

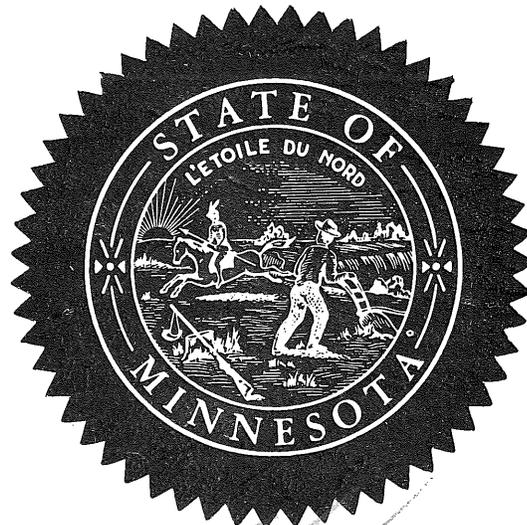
BIENNIAL REPORT

1960 - 1962

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DIVISION OF WATERS



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MINNESOTA

CONSERVATION DEPARTMENT



STATE OF MINNESOTA
DEPARTMENT OF CONSERVATION
SAINT PAUL 1

To the Governor and the Legislature
of the State of Minnesota:

It is my pleasure to transmit to you the Sixteenth
Biennial Report of the Department of Conservation in
compliance with M. S. A. 84.03.

The purpose of this report is to present factual
information concerning the activities, accomplishments,
and future needs of the department. It is presented in
simplified form for purposes of economy. Sufficient copies
have been printed to supply only a limited public demand.

Respectfully yours,

Clarence Prout
Commissioner of Conservation

CP:b

Administration

Our greatest need in the management of our natural resources is planning and programming for the future. An exploding population and economic changes of the day permit of no delay. A conservation plan or blueprint is a necessity.

In state government we have an enduring reminder of the wisdom of long range planning. It was in December 1903 that the first comprehensive plans for the Capitol Approach were drawn by Cass Gilbert. Although fifty years were required for realization, it was the beginning plan or blueprint that was important. At the outset it is pertinent to submit a review of the inception and development of the Department of Conservation.

Authority

Laws of 1931, Chapter 186, established the Department of Conservation administered by a five-man commission. In Laws of 1937, Chapter 310, the commission was abolished and authority vested in a Commissioner of Conservation.

History

In 1931 the Minnesota Legislature established the Department of Conservation. The Department combined three previously independent organizations (Forestry, Game & Fish and Waters) and subsequently encompassed two more divisions (Lands & Minerals and State Parks). Forestry was first established in 1911 as the Minnesota Forest Service. The first Game and Fish organization was the three-man Fish Commission created by the Legislature in 1874. The birth of the Division of Lands and Minerals was delayed approximately two years after 1931 because the State Auditor refused to relinquish administration of lands and minerals on constitutional grounds. The Division of State Parks was created by an act of the 1935 Legislature as a unit of the Department of Conservation. Historically, the Division of Waters is the successor of the Drainage Commission established in 1897.

Organization

The Minnesota Department of Conservation, directed by a Commissioner, consists of five divisions, namely: Forestry, Game & Fish, Lands & Minerals, State Parks and Waters. The Commissioner is assisted by a deputy and five staff bureaus: Boat and Water Safety, Engineering, Information, Legal Affairs and Operational Services.

The main task of the department is to care for the vital natural resources on which the economy and the welfare of the state depends - land, waters, forests, minerals and wildlife. The working force of the department for the fiscal year ending June 30, 1961 consisted of about 1,200 regular employees and 600 seasonal personnel, making a total of about 1,800 at peak employment. The total department budget for the same period was approximately \$10,000,000 including both state appropriations and federal aid.

Simply stated the goals of the Department of Conservation are:

(1) to provide better markets for forest products, maintain intensive fire protection, and produce nursery stock for a crash planting program; (2) to launch major acquisition program of lands for public access, wetlands and wildlife habitat; (3) to spearhead the drive for state, county and local parks to anticipate the projected recreational pressures of a changing world; (4) to determine the best possible use of state lands through a program of systematic classification; (5) to develop fully the use of our tremendous reserve of low grade iron ore, our manganese and of copper, nickel, titanium and other metals and minerals; and (6) to protect all of the public waters of our state against unwarranted pollution and against public or private encroachment to the end that water in abundance will continue to be our destiny.

For the future Minnesota needs -

- More Education for Public Awareness and Understanding!
- More Trees, Tree Farms and Farm Woodlots!
- Better Markets For Our Forest Products!
- More and Better State Parks!
- More Camping and Roadside Parking Areas!
- More Public Access to Our Lakes and Streams!
- More Wetlands and Wildlife Habitat!
- More Public Hunting Grounds and Wildlife Management Areas!
- Greater Utilization of our Mineral Resources!
- Watersheds Protected From Pollution, Erosion and Drainage!
- More Research and Planning For Better Management!

These are some of the needs of Conservation - - - Only you, the people, can provide them!

BOAT AND WATER SAFETY - The Bureau of Boat and Water Safety was created for the purpose of administering the Minnesota Boating Act passed April 26, 1959. The supervisor of this bureau, who is directly responsible to the Commissioner, is charged with the responsibility of boat licensing and maintaining liaison with the county auditors on boating registration and the county sheriffs on boating law enforcement and the commissioner's office, which is the administrator of the boating act.

ENGINEERING - The Bureau of Engineering was established on November 5, 1958. It is charged with the responsibility and sufficiency for property and project surveys, design and construction supervision relating to projects that may be sponsored by the various divisions of the department.

The Bureau of Engineering received 376 requisitions for engineering services from July 1, 1960 through June 30, 1962. Of these requests and those received prior to the above period, 324 were completed. On June 30, 1962, 190 requisitions for engineering services remained to be processed. Plans and specifications for 53 projects were submitted for contract involving and expenditure of \$365,627.44. During the two year period 142 projects were in progress of construction for which the Bureau of Engineering prepared the plans and/or supplied field supervision. Total expenditure on Conservation Department construction projects for

the above period was \$1,082,354.15. Other than those projects offered for bids, the total value of the construction program is not accurately reflected in the expenditures as labor and an equipment depreciation factor has not been applied. It does emphasize however, the magnitude of the bureau's construction phase of its service.

The bureau's field crews made 230 property surveys of individual tracts for the various divisions in the process of their land acquisition programs. In addition, plats were furnished as well as the legal description for each parcel.

A mapping project paid from funds furnished by the Division of Forestry was supervised by the Bureau of Engineering. The work entailed the correction of Forest Protection Maps covering most of northern Minnesota that were made in 1941. The work was performed by local draftsmen at the Forest Headquarters Station at Grand Rapids. The bureau also supervised two park boundary surveys (Cascade and Zippel Bay) in which monies were furnished from the Conservation Work Program fund and local land surveyors were employed to conduct the survey. Approximately 30 miles of park boundaries were accurately established, cleared of all brush and tree growth and monumented.

The appraisal of other various and sundry services rendered to the divisions both in the office and the field, while difficult to assess, have proved to be exceedingly important to the department's operations. These include the drafting of charts and diagrams, studies of special projects to determine feasibility, assistance rendered at public hearings, court cases and land negotiations.

INFORMATION - The Bureau of Information was established in 1941 and consists of a director and a staff of ten professionally trained and clerical employees. The Conservation Volunteer, the department's magazine with a circulation of 37,500 has attracted national attention. The weekly newsletter distributed to over 500 newspapers is an excellent dollar investment. Natural resource education has advanced in the integration of conservation materials into the school curriculum. "Following Conservation Trails" in cooperation with the University of Minnesota's School of the Air has added materially to the more than 125 sound-tape programs now available to schools. The bureau has a regular television program. Nearly 300,000 pieces of literature were mailed during the second year of the biennium to fill requests received by this office. Other activities include the film loan library, the Arbor Day program in cooperation with the Federation of Women's Clubs, a program of outdoor safety through the Minnesota Safety Council, and a service of "Reports and Report Making" on background materials in conservation.

LEGAL - As a party to binding agreements and in cases involving conflicting claims, the Conservation Department is similar to any individual or legal entity. The Department takes part in many transactions which call for legal services of a highly technical nature. Legal counsel is required in such matters as acquiring property, entering into contracts, negotiating claims, participating in hearings and handling litigations in courts of law. Responsibilities of the legal staff include providing counsel on matters which arise through various Conservation Department procedures and the handling of all legal proceedings in which the Department is involved. Personnel of the legal staff are paid and

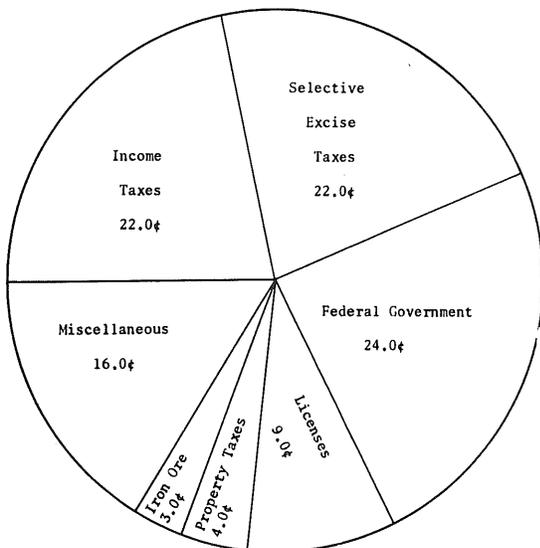
furnished office space by the department, although members are under the supervision of the State Attorney General's office.

BUREAU OF BUSINESS MANAGEMENT - The Bureau of Business Management, created in 1954, is a staff bureau of the Commissioner's office. It provides administrative services to the operating divisions and is responsible for the development of good business management practices throughout the department. The bureau is organized into three sections: namely, Finance, which is responsible for the operation of the department accounting system, budget control, internal audits, game and fish license sales and accounting, all other licenses and permits; Personnel, which is responsible for Personnel policies, personnel training, labor relations, personnel records and preparation of payrolls; and Plant and Equipment, which is responsible for maintaining a system of inspection and operating costs of all motorized equipment in the department, maintain records on department-wide inventory system, department office supplies, and mail and messenger service systems.

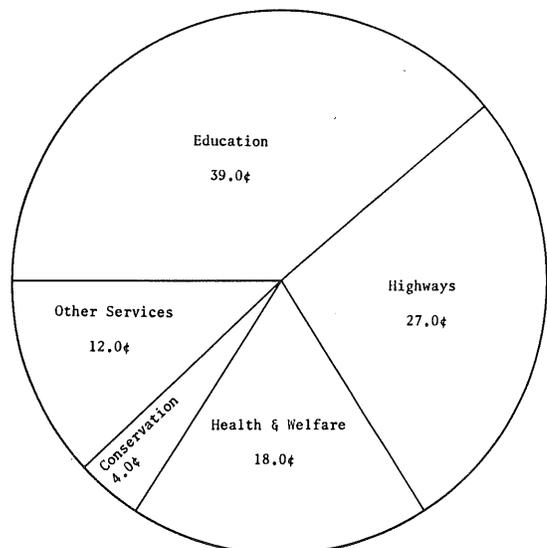
At the time of adoption of "Machine Data Processing" with I.B.M. equipment in 1954, a system of "Cost" Accounting was also included in the new accounting system. Within a short period of time this Cost Accounting system proved so worthwhile that it has become an integral segment of the accounting procedures now in operation with the Conservation Department.

It has eliminated to a great extent the tedious detailed "record keeping" on analysis sheets by numerous Department personnel. It has provided an accurate breakdown of expenditures which is necessary in the administration of Federal funds. It has provided a priceless "historical" record of expenditures which is so vital to sound fiscal planning. And having all these records on punched cards has provided a system for analyzing detailed records that would formerly have been too voluminous or costly to process using the antiquated "manual" system of record keeping.

