

CROP MANAGEMENT PLAN

Sherburne National Wildlife Refuge

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Fish and Wildlife Service

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Region III

CROP MANAGEMENT PLAN

1

I N D E X

	<u>Page</u>
I. Historical Background of the Refuge	
A. Area History	1
B. Land Use History	1
C. Refuge History	2
D. Farm Program Background	3
II. Farm Program Policy, Refuge Objective, and Administrative Control	
A. Fish and Wildlife Service Policy	4
B. Refuge Policy	5
C. Refuge Objectives	7
III. Climate of Area	
A. General	9
Table 1-Mean Monthly and Annual Precipitation and Extreme at Sherburne National Wildlife Refuge 1965-1975	10
Table 2-Total Monthly and Annual Inches of Precipitation at Sherburne National Wildlife Refuge 1965-1975	11
Table 3-Total Monthly and Annual Inches of Snow Received at Sherburne National Wildlife Refuge 1965-1975	11
Table 4-Mean Monthly and Annual Temperatures and Extremes at Sherburne National Wildlife Refuge 1965-1975	12
Table 5-Average Maximum and Minimum Temperatures at Sherburne National Wildlife Refuge 1965-1975	13
Table 6-Monthly and Annual Maximum Temperatures on Sherburne National Wildlife Refuge 1965-1975	14
Table 7-Monthly and Annual Minimum Temperatures Recorded at Sherburne National Wildlife Refuge 1965-1975	14
Table 8-Nine Year Record of First and Last Frost and the Number of Frost-free Days Each Year at Sherburne National Wildlife Refuge 1967-1975	15
IV. Farm Land Data	
A. General	16
Table 9-General Inventory of Lands	16
B. General Soil Description on Refuge	17
V. Farm Program Description	
A. Scope of Farming Program	21
B. Crop Type, Rotation and Amounts	21
1. Crop Type	21
2. Rotation	24
3. Amounts	25
C. Previous Successes and Failures	25
D. Soil Conservation Practices	26
E. Selection of Permittees	29
F. Records	29

I N D E X

11

G. Terms of Cooperative Farming Agreement	31
1. Share Determination and Computation of Refuge Share	31
2. Fertilizer Requirements	34
3. Cost Sharing	35
4. Planting Dates and Rates	35
Table 10-Recommended Rates of Fertilizer	36
5. Miscellaneous Special Requirements	37
a) Crop Residue	37
b) Removal of Silage	37
c) Burning	37
d) Weed Control	37
e) Plowing	38
f) Seed Treatment	38
g) Harvest of Red Clover	38
h) Fallowing	38
i) Refuge Buildings, Equipment, and Manpower Availability	38
j) Cooperator Equipment Storage	39

Appendix # 1	Soil Classification
Appendix # 2	Tract Farming History (In refuge files)
Appendix # 2a	Cooperative Farming Totals by Crop and Year
Appendix # 3	University of Minnesota Agricultural Extension Service, Fact Sheet AE # 13, "Custom Rates in Southern Minnesota, 1974"
Appendix # 4	Example of 1977 Share Division
Appendix # 5	Cost Figures for Corn, Rye, Red Clover, and Oats as Cover Crop for Red Clover
Appendix # 6	Special Conditions
Appendix # 7	Example of Special Conditions to be attached to Cooperative Farming Agreement

CROPLAND MANAGEMENT PLAN

I. Historical Background of the Refuge

A. Area History Historically, the lands of Sherburne County abounded with many forms of wild game such as elk, grouse, deer and bear. Ducks and geese and their broods dotted the marshes which held wild rice, pondweeds and other aquatic plants. The St. Francis River and its associated bottomlands played host to large populations of migrating birds during the spring and fall. With the arrival of the white settlers, the forests were logged off, the sod was broken and seeded to crops. As the demand for farmland grew with the increased population, the river basins became laced with drainage ditches while marshes and meadows were turned black by the plow. Only deep lakes and river channels remained to hold water for migratory waterfowl.

B. Land Use History All but the northwest corner of the refuge lies within the Anoka Sand Plain. The Zimmerman-Lino-Isanti-Peat Soil Association, nearly level to undulating, acid, windblown, sandy and rocky, makes up this area. The surface topography was created during the retreat of the Grantsburg sub-lobe of the Wisconsin ice sheet some 25,000 years ago.

This sub-lobe, intruding from the south, blocked normal movement of water down the Mississippi River Valley and diverted it northward for a period of time. The water flowing around the front edge of the ice as it retreated, deposited the extensive areas of fine sand that generally blankets the area. Vegetation established itself on the sandy surface rather slowly and during this intermediate period there was some movement of the surface sand by wind action. This "sand dune" effect is particularly noticeable in the southern portion of the refuge.

