterson, Cedar Point Biological Station, University of Nebraska

Dr. David Biesboer, Lake Itasca Forestry and Biological Station, University of  
Minnesota

Dan Dawson, Sierra Nevada Aquatic Research Laboratory/Valentine Eastern Sierra  
Reserve, University of California at Santa Barbara

Dr. Michael Klug, Kellogg Biological Station, Michigan State University

Dr. Kenneth Lang, Iowa Lakeside Laboratory, Iowa State University

Dr. Steven Moshier, Wheaton College Science Station, Wheaton College

Dr. Robert Stine, Cloquet Forestry Center, University of Minnesota

Dr. Stephen Tonsor, Pymatuning Laboratory of Ecology, University of Pittsburgh

Dr. Chris Wasser, Shortgrass Steppe Field Station, Colorado State University

**Background:**

In 1997 Oak Lake Field Station received a \$13,000 grant from the National Science Foundation Field Station and Marine Laboratory Facility Panel to fund a two-year strategic planning effort. The first phase of this effort includes the convening of this workshop of outside visitors. Ten field station directors from around the U.S. met at Oak Lake Field Station for an intensive three-day examination of current programs, facilities, and administrative structures. The results of their deliberations comprise this report.

The visiting directors were assigned to one of three panels: Administration and Funding, Programs (Education, Research, Service), Facilities. The panels met together to interview numerous members of the Oak Lake user community, and met separately several times to address the status of their respective subject matter.

Interviews were conducted with faculty who currently use the Oak Lake Field Station, with administrators at various university levels, with the field station committee that is internal to the university, and with the external community advisory group. Each group provided important insights and information to assist the visiting directors with deliberations, but it was the community advisory group that proved the most illuminating about the station's potential. This group is a tremendous resource for planning and implementation, and should be given as high a profile as possible as the strategic planning process for Oak Lake Field Station proceeds.

## **I. Administration and Funding**

*(Mike Klug, Facilitator, Dave Biesboer, Bob Stine)*

### **A. Director's Position**

Currently this position has a “good faith” reporting structure. We recommend a more direct financial and reporting structure which is commensurate with the responsibilities of the position. We recommend a 12 month position supported as:

50% Station Director

30% instruction

20% research (Agricultural Experiment Station support)

*The subcommittee accepted this recommendation from the review panel.*

The 50% salary for the Directorship should be funded through the President's office since the station is considered a unit within the University, not a unit administered through a department, a college, or the Agricultural Experiment Station.

*The subcommittee accepted this recommendation from the review panel. However, the Department of Biology & Microbiology and College of Agriculture and Biological Sciences have invested resources into the station over the past several years. Thus, department, college and university all feel some ownership of the station.*

Release time (50%) from faculty responsibilities would remain in the Department of Biology/Microbiology to cover teaching responsibilities. In this manner, the importance and value of the Station is emphasized by the President, and competition for resources at the department and college level vs. the Station are minimized.

*The subcommittee accepted this recommendation from the review panel.*

The Director should continue to report directly to the President on Station functions, and to an academic department for academic functions. Clear expectations must be made that the administration of the Station will be viewed positively during tenure or promotion deliberations. Alternatively, the Director should be evaluated for tenure only on his 50% academic appointment.

*The subcommittee agreed with this recommendation and would also like the director to continue reporting to the Oak Lake Committee. The subcommittee also recommended that the term “his” in the last sentence should be changed to “his/her”.*

The Director's position should place major emphasis on raising the level of visibility of the Station and garnering support for the Station. Talking to faculty, fundraising, grant-writing, etc. should be major responsibilities. More routine

operational tasks should not be performed by the Director (such as leading public tours), but rather by staff.

*The subcommittee accepted this recommendation from the review panel.*

In principle, the President's office needs to champion the value of the field station to the University. This can be accomplished by providing a funding framework which doesn't financially impact an individual college or department. Further, the University needs to support the Director's position at a level which is commensurate with the responsibilities. In this case we feel that, if the Station is going to advance, a 50% commitment must be made to the position.

*The subcommittee accepted this recommendation from the review panel.*

## B. Facility Support

### 1. Staffing

Initially there needs to be a full time position to support grounds, general maintenance, custodial and security of the site during the seasons the Station is in use. Ideally this person would live on site on an annual basis. As programs develop, an additional position would be required for program coordination and facilitation of research and educational programs on the site. This additional position is envisioned as 50%-time on an annual basis.

*The subcommittee felt that current levels of use did not warrant a full-time caretaker appointment. The committee recommended support for a full-time caretaker during the summer and 50% time appointment during the winter months. In addition, a 50% time seasonal worker should be hired during the active summer months.*

### 2. Maintenance

It appears that little administrative structure exists to provide consistent maintenance of the buildings associated with the Station. Further capital improvements and handling of deferred maintenance appears to rely on "opportunities" rather than a master plan for required maintenance.

Since the field station is administered through the President's office and supported from University general funds, it seems appropriate that maintenance (other than some routine items) be facilitated or carried out by the University's Physical Plant. The close proximity of the Station to the main campus further supports this concept. In this manner, the buildings at the Station would be treated in a similar fashion to those on campus (i.e., routine, deferred, and scheduled capital improvements).

Mowing, fence repair, maintenance of trails, and minor road repair appear to be well taken care of the residential caretaker. It is recommended that road

grading and needed tree pruning to prevent accidents along trails or roadways be handled through the campus Physical Plant and Grounds.

*In general, the subcommittee agreed that Oak Lake facilities should be considered part of the campus system and should receive maintenance support from the central campus. However, diverting responsibility of maintenance to the University Physical Plant may result in significantly greater costs to the field station budget. The field station has been able to work effectively with university administration and local contractors to address many maintenance needs. This arrangement has facilitated timely completion of maintenance projects at competitive pricing. Physical Plant has been consulted whenever a major maintenance project was planned. Dick Waldner (SDSU Physical Plant) developed a maintenance master plan shortly after the field station was acquired. This plan is currently under revision.*

### 3. Capital Improvement

A master plan is needed to define necessary capital improvements commensurate with future programs on site. An immediate need is to increase the capacity of the current facilities to allow for a moderate increase in use of the Station. Short-term capital activities might include “winterization” to allow three-season use of the Dining Hall, and improvements to housing and shower facilities within the Dining Hall structure. Such improvements would more adequately accommodate the housing of small groups, visiting investigators during three seasons, and expanded use of the commons area for meetings, retreats, etc. Frankly, we found the current state of accommodations to be inadequate for adults.

*The subcommittee agrees that a master plan is needed to define capital improvements needed to support future programs. Components of this plan were outlined in the Prairie Learning Center Concept Paper submitted to university administration during the onset of the most recent Capital Campaign. All of the major renovations suggested in this recommendation were included within the concept paper. The university was successful in generating more than \$50 million in support of its capital campaign outline. However, the director has not been informed as to the availability of additional funds to support these renovations. A formal master plan should be developed to outline specific capital asset needs and costs. This plan should be developed as an additional product of the planning effort.*

### C. Business Plan

We recommend that a cost value be placed on all commitments to the Station in order to develop a sound business plan. Many financial stakeholders and “in kind” services are currently part of the financial and physical management of the Station. Examples include the costs of providing rent-free housing to the caretaker in-lieu of salary, and in-kind contributions of the Biology/Microbiology secretary to management of the Station. The actual net cost of operation of the Station in dollar amounts should be established, in order to develop a realistic budget for its operations in the future.

*The subcommittee agrees with this recommendation from the review panel. Many “in-kind” services are provided toward operation of the field station. These services should be quantified and recorded to facilitate future budget and planning efforts.*

*In-Kind Services Provided Toward Field Station Operation*

<b>Caretaker</b>	
House & Garage	\$3,000
Barn	\$360
Propane Gas	\$1,296
Water	\$420
Grazing Rights	\$240
<b>Office &amp; Secretarial Support</b>	
Secretary Time	\$1,828
Fax	\$25
Telephone	\$41
Photocopying	\$30
Internet Service	\$18
<b>Director’s Time</b>	\$7,744
<b>Total In-Kind Support</b>	\$15,002

**D. Administrative Incentives**

After interviews with all major stakeholders, no clear examples of incentives which would lead to increased programs or use of the Station were apparent. If use of the Station is going to increase, the Central Administration could greatly facilitate that use through various incentives, including increases in the operating budget of the Station. The latter could be increased through priority setting during capital campaigns. Interviews with the Station’s Community Advisory Group suggested a fear that other areas within the University received a higher priority. Although this can be appreciated within current financial constraints, opportunities could well be missed by not using the stewardship of the resources of the Station as a positive fund raising vehicle.

*The subcommittee agrees with this recommendation provided by the review panel. The President’s Office has recently committed \$15,000 per year toward operation and maintenance efforts at Oak Lake. This figure was based upon average O&M expenditures since 1989.*

Increased research at the Station could be facilitated by providing undergraduate or faculty summer support to conduct research at the Station. Several mechanisms are suggested.

- Diversion of the interest from the endowment to student research support instead of maintenance or capital improvements.

*The subcommittee agrees that a small portion of the Rogen-Trooien endowment might be used each year to provide incentives for faculty/student research effort. An exact amount was not decided.*

- Providing \$2,500-5,000 per year from overhead return for faculty or student research at the Station.

*The subcommittee agrees with this recommendation. A proposal to this effect will be developed and submitted to university administration and the Dean for Graduate Research.*

- Facilitate development of an NSF Research Experience for Undergraduate (REU) grant to support undergraduate research at the Station.

*SDSU does qualify to submit a proposal to participate as a REU site. Proposals are due each year by September 15. The Dean for Graduate Research and Director are working toward a draft proposal.*

- Provide rotating 9-month faculty appointments that include summer teaching opportunities at the Station, with no net cost to the University.

*The subcommittee does not feel that this is a viable option. Nine month faculty generally leave the local area or engage themselves in their own research during the summer months. How would university departments fill teaching positions for one semester during the regular school year?*

- Initiate position management to allow for greater control on new faculty hires to support new initiatives such as field station programs.

*The subcommittee feels that it would be difficult to direct hiring decisions of various departments to ensure greater support of field station programs. Faculty are hired to fill specific needs within each department. Most faculty at SDSU carry heavy teaching loads but are also required to excel in research and public service. The requirements placed on each faculty member by their department and college are likely to carry much more weight than the needs of the station during a hiring decision.*

- Use local community advocates of the Station to influence regents and/or legislators about the importance of field stations and their role in facilitating research and educational experiences for students and citizens.