Where The State Dollar Comes From



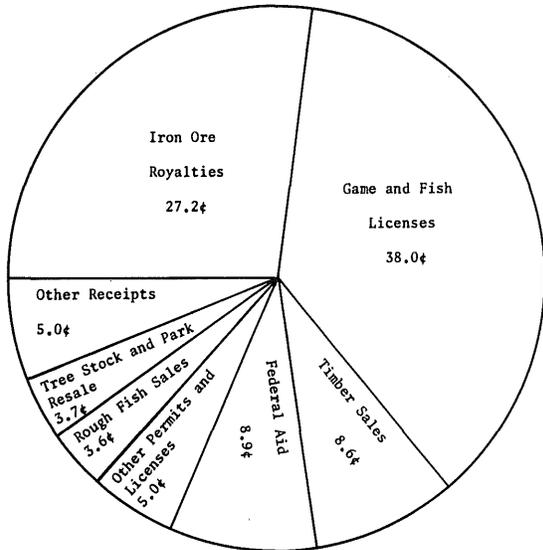
What The State Dollar Is Spent For



FINANCIAL STATEMENT

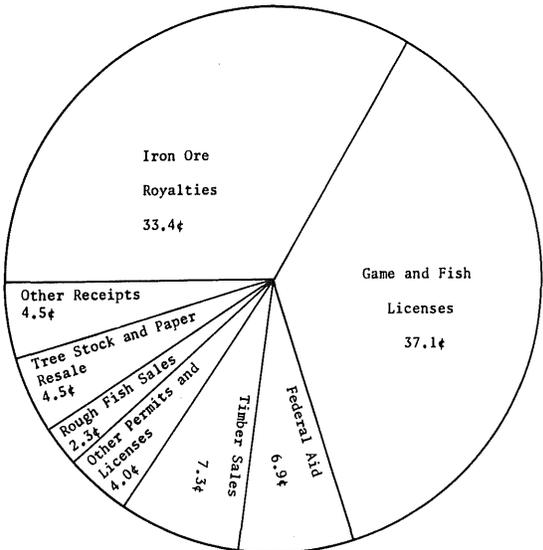
WHERE YOUR CONSERVATION DOLLAR COMES FROM

RECEIPTS 1960



INCOME BY DIVISION	
Administration	\$ 253,000
Waters	1,300
Forestry	1,464,600
Lands and Minerals	3,224,900
Game and Fish	5,343,800
Parks	628,400
Total	\$10,916,000

RECEIPTS 1961



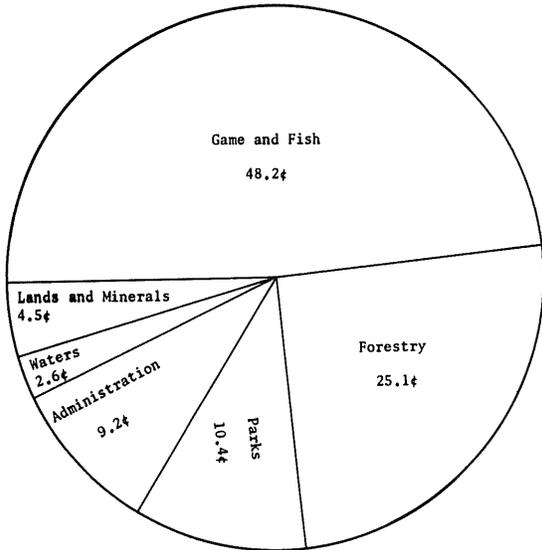
INCOME BY DIVISION	
Administration	\$ 152,500
Waters	78,100
Forestry	1,469,300
Lands and Minerals	4,071,500
Game and Fish	5,120,100
Parks	576,500
Total	\$11,468,000

Note: Approximately 60% of the income is reappropriated to the Conservation Department. The balance (40%) is deposited to the General Revenue Fund, Trust Funds, etc.

DEPARTMENT OF CONSERVATION

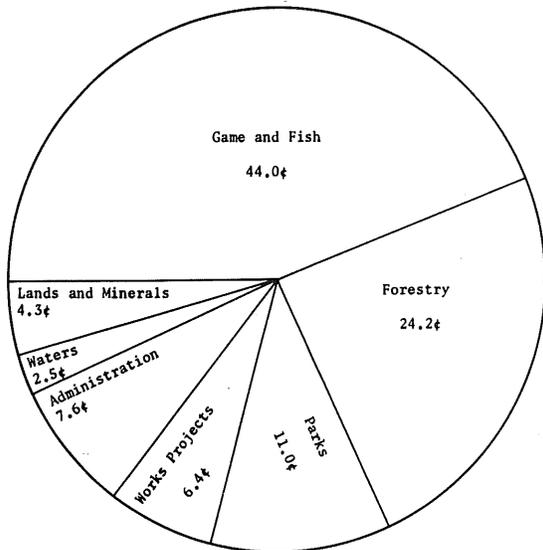
WHERE YOUR CONSERVATION DOLLAR IS SPENT

EXPENDITURES 1960



EXPENDITURES BY DIVISION	
Administration	
Operational Services	\$ 301,200
Engineering	161,200
Legal Bureau	73,400
Information Bureau	89,500
Boat and Water Safety	184,800
Other	38,500
Total Administration	\$ 848,600
Waters	233,800
Forestry	2,302,700
Lands and Minerals	415,800
Game and Fish	4,430,900
Parks	953,200
Total	\$9,185,000

EXPENDITURES 1961



EXPENDITURES BY DIVISION	
Administration	
Operational Services	\$ 300,100
Engineering	161,500
Legal Bureau	78,700
Information Bureau	96,900
Boat and Water Safety	122,400
Other	1,000
Total Administration	\$ 760,600
Conservation Works Project	666,500
Waters	247,000
Forestry	2,469,200
Lands and Minerals	433,300
Game and Fish	4,486,300
Parks	1,119,800
Total	\$10,182,700

NOTE: The expenditures as indicated for the Game and Fish Division do not include transfers to other departments and agencies.

Forestry

The State of Minnesota and its people are fortunate in having many natural resources. One of the basic renewable resources is its forests. The commercial forest area within the state is 18 million acres. Of this, 56 per cent is in public ownership, and 44 per cent in private ownership.

The state itself owns about 3 1/2 million acres of commercial forest land, which is administered by the Department of Conservation. The Division of Forestry, which in 1961 celebrated the 50th anniversary of its establishment, has the responsibility for the protection and management of the timber resources on such land.

Forestry ranks as one of Minnesota's "Big Four" industries. Timber cut in Minnesota in 1961, with value added to the raw material by harvesting, processing, transportation and distribution, amounted to almost a quarter of a billion dollars. With material demands of our economy constantly growing, the forest resource by nature promises an ever greater contribution.

The multiple use principle of forest management generates new wealth in such fields as wildlife, outdoor recreation and travel. Unlike many natural resources, the managed forest knows no depletion; it is forever renewing itself while providing products for good living for all.

ADMINISTRATION - The division has a total complement of 273 personnel in the permanent classification as well as 63 seasonal forest guards and 19 intermittent laborers. Approximately 1,500 to 2,000 persons were given employment on an hourly basis, amounting to 368,000 man-hours, on such projects as nursery operation, planting, roads, trails and building projects. Fire-fighters were needed for over 165,000 man-hours for the suppression of fires.

The supply depot maintained by the division at Grand Rapids continued to be a vital service facility to all projects. It is estimated that some 15,000 different supply and equipment items are stocked for distribution to the areas, nurseries and St. Paul. The division has more than 600 buildings of all types, and 117 forest fire lookout towers, all of which require some type of maintenance. Nearly a thousand miles of forest roads and trails were maintained, 28 miles were reconstructed, and eight miles of new road built.

Conservation Work Projects

An allocation of \$309,375 from the Conservation Works Projects Fund, appropriated by the Legislature of 1961, was received by the division. The major portion of these funds were used for site preparation and planting, timber stand improvement, forest roads and trails, campgrounds, nursery development, blister rust control, and forest survey work. Less than \$4,000 was used for the purchase of tools and equipment.

STATE LAND MANAGEMENT - Two additional state forests, the Golden Anniversary State Forest in Itasca county, and the Minnesota Memorial Hardwood State Forest in the counties bordering the Mississippi river and its tributaries from Hastings to the Iowa border, were established by the Legislature of 1961. This brought the number of forests in Minnesota to 36, encompassing a state-owned land area of 3,039,496 acres.

The division has the responsibility for the management of these state forests. They are used for many purposes: for timber production, wildlife habitat, and for recreation. Lakeshores are leased for summer homesites. Special use permits provide for the removal of gravel, hay and peat. Primitive campgrounds and picnic sites are provided.

Income to the state treasury from leases and special use permits of all types, including summer cabin sites, commercial leases, hay and grazing, gravel, peat, rice and various pole, pipeline and right-of-way permits, amounted to \$32,815.10 for fiscal year 1960-61, and \$46,733.36 for fiscal year 1961-62.

State Land Timber Sales

Management responsibility within the state forests includes timber sales administration. The fiscal years 1961 and 1962 were characterized by a below normal market demand for pulpwood and other forest products. As in other years, the volume of state timber harvested was considerably less than the recommended cut for sustained yield. Higher valued softwood products, such as white and Norway pine, jack pine and black spruce, did not present as serious a marketing problem.

Various research agencies have predicted a substantial increase in the demand for forest products in the future. It has, however, become apparent that the increased use of forest products is not developing as rapidly as desired. The contemplated addition of a marketing and utilization specialist to the staff of the Division of Forestry is expected to bring about more complete utilization of available forest products from both public and private forest lands.

During fiscal year 1960-61, under all types of sales, 256,845 cords of timber were harvested from state land, bringing into the state treasury \$831,889.89. During fiscal year 1961-62, the total harvest was 222,664 cords, with an income to the state treasury in the amount of \$688,461.26.

Forest Management Planning

The compilation of state-wide inventory field data was completed in 1961, and a report printed which could be compared with the state-wide inventory information obtained five years previously. The data obtained has been of immeasurable value in establishing state land management procedures and policies. It is shown conclusively that the gross timber growth on state lands the last five years far exceeds the drain from mortality, natural causes, and harvest, and that state forest stands are generally in better condition than they were five years ago.

Land Exchange

Land exchange applications have been received in increasing numbers. During the past biennium 24 land exchanges were completed and 25 are in the process of completion. Considerable time was spent in formulating long range land exchange plans between the state and federal governments in the vicinity of the two national forests in the state, the Superior and the Chippewa. Since obtaining approval of the Land Exchange Commission in 1962, work has begun on specific land exchange proposals in the vicinity of the Chippewa National Forest in accordance with these long range plans.

COOPERATIVE FORESTRY - The Division of Forestry furnishes fire protection to 17-3/4 million acres of public and private land. Except for the spring of 1962, the biennium was marked with a continued deficiency in snow and rainfall. One thousand eighty fires occurred during 1960, and 1,441 fires burned in 1961. These two years were considered as bad as any in the 50 years since the Forest Service was organized. On the basis of moisture deficiencies, fire weather build-up and fire danger class, 1961 was the worst year on record. In spite of these facts, the record was far more favorable due to the use of improved techniques and the acquisition of modern fire fighting equipment.

The division was fortunate in obtaining surplus government equipment through the General Services Administration of the federal government because of its participation in the federal aid forest fire protection program. The value of such equipment, received without cost to the state is estimated at \$93,000.