C. Refuge History Initial interest to restore the St. Francis River bottomland areas as a wildlife area was displayed as far back as the late 1930's by local sportsmen's clubs and wildlife conservation groups. In 1961, the Minnesota Conservation Department referred the project to the Fish and Wildlife Service - Bureau of Sport Fisheries and Wildlife for consideration. Because of its suitability for waterfowl development, ideal location for improved waterfowl distribution, and proximity to a metropolitan area, the area was immediately proposed as a National Wildlife Refuge.

Purchase of this area which lies in northern Sherburne County, Minnesota, was approved on May 18, 1965 by the Migratory Bird Conservation Commission with legislation including the Migratory Bird Treaty Act, the Migratory Bird

Conservation Act and the Migratory Bird Hunting Stamp Act authorizing its establishment. The first land acquisition occurred on October 1, 1965. Total acquisition was to include 30,500 acres within the approved refuge boundary. By the end of 1969, 22,569 acres had been acquired, and by June 30, 1975 29,457 acres had been purchased.

D. Farm Program Background The old policies of merely setting lands aside on refuges for wildlife utilization have gone. Modern management techniques now being applied to refuge lands are aimed at producing and maintaining optimized numbers of individual wildlife species from each acre of land. It is within this realm of intensive wildlife management that the refuge cooperative farming program fulfills a most important requirement. The program provides food for year-around animal maintenance, and the response of the wildlife resource will be in direct ratio to the amount of food and water available.

Through the years, the soils have been used, misused, and used again, consequently, many areas show the effects of man's efforts to exploit the land. A close look at the soils and one can determine that the most advanced farming techniques will be required to reach the high level of wildlife management required on this refuge.

II. Farm Program Policy, Refuge Objectives, and Administrative Control

A. Fish and Wildlife Service Policy Each branch of the Federal Government has a responsibility to manage wisely and in the interest of the public as a whole those public lands under its jurisdiction. In the utilization of these lands, the public has the right to expect that soil and water and the resources thereof, including timber, minerals, wildlife and recreational values, shall be safeguarded and managed judiciously for this and future generations.

Fish and Wildlife Service policy requires that agricultural lands be cropped to the full extent of their capabilities consistent with the maintenance of an ecological balance between croplands, grasslands and timber, and the food and habitat requirements of wildlife species for which the refuge is managed.

The Fish and Wildlife Service has an obligation to reduce the potential for depredations in the refuge locality. This can be effectively and practically accomplished through the production of farm crops. In addition the management of refuge food resources can be effectively applied to the management of migratory bird flight patterns, particularly Canada geese.

Policy dictates that feeding of harvested grain will not be practiced on refuges, or crops manipulated in any manner

which is inconsistent with normal agricultural practices immediately preceding or during the hunting seasons for migratory waterfowl, except to help control depredations, build up or establish goose flocks, and to solve other special waterfowl management problems.

All farming operations, by refuge personnel and cooperators alike, will be carried out by utilizing the recognized modern and widely accepted soil conservation techniques available for each particular soil type being farmed.

The F.W.S. ^{occasionally} occasionally has a moral obligation to former owners for cooperative farming, as in the case severance. Another moral obligation that the service has is to the land. If the capability classification clearly shows that certain lands should be removed from agricultural or economic uses, the Service will do so.

B. Refuge Policy The refuge should view the policy on farming not as an objective but as a means for achieving many objectives related to a wide variety of refuge programs and accomplishments.

Policies established for the refuge will incorporate those of the Fish and Wildlife Service and include additional guidelines specific to the station.

Refuge farming policies must be consistent with the basic policies on land use and management in that principles governing the refuge farming program remain firm, but the farming operations must be flexible enough to conform to or be compatible with national crop production needs resulting from time of food scarcity, food abundance, or national emergency.

Cooperative farming or share cropping will be encouraged for several reasons. It is uneconomical to attempt to meet requirements for food and wildlife by strictly a Government farming operation. It is a suitable method of supplementing basic refuge production. It can keep farmlands under control until they can be retired, and can contribute to the local welfare and economy. Farming by refuge personnel may be necessary to supplement co-op farming where great inconvenience to the cooperator may be present. Farming will be confined entirely to the lands that meet the capability requirements unless the farming of poor-quality lands is justified.

Cooperators will be required to follow established and approved rotations, and refuge managers will be responsible for coordinating the sharecropping program to insure that the kind and amount of food needed for refuge use will be produced.

Cash farming is not normally an acceptable practice and should be avoided, unless justified by the refuge manager.