*Oak Lake Field Station is fortunate to have an active, supportive community advisory group. This group was responsible for initiation of the Rogen-Trooien endowment. All members are actively involved in field station activities. However, the subcommittee feels that political use of the community advisory group may lead to unwanted repercussions. The field station is operated as a university facility. There are clear lines of communication between individual units within the University, Board of Regents and*

*State Legislature. It is important that these lines of communication be maintained. Thus, recommendations from the advisory group should be channeled through the Oak Lake Committee to University Administration and then to the Board of Regents.*

## **E. Outside Funding**

Recognized strengths of the Station are its grasslands, savannahs, and watersheds. Interdisciplinary funding for further study of management of pasture/grassland/watershed interfaces is the base for recent program initiatives associated with NSF, EPA, and USDA. The faculty, the landscape resources of the field station, and departments on campus appear to be suited to those initiatives. Further, this type of research appears to be a natural link to the mission and goals of the Biostress programs on campus.

From interviews with local farmers, the potential of developing partner farmers for such initiatives appears very high. This would also fit well with grant initiatives, especially those of USDA Funds for Rural Development. As discussed above, the resources of the Station seem ideal for an NSF-sponsored Research Experience for Undergraduates grant.

Also mentioned above is the feeling that interest within the local community is high for the continual stewardship of the Station's land resources. These interests could lead to contributions, e.g., further endowments. In order for this to happen, the value of the Station must be acknowledged so that it can receive proper prioritization within capital campaign initiatives or overall fund development activities within the University. Advocates within the community could serve pivotal roles if they were encouraged to campaign on behalf of the Station, and could be assured of continued University support for the Station's programs.

*The subcommittee agrees with this recommendation from the review panel. The Director and Dean for Graduate Research are currently looking at the guidelines for these programs.*

## **II. Facilities**

*(Dan Dawson, Facilitator, Ken Lang, Chris Wasser)*

### **A. Minimum Requirements**

To some extent, facilities help define a field station. At the very least, they frame the thinking of the users, shaping perceptions of the extent of activities at the station. For example, without the availability of a basic laboratory, researchers don't even consider many types of projects. In this context there is a minimum set of facilities required to form a basic field station:

- three-season housing for approximately 30 students
- faculty (or researcher) housing with desk space and private bath
- food service and dining hall (or kitchen facilities)
- a basic research lab
- a classroom and teaching lab (may be the same space)

## B. Short-Term Needs (1-5 Years)

### 1. Facilities

Oak Lake Field Station falls short of meeting minimum field station requirements. With limited expenditures, existing facilities could be upgraded and new facilities added to meet this minimum. These improvements are listed in priority order:

- Upgrade the existing dining hall housing to provide interim faculty and visiting researcher housing. The existing three rooms should be converted to finished bedrooms with two beds each, insulation, heat, improved lighting, dressers, and desk space. The bathrooms should be designated unisex and the tub converted into a shower. The dining hall will become the hub of activity at the field station, and as such needs to be the highest priority.

*The committee agrees with these recommendations. Conversion of dining hall bedrooms to two person units is achievable within the year. Used furniture may be acquired through campus organizations or local vendors. Bathroom designations can be altered to unisex immediately. The tub can be converted to a shower within the year. Insulation and heating of bedroom facilities may be accomplished within 2-4 years.*

- The rest of the dining hall building should be insulated and heated for three- season use.

*The committee does not feel that it would be cost effective to winterize and heat the entire dining hall facility. The committee recommends moving and installing the wood burning stove (currently located within the North Farm House) to the main dining hall. Kitchen, hallway, bathroom and bedroom facilities may be insulated and heated. However, it is anticipated that this effort would require more than five years to complete as funding sources for renovations have not been secured.*

- Create a grouping of comfortable furniture, coffee tables and reading lamps in the dining hall to allow evening relaxation, conversation, and study.

*The committee agrees with this recommendation. Used furniture can be obtained through campus organizations and local vendors. Some of this furniture can be placed into the dining hall bedrooms. An assortment of comfortable chairs, sofa and reading lamps could be acquired for the main dining hall area within 1-2 years.*

- Construct a new research lab. This would include a modern lab of at least 300 ft.<sup>2</sup> with benches and cabinets, a future computer room, and a collections room with appropriate herbarium and sample cabinets. The existing administrative building could be walled in to create this laboratory space.

*The committee agrees with this recommendation. The most cost-effective solution may be to wall-in the open area of the Administration Building and expand the existing rooms on each side of the building. This would greatly expand available space for classroom and research activity. Herbarium and invertebrate collections cabinets were recently acquired. Five PC computers are available on-site from late spring to early fall. These computers are moved back to campus during the school year. Use of endowment interest and additional funds from the NSF Division of Marine Laboratories and Field Stations might provide the funding necessary to complete this project within 5-7 years. Mr. Les Olive is presently working on plans and cost estimates for this project.*

- Convert the existing outdoor classroom building to a combination classroom/teaching laboratory. This would include finishing the building to a three-season use condition and splitting the building in half with a dividing wall. Outfit the teaching lab with basic equipment.

*The committee does not agree with this recommendation. The existing outdoor classroom building is not serviced with electricity. Electrical service to this building would be a significant expense and a low priority by comparison with other recommended changes. Water is available just outside the building. Access is good. The committee recommends no renovation to this facility over the next 5 years.*

- Construct new student housing for 30 students near the existing shower house. At a minimum two student dorms are required, ideally with rooms for two - to- four persons. To get started, tent cabins could be put up on concrete slabs that could later be used as building foundations. The existing bunkhouses are not a long-term solution for student housing. In the short term they can be used for 4-H and other public service groups. Later they may be upgraded for researcher use of the south farm and to increase student numbers.

*The committee agrees that new student housing will be necessary to support extended field sessions and summer classes. This housing may be created with new buildings or by moving the existing new bunkhouse near the Administration and Dining Hall buildings. Minor renovations could be made to the existing Bunkhouse Structure (wall dividers, interior walls and insulation) to create comfortable three-season housing. Existing utility service would be adequate to service this new structure.*

- Reconstruct the existing shower house to service the 30 students. Provide additional toilets and sinks and roof the entire facility.

*The committee agrees that new shower/bathroom facilities are necessary to make the facility truly functional for student and faculty groups. However, the committee feels that new facilities should be built onto or near the existing dining hall. The old shower unit should be maintained for overflow.*

## 2. Infrastructure

According to Mr. Waldner, SDSU Director of Physical Plant, existing water and power supplies and distribution are adequate throughout the Station. The existing buildings are on a common sewer running to an evaporative lagoon. Sewer lines run between existing buildings, and could easily be adapted for new construction. The existing sewer system would handle at least a doubling of capacity. Fire extinguishers should be conspicuously placed in every building and serviced annually.

*Existing utility service and capacity are adequate to meet the needs of future expansion. Fire extinguishers have been placed in the Dining Hall, Administration Building and Bunkhouses on site.*

Both resident students and faculty require access to phones, fax, copier, computers, and email. There should be at least one indoor phone available for student use with appropriate toll restriction. Faculty require access to a separate line in a separate location. New faculty cabins should have individual phone lines. Faculty can then arrange personal lines directly with the phone company if desired. As soon as a class is taught at the Station, the students will need computers for report generation and data analysis. As indicated above, a small computer room should be built as part of a new research lab. Three or four computers will be required to meet class needs.

*Current telephone service includes one line (unrestricted service) to the Administration Building and one line (restricted service) to the dining hall. Additional jacks could be installed in the bedrooms of the dining hall by field station staff. These lines would provide local service but would require the use of a credit card or collect call for long distance. One additional telephone line has been installed in the Administration Building to accommodate Internet/e-mail access. A photocopier for the Administration Building was acquired in May 1999. Five PC computers are now available on site during the May to September period. Three of these computers are designated for student use. E-mail is currently accessible through the Field Station's Internet Service Provider.*

## 3. Staffing

Even at current facility levels, the Station absolutely requires a full-time maintenance worker. It is a false economy to have a faculty member such as the Director dealing with maintenance at any level. The University must make this level of commitment to the Station. Further, although the existing facilities are functional, having all facilities, grounds, trails, roads, and plots well tended creates a very important impression. The maintenance worker can be the resident caretaker or can be an additional individual. As development proceeds, one or two students can be employed on a part-time basis in the summer to help with maintenance and construction projects. These students may be enrolled in programs, with housing and board waived in exchange for work. As the Station matures and additional structures are added, a second seasonal maintenance worker should be employed.

*The committee feels that the caretaker position should remain 50% time during the winter months. However, the position should convert to 100% time during the summer. In addition, a seasonal temporary (50% time) should be hired to assist the caretaker during the summer months. In the past, students have been employed to assist the caretaker during the summer. In addition, local Job Service Agencies have provided personnel to assist the caretaker with routine grounds and maintenance tasks.*

#### 4. Equipment

Some basic equipment is fundamental to effective functioning of a field stations:

- copier
- fax machine
- additional computers
- herbarium cabinet
- collections cabinets (birds, mammals, invertebrates, as needed)

*Photocopier and fax machine were acquired in May 1999. Five PC computers are available on site. These machines include 1-486 desktop and 4 – Pentium machines. Three of these machines are running on Windows NT. All machines are loaded with State supported software.*

#### C. Medium-Term Needs (Five -10 Years)

Ultimately as the Station matures additional facilities will be required.

Suggestions for these are:

- Construct 3-4 faculty or long-term researcher housing units as soon as possible. The upgraded housing in the dining hall should be considered an interim measure. These units should be one or two bedrooms (for some family use), have some desk/work space and have private baths. They should be three-season and heated, and wired for phones.

*See discussion under item IIB1 above.*

- Upgrade the south farm unit bunkhouses. This space can be used for public service groups, agronomy and horticulture researchers using the south farm, and for additional students when the demand exceeds the 30 students at the main campus. Replace the beds and mattresses, and consider partitioning the buildings into four-person rooms. Insulate, finish the interiors, and improve the lighting.

*Our ability to address this recommendation will depend on a final decision as to the fate of the New Bunkhouse. If the New Bunkhouse is moved to accommodate housing needs, only the Old Bunkhouse facility would be remodeled.*

- Construct a new bathhouse adjacent to the south farm bunkhouses with flush toilets and showers.

*The committee feels that this is a low priority by comparison with renovations to the Dining Hall and Administration Building.*

### **III. Programs**

*(Steve Tonsor, Facilitator, Mary Batterson, Steve Moser)*

The Program Panel began by developing a succinct mission statement for the Oak Lake Field Station, deriving from the four separate missions of the current management plan, based on a review of the current facilities and programs, and after interviewing numerous users and supporters. This statement is:

<p>MISSION</p> <p><i>To increase, through field research, the understanding of the Northern Great Plains ecosystem, and to foster ecosystem stewardship through training, education and outreach.</i></p>
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The subcommittee agreed that a more focused mission statement would facilitate planning and management of field station programs. However, the draft mission statement developed by the review panel does not complement the diversity of user-groups using the station. The subcommittee developed the following revision:

*The Review Committee edited the proposed mission statement as follows “To increase the understanding and appreciation of the Northern Great Plains and to foster ecosystem stewardship through education, research and service.”*

#### **A. Fundamental Assumptions In the Panel’s Approach**

The central focus of the Oak Lake Field Station will be research centered on the function of and stresses to the Northern Great Plains Ecosystem and its components. These components include the natural biota of the area as well as the human influences on the landscape. Some of this research may be fundamental research characterizing the components or the ecosystem as a whole. Some of the research will have more immediate application to stewardship, remediation/restoration, or sustainable use. This research will drive and make vital training and outreach activities. The training, education and outreach components should therefore be integrated with the research focus.