Although great strides have been made in the development and use of new fire fighting equipment, fire incidence remains high. A vigorous fire prevention education program is being conducted, additions are to be made to the lookout tower system, and aircraft patrol will be added to provide better fire detection. The division's radio network will be changed over to high frequency channels, and the field staff will be trained in better law enforcement.

Cooperative Forest Management

A very important segment of the commercial forest land in Minnesota is in private ownership - primarily in small woodland holdings - 150,000 individual owners controlling nearly seven million acres of such lands. Technical forestry assistance furnished to such owners materially influences the long-term management of this important source of forest products. The service is provided by nine district foresters who are stationed in the southeastern part of the state.

Foresters in this program also cooperate in the Agricultural Conservation Program, the Small Watershed Program, and with the Soil and Water Conservation Districts. During 1962 three positions which had been financed by Soil Bank Act funds were added to the Division of Forestry complement and financed with matching funds under the Cooperative Forest Management Act.

The Agricultural Conservation Program made significant advances during the biennium. It was used on state and county forest lands for the first time as

an aid in demonstration areas. With the curtailment of planting under the Conservation Reserve of the Soil Bank Act, the division's nurseries appeared to have an over-production of nursery stock. By agreement with 25 county Agricultural Stabilization and Conservation Committees, the state supplied planting stock without initial payment by the tree planters, thereby moving over 13 million seedlings and eliminating the surplus.

In an effort to use every tool available to secure better forest management on private lands, the division has been very active in the Tree Farm movement of Keep Minnesota Green, Inc., and the American Forest Products Industries, Inc. During the biennium 165 parcels of land for certification by the Tree Farm committee were inspected.

State Tree Nurseries

Tree production has been stabilized by the division to three nurseries capable of producing 50 million trees annually for state, county and school lands, as well as trees required for planting on private lands in the development of shelterbelts, windbreaks, woodlots and for erosion control.

During the spring of 1961, more than 41 million trees were shipped for planting on public and private land. In 1962 the number of trees shipped was close to 37 million. This production is nowhere near the goal of 100 million trees, which is the recognized number that should be planted annually. It has been estimated that there are over a million acres of deforested and understocked land in state ownership in need of planting.

Planting Program

Nearly 16 million trees were planted on 11,825 acres of state forest land during the biennium; 8,752,000 on 6,333 acres during fiscal year 1961, and 6,951,000 trees on 5,492 acres in fiscal year 1962. The number of trees planted was a 34 per cent increase over the previous biennium. This was accomplished in spite of adverse planting conditions. More than 3,200 acres required site preparation in 1962, which was a 24 per cent increase over the previous year. The fall of 1961 was so dry that only 560,000 trees could be planted, on sites where conditions were favorable. The spring of 1962 was extremely wet, making planting conditions difficult or practically impossible in certain areas. Where trees were planted, however, the moisture resulted in one of the highest survival percentages in years.

The tree planting program on county lands was under authority of Title IV of the Agricultural Act of 1956, and the division cooperated in a reforestation plan in which all classes of forest land suitable for industrial wood production were eligible. Federal funds for 50 per cent reimbursement were made available and seven counties participated, resulting in the planting of 2,035,700 trees on 1,777 acres of land.

Forest Insect and Disease Control

During the biennium the Division of Forestry and the Division of Plant Industry cooperated on a 12,625 acre spruce budworm spraying operation and a 4,200 acre pine tussock moth control project. The spruce budworm infestation continues to be severe in the northeastern part of the state. The pine tussock moth defoliated approximately a thousand acres of jack pine in the General Andrews State Forest. About 600 acres of this jack pine was killed completely and had to be logged in order to salvage it.

Several experimental spray jobs with the antibiotic Acti-dione and Physoactin were performed in an effort to find a control for white pine blister rust, and the results appear promising.

Auxiliary, Memorial, and School Forests

The acreage of privately owned forest land under auxiliary forest contract increased during the biennium from 244,404 acres to 261,582 acres. Some contracts were cancelled and the lands placed under the Minnesota tree growth tax law. A new contract covering 28,671 acres was consummated, more than offsetting the withdrawals. The auxiliary forest law is a step in the direction toward solving the problem of forest land taxation. Taxes received by the counties from auxiliary forest lands and yield taxes on timber sales amounted to \$35,782.14 in 1961, and \$41,400.18 in 1962.

Memorial forests established by various counties in the state embrace 968,442 acres. There are also 29 school forests in the state, covering 2,126 acres, and six municipal forests comprising 6,160 acres of land.

Tax-Forfeited Lands

Under provisions of laws governing tax-forfeited lands, the division personnel examined the timber on 410,412 acres offered for sale by the counties. The division also approved the cutting and timber management practices on such lands as were retained by the counties.

During this biennium under authority of law, approval of appraisals of timber on tax-forfeited lands to be offered for sale was waived by the commissioner of conservation in such counties as had land commissioners and made request for the waiver. Random checks only are made by forestry field personnel. This action minimizes duplication of effort in the approval of timber appraisals on tax-forfeited lands.

YCC Forestry Camps

Minnesota has three YCC camps, established by the Legislature. The three camps, namely the Willow River, the Thistledew Lake, and the St. Croix YCC camp, provided nearly 300,000 man-hours of labor on nursery work and forestry projects during the biennium. Of this total, one-third of the time was devoted to nursery work, and two-thirds to forestry projects.

In 1951 the first YCC camp was established at the General C. C. Andrews Nursery at Willow River. The camp quota is 50 to 60 wards, who are from 18 to 21 years of age, the majority of them being assigned to the camp from the St. Cloud Reformatory or referred directly to the camp. The Division of Forestry provided the land, the original camp buildings, and the water and sewage systems.

The second YCC camp was authorized by the Legislature of 1955 and was established at Thistledeew Lake, north of Nashwauk. The wards at this camp are from the Red Wing Training School for Boys. The camp quota is 50 to 60 wards. In addition to their regular camp duties, the boys have put in more than 80,000 hours on forestry work.

The Legislature of 1957 authorized the establishment of a third YCC camp. It was set up in Pine County, in the St. Croix State Forest. The wards at this camp are from 14 to 17 years of age and are from the Red Wing Training School for Boys.

ESTIMATED VALUE OF FOREST PRODUCTS HARVESTED IN MINNESOTA 1961

PRODUCT	AMOUNT HARVESTED IN MINNESOTA	PULPWOOD SHIPPED			VALUE OF PRODUCTS PROCESSED OR USED IN STATE			TOTAL VALUE
		OUT OF STATE		MINN. MILLS	CORDS	UNIT VALUE	TOTAL VALUE	
		CORDS	VALUE	CORDS				
1 PULPWOOD	968,108 Cords	255,773	5,371,233	712,335	1,118,842	168.30	188,349,231	193,720,464
2 LUMBER	225,000,000 Bd. Ft.					91.50	20,587,500	20,587,500
3 FUELWOOD	607,000 Cords					15.00	9,105,000	9,105,000
4 CHRISTMAS TREES WREATHS ETC.	6,000,000 Pieces					1.15	6,900,000	6,900,000
5 MATCHWOOD COOPERAGE ETC.	28,000 Cords					154.00	4,316,730	4,316,730
6 POSTS	6,500,000 Pieces					.35	2,275,000	2,275,000
7 SHAVINGS, SAWDUST NOVELTIES, STAKES, ETC.	277,830 Cords					5.50	1,528,065	1,528,065
8 POLES	231,000 Pieces					4.75	1,097,250	1,097,250
9 VENEER WOOD	9,940,000 Bd. Ft.					90.00	894,600	894,600
10 CHEMICAL BY-PRODUCTS	199,716 Tons					4.03	804,855	804,855
11 MILL REFUSE USED AS FUEL	97,250 Cords					5.00	486,250	486,250
12 RAILROAD TIES	189,000 Pieces					2.15	406,350	406,350
13 MINING TIMBER	2,500,000 Bd. Ft.					60.00	150,000	150,000
14 PILING	159,000 Lin. Ft.					.70	111,300	111,300

TOTAL ... \$242,383,364

OTHER FOREST PRODUCTS - WILD BERRIES, NUTS, FRUITS, MAPLE SYRUP, CONES, ETC. ESTIMATED VALUE \$1,500,000

Game and Fish

The growth and popularity of outdoor pursuits and major land use changes have created new demands upon our wildlife resources. It has accentuated the need for an expanded program of game and fish management.

Game and fish management is like any other business. To produce more we must invest more. Fortunately, through the modern technology at hand and that which will be added through research, we can substantially increase the harvest of game and fish - if we are willing to make the investment. This investment must be made not only in increasing the harvestable surplus of our wildlife, but in providing the space and the opportunity needed for high quality outdoor recreation. Following are a few examples of the accelerated program required to meet our obligations to the people.

1. The most important investment to make for the future of fishing in Minnesota is in the acquisition, preservation, and improvement of natural fish spawning and rearing areas in, or adjacent to, our lakes and streams. Such areas are disappearing rapidly through development by private interests while our acquisition program goes along at a snail's pace.
2. We must secure permanent rights to a large number of "nature's northern pike hatcheries". These waterfowl and wild rice type lakes can be managed to produce great numbers of northerns for stocking throughout the state. This is an expensive program but one which actually is inexpensive when the results are considered.
3. We must construct more carp control barriers in order that carp can be controlled in lakes and in entire watersheds through the use of chemicals. New holding ponds for fish brood stock are necessary and many existing rearing ponds must be rehabilitated. Additional trout rearing facilities, particularly in the northcentral part of our state, ranks high on the priority list.
4. A change in the law delegating broader power to the Commissioner of Conservation would make possible the expansion of fishing opportunities through liberalized regulations when conditions permit.
5. The popular public access program now being handled by the Warden Service must be further accelerated. With each passing year this program becomes more costly and more difficult. We not only need well developed public access sites to thousands of lakes but through purchase or easement, access privilege to 5,000 miles of streams.
6. Minnesota has taught the Nation the importance of saving wetlands. One-hundred-and-nine thousand acres already have been acquired at a cost of over 3 million dollars. But the job is less than half done. At our present rate of acquiring 15,000 acres of wetlands per year, it will be another 10 years before we reach our goal of 250,000 acres. Too many prime wildlife areas will be lost during the 10-year period. Adequately financed we could easily do the job in half the time.

7. The great potential for increasing the production and harvest of game in our forested area is recognized and substantial progress has been made in the past five years. Approximately 1,250 miles of access road has been constructed to make unharvested deer and grouse range available to the hunters and to facilitate the harvest of timber which is one of the most important tools in managing the forest game populations. We should be constructing 50 miles of roads and trails annually. A good start has been made in integrating game management plans with forest planning. The potential here for improving wildlife habitat is great, but inadequate staffing with trained game managers is a deterrent to progress.

8. Construction of water impoundments in forested areas is another type of important cooperative project. Examples of these are Kettle lake, Grayling marsh, Moose Willow, Big Rice lake, Mud-Goose lake, Morph Meadows, and small impoundments on the Red Lake Wildlife Management area. Several hundred similar sites are waiting only for the funds necessary to develop them into wildlife areas.

9. During the next ten years we not only should develop, plant and fence the state lands acquired, and the new wetlands area; we should also increase our major wildlife units by some 1,000 acres. Both small and large permanent water development projects are needed in the state's waterfowl management program. We now have 450 active game management projects in 76 counties. The expansion potential is virtually unlimited.

10. With more people spending an ever-increasing amount of time in the out-of-doors, the problems of law enforcement multiply. Recognizing this and also recognizing the fact that game wardens are taking on added responsibility, both in the management field and in public relations and education, we must at least build our warden force to its former strength and intensify undercover enforcement aimed at commercial violators.

GAME - Minnesota has a rich wildlife heritage. The abundance and variety of wildlife found within its borders and the many public hunting areas make it one of the outstanding states for hunting in the nation. Approximately 15 different hunting seasons are established annually with some form of hunting available to hunters for a period of more than 5 months. Hunting starts in September and continues for some seasons until March of the following year.