The farming program of the station should be planned to meet overall needs without creating excessive surpluses and waste.

The refuge farming program should normally be geared to produce crops which in the main do not require manipulation to make them available.

The harvest of the refuge's share of grains should be held to a minimum, consistent with needs for trapping and feed for captive flocks.

C. Refuge Objectives The Fish and Wildlife Service has a stated objective of managing the refuge for the production of waterfowl and substantial numbers of ducks and geese during the peak migration periods. Sustaining a harvestable deer herd and population of upland game birds are also considered as part of the management objectives.

Refuge objectives more specifically state that the refuge will host a peak fall migration of 25,000 geese and 80,000 ducks. To fulfill these objectives it will be necessary to select the better croplands and use the best soil and moisture conservation techniques. With the completion of the proposed pool system on the refuge, approximately 2,000 acres of cropland will be required to meet the objectives. Twenty-five thousand geese alone feeding on corn will

consume better than 1600 bushels of corn in a single week. It is not just enough to provide habitat and protection, but the refuge must provide food as the link that binds the system together.

Another important objective of the farm program is to provide a basis for site preparation for the refuge's native grass program. Farm techniques eliminate the quack competition and ready the field for the introduction of native grasses.

The native grass program and the farm program are compatible since both provide nesting cover and green browse at certain time of the year for all forms of wildlife.

An objective for the farm program will be to have the farm fields serve as a demonstration area of good soil stewardship to the visiting public.

The refuge farming program is to fulfill yet another objective, and that is to contribute to the local economy through a program of cooperative farming. The refuge personnel will do little farming except to provide some goose browse near the goose observation area and breeding pens.

Idleness of some of the open fields on the refuge lends itself to encroachment from willows and aspen. The farm program is useful in retaining these fields open and controlling brush encroachment.

Overall, the refuge farming program will serve many needs and indeed be a useful tool in aiding to meet the multiple objectives of the refuge.

Tables 6 and 7 list the monthly and annual maximum and minimum temperatures, respectively, recorded during each year of the 11 year period.

Table 8 presents the nine year record of first and last frost, and the number of frost-free days each year from 1967-1975. The annual mean date of the last frost recorded each spring over the nine year period was May 21 and the mean date of the first frost in the fall during this period was September 17. The total number of frost-free days in the 9 year-period ranged from a maximum of 156 days in 1968 to a minimum of only 98 days in 1974. The mean number of frost-free days from 1967-1975 was 127 days, or roughly, 18 weeks.

III. Climate of Area

A. General The refuge is located in the north central portion of Sherburne County, Minnesota, at a latitude of $45^{\circ} 28' N$ and a longitude of $93^{\circ} 45' W$. This area is subject to the usual range of storms common to the Upper Mississippi Valley. Thunderstorms, hail and tornadoes prevail in the summer and ice storms and blizzards in the winter. The average annual snowfall based on 11 years of records (1965-1975) is 47.36 inches. Annual snowfall extremes recorded during the 11 year period ranged from a maximum of 69.2 inches during 1969 to a minimum of 20.6 inches in 1973.

The mean monthly and annual precipitation and extremes from 1965-1975 is shown in Table 1. The mean annual precipitation received during this 11 year period was 26.84 inches with the extremes ranging from a low of 22.85 inches in 1967 to a high of 42.58 inches in 1965.

Tables 2 and 3 represent the total monthly and annual inches of precipitation and snow, respectively, received from 1965-1975.

The mean monthly and annual temperatures and extremes from 1965-1975 is shown in Table 4. The mean annual temperatures over the 11 year period was 41.7° with the extremes ranging from a low of -38° in 1972 to a high of 98° in 1966. The average monthly and annual maximum and minimum temperature from 1965-1975 is shown in Table 5.

Table 1 Mean Monthly and Annual Precipitation and Extreme
at Sherburne National Wildlife Refuge 1965 - 1975

Month	Mean Inches of Precipitation *	Extremes			
		Low	Year	High	Year
January	0.76	0.07	1974	3.48	1967
February	0.78	0.34	1973	2.24	1971
March	1.33	0.22	1967	4.36	1965
April	2.30	1.06	1967	4.52	1968
May	3.60	1.49	1967	7.70	1965
June	4.64	2.31	1969	7.83	1967
July	3.23	1.54	1975	11.93	1972
August	3.89	1.99	1974	5.73	1975
September	2.65	0.69	1967	8.46	1968
October	1.69	1.07	1967	6.79	1971
November	1.12	0.05	1967	3.36	1970
December	0.84	0.14	1975	2.46	1968
Annual	26.84	22.85	1967	42.58	1965

* Data taken from the St. Cloud Weather Station and based on 20 year average monthly precipitation. All other data on Tables 1-8 were collected from daily weather observations at the Official Weather Station located at the Gordon Wold residence, one mile north of the refuge shop.