The University’s resources are limited. Re-alignment of allocations and of faculty time and effort is difficult. Short-term goals must be modest, but sufficient to provide the necessary primer for the development of the next step, the long-term goals.

The OLFS must be fully integrated with on-campus programs, and regarded as a vital part of the University’s mission. In regards to its research mission, this would best be accomplished by integrating the OLFS with BioStress center, since much of ecosystem change and challenges to sustainability can be viewed in the context of

stress ecology. In regards to its training and education mission, this requires integration with the curricula of on-campus departments. Some of the future courses offered at OLFS should be required components of the curriculum in some majors, such as Environmental Management, Horticulture, or Range Science.

## B. Goals

### 1. Research

#### a. Long Term

Develop a self-sustaining, multiple user, multiple institution research program centered on the Northern Great Plains Ecosystem.

*The committee feels that B1a should read “Develop a self-sustaining, multiple user, multiple institution research program centered on the Northern Great Plains.” While this change is subtle, it would more accurately represent the broad research potential on the site.*

#### b. Short term

- i. Develop a core SDSU research faculty associated with Oak Lake, with long-term research interests in the Oak Lake ecosystem. This faculty core would be expected to:
  - develop funding which would support their research activities
  - produce research results, published in peer-reviewed journals
  - involve undergraduate and graduate students as a significant part of the research effort.
- ii. Develop a mechanism for attracting visiting scientists, to share research results and provide peer critiques of research approaches. This approach would lead in some instances to the establishment of new long-term research from visiting scientists and collaborative research with other field stations.

### 2. Education

Enhance existing core set of field courses, centered around or embedded in an understanding of the Northern Great Plains ecosystem. These courses must be:

*The committee feels that item 2 above should be reworded as “Promote credit and non-credit learning opportunities for people of all ages to enhance understanding of the Northern Great Plains”.*

- a. integrated with the on-campus curricula, so that they are viewed by students as an indispensable (or required) component of their majors.

*The committee agrees with this integration point.*

- b. integrated into the research life of Oak Lake Field Station, so that students not only gain knowledge in their area of coursework, but also gain experience with the life of a field scientist, and come to understand some career pathways in environmental field science.

*The committee feels that this integration point should be reworded as “integrated into the research life of Oak Lake Field Station, so that students not only gain knowledge in their area of coursework, but also gain experience with the life of a field professional and come to understand some career pathways in environmentally oriented career pathways.”*

- c. centered around inquiry-based learning and substantially around team-oriented problem solving.

*The committee agrees with this integration point.*

- d. integrated with on-campus research and mentoring opportunities, so that the beginnings of a career pathway can be pursued during the following academic year.

*The committee agrees with this integration point.*

### 3. Outreach and Service

Outreach activities should be aimed at increasing the ability and interest of the community in stewarding the Northern Great Plains ecosystem, through translation of research results into understandable and actionable principles and procedures. Current outreach activities are a beginning toward this effort, and should be enhanced. A good example of an appropriate program is the membership instructional activities series.

Service activities should, in as much as is possible, be directed towards uses of the Oak Lake facilities by groups whose activities and goals are concordant with the mission of the Oak Lake Field Station. Other activities should be performed as a lower priority, and only as time allows.

*The committee agrees with this recommendation. Mechanisms should be implemented to focus users toward the missions of the station. These mechanisms may include (1) restricted use of the site to those groups with clearly stated objectives that link to the stations missions and/or (2) increasing user-fees for groups not using the facility in a way that fits within station missions.*

*The following revision to Field Station rental fees has been proposed to address mechanism (2) listed above. This proposal was accepted during the May meeting of the Oak Lake Committee.*

**Existing Fee Structure**

<b>Group</b>	<b>Overnight</b>	<b>Outdoor Classroom</b>	<b>Bunkhouse</b>	<b>Dining Hall</b>	<b>Resource Room</b>	<b>Canoes</b>
<i>Academic</i>	\$2	\$1/\$5 min	\$1/\$5 min	\$1/\$15 min	\$1/\$5 min	\$5/dy
<i>Non-Academic</i>	\$4	\$1/\$10 min	\$1/\$10 min	\$1/\$25 min	\$1/\$10 min	\$5/dy

**Proposed Fee Structure**

<b>Group</b>	<b>Overnight</b>	<b>Outdoor Classroom</b>	<b>Bunkhouse</b>	<b>Dining Hall</b>	<b>Resource Room</b>	<b>Canoes</b>
<i>Academic</i>	\$2/ind	\$1/\$10 min	\$1/\$10 min	\$1/\$20 min	\$1/\$10 min	\$5/dy
<i>Non-Academic</i>	\$8/ind	\$1/\$20 min	\$1/\$20 min	\$1/\$40 min	\$1/\$20 min	\$15/dy

<sup>1</sup>*Academic groups are those engaged in educational programs through 4-H, scouting, public schools, colleges and universities. Non-academic groups are those engaged in all other private, civic and religious programs. The decision as to whether a group qualifies for academic rates is made by the Field Station Director at the time of registration.*

<sup>2</sup>*Overnight charges are assessed per individual per day.*

<sup>3</sup>*Building use requires a fee of \$1 per person per day. Minimum charges are listed for groups with 25 or fewer people. Groups of 25 or fewer people pay the minimum building charge. Groups of more than 25 pay \$1 per person per day. Building charges are assessed the full charge for each day (no partial billings).*

<sup>4</sup>*Each canoe holds three people. Life vests and paddles are included with the rental fee. South Dakota State University assumes no responsibility for accidents related to the use of canoes.*

**C. Implementation**

1. Research

- a. Develop research involvement in OLFS from a number of departments whose disciplines have natural tie-ins to the Oak Lake mission.

Departments with a potential involvement are listed below. Asterisks indicate potential as one of the lead departments:

- \*Biology and Microbiology
- \*Range and Animal Science
- \*Horticulture, Forestry, Landscape and Parks
- Plant Science
- Rural Sociology
- \*Wildlife and Fisheries
- Education
- Northern Great Plains Water Resource Institute

*The committee agrees with this recommendation. Pharmacy, Engineering and Instructional Technologies Departments may also find research opportunities on site.*

- b. Identify key faculty members who either have some experience at Oak Lake or whose research could fit well into the Oak Lake environment.

*This list may begin with former and current members of the Oak Lake Committee in addition to those Departments/Individuals who have already shown an interest in conducting research at the station. The following faculty have conducted research or shown an interest in conducting research at Oak Lake Field Station: Adrian Hannas (Augustana College), Arvid Boe (PS), Janet Gritzner\*(Geog), Lois Haertel (Bio/Micro), Jon Jenks (WL), Carter Johnson (HFLP), Pat Johnson\*(ARS), Paul Johnson (PS), Gary Peterson (Bio/Micro), Neil Reese (Bio/Micro), Diane Rickerl\*(PS), Nels Troelstrup\*(Bio/Micro) and (Mike Brown (WL).*

- c. Provide incentives for the development of research programs at Oak Lake Field Station. One of the major obstacles which must be overcome is that the kind of researchers required are already successful in conducting research in other settings. They must be provided with seed funds to allow the establishment of new lines of research at OLFS without impacting their productivity in ongoing projects.

- i. Set-asides from the existing \$60K small grants administered by the Graduate Dean. A set-aside of \$5,000-\$6000 per year for five years could provide that seed money, making \$2000-3000 available per researcher per year to fund a graduate student's research supplies and equipment needs at OLFS. After an initial period of five years, this set-aside can be folded back into the general small grant pool.

*The committee agrees with this recommendation. The Dean for Graduate Research has been approached regarding this issue. It is possible that a separate research grant could be established with assistance from the Graduate School. The field station may be required to provide matching funds. In addition, the field station may provide field laboratory space and/or access to some equipment to support research effort.*

- ii. Free or subsidized use of OLFS facilities during the first two summers of a new research project.

*The field station may provide space for experimental plots, laboratory space, use of equipment, access to communications and office and/or lodging space. The ability of the station to waive fees or subsidize facilities will be limited by need and availability.*

- iii. Core research faculty submit NSF Research Experience for Undergraduates proposal, perhaps in conjunction with BioStress Center.

*The Director and Dean of Graduate Studies are currently working on an REU Proposal. It is likely that this proposal will include participation by faculty from several departments.*

- iv. Start-up funds earmarked for new faculty hires for research at OLFS

*Limited start-up funds may prevent individual departments from earmarking funds toward OLFS research.*

- d. Exercise the right of the Dean to reallocate positions to build a core faculty associated with the BioStress Center and the Oak Lake Field Station.

*The committee agrees with this recommendation. However, limited resources and heavy campus workloads would probably inhibit implementation.*

## 2. Education

Develop a core set of courses which are integrated with the research program, and make use of researchers and their graduate students as teaching personnel. Because of constraints on new course creation, these should make use of existing course numbers as much as possible.

- a. Department chairs need to be provided with incentives for:
  - i. redirecting course numbers, or eliminating under-enrolled courses, to allow courses to be taught at OLFS.

*The committee agrees with this recommendation. A few faculty have already expressed interest in teaching summer courses. Curriculum revisions, limitations on summer offerings and restrictions on generation of new courses have prevented development of a true summer program. New courses may be initiated as Special Topics. Those with successful enrollments may be converted to true summer session courses. Alternatively, the station could offer a series of Special Topic field courses each summer.*

- ii. redirecting the teaching semesters of involved faculty on 9-month appointments so that they have teaching in the summer session and one academic year semester, with the other academic semester off or with a reduced teaching load.

*Implementation of this recommendation seems unlikely due to contract issues stipulated in the agreement between Board of Regents and Faculty Unit.*

- b. Faculty and graduate students can be provided with free housing and/or station use in return for teaching involvement. This benefit can also be used as a way to involve faculty from other institutions.

*The committee agrees with this recommendation. However, this approach should be limited to those with a sincere need. In addition, the Director must consider other potential researchers with grant funding who might require facilities already committed to a "free ride" project.*

### 3. Additional Resource Issues

#### a. A summer session coordinator

A coordinator is needed to arrange course scheduling, equipment movement to campus and back, classroom set-up, boat scheduling etc. This person must be on site during all courses. This is envisioned as a 50% position, and could be filled by a graduate student with the appropriate skills.

#### b. An outreach and service coordinator

This person arranges service and outreach activities, teaches in some outreach programs, arranges tours and open houses, and handles logistics on-site during the activities. This is envisioned as a 50% position, and could be filled by a graduate student with the appropriate skills.