350,000 small game hunters and 250,000 big game hunters take to the woods and field annually. They bag a total of 3-1/2 million animals and birds. Hunting is a fifty million dollar annual business in Minnesota and it is estimated that one out of six of its residents hunt. It provides about sixteen million hours of outdoor recreation annually.

Minnesota ranks first in deer hunting success in the major white-tailed deer states. In 1961, 250,031 resident firearms hunters shot 106,763 deer for a 43% success. This is a record number of hunters and deer harvest for this state.

At the close of the biennium the Section of Game had acquired, developed and brought under management 450 individual wildlife management areas in 77 different counties of the state. 100 new wildlife management areas were established during the biennium; in addition, 18 areas were evaluated and approved for acquisition.

Land Acquisition

Again in this biennium as in preceding bienniums the most important activity of the Section of Game has been the acquisition of wetlands under the "Save Minnesota's Wetlands" program. This program has been vigorously carried out to the extent of available funds by our game managers. Progress of the wetlands acquisition program is shown in Table 1.

Table No. 1 Progress of the Wetlands Acquisition Program

Date	No. of Counties	No. of Units	No. of Options	No. of Acres Optioned and Acquired	Cost
1960-1962	3*	116	259	31,237.87	\$ 809,327.30
Prior to 1960	70	385	782	77,256.80	2,381,199.38
Totals	73	501	1,041	108,494.67	\$3,190,526.68

*This represents only new counties where work was done.

There is no sign of abatement in the rapid rate of drainage of surface waters in Minnesota. We are losing our small surface water areas at a rapid rate of 5% per year.

If we are to reach our primary goal of acquisition of 250,000 acres of wetlands while they are still available, the rate of wetlands acquisition must be stepped up. Acquisition should be completed within the next 10 years if the primary goal is to be reached while wetlands are still available for purchase.

Major conservation organizations in the state have again, during the biennium, favorably endorsed the "Save Minnesota's Wetlands" program. They also continue to oppose the payment of drainage assessments out of the wetlands acquisition fund.

Wetlands are receiving heavy use by the public. They are open to public hunting and trapping and furnish not only hunting for waterfowl, but also upland game and deer. In some intensively farmed areas they are the only natural cover remaining. These are veritable "wildlife oases".

Table No. 2 Land Acquisition on Major Wildlife Management Units

Name of Project	Location by County	No. of Acres Optioned & Purchased	No. of Options	Cost
Barnesville	Clay	357.54	1	\$ 1,787.70
Camp Kerk	Swift	114.36	3	3,070.00
Carlos Avery	Chisago	383.50	6	8,809.00
Hubbel Pond	Becker	140.00	2	1,805.00
Kimberly	Aitkin	8,322.22	1	17,688.91
Lac qui Parle	Chippewa	240.00	1	50,000.00
Mille Lacs	Mille Lacs	240.00	2	161.00
Moose-Willow	Aitkin	400.00	4	3,750.00
Thief Lake	Marshall	200.00	2	2,800.00
Whitewater	Winona, Wabasha & Olmsted	928.35	8	61,096.00
Totals		11,325.97	30	\$150,967.61

Lands on these major projects were acquired to improve wildlife management possibilities, to provide more opportunities for the sportsmen to hunt and to "square off" boundary lines. The improvement of wetlands habitat on major units was stressed during the biennium.

In addition to the lands which were purchased, 33,000 acres of state conservation area lands in eastern Marshall county were classified and assigned to the Section of Game for wildlife management and public hunting grounds. Also, a total of 1,096.5 acres were licensed to the state for a 25 year period by the U. S. Corps of Engineers for wildlife management purposes in the Lac qui Parle Wildlife Management Area in Swift county and the White Rock and Reservation Dam Areas in Traverse county.

Future Plans

The "Save Minnesota's Wetlands" program needs continued emphasis backed up with sufficient funds to make possible accelerated acquisition. Another 140,000 acres must be acquired to reach the primary goal of 250,000 acres. With no sign of abatement in the rapid rate of drainage of surface waters, this must be accomplished within the next ten years while wetlands are still available for acquisition by the state. Conservationists throughout the state agree that additional funds are urgently needed for wetlands acquisition and that these funds should not be diverted to pay drainage assessments.

It is also planned to continue the approved land acquisition program on the major wildlife management units at the current rate or faster if funds are available.

Additional area game managers are urgently needed to efficiently carry out the Section of Game program and to give proper service to the hunters.

The Section of Game will continue to attempt to handle as many local wildlife management and public relations problems at the local level as possible.

Multiple use of wildlife management areas will be stressed wherever this is compatible with primary project objectives.

Section of Game personnel will continue to work with the department's attorneys and engineers to help them maintain the good progress which they have made during 1960-1962 biennium in saving wetlands and in establishing public character of waters in Minnesota.

FISHERIES - The Section of Fisheries has the responsibility of carrying out a state-wide fish management program, in accordance with law, department policies, regulations, and available funds. The objective is to provide a maximum, sustained yield of fish from the waters of the state and the maximum number of satisfactory sport fishing hours.

Fish management activities include habitat improvement; acquisition, development, and management of natural spawning and rearing areas; operation of hatcheries and rearing ponds for the propagation and distribution of fish;

rescue of fish from lakes where they are subject to winterkill; rough fish control; lake reclamation through the use of fish toxicants; administration of licensed commercial fishing and private fish hatcheries; and formulation of regulations governing the harvest of fish (sport and commercial).

Lake improvement projects during the biennium totaled 21, and included one water-control dam, six fish barriers on reclaimed lakes, ten northern pike spawning areas, three carp trapping areas, and one channel improvement job. Twenty-three trout streams were improved and maintenance was carried on on many lakes and stream projects.

Two northern pike spawning areas (110.24 acres) were acquired and 21 others (399.21 acres) were in various stages of acquisition.

Twenty-one lake reclamation projects, with a total area of 731.3 acres, were carried out during 1960 and 1961.

Good trout fishing has been provided in many small lakes through the reclamation program. Some carp infested lakes have been treated and there is a need for more of this type of management on larger lakes.

The management of northern pike spawning areas, tributary or adjacent to lakes, is very important in the maintenance of this species. This involves the installation of water-level-control structures and channel improvement, and in some cases pumping units. In many instances, such areas are stocked with brood fish which have been rescued from winterkill lakes. During 1960, 60 such areas were managed; in 1961, 73.

Stocking is recognized as an important tool in fish management when its use is based on actual need for stocking. Total distribution, including fry, fingerlings, yearlings, and adults of all species from hatcheries, rearing ponds, and rescue operations was as follows:

<u>Year</u>	<u>Number</u>	<u>Pounds</u>
1960	144,965,379	302,912
1961	269,497,508	344,392

Ponds near centers of heavy population continued to receive bullheads and panfish which were surpluses from other waters.

Fish rescue operations on lakes subject to winterkill are becoming increasingly important in fish management, particularly for northern pike. Some of the wild-rice and waterfowl types of lakes are actually managed for northern pike production. Northern pike production from such areas totaled:

<u>Year</u>	<u>Number</u>	<u>Pounds</u>
1960	158,309	109,835
1961	509,987	182,846

Rough fish removal operations by State crews, contracts, permits, and the bullhead project resulted in the removal of 20,831,078 pounds of rough fish during the biennium. A considerable portion of this amount was low-value fish, which were sold for animal food.

The licensed commercial fisheries were active on Lake of the Woods, Rainy Lake, Lake Namakan, Lake Superior, and the Mississippi and St. Croix rivers boundary waters. A total of 13,794,565 pounds was removed at an approximate value of \$750,000.

The commercial fishery at Redby on Lower Red Lake, operated by the Red Lake Fisheries Association as a cooperative venture of the Red Lake Chippewa tribe, took 2,269,701 pounds during the biennium.

Much more could be done in the management of the fishery resources of the state. With the knowledge and techniques now available, the production of fish from our lakes to the sport fishery could be increased by more intensive management of each body of water. Most urgent is the acquisition and protection of the marsh-type of shoreline property which is being drained, dredged, or filled in at a rapid rate on many lakes.

RESEARCH AND PLANNING - The Section of Research and Planning is made up of four operational units: (1) Fisheries Research, (2) Game Research, (3) Fish and Wildlife Surveys and (4) Biological Services. About one-third of the work is financed from the state license monies and the remainder from federal aid funds. Of the work done about one-third can be classified as basic research in that it is gathering information to be used by management at a future time, and the remaining two-thirds is technical operations, planning and biological services -- information that is currently used. Some highlights are as follows:

Studies concerning trout included an evaluation of the effects of beaver on trout streams; experimental removal of rough fish from trout lakes to increase trout growth; study of best types of stream bottoms for trout spawning and useful in the construction of artificial spawning areas; study of the steelhead runs in the North Shore streams and evaluation of the reclaimed trout-lake program. Work was carried out on development of two-storey trout lakes with rainbow trout in the upper waters and lake trout in the lower waters. Quality control including nutrition and disease control was carried out at all Minnesota trout hatcheries.

Work on warm water fishes included investigations on homing tendencies of walleyes and suckers to specific spawning areas and determination of best kinds of spawning sites for walleyes. Two studies were made of largemouth bass populations and their catches and two studies on northern pike including effectiveness of stocking rescued northern pike. Food consumption of pan fishes was investigated as relating to size and age of fish. A study was made of experimental trawl fishing for rough fish in Lake of the Woods. Research continued on best methods of fertilization of walleye rearing ponds and a study was carried out on techniques for controlling winterkill in shallow lakes. During the period about 3,000 samples of water, soil, fertilizer and other materials were analyzed in the chemical laboratories for the department and for the public.

Detailed biological surveys were made on 135 fish lakes and on five streams and 252 lakes were sounded and mapped. These maps are available to the public for cost of printing. Creel census was carried out to determine fishing use on 30 lakes and a creel census begun on the lower Mississippi river. Effect of elimination of carp and bullheads on aquatic plants was investigated and survey work started on three watersheds. There was close cooperation in land use planning with other agencies.

The Biological Services Unit supervised the control of aquatic nuisances such as excessive growth of water plants, algae, snails that carry swimmer's itch at 661 sites. Each of these jobs requires a permit issued by the department. Nine pollution investigations were made and studies made on the relationship of pesticides and herbicides to wildlife.

In the microbiology laboratory 1,223 specimens of game fish and other material were examined. In addition 6,432 samples or specimens were examined in the general biology laboratory -- such samples as fish stomachs, plankton and fish scales.

The Game Research Unit consists of four working groups, waterfowl, upland game, big game and furbearers and predators. A study was completed of land use as related to the production of waterfowl. Current information was gathered on duck population trends and hunting kills. Work continued on migration and homing of ducks and on effects of disease and predation. A study was begun on the relationship between the basic fertility of waterfowl areas and their production of birds. The Waterfowl Unit worked in close cooperation with the Mississippi Flyway group.

Current information was gathered on pheasant populations and kills. We took about 1.2 million birds in 1960 and 1.3 million in 1961. A study is being carried out on the effect of experimental control of predators on pheasants. Changing land use patterns in the pheasant range were investigated as was the value of federal feed-grain acreages. Illegal kill of hen pheasants was studied as was the relationship of pheasant distribution to lime in the soil. A study on sharp-tailed grouse was started in northern Minnesota and throughout the period populations and kill statistics were gathered on all upland birds.

Studies relating to big game especially deer included effect of prescribed burning and forestry cutting on deer food plants; testing of deer repellents for use in agricultural areas and study of movement and behavior patterns of deer. Statistics were maintained on sizes of deer populations and hunting take. The anatomy of the deer and its reproductive cycle were studied. Work was done with the Section of Game on estimating the size of the moose population. The 1962 census indicated about 6,000 animals.