Table 2 Total Monthly and Annual Inches of Precipitation
at Sherburne National Wildlife Refuge 1965-1975

	Years 19--										
Month	65	66	67	68	69	70	71	72	73	74	75
Jan.	0.47	0.83	3.48	0.89	2.33	0.64	1.61	1.61	1.17	0.07	3.40
Feb.	1.62	0.81	1.87	0.39	0.62	0.39	2.24	1.03	0.34	1.63	0.52
Mar.	4.36	1.37	0.22	1.47	0.49	1.80	0.45	1.42	2.09	0.87	1.62
Apr.	3.23	2.04	1.06	4.52	3.20	2.26	2.18	2.51	1.51	2.12	3.67
May	7.70	1.86	1.49	3.97	1.62	2.88	2.52	3.46	4.48	3.42	3.22
Jun.	3.54	2.82	7.83	5.55	2.31	4.33	3.86	4.26	3.29	4.31	5.61
Jul.	4.68	6.27	2.14	1.75	5.47	4.07	3.40	11.93	3.38	3.35	1.54
Aug.	5.60	4.46	2.25	4.65	2.32	2.35	3.39	4.95	4.35	1.99	5.73
Sep.	5.74	1.11	0.69	8.46	2.57	1.83	2.47	2.03	3.52	1.75	3.11
Oct.	1.41	1.10	1.07	6.69	1.36	5.87	6.79	3.65	4.03	1.16	1.41
Nov.	2.32	0.56	0.05	1.25	0.92	3.36	3.05	1.12	1.99	2.53	2.76
Dec.	1.91	0.95	0.70	2.46	1.95	0.25	0.77	1.80	1.45	0.80	0.14
Annual											
Tot.	42.58	24.18	22.85	42.05	25.16	30.03	32.73	39.77	31.60	24.00	32.73

Table 3 Total Monthly and Annual Inches of Snow Received
at Sherburne National Wildlife Refuge 1965-1975

	Years 19--										
Month	65	66	67	68	69	70	71	72	73	74	75
Jan.	11.0	9.0	25.6	9.0	22.9	2.7	13.1	8.3	5.8	6.0	34.8
Feb.	12.0	1.5	20.0	3.3	6.8	2.8	21.6	6.7	4.0	16.0	2.8
Mar.	37.1	2.0	-	0.1	4.0	6.1	4.3	8.6	0.3	5.0	16.0
Apr.	-	-	-	0.6	2.1	2.6	4.4	7.2	-	4.0	-
May	-	-	-	-	-	-	3.2	-	-	-	-
Jun.	-	-	-	-	-	-	-	-	-	-	-
Jul.	-	-	-	-	-	-	-	-	-	-	-
Aug.	-	-	-	-	-	-	-	-	-	-	-
Sep.	-	-	-	-	-	-	-	-	-	-	-
Oct.	-	-	-	-	4.0	0.4	0.5	-	-	-	-
Nov.	5.0	7.0	-	5.7	4.4	9.6	8.9	0.4	1.6	3.0	13.2
Dec.	2.0	11.0	-	25.4	25.0	2.5	6.6	14.0	8.9	6.5	2.0
Annual											
Tot.	67.1	30.5	45.6	44.1	69.2	26.7	62.6	45.2	20.6	40.5	68.8

Table 4 **Mean Monthly and Annual Temperatures and Extremes**
at Sherburne National Wildlife Refuge 1965 - 1975

Month	Mean Temperature Degrees *	Extremes			
		Low	Year	High	Year
January	8.9	-38	1972	50	1973
February	13.3	-30	1972	50	1966
March	25.9	-23	1965	80	1968
April	42.9	-1	1975	88	1968
May	55.0	16	1967	95	1969
June	64.8	32	1969	96	1968
July	70.2	37	1969	98	1966
August	68.4	34	1967	96	1971
September	57.8	18	1974	90	1971
October	47.6	6	1966	85	1967
November	30.0	-10	1966	71	1975
December	15.8	-27	1967	48	1969
Annual	41.7	-38	1972	98	1966

* Data taken from the St. Cloud Weather Station and based on 20 year average monthly temperatures. All other data on Tables 1-8 were collected from daily weather observations at the Official Weather Station located at the Gordon Wold residence, one mile north of the refuge shop.