*The committee agrees with recommendations (a) and (b). At present, these positions might be filled by an undergraduate or graduate student seeking part-time summer support. Local community volunteers and/or retired citizens organizations may also provide an individual willing to fill this role.*

#### c. Long-term data collection and data base management

Current efforts at data collection and management are on the right track and should be continued and expanded in the future. The presence of baseline information and of a protocol for continuing long-term monitoring is a great resource for researchers, assuring the field station of a competitive advantage in attracting a research community.

*The Director has developed climate and water quality monitoring programs and geographic information system capabilities to facilitate research and educational programs at Oak Lake. These programs will continue and should expand in the future.*

### Summary

Field stations are very important assets for colleges and universities. Learning in the field takes place at a more comprehensive and fundamental level. The scientific research conducted at field stations provides significant intellectual contributions to the institution and to the general public. The Oak Lake Field Station is a treasure in many ways for South Dakota State University, and should be respected as such.

## Community Advisory Group Letter of Support

September 20, 1999

Dr. Peggy Gordon Elliott, President  
South Dakota State University  
Box 2201  
Brookings, SD 57007

Dear President Elliott,

We the members of the Oak Lake Community Advisory Group wish to express our support of National Science Foundation Recommendations for improvement of the Oak Lake Field Station. Our group was established in 1994 to (1) serve as liaison between the Oak Lake Field Station and surrounding communities, (2) submit management recommendations to the campus Oak Lake Committee and (3) facilitate outside funding opportunities for Oak Lake Field Station facilities and programs.

Our group met July 10, 1999 to review recommendations within the NSF report and define what we perceive to be priorities for the Oak Lake Field Station. Dr. Nels H. Troelstrup, Jr. presented the NSF report and provided an overview of Oak Lake Committee deliberations on each recommendation. Our group considered the NSF review item by item and we fully support all of the recommendations contained in said report. However, there are a few priority areas we feel should receive special attention, since action in these areas would especially improve field station facilities and programs.

We feel that future development and maintenance of Oak Lake as an educational and research facility depend upon three issues. First, the facility must have strong support from university administration. There must be a significant and sustained financial commitment to the facility. Sufficient resources should be made available to (a) facilitate and focus the activity of the director, (b) provide for a full-time caretaker with one or two temporary summer assistants and (c) provide sufficient resources for routine operation and maintenance expenses. In addition, field station deferred maintenance should be considered as part of the annual budget.

Second, the director and the caretaker should have appointments which provide time for focused attention to field station needs. It is our understanding that the Director's position is not presently defined. Rather, Dr. Troelstrup is currently hired to provide instruction and conduct research. His field station duties are not a part of his existing appointment. Similarly, Mr. Svoboda is contracted to provide 20 hours of effort per week in exchange for lodging, barn space and garage space. His position does not provide sufficient time to meet the maintenance needs of the station, nor does he have summer assistants.

Third, funding resources must be acquired to remodel and develop station facilities. We submit that it will be difficult to attract university instruction and research activity without adequate facilities. New housing facilities are needed to encourage and support extended use by faculty and students. Classroom and laboratory spaces should be expanded to accommodate instruction and research efforts. New shower facilities are needed within the existing dining hall. While none of this remodeling is exceedingly expensive, it is important that these basic needs be provided to attract faculty and students to Oak Lake.

The Oak Lake Field Station has witnessed major changes since its acquisition by South Dakota State University. Many facilities have been remodeled and made functional. Station use has increased every year. New instruction and research efforts have been initiated. Field and rangeland management practices have been implemented to improve the grounds. However, many instruction and research opportunities remain just out of reach.

Therefore, we believe that attention to the three issues listed above would provide the necessary resources (time, funding and facilities) for future development of the Oak Lake Field Station. Should these resources become available, many of the remaining recommendations within the NSF review would likely take care of themselves. Thank you for your support and consideration of our ideas. Please feel free to contact our Chair (Mr. Trygve Trooien) with any questions you might have. We would also be happy to meet with you as a group to discuss these crucially important issues.

Best regards,

Oak Lake Community Advisory Group  
%Mr. Trygve Trooien  
Box 44  
Astoria, SD 57213  
(605) 832-4401

*Oak Lake Community Advisory Group*

*Mr. Loren Christianson, Astoria  
Ms. Verna Rogness, Astoria  
Mr. Trygve Trooien, Astoria  
Mr. Earl Rue, Brookings*

*Mr. Chuck Woodard, Brookings  
Mr. Tom Reeves, Hendricks  
Mr. Dave Iverson, Toronto  
Mr. Pete Eekhoff, White*

*Mr. Art Graslie, White  
Mr. Russ Larson, White  
Ms. Anne Patrick, White  
Mr. Nels H. Troelstrup, Jr., White*

## **Strategic Management Plan**

### **Oak Lake Field Station**

Recommendations provided by visiting directors were used to establish strategic goals, objectives and strategies to meet Oak Lake's science agenda. This strategic plan provides measurable outcomes to facilitate management of Oak Lake Field Station under its modified mission.

#### ***Station Mission***

To increase the understanding and appreciation of the Northern Great Plains and to foster ecosystem stewardship through education, research and service.

#### ***Goals, Objectives and Strategies***

**Administrative Goal: Develop support staff and funding sources to facilitate instruction and research programs in support of Oak Lake's mission.**

Objective #1. Provide resources and administrative support to facilitate proper direction of Oak Lake Field Station.

Strategy #1: Negotiate increased administrative allocations to \$15,000 per year in support of Oak Lake general operations by the year 2000.

Strategy #2: Negotiate administrative financial support for a small Grants program in support of faculty research at Oak Lake Field Station by the year 2000.

Strategy #3: Provide one full-time technician to support the Oak Lake director by the year 2001.

Strategy #4: Provide a 50% time appointment for the Oak Lake director by the year 2002.

Strategy #5: Reconfigure the reporting structure of the Oak Lake director to the Dean of the College of Agriculture and Biological Sciences by the year 2002.

Objective #2. Provide sufficient resources to develop and maintain facilities and programs of Oak Lake Field Station.

Strategy #1: See Objective #1, Strategy #1.

Strategy #2: Develop an Oak Lake Field Station business plan which defines in-kind services by the year 2000.

Strategy #3: Develop funding sources necessary to support a 75% time contract for the field station caretaker by the year 2001.

Strategy #4: Develop funding sources necessary to provide one full-time seasonal technician by the year 2001.

Strategy #5: Develop a master plan to define necessary capital improvements commensurate with future programs at Oak Lake Field Station by the year 2001.

**Instruction Goal: Promote credit and non-credit learning opportunities for people of all ages to enhance understanding of the Northern Great Plains.**

Objective #1. Provide facilities and environment for public school and university classes.

Strategy #1: Develop an indoor classroom facility for use by public schools and university courses by the year 2000.

Strategy #2: Develop Internet and multimedia capabilities for use by instructors by the year 2000.

Strategy #3: Develop on-site library to support studies of Northern Prairie environments by the year 2000.

Strategy #4: Remodel dining hall bedrooms to accommodate visiting students and instructors by the year 2000.

Strategy #5: Create comfortable groupings of furniture within the dining hall to enhance group discussions and study by the year 2001.

Strategy #6: Develop collaborative distance education offerings in natural resources and environmental science by the year 2003.

Strategy #7: Develop three-season classroom facilities capable of supporting 25-30 students by the year 2005.

Strategy #8: Develop new bathhouse and storm shelter facilities capable of supporting groups of 30 students by the year 2007

Strategy #9: Develop housing facilities capable of supporting extended instruction for groups of 25-30 students by the year 2010.

Objective #2. Develop a natural resources monitoring program to facilitate instruction and research effort at Oak Lake Field Station.

Strategy #1: Design, implement and maintain a water quality monitoring program for the Oak Lake Basin by the year 1994 [Monitoring Underway].

Strategy #2: Work with the National Weather Service to develop and maintain a climate monitoring data base by the year 1995 [Monitoring Underway].

Strategy #3: Develop and maintain an inventory of Oak Lake flora and fauna by the year 2005.

Objective #3. Develop and maintain data related to natural and human resources of the Oak Lake Field Station.

Strategy #1: Construct a geographic information system for Oak Lake Field Station by the year 1995. Basic GIS coverages should be developed on a 1:24,000 base map and include soils, land cover, drainages, basins, building structures and transportation corridors [Functional GIS Constructed].

Strategy #2: Develop spreadsheet data sets of monitoring and inventory information by the year 1998. Such data sets should be constructed to allow easy access to public schools and university students/faculty [Database Files Established].

Strategy #3: Define land and cultural history of Oak Lake parcels by the year 1998 [Land Ownership Research Complete].

Objective #4. Provide marketing and incentives to improve instructional use of Oak Lake Field Station.

Strategy #1: Establish collaborative linkages with state agency and tribal education programs to provide funding to support environmental education courses by the year 1996 [Current Funding Available for Environmental Education Programs].

Strategy #2: Develop and offer weekend education programs on natural resources by the year 1996 [Oak Lake Membership Programs Developed].

Strategy #3: Develop an Internet home page to advertise station programs and facilities by the year 1998 [Internet Home Page Constructed].

Strategy #4: Utilize newsletters, press releases and brochures to advertise educational offerings at Oak Lake Field Station [annual newsletter and regular press releases now utilized].

Strategy #5: Establish joint student exchange opportunities with collaborating institutions by the year 2000.

Strategy #6: Integrate undergraduate biology classroom instruction with research activity at Oak Lake Field Station by the year 2001.

Strategy #7: Revise undergraduate curricula within the Department of Biology & Microbiology to require field experience for all majors by the year 2002.

Strategy #8: Establish a visiting scholars program to enhance summer course offerings at Oak Lake Field Station by the year 2005.

Objective #5. Improve instructional funding to support instructional programs and facilities at Oak Lake Field Station.

Strategy #1: Identify instructional facility, equipment and programming needs to support our instructional science agenda by the year 1999.

Strategy #2: Utilize university new instructional ideas fund to support acquisition of equipment and small building renovations in support of our instructional science agenda by the year 1999.

Strategy #3: Submit funding requests to the National Science Foundation (Division of Marine Laboratories and Field Stations) in support of large building renovations by the year 2000.

Strategy #4: Develop partnerships with local landowners to offer educational programs which focus on prairie ecology and management by the year 2001.

**Research Goal: Develop a self-sustaining, multiple user, multiple institution research program centered on the Northern Great Plains.**

Objective #1. Improve field station facilities and equipment available for prairie research.

Strategy #1: Identify research facility and equipment needs to support collaborative, interdisciplinary research efforts by the year 1999.

Strategy #2: Develop library reference collection focusing on prairie environments by the year 2000.

Strategy #3: Purchase two dedicated IBM compatible workstations to support research efforts at Oak Lake Field Station by the year 2000.