Work of the furbearers and predator group included a study of gray squirrel populations, mink (our most valuable furbearer) and experimental control of fox populations. Intensive trapping was done to determine effect of predators on pheasant and on duck populations -- the former in Martin county and the latter on the Lake Agassiz Wildlife Refuge in northwestern Minnesota. These studies will require another year to complete.

Results of the investigations and studies made are reported in detail in 43 published papers, bulletins and notes; 27 completed reports being prepared for publication; 81 mimeographed items on game research activities; 34 other mimeographed reports; 37 longer typewritten reports and 135 lake survey reports. A detailed listing of the major papers and reports will be available in the forthcoming Biennial Report of the Section.

Other jobs during the biennium include issuance of 309 Special and Scientific Collecting Permits; work on wild rice and preparation of a bulletin on game and fish conservation for use in schools.

WARDEN SERVICE - The Section of Warden Service is the law enforcement arm of the Division of Game and Fish. The objective of the section is to enforce all laws and regulations pertaining to wildlife with the thought in mind of preventing violations as efficiently as possible, apprehending and prosecuting those who have no regard for the objectives of the division and working toward gaining the wholehearted approval and cooperation of the citizenry of the state in general. The Division of Game and Fish has long recognized that one of the most potent tools of wildlife management is the promulgation of regulations for harvesting and protecting. Naturally, to carry this out the warden must have a broad understanding of all phases of management and must participate in these various phases in order to sell the program to the people. The ever-increasing interest in wildlife conservation places a demand upon our enforcement officers to spend considerable time and effort not only with the hunter and fisherman but, also, he must appear before various sportsmen's clubs, civic and fraternal organizations and youth groups, such as boy scouts, 4-H, FFA, schools, etc., in order that they will be well acquainted with the objectives and aims of the division. It has been said that "A game warden is the guardian of wildlife including factors affecting it and is in no way limited to law enforcement."

The Warden Service has a complement of 148 men and three clerk-stenographers. We have the Chief Warden, two Assistant Chief Wardens, a Warden Supervisor, and a game warden assigned to the St. Paul office. One of the Assistant Chief Wardens is assigned to law enforcement duties, the other Assistant Chief Warden is in charge of the Firearms Safety program. The Warden Supervisor is in charge of the Conservation Volunteers program and the game warden is assigned to work with both the law enforcement branch and the Firearms Safety unit. The state is divided into ten warden supervisory districts, with each area having from twelve to fifteen men.

A school for game wardens is generally held each year. The last Warden School was held at the Bemidji State College with the entire warden force participating in the school. Interesting programs dealing with wildlife management and law enforcement problems enable the wardens to become more efficient in the field. A very interesting part of the program furnished through the Attorney General's Office was that of a panel of three men - one a retired district court judge, a deputy attorney general, and an attorney in private practice - who went over our game and fish laws answering questions and they gave the wardens a most interesting and informative program which was of great benefit to everyone in the Warden Service.

A game warden is expected to perform a great variety of duties all pertaining to conservation. Among the major activities are:

- Game and Fish law enforcement
- Posting game refuges
- Making game and fish surveys
- Checking on wild animal damage complaints, such as deer, beaver, bear, pheasants, squirrels, raccoon, and muskrat
- Checking commercial fishermen
- Predator control
- Blowing beaver dams
- Water pollution investigation
- Looking for lost persons
- Checking hunters, fishermen, and trappers
- Issuing bounty certificates
- Attending court trials
- Sealing beaver pelts
- Checking fur buyers and minnow dealers
- Attending sportsmen's clubs
- Division of Waters violations
- Wild rice law enforcement
- Firearm Safety program
- Public access program
- Conservation Volunteers program

Our warden force is completely equipped with two-way mobile radios for the state warden patrol cars and in addition, several of the new style transistor equipped walkie-talkies. We cooperate with the State Highway Patrol and have reported to them and at their request held serious violators for the patrol. The Highway Patrol has also given us valuable assistance. As our radios are on the same frequency as the State Highway Patrol, it makes it very easy to cooperate with each other.

The Warden Service has three (3) airplanes. They are equipped with two-way radios and are invaluable in law enforcement work, wildlife census, and in looking for lost persons. These airplanes are stationed at Warroad, Brainerd, and Winton. An additional plane is needed to provide proper coverage. This plane would be stationed at Mankato to give service to the southern part of the state.

Arrests for this biennium (1960-62) totaled 8,829. For comparison the 1958-60 biennium totaled 8,213.

Violations have been broken down into the following categories:

Big Game (General)	429
Small Game	292
Fishing (General)	3,390
Headlighting Deer	143
Fishing Without License - Resident	629
Fishing Without License - Nonresident	272

Transport Fish Illegally	27
Migratory Waterfowl	636
Transport Big Game Illegally	44
Transporting Uncased Firearms	927
Transporting Loaded Firearms	1,089
Wild Rice Violations	144
Transporting Game Birds Illegally	41
Trapping	46
Trespass	63
Game Refuges	120
Fur Violations	26
Minnow Violations	31
Nonresident Hunting Without License	21
Resident Hunting Without License	75
Changing Contour of Lake	8
Netting	92
Resisting Wardens	31
Miscellaneous Violations	253
	<u>8,829</u>

Fines levied against game and fish violators amounted to \$210,925.78.

Confiscations for this biennium (1960-62) totaled 5,546. For comparison the 1958-60 biennium totaled 5,082.

Confiscations ranged from game and fish through fishing equipment, firearms, fur pelts, wild rice, fish nets, and automobiles. In 1960-62 these confiscated articles amounted to \$37,692.38.

Lands and Minerals

Minnesota, with its 84,000 square miles of land and inland water area, is equal in size to the combined area of 7 of our northeastern states -- namely, Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New Jersey and Vermont.

Under the 1857 act authorizing a state government, Congress granted to the new State of Minnesota millions of acres of land, to be used for the support of public schools, a state university, for erecting public buildings, constructing public roads and other internal improvements. Congress in 1860 further granted to the state all swamp and overflowed lands which had not already been conveyed to the state; in 1862 a grant for an Agricultural College; and in 1870, 72 additional sections for the University.

Part of the swamp land grants were conveyed to railroad companies; but the trust fund lands that were covered by the original State Constitution and the Swamp Land Amendment of 1881, established Permanent Trust Fund Lands that exceeded 5-1/2 million acres.

The Division of Lands and Minerals is charged with the administration of all lands owned by the state under the jurisdiction of the Commissioner of Conservation, except those that are located in State Forests. It also acts as agent for the counties and local taxing districts in exploiting and leasing iron ore and other minerals located in tax forfeited lands; conducts research on low grade minerals; and promotes the exploration and development of minerals in areas where iron ore and other minerals are not known to exist.

The division work is divided into two sections-- one covering land, the other minerals, with headquarters for both in Saint Paul. The Minerals Section, under supervision of a Chief Mining Engineer, has an engineering research and chemical building at Hibbing, and an engineering office on the Cuyuna Range at Ironton. The Land Section, under the supervision of a Land Administrator, has land appraisal offices located at Bemidji, Hibbing, and Thief River Falls.

Revenue and Activities

Lands and Minerals revenue for the biennium ending June 30, 1962, totaled \$7,274,350, an increase of about \$387,000 over the previous biennium. \$6,886,778 of this was derived from iron ore and other minerals; and the balance, \$387,572, was received from sale of state land and timber and the rental of state lands. Over 90% of the total receipts was paid into the Permanent Trust Funds of the state, which totaled \$309,352,002 on June 30, 1962.

Minerals acquired by the state through tax forfeiture are administered by this division. Tax forfeited mineral royalties for this period totaled \$468,371. Most of this, or about \$437,000, was derived from royalty paid under taconite leases and 80% of this was returned to the taxing districts in which the taconite was located; the remaining 20% was retained by the state and deposited in the General Revenue Fund.

From the time of the first shipment of state-owned ore in 1893 until June 30, 1962, a total of 385,536,140 tons of royalty ore has been shipped from state-owned properties. Of this amount, 48,884,087 tons were crude taconite.

During the biennium, 28 state-owned mining units were active in producing 29,431,438 tons of royalty ore. Twenty-three units were regular mines, two were stockpile units, one was a lakebed mine, and two were taconite quarries operated by Reserve Mining Company and Erie Mining Company. These two commercial taconite plants processed 24,091,493 tons of state-owned crude taconite during the biennium, an increase of more than 30% over the previous biennium. The remainder of the royalty ore, 5,339,945 tons, consisted of iron ore and concentrates produced by other mining units. These figures are particularly impressive considering the general reduction in mining throughout the area during this period due to cutbacks in the steel industry and the demand for higher grade, better structure ore, which is becoming evermore available from sources outside of Minnesota.

The Lake Bed Section continued the field examinations and investigations which are necessary in preparing the engineering data used by the Attorney General's office in litigating the ownership of minerals underlying lakes and water courses. In addition to the detailed engineering work done on specific lakes and rivers on which litigation is in process or anticipated in the immediate future, this section has continued to expand its preliminary survey work in known and possible mineral areas in order to program its future efforts.

The Research Section processed and classified about 37,000 feet of drill hole exploration samples, an increase of more than 15% over the previous biennium. Approximately 650 laboratory tests were made on samples of low grade ore, iron ore tailings, taconite, and non-ferrous minerals, representing a 50% increase in the amount of testing done in this period. The Chemical Laboratory completed about 16,000 analytical determinations on samples from iron ore shipments, lean ore dumps, and samples from tests that were conducted in the Research Laboratory.

In the two-year period ending June 30, 1962, 7,839 acres of trust fund land located in 21 counties were sold by the Land Section for \$64,800. Receipts from 2,317 surface, lakeshore, and miscellaneous leases totaled \$105,295. This represents an increase of 25% over the previous biennium. During this same period, 23,160 acres of tax forfeited land located in Conservation Areas and in the Red Lake Game Preserve were sold by county officials after they had been investigated by division appraisers and approved for sale by the Commissioner.

During the biennium, under a 1-1/2 million dollar Conservation Department Work Program which was authorized by the 1961 Legislature, the division completed the following projects: 314 new lakeshore cabin sites were developed on 18 lakes, 30 public access sites were established or improved, and 17.7 miles of access roads were constructed. As a result of this lakeshore work, 256 new cabin site leases were issued. The division also planted 150,000 trees on mine dumps that parallel the Mesabi Range highways.

The 20,000 acre deficiency that had existed for years in the Public School grants that were conveyed to the state under the 1857 act was partially settled

during the previous biennium by a grant of 16,000 acres under Clear List 15 and 16. In 1960, under Clear List 17, the state received 4,312 acres, which covered the balance of acreage due from the federal government.

One other project cleared up during the biennium was the legislation passed in 1961, which makes it possible for the state to acquire 33,221 acres of land which, because of the so-called Volstead ditch liens, could not be used by either state or federal agencies. Laws 1961, Chapter 472, authorized the purchase of this land for \$148,181, and the act provides that the land may be administered in the same manner as state trust fund lands are by the Commissioner of Conservation.

Under Laws 1961, Chapter 336, which amends the underwater mineral law, M.S. 93.08, governmental subdivisions are allowed to obtain for public use, without payment of royalty, sand, gravel, or other similar material from the beds of Minnesota's lakes and rivers.

Two other changes in the administration of state lands were established under Laws 1961, Chapter 657. The first covers an amendment to Section 92.03, which withdraws from sale state land that contains "over 10 acres of White or Norway Pine timber or reproduction of minimum stocking growing on it". The second change repealed Subd. 3. of Section 92.12 and removed the limit of 320 acres that has applied to the sale of trust fund lands to any one purchaser.