Table 5 Average Maximum and Minimum Temperatures
at Sherburne National Wildlife Refuge 1965-1975

<u>Month</u>	<u>Average Maximum Temperature</u>	<u>Average Minimum Temperature</u>
January	38.3	-30.4
February	43.1	-24.4
March	55.1	- 8.9
April	73.1	12.6
May	85.1	27.0
June	89.9	39.7
July	93.1	43.8
August	92.9	40.5
September	84.1	28.1
October	80.5	17.0
November	60.7	1.0
December	42.2	-16.4
Annual	69.8	10.8

Table 6 Monthly and Annual Maximum Temperatures on
Sherburne National Wildlife Refuge 1965-1975

Month	Years 19--										
	65	66	67	68	69	70	71	72	73	74	75
Jan.	38	30	44	44	33	35	34	37	50	42	34
Feb.	44	50	42	43	40	43	48	41	44	43	36
Mar.	38	67	74	80	47	45	50	50	60	49	46
Apr.	60	67	69	88	74	85	74	78	69	80	60
May	81	89	82	81	95	89	79	89	80	81	90
Jun.	90	92	85	96	84	92	90	90	93	87	90
Jul.	93	98	91	90	94	95	89	90	90	97	97
Aug.	96	90	91	92	93	93	96	93	95	90	93
Sep.	80	86	82	83	84	89	90	82	85	84	80
Oct.	79	84	85	84	84	83	80	73	75	77	81
Nov.	69	51	60	61	67	54	57	56	62	60	71
Dec.	42	40	45	41	48	46	36	41	42	42	41
Annual	96	98	91	96	95	95	96	93	95	97	97

Table 7 Monthly and Annual Minimum Temperatures Recorded
at Sherburne National Wildlife Refuge 1965-1975

Month	Years 19--										
	65	66	67	68	69	70	71	72	73	74	75
Jan.	-34	-32	-34	-28	-24	-36	-22	-38	-28	-33	-25
Feb.	-30	-22	-29	-22	-22	-28	-29	-30	-10	-19	-27
Mar.	-23	0	-18	-7	-9	-1	-12	-18	19	-15	-14
Apr.	22	18	5	14	22	0	10	14	17	17	-1
May	34	20	16	27	30	28	30	30	28	24	30
Jun.	45	42	41	40	32	41	43	35	42	37	39
Jul.	48	48	39	41	37	45	44	40	46	46	48
Aug.	37	43	34	38	46	41	38	43	48	37	40
Sep.	25	28	30	35	32	29	28	25	29	18	30
Oct.	22	6	12	26	16	13	24	9	25	14	20
Nov.	2	-10	-1	10	-3	-5	2	7	8	5	-4
Dec.	-8	-15	-27	-24	-6	-12	-14	-25	-25	-5	-19
Annual	-34	-32	-34	-28	-24	-36	-29	-38	-28	-33	-27

Table 8 Nine Year Record of First and Last Frost and *
the Number of Frost-free Days Each Year at
Sherburne National Wildlife Refuge 1967-1975

Year	Last Frost	First Frost	Frost-free Days
1967	May 21	September 25	126
1968	May 5	October 4	156
1969	June 13	September 24	102
1970	May 2	September 27	147
1971	May 19	September 16	119
1972	May 3	September 22	141
1973	May 17	September 20	125
1974	May 25	September 1	98
1975	May 2	September 13	133
Mean	May 21	September 17	127

* 32° or lower

IV. Farm Land Data

A. GeneralTable 2 General Inventory of Lands

<u>Land Classification</u>	<u>Acres *</u>
Wetland Types (Total)	<u>10,462</u>
Type II (Fresh meadows)	1,926
Type III (Shallow fresh marshes)	1,876
Type IV (Deep fresh marshes)	564
Type V (Open fresh water)	255
Type VI (Shrub swamps)	4,798
Type VII (Wooded swamps)	535
Other Wetlands (Rivers & streams)	508
Upland Types (Total)	<u>20,038</u>
Croplands (Total) (1975)	<u>1,342</u> **
Non-irrigated-green browse annual	**
Non-irrigated-green browse perennial	**
Non-irrigated-hot foods	**
Grasslands (Total)	<u>7,693</u>
Native grasslands	5
Native grasslands-restored	842
Grasslands-introduced	6,231
Dense Nesting Cover	615
Forestlands (Total)	<u>10,279</u>
Commercial forests	<u>10,229</u>
Non-commercial forests	50
Brushlands (Total)	<u>201</u>
Other Land Types (Total)	<u>523</u>
Administrative(bldg. sites, roads, etc.)	<u>523</u>
Total Refuge Acreage	<u><u>30,500</u></u>

* Acreage figures taken from FY 1975 "Land Type Inventory Report."