Strategy #4: See Instruction Goal, Objective 1, Strategy #4.

Strategy #5: Remodel existing Administration Building to provide one laboratory/classroom, research laboratory and administrative office by the year 2005.

Strategy #6: See Instruction Goal, Objective 1, Strategy #8.

Strategy #7: See Instruction Goal, Objective 1, Strategy #9.

Objective #2. Provide incentives to increase research productivity at Oak Lake Field Station.

Strategy #1: Develop natural resources database and geographic information system in support of research efforts by the year 1999 [GIS and Structure Defined].

Strategy #2: Develop a listing of faculty who either have some experience at Oak Lake or whose research could fit well into the Oak Lake environment by the year 1999.

Strategy #3: Develop research opportunities profiles for societal bulletins and OBFS newsletter by the year 1999.

Strategy #4: Develop a mechanism to generate "seed money" to support a competitive research fund for on-site projects by the year 2000.

Strategy #5: Increase collaborative research efforts with tribal colleges, public universities and state/federal agencies by the year 2000.

Strategy #6: Develop and submit funding request to establish Research Experience for Undergraduates program at Oak Lake Field Station by the year 2000.

Strategy #7: Provide opportunities for on-line publishing of student research results on Oak Lake home page by year 2000.

Objective #3. Increase visibility of Oak Lake facilities and research opportunities.

Strategy #1: Publish and distribute summary articles describing research efforts in field station newsletter and home page [Newsletter and Home Page Developed].

Strategy #2: Require published and presented research deliverables from field station funded research efforts.

Strategy #3: Develop annual Oak Lake Research Rendezvous to facilitate interaction and presentation of regional research activities by the year 2001.

**Service Goal: To increase the ability and interest of the community in stewarding the Northern Great Plains ecosystem through translation of research results into understandable and applicable principles and procedures.**

Objective #1. Focus utilization of field station facilities and grounds to activities which are concordant with the field station mission.

Strategy #1: Restrict use of the field station to those groups with clearly stated objectives that link to the station's mission.

Strategy #2: Develop a dual fee structure providing incentives to those groups using the field station for instruction and research activity.

Objective #2. Provide outreach educational opportunities to local schools, youth groups, civic organizations and private groups.

Strategy #1: Develop and implement outreach educational programs through an Oak Lake Membership program by the year 1998.

Strategy #2: Develop and maintain hands-on education modules for delivery to local school children and youth group visitors by the year 1998.

Strategy #3: Develop and maintain presentation materials describing the field station and its programs to be delivered to civic organizations, agencies and private groups by the year 1998.

Strategy #4: Develop and maintain collaborative ties with environmental education programs for delivering of outreach educational programs to children and adults by the year 2000.

## Architectural Designs - Field Laboratory and Classroom Oak Lake Field Station

### Project Description

The Administration Building will be renovated to provide one classroom to accommodate 25-30 students, research laboratory and administrative office areas. This renovated facility will be insulated and heated to facilitate three-season instruction and research activity. Finishes shall be highly durable, have ability to expand and contract with seasonal changes and allow for winter season shutdown. Total available space shall be limited to that contained within the exterior boundaries of the existing facility.

### Justification

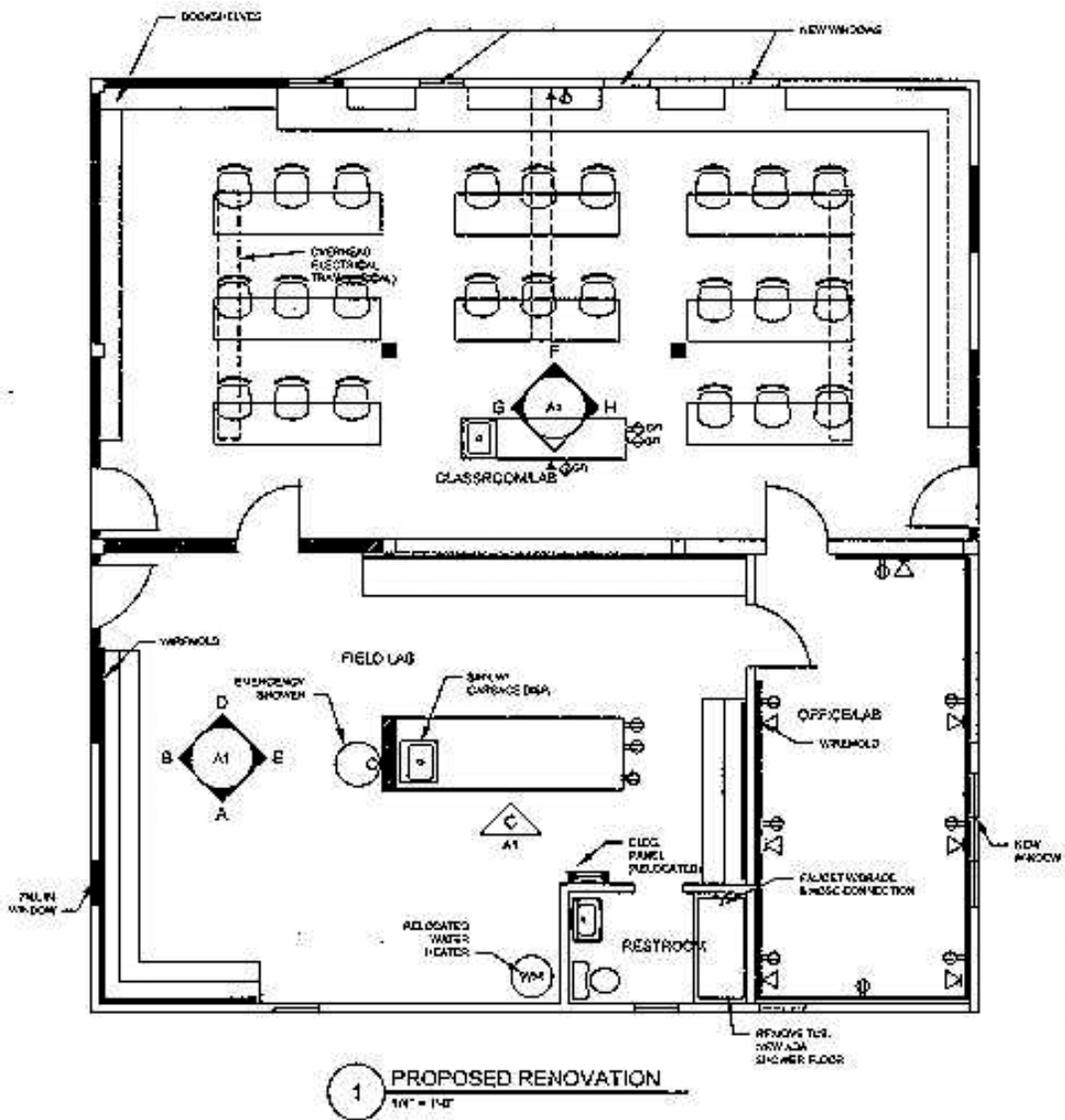
Existing classroom and laboratory facilities are too small to accommodate moderate class sizes (i.e., 20-30 students) and multiple researchers. The administration building can be remodeled to more than double the effective classroom and laboratory space. Additional countertops and cabinetry will provide needed storage space. New classroom tables and instructors lab table will facilitate instructional activities. New wiring will facilitate use of the Internet. New shelving will accommodate field library holdings. The entire structure will be insulated and heated for three season use.

### Cost Estimates

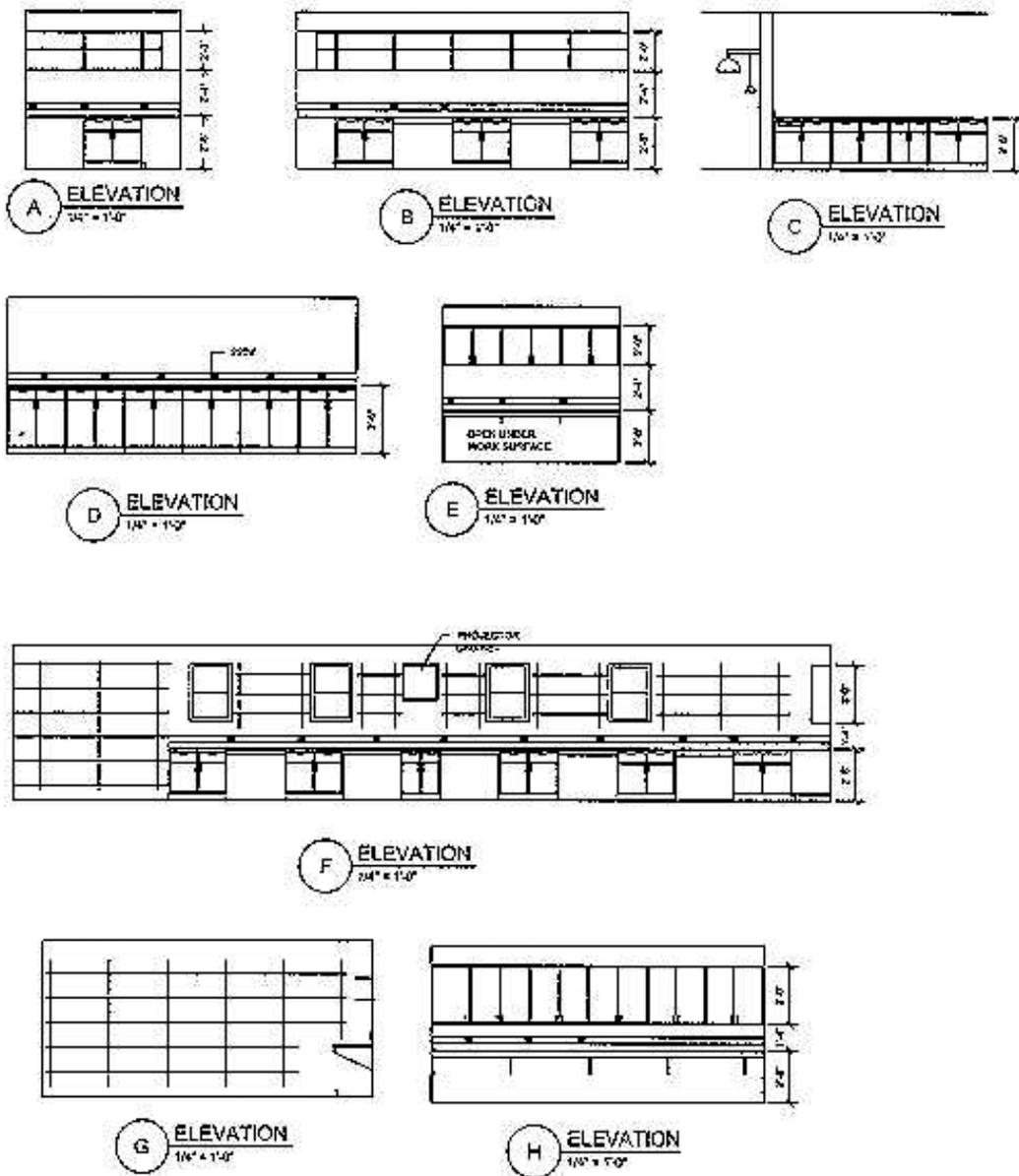
Item	Cost
Demolition	\$6,803
Sitework	\$11,237
Architectural	\$63,605
Furnishings	\$9,360
Plumbing	\$6,600
Ventilation	\$470
Electrical	\$27,225
Total Construction Costs	\$125,300
Contingency	\$18,795
Architect's/Engineer's Fees	\$15,036
Administrative Costs	\$8,771
Total Project Cost	\$167,902

### Potential Funding Sources

A Howard Hughes Medical Institute grant has already been submitted to cover most of this project. Matching dollars will be generated from the field station endowment, private donations and solicitations from university administration.