Transition From Natural Ores to Concentrates

Direct iron ore shipments from Minnesota are gradually being replaced by concentrated ore. During the ten-year period beginning in 1943, the percentage of concentrates shipped from all Minnesota mines gradually increased from 22.1% (15.4 million tons), to 33.1% (27 million tons) in 1953. By 1961 the percentage of concentrates increased to 71.1%, or 32.2 million tons out of a total of 44.8 million tons. The large percentage of increase over 1953 was mainly due to the 14.4 million tons of taconite concentrates shipped in 1961 which represented over 44.7% of the total concentrates. The percentage of iron ore concentrates shipped from state-owned mines has followed this same pattern, but to an even greater extent, for in 1961, 95.5% of the ore shipped from state-owned mines consisted of concentrates.

One of the serious problems that has developed in connection with the concentration of Minnesota iron ore is that while the percentage of concentrates shipped is constantly increasing, the grade and structure requirements for these concentrates have also risen. Analysis of the total shipments of iron ore from the Mesabi Range in 1955 averaged 50.43% natural iron and 10.21% silica. In 1961 the total shipment for the Mesabi Range averaged 55.53% in natural iron and 8.78% silica.

During recent years the limiting point of silica has been lowered from 12% to 10%. Much of the concentrates now being produced exceed this silica limit and must be graded off with better material. Indications now point to even higher grade requirements in the future which will require the lowering of this limiting point of silica even further. Even the taconite industry in Minnesota has been affected by the changing grade requirements. Much

experimental work has been done by the taconite operators to reduce their silica to make their products more competitive. One of the operators is now treating a portion of their normal taconite concentrates even further by means of flotation in order to lower the silica content.

During the biennium, the first beneficiation plant on the Mesabi Range to employ autogenous grinding was put into operation at the state-owned Hill Annex Mine at Calumet. This autogenous mill uses the ore material itself to do the grinding. The product is then concentrated by simple means, using spirals. The plant is unique in that it was designed to use a specific kind of ore (cretaceous ore), but testing indicates that it may find application for other Minnesota iron ores as well.

Taconite Development

Taconite is the name that has been given to the hard iron-bearing rock comprising the bulk of the Mesabi Iron Range. The Mesabi Iron Formation contains about 105,000 acres of mineral lands, and the percentage of trust fund lands owned by the state in this area amounts to about 15% of the total. When combined with the lands that have forfeited for taxes, the total state ownership of the Formation amounts to over 18%. Estimates indicate that as much as 90 billion tons of crude taconite may be located in the Mesabi Iron Formation north of the Virginia slate. This includes slaty taconite which presently is not amenable to concentration; non-magnetic taconite which will probably be concentrated on a commercial basis at some time in the near future; and the magnetic taconite which is being concentrated on a commercial basis at the present time.

Minnesota, through its trust fund lands and lands that have forfeited for taxes, owns at least 5 billion tons of commercially concentratable taconite which someday can be converted into about 1-1/2 billion tons of high grade taconite concentrates or pellets.

This state-owned reserve of potential high grade iron ore is particularly impressive when compared with the 2-1/2 billion tons of natural iron ore and concentrates that have been produced to date from the three Minnesota Iron Ranges.

At the present time there are two large commercial taconite plants and one large experimental taconite plant treating magnetic taconites in Minnesota. These three units have a combined capacity of approximately 14 million tons of taconite pellets a year, and is presently being expanded by an additional 3 million tons of pellets per year.

One of these taconite plants is operated by the Reserve Mining Company at Silver Bay, and began producing taconite pellets in October of 1955. Throughout this biennium, the operators have been working on a 120 million dollar expansion program to increase their capacity from 6 million to over 9 million tons of pellets per year. It is estimated that this expansion program will be completed by 1963.

The Erie Mining Company's Hoyt Lakes Taconite Plant located near Aurora started producing taconite pellets in the fall of 1957. This 300 million dollar

project has a present capacity of 7-1/2 million tons of taconite pellets per year. About one-half of the crude taconite that is being processed by this plant is owned by the state; and during the biennium, 23,662,586 tons of state-owned crude taconite were concentrated in this plant. An interesting factor in connection with this production is that about 10 million tons of crude taconite located in University lands are processed annually in this plant, and the royalties obtained from this source will eventually yield a minimum of \$75,000,000 to the University Trust Fund.

Reference is made elsewhere in this report to the experimental flotation that is being conducted on normal taconite concentrates. Some of this experimental work is being conducted at the Erie Plant for the purpose of lowering the silica in the taconite concentrates.

Since 1953, Oliver Iron Mining Division of the United States Steel Corporation has had a taconite pilot plant in operation near Mountain Iron, which has a capacity of over one-half million tons of taconite concentrates per year. Although no announcement has been made by the officials of this company in regard to the construction of a large commercial taconite plant in Minnesota, the operators have continued the program of acquiring the auxiliary lands which will be necessary for stockpiling, tailings pond, and other facilities in connection with a large-scale taconite operation.

The Oglebay-Norton Company in 1961 announced that they have obtained a reserve of crude taconite in the Virginia-Eveleth area large enough to warrant the development of a taconite plant capable of producing 2 million tons of high grade pellets per year. However, before such a project can be started, the company must find a market for its concentrates, and investors to furnish the millions of dollars needed to develop the quarries and to construct the plant.

Semi-Taconite Development and Direct Reduction

Immense reserves of semi-taconite are located in the western end of the Mesabi Range. This is non-magnetic iron-bearing material, softer than unaltered taconite or compact rock; and to produce high grade ore from this material will probably require either roasting, flotation, or some other complex method of concentration. During this biennium, two pilot semi-taconite plants were put into operation on the western Mesabi Range. One of these plants is operated by the Oliver Iron Mining Division in conjunction with their Trout Lake ore concentrator at Coleraine, and the other is a 2 million-dollar experimental unit operated by the Hanna Mining Company in the Nashwauk-Cooley area. Both of these pilot plants roast the iron ore in such a way that its chemical composition is changed and the ore becomes magnetic. It can then be concentrated and processed into pellets in the same manner as the natural magnetic taconite of the eastern Mesabi Range.

State and federal programs have been started during this period to investigate and determine the feasibility of applying direct reduction to Minnesota iron ore reserves. Studies and tests have been made by these groups of the Krupp-Renn, Strategic-Udy, and the R-N processes, all of which produce a metal product similar to pig iron. Much of the sample material used in this testing has come from state-owned properties.

Reports on the limited tests that have been conducted during the biennium have been rather sketchy, but indications are that some of the Minnesota iron ores are amenable to direct reduction on a pilot plant basis. However, a great deal more research will have to be conducted in connection with the actual reduction of the ore and in determining how a metallized product can be marketed commercially in this area.

At the present time the U. S. Bureau of Mines in Minneapolis is experimenting with a process to increase the relative iron content of conventional taconite concentrates from 63.00% to about 79.00%. The resultant pellets of this process are partly converted to metal. In experimental blast furnace tests where these semi-metallized pellets have been substituted for conventional pellets, the comparable rate of pig iron production was increased.

If these metallized pellets can be produced commercially in Minnesota, it would help restore the state's competitive position in the iron ore industry.

Mineral Outlook

In addition to this Department, many agencies such as the University of Minnesota, the Minnesota Geological Survey, the U. S. Bureau of Mines, and the Mining Industry are all endeavoring to determine what goals should be established, and what objectives can be attained in the future, not only for Minnesota's tremendous reserve of low grade iron ore, but also for the development of our next most important reserve - manganese; and for copper, nickel, titanium, and other metals and minerals that exist in the state which are not being produced at the present time.

The transition that has been taking place the last few years in the mining industry is evidenced by the fact that 22% of the iron ore shipped in 1943 consisted of concentrates, and this was increased to 71% in 1961. All of the factors involved in this changing pattern cannot be outlined in this report; but the main reasons are the demands of blast furnace operators for a much higher iron, lower silica, better structure product than they formerly used in making iron, and the much better grade and structure of the foreign ores that are replacing part of our domestic production.

The State of Minnesota has immense reserves of taconite and semi-taconite, and limited reserves of natural ores and other iron-bearing materials which are amenable to present methods of concentration. The transition that is taking place has made it necessary, in recent years, for the state to change its classification of what type of ores can be considered commercial.

To help restore Minnesota to its former competitive position in the iron mining industry, further changes in state policy and iron ore laws are necessary. To accomplish this it will be necessary for the 1963 Legislature to revise the iron ore lease laws. Such laws should be amended in order to promote the mining of state-owned marginal iron-bearing material which is not being concentrated at the present time. Royalty schedules on natural ores and concentrates should be lowered, and other necessary changes made.

Another important proposal that should be presented to the 1963 Legislature deals with the mineral reservations that have been made throughout the years by former owners of lands located in Minnesota. The lack of records dealing with the ownership of mineral reservations has interfered a great deal with the proper administration of mineral lands that have been acquired by the state through tax forfeiture. As a follow-up on previous efforts of the state legislature and this department, a bill requiring registration of all mineral reservations that have been separated from the surface title will be submitted to the next session of the legislature.

Iron ore is still our most important non-renewable resource; and while this division will continue to promote the exploration and utilization of other minerals, our major objective is to promote the exploration, mining and production of the state's reserve of iron-bearing material.

State Parks

The Minnesota State Park System was initiated in 1889 when 12 acres of land were acquired for the erection of a monument to mark the site of the surrender of Indians and the release of the prisoners they had captured during the insurrection of 1862. The establishment of Camp Release State Park was followed by the recognition of many other outstanding features in Minnesota which were set aside for protection and public use in the interest of present and future generations.

Itasca State Park was established in 1891, followed by Interstate Park in 1895, producing two areas of outstanding natural features, geographical, geological, and embracing a wealth of wildlife and scenic values.

In 1935 the Division of State Parks was established to administer the state parks and monuments established in prior years which at this time numbered 27 units with a combined area of about 50,000 acres. Uniform Rules and Regulations, uniform operational procedures and projected plans for the future State Park system were adopted as a first step in coordinating the State Park system.

In 1942, the State Park system had been increased to 54 units and a total of about 63,000 acres of dedicated land. The preceding period of economic depression had resulted in the construction of many public use facilities, carefully planned, in the majority of the established parks.

World War II and the year immediately following was a period of austerity with respect to maintaining the State Park system. At the same time improved highways, returning armed service veterans, and other factors in the surging economy resulted in an increasing number of State Park visitations, taxing the capacity of the marginally maintained public service accommodations. Also during the period additional state park units were added to the system which now numbered 61 with a total area of 84,000 acres. The 1953 year was a critical period in the Minnesota State Park program. The Legislature was appraised of the growing importance of the State Parks to state residents and to our growing Tourist industry. This year the motor vehicle permit law together with authority to borrow funds for immediate rehabilitation and development of needed park facilities was provided.

The program of State Park system expansion to meet the rapidly increasing public use has continued to the present time. Since 1953 13 major state park units and 1 minor unit have been authorized which together with authorized enlargement of formerly established parks and the transfer of 3 park units to more proper city jurisdiction results in the present complement of 74 units with a total area of 134,000 acres.

Parks added to the system since 1953 are as follows:

Bear Head Lake	1961	4,418 acres
Big Stone Lake	1961	2,150 acres
Bois Brule'	1959	4,440 acres

Naturalist Interpretation Programs are well received with 303,000 participants in 1960 and 452,000 in 1961. This activity has produced the most favorable impression on park visitors as evidenced by the number of complimentary letters received. Other benefits have been noted in reduced vandalism in those parks where conducted hikes and campfire programs are offered. This activity must be expanded and managed by a qualified staff employee on a full time basis.