** Variable figure: changes with yearly crop rotation.

B. General Soil Description on Refuge The Sherburne

Refuge does not have good soils with which to work. In the future, the use of some of these lands will change gradually as the refuge realizes development. Generally, it will be the refuge policy to farm only the better classes of soil in so far as this is possible. This means that Class II, III, and IV soils will be the ones which will be mainly involved in the farming program. There should be no Class VI or VIII soils farmed. If for some reason Class VI or VIII soils are farmed, they must be done so under a strict soil conservation program. Some of the fields in Classes III and IV will be eliminated from farming consideration due to inundation by water or conversion to native grasses or dense nesting cover.

The soils are generally low in fertility, sandy, droughty and sometimes rocky. Lime requirements are high and only those farmers following the best conservation techniques would be able to make a full time living from the land.

Approximately 9,000 acres of land fall into the categories of cropland, former cropland, or grassland (reverting farmland). Of this total, about 420 acres are Class II soils. Mora Loam, Chetek Sandy Loam, and Milaca Fine Sandy Loam make up almost all of the Class II soils. Mora and Milaca are characterized by being deep, light colored and well drained sandy loam. Chetek is shallow, light colored, sandy loam and is excessively drained. Mora loam has higher fertility and moisture holding capacity and is better suited to all kinds of farming than Milaca and Chetek types. All

are moderately acid (pH 5.6-6.0), and have stones throughout the soil profile. The Mora Loam type is found almost entirely on the Viste-Wicktor-Anderson tracts of the northwest portion of the refuge. The Chetek type is found almost entirely on the Sunnyview-Anderson tracts of the northeast corner of the refuge. Only small acreages of the Milaca type are found on the refuge, mainly scattered about the northeast and northwest areas in the same location as the Mora and Chetek types.

Two-hundred and eighty acres fall into the Class III soils category. Braham Loamy Fine Sand and Scandia Sandy Loam make up the two most common soil types within this class. Both soils are light colored, excessively drained and moderately acid (pH 5.6-6.0). Fertility and moisture holding capacity are low in both types, but Scandia tends to be a shallow soil whereas Braham is a deeper soil. A major problem with both is that they are susceptible to erosion and drought. Almost all of the Class III soils are to be found in the northwest corner of the refuge in association with the Class II soils of the Winkleman-Viste-Wicktor-Anderson tracts.

Over 7200 acres of land is placed in the Class IV soil category. About 90% of the soil is typed as Zimmerman Loamy Fine sand. Isanti Loamy Fine sand and Lino Loamy Fine sand make up the remainder of the Class IV soils on the refuge. Zimmerman soils are characterized by being very deep, light colored, excessively drained, moderately acid (pH 5.6-6.0), loamy fine sand with low fertility and low moisture holding capacity. It

is usually susceptible to drought and wind erosion. It is by far the most prominent land utilized in the farming program and is found throughout the refuge. The Lino and Isanti types are also very deep soils, but are darker than the Zimmerman type. These two types are moderately acid with low fertility and usually require drainage to be useful for crop production. Only in dry years can they be farmed. At other times their close proximity to the sub-surface water table makes them marginal for cropping. Lino and Isanti types are distributed mainly throughout the northwest and north central regions of the refuge, and are intermingled with the more dominant Zimmerman soil type.

There are no Class V or VII soils on the refuge.

The Class VI and VIII soils make up the remainder of the 9,000 acres of the farmland. Nearly 700 acres of the Class VI soils represented by the Zimmerman Loamy Fine sand with 200 acres representing the Zimmerman Fine Sand type. Both these soils are similar to the Class IV soils of the same name. The major difference being a much steeper slope with a greater probability of erosion. This land is scattered lightly throughout the western and north central parts of the refuge and is most prominent in the middle east and southeastern portions, usually along the larger lakes such as Rice Lake and Lake Josephine and the river itself. None of this land is farmed.

Class VIII soils represent about 200 acres of the old farmland. Again this soil is typed as either Zimmerman Fine Sand or Zimmerman Loamy Fine Sand and differs from the Class IV and Class VI soils by having a greater degree of slope and more susceptibility to erosion. Except for one or two small areas in the mid-refuge area, the Class VIII soils are nearly all in the eastern and boot-heel areas of the refuge. None of this land is farmed.

More detailed information concerning refuge soil types and classes can be found in copies of the refuge soil maps, the "Soil Survey of Sherburne County, Minnesota" U.S. Dept. of Agric., SCS 1968 and the single sheet "Soil Survey Interpretations" U.S. Dept. of Agric., SCS. All are available for inspection at refuge headquarters.

V. Farm Program Description

A. Scope of Farm Program It has been previously stated that the refuge will be farming approximately 2,000 acres following the pool development outlined in the Master Plan. Current farming practices utilize nearly 1,300 acres. All farming, except small select areas near the refuge maintenance shop will be farmed under cooperative agreement.