OAK LAKE FIELD STATION - RENOVATED FIELD LABORATORY  
SOUTH DAKOTA STATE UNIVERSITY



OAK LAKE FIELD STATION - RENOVATED FIELD LABORATORY  
SOUTH DAKOTA STATE UNIVERSITY

## **Architectural Designs - Bathhouse with Storm Shelter Oak Lake Field Station**

### Project Description

This project will provide a bathhouse capable of supporting full occupancy within new housing facilities (30 occupants). The basement area has been designed to serve as a storm shelter capable of accommodating 100 people. The facility will be constructed with concrete masonry walls, concrete board ceilings, steel bar floor joists and concrete topping floor.

### Justification

Existing shower facilities are out-of-doors and not designed for use by disabled occupants. Shower stalls were originally designed for use by small children. This new structure would provide indoor, heated bathroom facilities to accommodate up to 30 station visitors. ADA accessible facilities would be available. In addition, the basement of this facility would serve as a storm shelter. The field station presently has no storm shelter.

### Cost Estimates

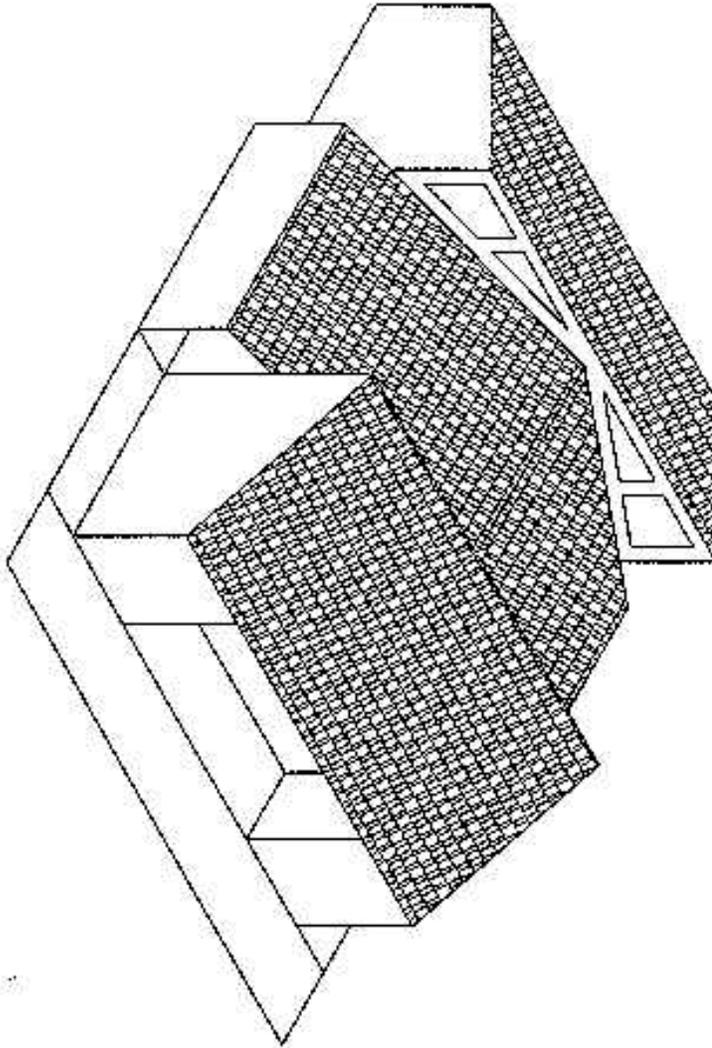
Item	Cost Estimate
Sitework	\$12,790
Architectural	\$77,684
Plumbing	\$42,584
Heating/Ventilation	\$6,640
Electrical	\$16,350
Total Construction Cost	\$156,048
Contingency	\$23,407
Architect's/Engineer's Fees	\$18,726
Administrative Costs	\$10,923
Total Project Cost	\$209,104

### Potential Funding Sources

Funding for this effort would be solicited through a proposal to the National Science Foundation, Division of Marine Laboratories and Field Stations with matching dollars contributed by the field station endowment, private donations and South Dakota State University.

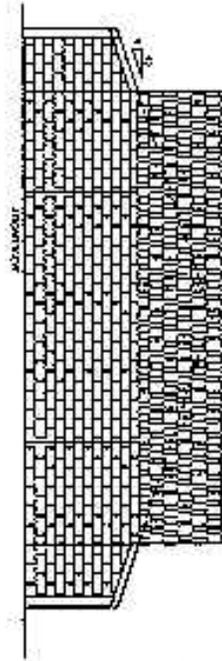
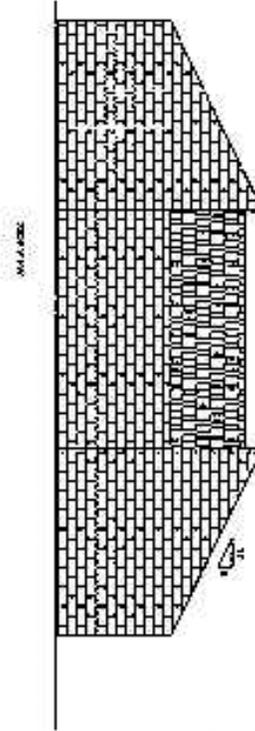
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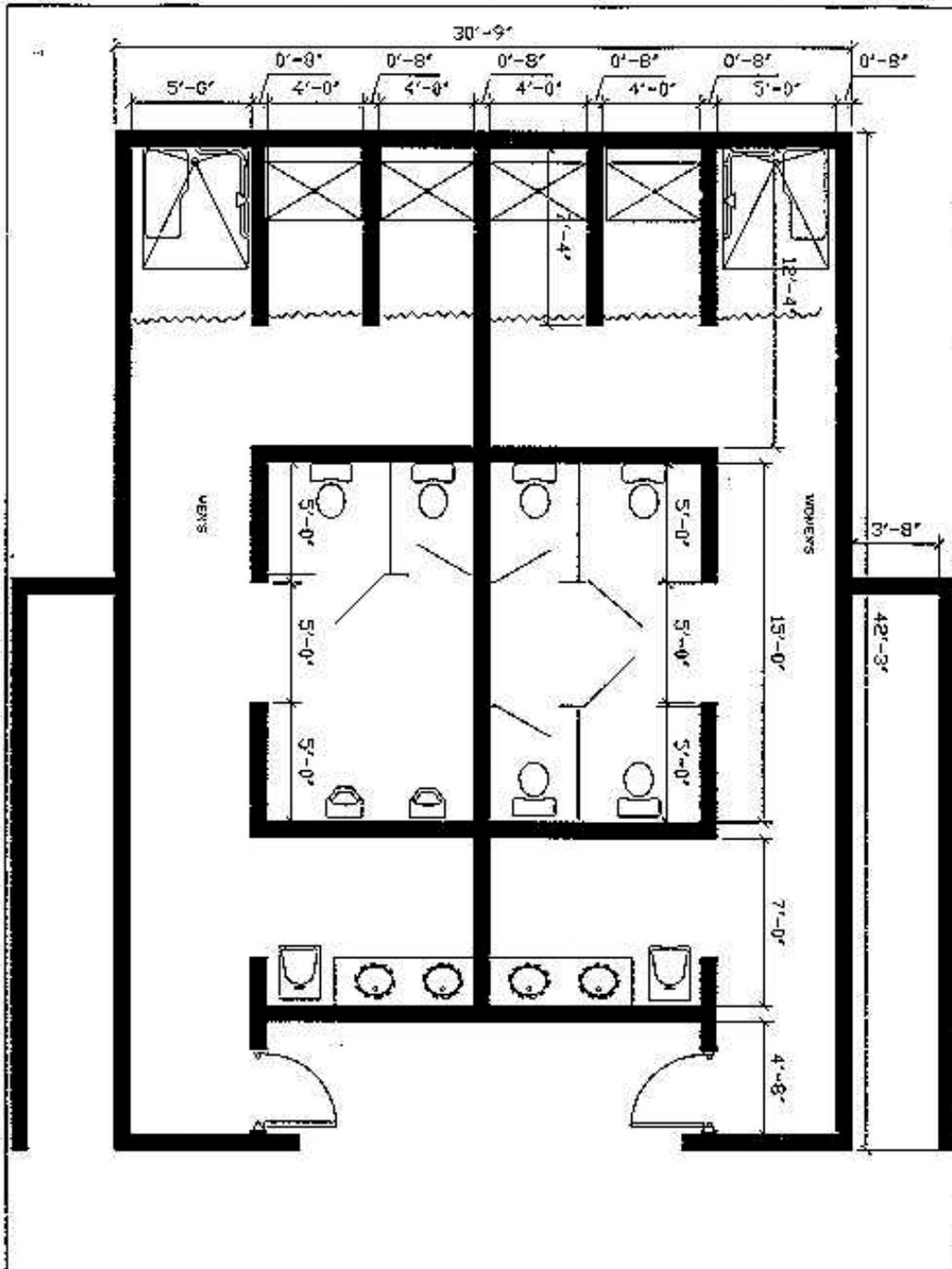