REVENUE FACILITY OPERATION - This activity is financed by a \$30,000.00 unobligated cash balance carried over each fiscal year. Any unobligated amount in excess of \$30,000.00 naturally reverts to the State General Revenue Fund. Refreshment, lunch and dining services were operated in 24 state parks, camping in 41 parks, swimming beaches in 14 state parks, boat rental services in 14 state parks, organized childrens camp facilities in 9 state parks, tourist cabins in 4 state parks and resort hotel accommodations in 1 state park.

<u>Statement</u>	<u>1961</u>	<u>1962</u>
Total Receipts	\$417,469.58	\$418,958.50
Total Expenditures	\$405,011.00	\$447,238.00

It is to be noted that the receipts finance the Naturalist Program without fees, also lifeguard service and organized childrens camp maintenance which exceeds the nominal fees charged.

Vehicle Permit receipts in excess of Certificates of Indebtedness obligation dedication to Maintenance and Improvement amount to \$154,253.85 which have been utilized to supplement maintenance personnel requirements, carry out prison inmate labor programs in three state parks, provide additional equipment, supplement Capital Improvement Projects where appropriations were inadequate, provide professional services in the Bureau of Engineering for planning present and future park developments in addition to the overhead expense of sale and enforcement of the permit requirement.

Income

<u>1961</u>	<u>1962</u>
\$148,337.50	\$131,144.35

Certificates of Indebtedness Payment - 10 Year Plan

<u>1961</u>	<u>1962</u>
\$ 63,316.36	\$ 61,911.64

Balance of indebtedness as of June 30, 1962 -- \$315,000.00

Under the amended law passed in the 1961 Session and effective in 1962 annual permit fee increased to \$2.00 with \$1.00 reserved for appropriation for additional lands and improvements in 1963, \$17,666.70 have been received as of June 30, 1962.

The 50¢ two-day permit has received general favor in our State Parks and has minimized objections to the increase in the annual permit fee.

THE BIENNIAL APPROPRIATION FEE - The maintenance and operation of the State Park system provides the basic means for general administration.

Appropriations

	<u>1961</u>	<u>1962</u>
Salaries	\$303,130.00	\$350,077.00
Expense	\$ 82,085.00	\$ 94,500.00

Total - \$829,792.00

Rent collected from employees in State Parks residence supplement the expense appropriation.

Personnel complement limited to 52 full time employees in this appropriation.

TOTAL PERSONNEL COMPLEMENT -

	<u>Full Time</u>	<u>Part Time</u>	<u>Seasonal</u>
Appropriation	52		37
Working Capital Fund	9	167	19
Maintenance and Imprv. Fund	2	85	1
Totals -	<u>63</u>	<u>252</u>	<u>57</u>

	<u>1961</u>	<u>1962</u>
Total Expenditure all Funds Salaries	\$569,482.00	\$644,601.00
" " " " Expenses	<u>\$288,752.00</u>	<u>\$359,053.00</u>
	\$858,234.00	\$1,003,654.00

EXPANSION AND IMPROVEMENT ACCOMPLISHMENT - Capital Improvements authorized in the State Building Fund during the 1961 Legislative session have been held up pending the referendum vote required to increase the State debt limit. Activities have been limited to completing improvements authorized in the 1959 State Building Fund Program.

Expenditure

	<u>1961</u>	<u>1962</u>
	\$230,270.74	\$103,251.60

The major items completed during the biennium:

- 3 modern tourist camp sanitation buildings
- 6 childrens camp barracks buildings
- 1 childrens camp dining hall with kitchens
- 1 childrens camp central sanitation building
- 3 modern picnic ground toilet buildings
- 1 bathhouse for bathing beach
- 2 information and office buildings
- 6 wells and water system installations
- 3 miles of park road construction
- 2 tourist camp developments - total 20 sites
- 1 swimming pool
- 3 electric service installations
- 4 sewage systems

The Economic Aid Program

CONSERVATION WORK PROJECT - This program, authorized for immediate operation in the 1961 Legislative session to relieve unemployment in 19 counties, resulted in the realization in many parks of developments that were urgently needed. The opening and dedication of three major State Parks, recently established, was made possible through this program.

70 Tourist Camp Sites

LAND ACQUISITIONS - A total of 28 individually owned tracts of land in 14 State Parks were acquired during the biennium. The total acquisition amounted to 3,504.04 acres and cost \$116,369.00. Land areas were added to eleven state parks established prior to 1961 and land acquired for 3 of the parks established in 1961. Four transactions involved transfer of lands from county, state and federal agencies. Our transaction involved eminent domain proceedings and the balance or 23 tracts were purchased on a direct negotiation basis. As of June 30, 1962 negotiations were completed on seven tracts involving approximately 500 acres, 3 tracts in land exchange involving approximately 1,780 acres, 2 tracts under condemnation proceedings involving 188 acres, in process of acquisition.

CONSERVATION WORK PROJECTS - Field Projects consisted of clearing and construction of roads, foot trails, water lines, enlargement and extension of utility lines and camp site landscaping. Boundary firebreak clearing was completed in two parks, total increase 19 miles.

Shop Projects produced 1,500 picnic tables, 105 portable pit toilet units, 1,000 fireplace grates, 2,200 posts for guard rails and signs were realized from clearing operations. Wells for water supply were provided in 3 new parks and 2 older parks.

The result was that the facilities of the park system were increased as follows:

5 miles main park roads
50 acres of picnic areas with parking areas, tables, benches, water supplies and toilets
100 tourist camp sites completely equipped
3 - 5,000 gallon water reservoirs constructed
4,000 lineal feet of water service line laid
19 miles of park boundary surveyed and cleared for firebreak and posting
2 miles of park boundary fenced.

Expenditure

Labor	\$263,867.08
Equip. & Mat'l.	\$109,006.03
Total	\$372,873.11

A prison inmate labor program was carried out in 4 parks, namely, Lake Carlos, Interstate and William O'Brien, and Sibley State Parks. St. Cloud Reformatory inmates were housed in the childrens camp in Sibley State Park during the 1960-61 winter and in the Lake Carlos Childrens Camp unit during the 1961-62 winter. At Interstate and William O'Brien State Parks small work crews from Stillwater Prison inmates were transported to the parks each work day and returned each evening. Overhead costs of heating the building, utility service expense, project equipment, material, and supervision expense were borne by the Division of State Parks in the camp program. The Stillwater commuting program required that the salary of a prison security guard as well as transportation costs, project equipment, material and supervision cost be borne by the Division of State Parks in addition to \$1.00 per day per inmate. This program was financed out of State Park vehicle permit funds. Accomplishments were primarily in the landscaping projects, razing old buildings as newly acquired land and in three instances capital improvement construction was carried out.

1. Foot bridge in William O'Brien across a channel of the St. Croix river.
2. Campground enlargement at Interstate Park.
3. Childrens camp dining hall at Sibley State Park. Shoreline clearing, hiking and bridle trail construction made up the bulk of the program.

PLANNING FOR THE FUTURE - The increasing use of the State Park facilities coupled with the growth of our State makes it mandatory that the State Park system be expanded to provide for the future population requirements. Also there is a great need to recognize and evaluate the natural features and historic areas of our state to determine the possibilities of protecting those worthy of inclusion in the State Park system before they are diverted to uses which will destroy these important features.

The 1961 Legislature passed the County Park Enabling Act which was of extreme importance to the state-wide park program in all governmental levels.

Several counties have proceeded to establish county parks under this new authority. This division has not been able to offer any material assistance in the county park program but have acted in an advisory capacity upon request.

There were about 135 potential park areas studied during this biennium. We were assisted by a representative of the National Park Service. The conclusions reached in those studies indicated that a majority of the sites were suitable for county park designations due to the features and historic significance development less than state-wide intent. This study resulted in 35 of the areas recommended for establishment as State Parks in the future. There are several State Parks formerly established which should be transferred to county or city jurisdiction.

This division also acted as a center for the collection of data for the nation-wide Outdoor Recreation Review Commission (ORRC). This nation-wide study and report now published was responsible for the establishment of the new Bureau of Recreation in the U. S. Department of the Interior. A coordinated study of all outdoor recreational needs and potential under the direction of this division is recommended under the direction of a staff member.

The near future demands and responsibilities in providing for the Minnesota State Park system was studied and resulted in the projected financial requirements for each biennium of the ten-year period. This study was incorporated in the department plan for the future and incorporates proposals for reorganization to more efficiently correlated activities and manage the parks under uniform policies, maintenance, operation, and development procedures.

A table of the financial requirements are estimates of the biennial cost that would be anticipated in the program.

	<u>1961-63</u> <u>Biennium</u>	<u>1963-65</u> <u>Biennium</u>	<u>1965-67</u> <u>Biennium</u>	<u>1967-69</u> <u>Biennium</u>	<u>1969-71</u> <u>Biennium</u>
Normal Operation	\$1,738,422	1,904,104	1,864,896	1,950,000	2,103,000
Expansion		<u>5,832,185</u>	<u>3,450,000</u>	<u>3,070,500</u>	<u>3,275,000</u>
Total -	\$1,738,422	7,736,289	5,314,896	5,020,500	5,378,000

Minnesota's State Parks are extremely important to the growing tourist industry which is coming to the fore to offset the economic recession due to industry recession particularly in the iron mining regions. It becomes increasingly important to protect those areas of outstanding natural beauty, historic and scientific interest and provide facilities for their enjoyment by the touring public. We must maintain high standards both in constructing and maintaining facilities which will encourage greater public use. There is an urgent need for adequate interpretive services in all the State Parks in order to help people to understand the features protected in the parks and through such understanding to gain fuller enjoyment of them.

Waters

Under authority delegated by the Commissioner of Conservation, the Division of Waters has general administrative jurisdiction over the waters of the state, surface and underground. It is responsible for the development of a general water resources conservation program for the state, and for basic water resources investigations.

Its objectives are the protection, development and management of the state's water resources to the end that they may continue to serve the needs of the people of the state. These needs, however, continue to change. Expanding population, growing industry, increased leisure time, bring with them a demand for more abundant and dependable water supplies and greater recreational use of lakes and streams. In response to these changing requirements, the division's activities have increased, and may be expected to continue to increase, along the following lines:

1. Additional investigations have been made to determine the extent of known water supplies and the possibility of developing new or increased water supplies. Since the future security and prosperity of many communities will depend on a continued adequate municipal water supply, it is important that such investigations be made before actual water shortages develop.
2. More intensive use of all bodies of water for recreational purposes is a certainty for the near future. This requires that they be protected, developed, and managed in order to preserve their actual or potential values.
3. As the problems of water supply and water management become more urgent, they require complete and accurate hydrologic data and a better understanding of all the factors which influence water supply. These needs can be met by expansion of the existing programs for collection of basic data, and by initiating research programs related specifically to Minnesota.
4. Obviously the decisions concerning water management which must be made should be based on a sound knowledge and understanding of the water resources available and of the present and future water requirements of each community and region. Comprehensive planning reports containing essential hydrologic and engineering data are essential.

Water Resources Investigations -- Cooperative

Basic data on the surface water and ground water resources of the state are collected by the U. S. Geological Survey in cooperation with state and local agencies, and with other departments of the federal government. The records thus collected, and interpretive reports based on them, are published as water supply papers by the U.S.G.S., or as bulletins by the Division of Waters. All funds contributed by state and local cooperators for these purposes are matched by an equal amount of federal funds.

105 *Mass of State*
As of June 30, 1962, discharge (stream flow) data were being collected at 111 full-time gauging stations on Minnesota streams. Records of stage only were being obtained at 51 sites on lakes and streams. Partial discharge records, for the purpose of determining maximum flood stages and discharges, were being collected at 133 high-stage stations under an agreement with the Minnesota Highway Department.