B. Crop Types, Rotation and Amounts Refuge objectives indicate peak waterfowl populations of 25,000 geese and 80,000 ducks. The objectives also indicate that maintenance of harvestable populations of deer and other resident small game species is needed. Food production and habitat manipulation, therefore, are key items.

Currently there are no permanent farming tracts designated on the refuge, and only a few of the farmed tracts have all fields in a continuous rotation. Permanent designation of farm tracts will follow pool development. When the proposed 9,000 acres of land is flooded, defining which remaining fields should be planted to DNC, native grass or crops will be simplified. A proper balance of all three will be the most desirable and beneficial to habitat and wildlife.

1. Crop type

Corn, up to this time, has been considered the chief source of "hot" food. There is no question as to the value of corn as a wildlife food or as a cooperator crop. However, the fact remains that the refuge is a marginal corn production area because of

soil and climatic conditions. It is estimated that in the near future the refuge share of 1600 acres of corn, or approximately 400 acres, with an average yield of 40 bu./acre will be required to meet the demand of wildlife populations. The current refuge share of corn is near 150 acres.

Many years may be required to reach the estimated acreage needed for corn. Currently corn cropping is used not only for food for wildlife, but a variety of other land use needs. Through these secondary uses of corn production, total acreage of corn is not as high as in some previous years.

Major uses of corn farming; besides food for wildlife, are land preparation for the DNC and N.G. programs, brush encroachment control, and breaking of new lands to establish areas for rotational cropping.

Corn is essential to the native grassland reestablishment program. Soil preparation for corn requires the use of select herbicides, such as Atrazine, to reduce weed competition. Native grass following corn allows competition-free growth of the seedling plant during one of its most critical periods.

Fall Rye plays an important part in the refuge farming program. Green browse is an essential part of the diet of geese, and as such needs to be available both in spring and fall. Rye is winter hardy and thus survives the harsh Minnesota winters to provide green browse in late winter and early spring as a food supplement for deer.

Planted in the early fall, rye takes advantage of fall and winter precipitation. If normal rainfalls are received in the spring, it thrives to become acceptably profitable for the cooperator.

Some advantages of rye to the refuge are that when farmed along with other crops in a rotation it provides an alternate pattern of high and low crops, has a dense vegetative soil covering, returns nutrients to the soil when straw is plowed under or when the green rye is used as green manure. The grain is valued by ducks when dry standing rye is shattered with a chopper and allowed to lay in the fields.

Presently approximately 220 acres are being put into rye. Needs for expansion or cutback in this crop will be evaluated when pool development becomes a reality.

Clover/Oats - Clover has replaced alfalfa on the refuge as the legume most readily suitable to refuge lands. Basic soil fertility is low on most farm fields and red clover lends itself to these lands better than sweet clover, which requires lime, potash and good fertilization.

Besides its general adaptability to refuge lands, red clover replaces nitrogen, adds needed organic matter, increases soil stability, prevents soil erosion on the farm fields. It also provides green browse in late summer, and provides nesting cover in spring.

It is understood that the cooperator would like to realize some cash grain income from every acre of refuge land each year. This may not always be possible. The soil fertility may not withstand the double cropping, and summer droughtiness makes it difficult to grow even one crop successfully. Yet, it is shown that the cooperator loses cash benefits with the clover in the rotation. One way to regain some of the cash loss is to allow catch or cover crops such as oats to be seeded with the clover. Cover crops should be allowed only on Class II, III, and IV soils.

More indirect benefits of the clover are obtained to benefit the cooperator when the crop is utilized as hay or taken as seed and the crop residue returned to the soil as green manure.

Others - Buckwheat, sunflowers, wheat and vetch are some crops that need investigation as to feasibility and compatibility with refuge programs. These have been suggested by cooperators and warrant some study.

2. Rotation

Crop rotations will be used on all lands farmed on the refuge. Row crops will be alternated with small grains and clover (or other suitable legume) on a proposed 4 or 5 year rotation plan. A typical rotation would be corn-corn-clover-(clover second year if desired)-rye.

Cooperators who are presently under a cropping plan other than the above will be gradually converted to a complete

rotation. Special consideration will be given to those cooperators who are farming only as a result of the N.G. or DNC management plans. This refers to cooperators who are being utilized to control quack or other weeds, for conversion of that particular unit to N.G. or cover in the near future, usually not more than 2 years in one field.

3. Amounts

See Appendix # 2 and # 2a for past acreage amounts.

C. Previous Successes and Failures Throughout the years a number of agricultural trials of different types have been attempted on the refuge. Some were successful, others average, and some failures.