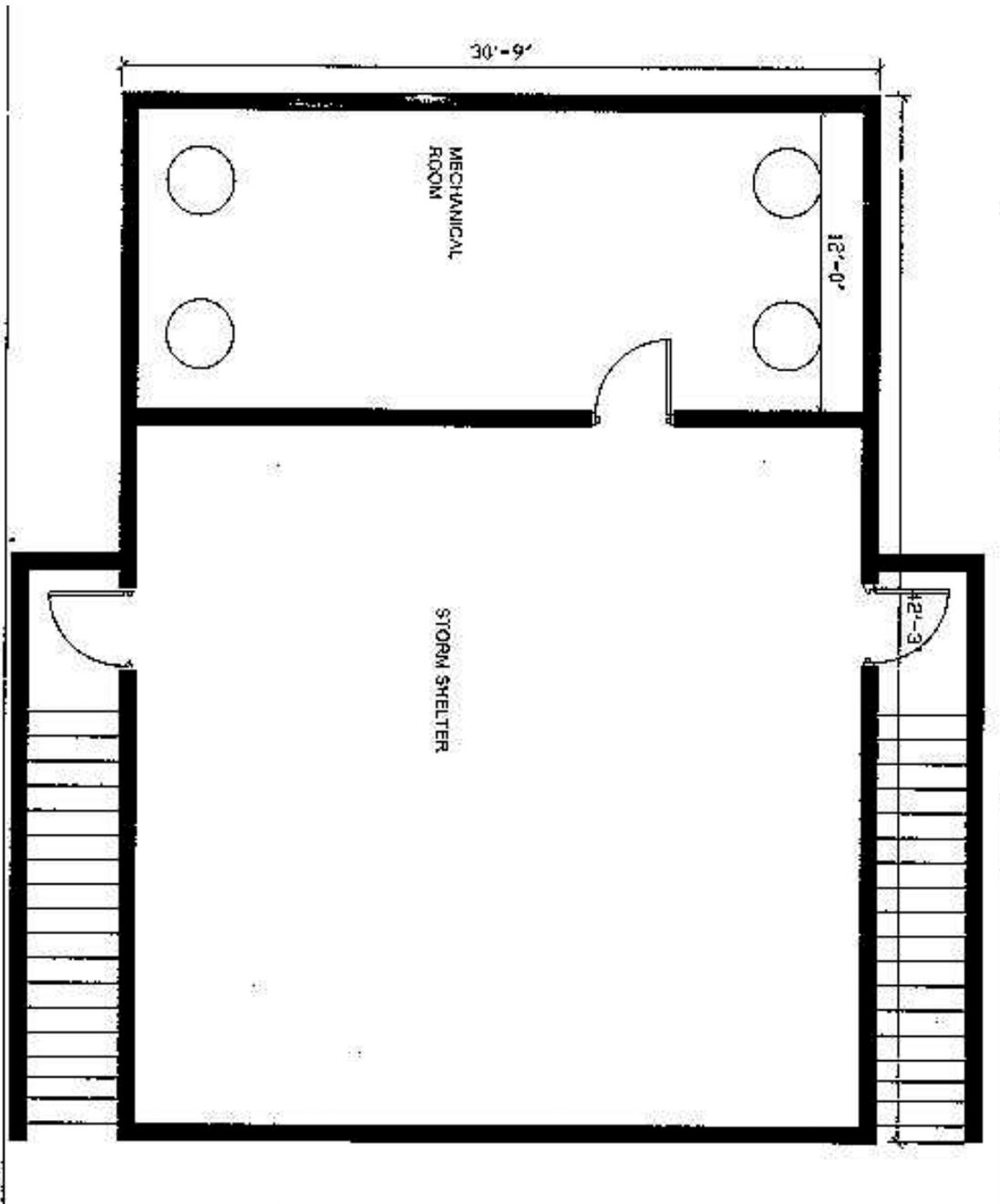
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## Architectural Designs - Student/Faculty Housing Facilities Oak Lake Field Station

### Project Description

Cabin type lodging facilities will be built to support long-term activities by faculty and students. Cabins shall be large enough to accommodate two people. Individual cabins are preferred over a motel or dormitory arrangement to simultaneously accommodate multiple user-groups. Cabins will be constructed in a modular arrangement to facilitate group activities. Finishes shall be durable and tolerate winter shut-down as cabins will be used as three season facilities. Cabin exteriors will be constructed to match exteriors of other large buildings on site. Cabins with and without bathroom facilities are under consideration.

### Justification

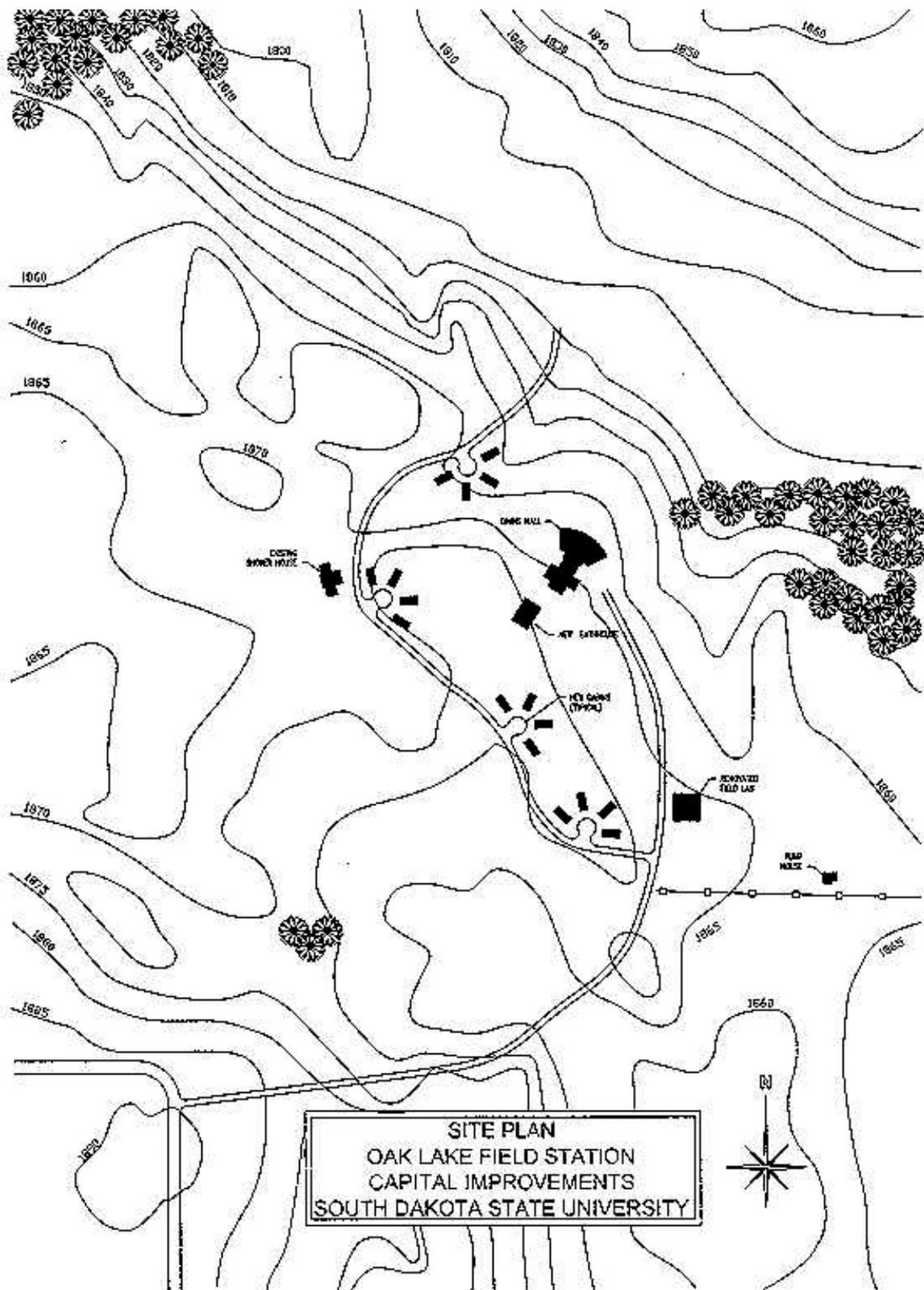
Field station housing currently consists of two bunkhouses and bedrooms within the dining hall. Current bunkhouse accommodations consist of multiple bunks in large rooms (i.e., barracks style). These accommodations are not desirable to adult visitors. Furthermore, existing housing facilities are several hundred meters away from classroom, laboratory, bathroom and dining facilities. New cabins would be constructed near these facilities, providing a more efficient and desirable working environment.

### Cost Estimates

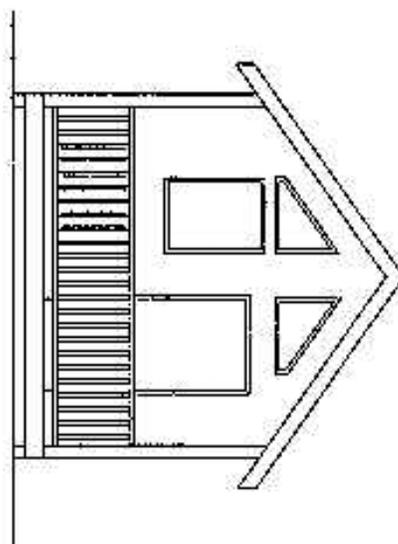
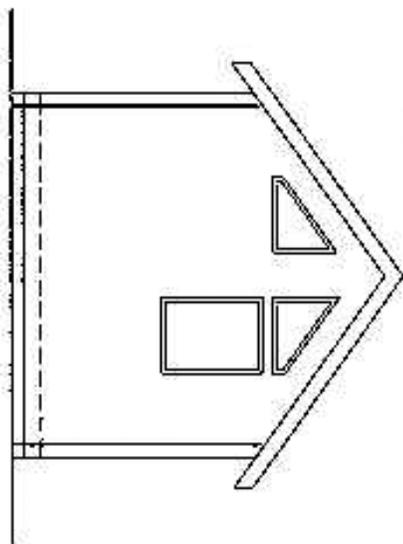
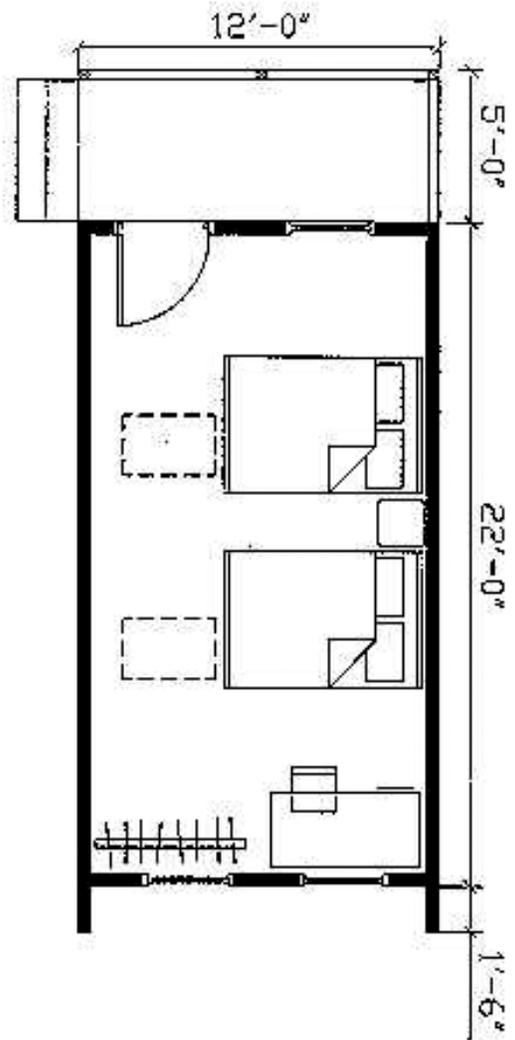
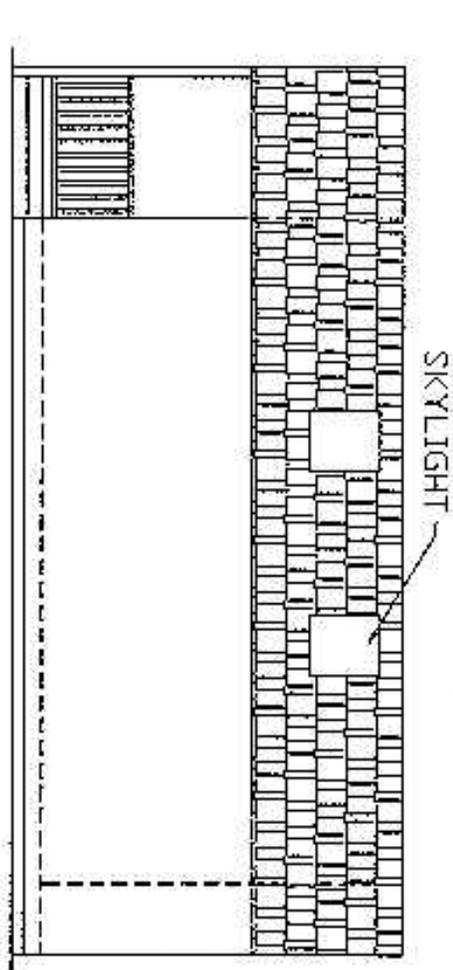
Item	Cost w/ Bathroom	Cost w/o Bathroom
Sitework	\$2,259	\$1,125
Architectural	\$20,710	\$16,344
Furnishings	\$3,000	\$2,500
Heating/Ventilation	\$5,470	\$5,250
Plumbing	\$3,925	\$0.00
Electrical	\$2,850	\$1,550
Total Construction Cost	\$38,214	\$26,769
Contingency	\$3,821	\$2,677
Architect's/Engineer's Fees	\$1,146	\$803
Administrative Costs	\$764	\$535
Total Project Cost (ea)	\$43,946	\$30,784