The Division of Waters program included 48 of the stream gauging stations, and 36 lake stage stations. Of these, 4 stream gauging stations were supported by donations made to the department by municipalities or by mining companies. Records of the fluctuations of ground water levels are obtained from 28 observation wells distributed over the state.

Intensive investigations of ground water resources were made in the following localities:

Halma-Lake Bronson area, Kittson county
City of Worthington
City of Marshall
City of Redwood Falls
Village of Stephen
Lyon county
Nobles county

A quality water program was initiated in August 1960 and continued through the biennium. The objectives of this investigation are to obtain and evaluate data relating to:

1. The chemical quality of ground water in the Minneapolis-St. Paul metropolitan area.
2. The chemical quality of ground water in the major aquifers of the state.
3. The chemical quality of surface waters in selected streams and lakes.
4. The fluvial sediment load of streams in selected drainage basins.

Ground Water Activities

Basic data collection and analysis

Well logs

From July 1, 1960 to June 30, 1962, 1,060 well logs were filed with the Division of Waters by water well contractors operating in the state.

Well formation sample analyses

The study of formation samples was continued during the biennium in cooperation with the Minnesota Geological Survey. In addition to determining some of the lithologic and hydrologic characteristics

of the major aquifers, the study has made significant contributions of stratigraphic correlation and mapping of the Paleozoic rocks in southeastern Minnesota. Most of the samples, which came from 56 wells, were from the Paleozoic section in the Minneapolis-St. Paul metropolitan area.

Pumping tests X

Pumping tests were completed on 34 wells during the biennium. The aquifers tested and the number of tests on each aquifer are tabulated below:

Aquifer	Number of Tests
Glacial drift	4
Cretaceous sandstone	1
St. Peter sandstone	4
Jordan sandstone (including Shakopee- Oneota dolomite)	17
Franconia formation	1
Dresbach-Hinckley sandstones	4
Precambrian crystalline rocks	3

During the fall of 1961 and spring of 1962 technical services were rendered to the Minnesota Highway Department in testing the St. Peter sandstone to determine its hydraulic characteristics in the south Minneapolis area. The services included assistance in preparing specifications for test wells, collection of pumping data on the wells and the analysis and application of the data. The purpose of the testing was to determine optimum number, spacing and yield of wells required to unwater the sandstone sufficiently to permit construction of a storm drain tunnel for the new Interstate highway. An interpretive report was prepared for the Highway Department.

In May 1961, the Lakes States Forest Experiment Station was provided with technical services in setting up a project to study the effect of forest manipulation on hydrology in the Coulee Experimental Forest area near LaCrosse, Wisconsin.

During the biennium technical assistance was given to 10 municipalities directly or indirectly through their consulting engineers.

Cooperative program with the Ground Water Branch of the U. S. Geological Survey.

Geologists of the Division of Waters participated with U.S.G.S. geologists in field checking the geologic mapping of cooperative projects in southwestern and northwestern Minnesota and in the Mesabi range area.

Publications

Bulletin 11 "Water resources of the Minneapolis-St. Paul metropolitan area," 52 p., August 1961.

- Bulletin 12 "Floods in Minnesota, magnitude and frequency," 142 p.,
September 1961.
- Bulletin 14 "Ground water in alluvial channel deposits, Nobles county,
Minnesota," 23 p., December 1960.
- Bulletin 15 "The problem of water supply for Twin and Crystal Lakes
in Robbinsdale, Hennepin county," June 1961.
- Bulletin 17 "Water use for irrigation in Minnesota," 19 p., April 1962.
- Tech. Paper 2 "Geohydrology of the Jordan aquifer in the Minneapolis-
St. Paul area, Minnesota," 24 p., January 1961.
- Special
Report 1 "Restoration of Big Kandiyohi Lake," June 1961.

In Press

- Bulletin 16 "Water resources of Minnesota, A study guide," 28p., to be
released fall of 1962.
- Bulletin 18 "Graphs of ground water levels in Minnesota 1957-1961,"
7 p., 5 maps, 46 hydrographs, to be released fall or winter
of 1962.
- Bulletin 20 "Power development in Minnesota," to be released fall of 1962.

In Preparation

- Bulletin 19 "Basic geologic and ground water data for Kittson and parts of
Marshall and Roseau county, Minnesota," to be released in
1963.

Summary of Surveys
and
Field Investigations Made

Type No.	Number of Surveys	Explanation
1	28	Surveys made to obtain data required for projects proposed for the improvement of lakes and streams.
2	4	Topographic surveys for the acquisition of easements.
3	2	Surveys for the determination of natural ordinary high water.
4	12	Surveys made in connection with operation or main- tenance of state or other dams.
5	14	Ground water investigations.
6	30	Surveys and investigations made for the protection of lakes.

7	9	Investigations of reported violations of state law.
8	4	Surveys in connection with permit applications.
9	1	Surveys in connection with proceedings to register title to riparian lands.
10	6	Investigations made because of complaints (flooding, drainage of lakes, etc.)
Total -	110	

Permits Issued

Minnesota Statutes Chapter 105 requires that permits be obtained from the Commissioner of Conservation for work in the beds of public waters, for appropriation of ground or surface water, and for public utility crossings of public waters. All applications for such permits are examined closely by the Division of Waters to see that the proposed work will not result in wasteful use of water, in permanent encroachment on the beds of lakes and streams, or in other ways adversely affect the public health, safety and welfare.

During the biennium 1,986 applications for permits were received, and 1,866 permits issued. The permits issued are classified as follows:

I. Change of course, current or cross-section		
a. Lake and stream improvement -----	1,171	
b. Highway construction -----	282	
c. Mining construction -----	3	
d. Miscellaneous -----	17	
Total -----		1,473
II. Appropriation of Water		
A. Surface		
1. Municipal -----	7	
2. Industrial -----	25	
3. Mining -----	3	
4. Irrigation -----	93	
Total -----		128
B. Ground		
1. Municipal -----	23	
2. Industrial -----	97	
3. Mining -----	1	
4. Irrigation -----	46	
Total -----		167
III. Utilities Crossings		
a. Over -----	35	
b. Under -----	63	
c. Other -----	0	
Total -----		98
Total number of permits issued -----		1,866

The state laws governing drainage require that the engineer's plans for all public drainage enterprises be submitted to the director of the Division of Waters, who shall report thereon to the county board or to district court. During the biennium 5 preliminary and 66 final director's reports were made on such projects. Of these, many requested modification of the plans in order to protect lakes or streams which would be affected. Eighteen hearings on ditch proceedings were attended by representatives of the division in order to protect the state's interest.

State Dams

Continuing a program begun several years ago of converting state dams from what are known as Minnesota Type "C" dams to fixed concrete weir or spillway structures, nine dams were thus modified. This work, together with inspections and routine maintenance and repair, was carried on during the open-water seasons.

Under an appropriation of \$104,000 made to the Division of Waters by the 1961 session of the Legislature for the construction and reconstruction of dams, the following was accomplished:

At Carlos Lake, Douglas county, a concrete dam constructed at the outlet as a WPA project in 1937 and which had been severely damaged by ice action was replaced by a steel sheet piling structure located at a point further downstream.

The dam on the South Fork of Two Rivers at Lake Bronson, Kittson county, which forms the lake in Lake Bronson State Park was further modified by the installation of gates in two bays. All six bays of the dam are now equipped with power-operated gates, which will provide added safety from flood damage to the structure.

At Lightning Lake, Grant county, surveys were made and plans and specifications prepared, and easements were obtained from all riparian land owners. Construction of a new dam at the lake outlet was expected to start early in the following biennium.

In preparation for reconstruction of the state dam on the Snake river at the outlet of Pine county, topographic surveys were made of low lands along several miles of the shoreline of Cross Lake, Pokegama Lake and the Snake river. Easements from riparian land owners are being obtained by a local citizens group, and construction will begin as soon as all easements are obtained.

Minnesota River Channel Improvement

A project for improving the channel of the Minnesota river to make it suitable and safe for small pleasure boats was undertaken by the division under an appropriation made for the purpose by the 1961 session of the Legislature. During the summer and fall of 1961 snags were removed from an 83 mile stretch of the river from Shakopee to Mankato, and in February 1962 a channel 12 feet wide was blasted through the lower rock shelf which forms Carver Rapids.

The work done to date has greatly improved the navigational possibilities of the river, but much remains to be done. High water conditions which have persisted through most of 1962 have prevented resumption of the work, but it is anticipated that the remaining funds available will be used in fiscal year 1963.

98 quadrangles published from June 1, 1960, through June 30, 1962
Topographic Mapping

During the biennium July 1, 1960, through June 30, 1962, sixty-two 7-1/2 minute quadrangles were published. Four of these were 7-1/2 minute quadrangles of the Red River of the North, previously mapped in the Fargo 30 minute quadrangle.

Dec 31, 1963 - 41,7590 mapped *41.75%*
 During the biennium 3.28 per cent of the state was mapped. As of June 30, 1962, the total area of the state covered by topographic maps is 39.6 per cent or 663 of the 1,767 7-1/2 minute quadrangles in the entire state according to the present program.

Maps partly completed at the end of this biennium include:

<i>Dec 31, 1963</i>	<u>Number</u>	<u>Quadrangle Size</u>	<u>Sponsor</u>
169	24	7-1/2 minute	Conservation Department
0	69	7-1/2 minute	Iron Range Resources and Rehabilitation <i>Hydrograph</i>
65	61	7-1/2 minute)	Federal or adjoining state cooperative program
11	10	15 minute)	

This is equivalent to ^{16.3}10.7 per cent of the state. *1 5/8 7 1/2 minute quadrangles*

Many depth curves or sounding maps of Minnesota lakes were prepared by the U. S. Forest Service in cooperation with the Civilian Conservation Corps in the late 1930's. More recent surveys were made by the Department of Conservation. The Geological Survey in November of 1960 agreed to show depth curves of lakes on quadrangle maps. Over 500 depth curve charts have been sent to the Survey since that time. To date 370 lakes are shown on preliminary quadrangles and 129 are shown on published quadrangle maps. As older maps are reprinted in the future, depth curves for lakes which have been charted will be shown.

7 1/2 minute quadrangles
 In October 1961 the U. S. Geological Survey accepted the proposal to label the drainage systems that are shown on the maps. Twenty watershed maps showing drainage systems were sent to the Survey for this purpose. To date five ²¹ drainage systems have been so labeled.

Watershed Districts

On August 31, 1960, the South Buffalo Watershed District was established by order of the Water Resources Board, and on April 27, 1961 the Bear Valley

*Resolves of the Commission on the North & West Watersheds
Watershed Co.
Watershed District*

Watershed District was established. The previously established Worthington Drainage and Conservancy District was authorized to operate under the Minnesota Watershed Act by order of district court on August 11, 1960. Later action by the Water Resources Board enlarged the area and changed the name to Okabena-Ocheda Watershed District. There are now 12 watershed districts established under the Minnesota Watershed Act. *l*

Director's reports were prepared on each of the petitions to establish these districts, and on other petitions for change of boundaries for established districts. Reports were also prepared by the division on five proposed overall plans which were presented to the board for approval. Engineer's plans for improvements to be undertaken by the Two Rivers and Coon Creek Watershed Districts were reviewed and reports thereon made to the managers of the districts.

Corps of Engineers' Projects

The division reviewed and reported on nine projects for which plans were prepared by the U. S. Corps of Engineers, and division personnel attended several public hearings held with reference to these projects in order to represent the state's interest in them. Permits were issued to local units of government for work in public waters in connection with three of these projects. The projects concerned flood protection, the improvement of channels and harbors for commercial navigation, and the construction of small boat harbors. *Headwaters Report*