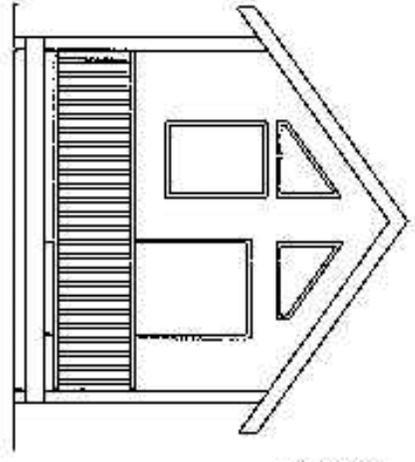
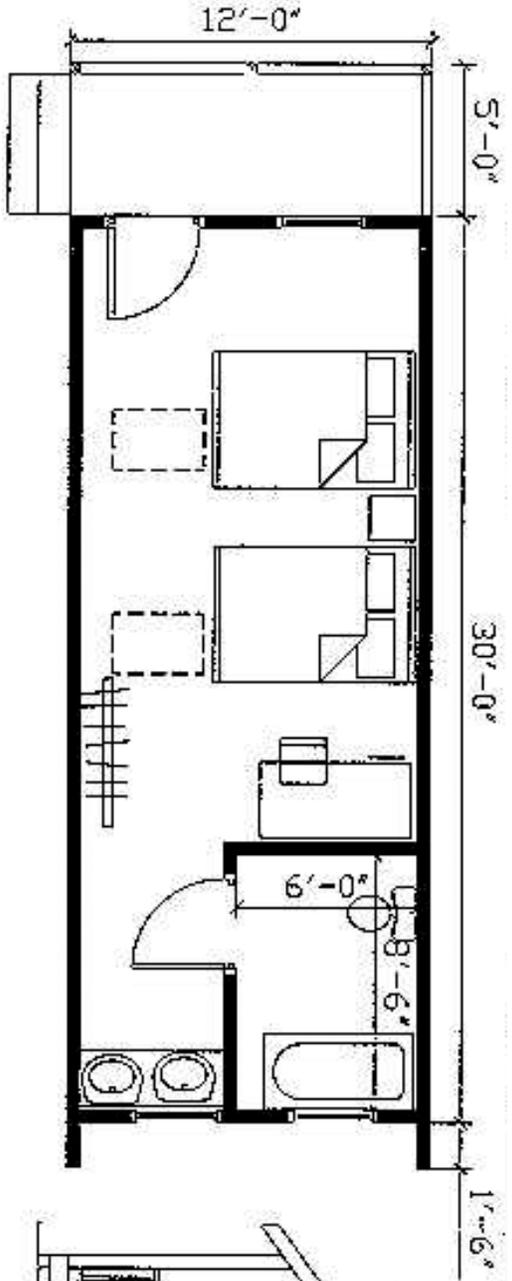
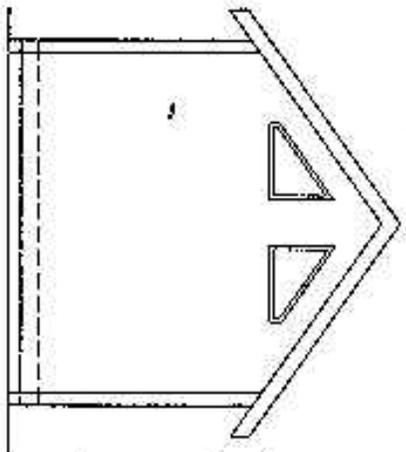
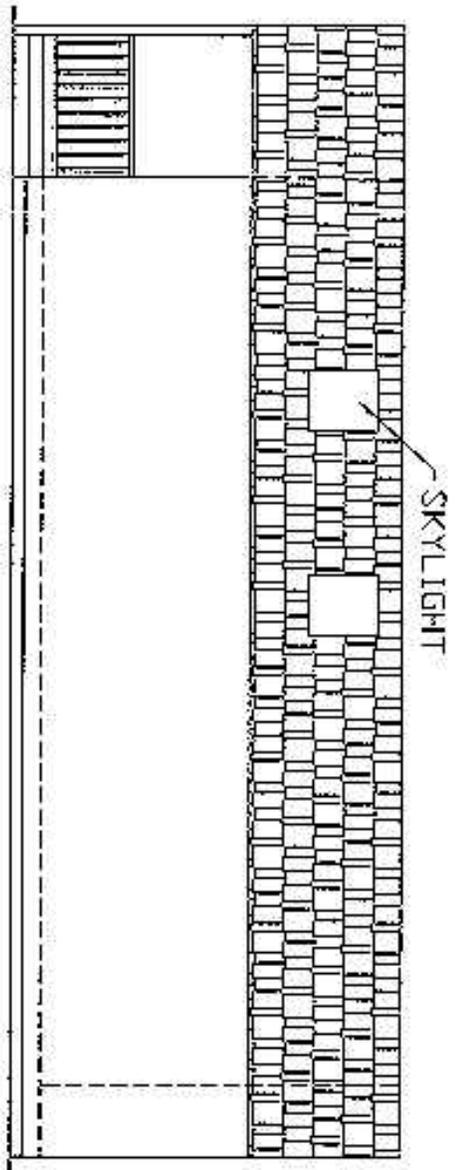
### Potential Funding Sources

Funding for this effort would be solicited through a proposal to the National Science Foundation, Division of Marine Laboratories and Field Stations with matching dollars contributed by the field station endowment, private donations and South Dakota State University.



**SITE PLAN**  
**OAK LAKE FIELD STATION**  
**CAPITAL IMPROVEMENTS**  
**SOUTH DAKOTA STATE UNIVERSITY**





## Estimated Costs of Implementing Management Strategies

### National Science Foundation Planning Effort

Management Area	Estimated Cost	Allocation	Sources
Personnel			
50% Time Director's Position	\$27751	Annual	Administrative Reallocation
75% Time Caretaker's Position	\$16000	Annual	New University Position
75% Time Director's Assistant	\$9240	Annual	Student Labor
100% Seasonal Caretaker's Assistant	\$6160	Annual	Student Labor
Total Personnel	\$59151		
Equipment & Materials			
Computer Maintenance	\$1000	Annual	Operating Budget
Photocopier	\$0.00	Annual	Supplied, User Fee
Fax Machine Maintenance	\$0.00	Annual	Donation, User Fee
Lounging Furniture	\$2000	Once	Donations, Operating Budget
Replacement Mattresses (distributed)	\$6000	Once	Operating Budget
Bedroom Phone Lines	\$200	Once	Operating Budget
Total Equipment & Materials	\$9200		
Increase in Operating Budget Allocation	\$15000	Annual	Administrative Reallocation
Facility Construction			
Remodel Classroom/Field Lab	\$167902	Once	Grant, Private, Endowment
Bathhouse and Storm Shelter	\$209104	Once	NSF, Endowment, Match
Housing Units to Support 30 People	\$545192	Once	NSF, Endowment, Match
Total Facility Construction	\$922168		
New Facility Maintenance			
Classroom/Field Lab	\$500	Annual	Operating Budget
Bathhouse/Storm Shelter	\$1500	Annual	Operating Budget
Housing Units (est. for 16 units)	\$5500	Annual	Operating Budget
Total New Facility Maintenance	\$7500		
Information Management			
Lake Monitoring Database	\$1500	Annual	Operating Budget
Weather and Climate Database	\$200	Annual	Operating Budget
Geographic Information System	\$200	Annual	Operating Budget
Natural History Collections	\$500	Annual	Operating Budget
Library Acquisitions	\$500	Annual	Operating Budget, Donations
Research Rendezvous	\$500	Annual	Operating Budget
Total Information Management	\$3400		
Marketing			
Homepage Development	\$250	Annual	Operating Budget
Newsletter	\$1000	Annual	Operating Budget
Press Releases	\$500	Annual	Operating Budget
Presentation Management/Delivery	\$250	Annual	Operating Budget
Annual Attendance OBFS Meeting	\$500	Annual	Operating Budget
Total Marketing	\$2500		
Incentives Programs			
Instructor/Student Waivers	\$1000	Annual	Waived Facility Fees
Research Incentives Program	\$5000	Annual	Membership Receipts, REU
Student Exchange Honorarium	\$1500	Annual	Investigator Labor Budgets
Visiting Scholars Seminars	\$1000	Annual	Bush Fellowship Grants
Total Incentives Programs	\$7500		
Total New Recurring Costs			\$96051
% New Recurring Costs in Salaries			62%
Total Non-Recurring Costs			\$930398