An attempt is made here to list some of the trials that were made and the results which were obtained. This may eliminate "plowing the same ground twice" by future farm program managers. Late planting of crops will invariably lead to yield disaster. Summer drought or early frost are climatic conditions that will take a toll.

Sweet clover will not respond without applications of lime.

Spring plowing followed by sweet clover seeding, then plowed again in fall to utilize the sweet clover as green manure will not work. Even if lime is applied to give good plant growth due to soil composition, the sand fields cannot be plowed a second time in one year.

Clover with oats as a cover crop is acceptable, but on sand the cooperator must be careful to avoid overseeding and under fertilizing because sufficient water may not be available to sustain two crops.

Atrazine application rates of over 2 lbs/acre are not necessary for complete weed control in corn, especially in the second year of the two year corn rotation. Above 2 lbs/acre tends to allow some residual herbicide carryover into the following year's rotation which is clover. Much clover has been killed before it got started from this carryover.

Application rates of $2\frac{1}{2}$ lbs/acre are not too high for first year corn in fields that are unusually high in quack growth. A combination of $1\frac{1}{2}$ lbs/acre Atrazine + 1 to $1\frac{1}{2}$ lbs. of Lasso usually resolves the carryover problem.

D. Soil Conservation Practices

1. The recommended crop rotation has been discussed under Section V, Part B. The legume in the rotation will not be cut for hay until after July 15. Only one crop can be taken from the legume and the choice is hay or seed. All plowing will be arranged to see that no land is allowed to fallow all winter.

2. Strip cropping will be used on all lands farmed on the refuge. The desirable strip width should be about 10 rods, or 165 feet. These strips may, under special conditions be changed to a maximum of 15 rods or approximately 250 feet to accomodate the cooperators and his equipment. The variance may be granted also for large fields of 60 acres or more where larger strips may be preferable. All fields of 12 acres or more should be stripped unless the field contour is not conducive to strips.

3. Contour farming is not usually undertaken on the refuge as most lands requiring contouring would be seeded to N.G. or D.N.C. If farming for weed control is necessary, contours should be laid out for the cooperator by the farm program manager and the project leader.

4. A combination of all three above is acceptable if slope, field size, soil and necessity of farming the area desired

5. Soils are acid and as such generally require 3 or 4 tons of lime per acre in order to establish most stands of legumes except clover. Lime is also important for fertilizer utilization by the growing plants. Without a liming program, the fertilizer program loses considerable value. Lime will be applied to all fields that will be seeded directly to D.N.C. regardless of the length of time that the field had been in previous rotation. When this soil conservation technique is applied, it should be handled completely by the refuge, at no cost to the cooperator.

On fields that are proposed to be in permanent rotation, the manager may approve of the cooperator applying lime to his farm fields. The refuge share of crops may then be reduced accordingly to cover the permittees application.

If monies exist at or near the close of the fiscal year, the manager may select fields that are proposed as permanent farm fields and properly lime them. Records are available to indicate past liming history

6. Fertilizer application at the recommended rate is an essential part of the farming program. It has been determined from previous experience that soil fertility levels vary little from area to area around the refuge, thus frequent soil testing is not necessary. If any cooperator desires soil testing to check for increases or decreases in available fertility he may request tests to be made. The procedure shall consist of the cooperator obtaining boxes from refuge headquarters, taking soil samples himself as recommended by the Univ. of Minnesota Extension Service and returning full boxes to refuge headquarters for mailing. Analysis will be returned to refuge headquarters. Costs of the tests will be covered by the refuge. These soil tests should be conducted at least once every 5-7 years for each agricultural unit on the refuge.

In the past, farmers have been reluctant to use much commercial fertilizer because of the investment required. Recently, experience has shown that they are applying higher than the recommended rates for most fertilizers. All refuge recommendations for fertilizer application rates will be followed by the cooperator.

7. Rock removal of certain fields and/or areas. If rocks become a farming problem in any field being farmed by a cooperator, he should take upon himself to remove these obstacles. If unusually large amounts of rock are to be removed the cooperator may be compensated by the refuge in the form of extra shares of corn to be harvested. However, no large amount of rock removal will be undertaken without prior approval of the refuge manager.

E. Selection of Permittees Any individual who wishes to farm on refuge lands will be issued an "application for permit" (Farming) form (See Appendix). Upon return of this form to the headquarters, it will be filed in the Asst. Mgrs. farm files along with all other applicants desiring farm land.

When land becomes available, new permittees will be selected from the applications on file. All candidates will be selected from the applications on file. All candidates will be given equal opportunity except that preference must be granted to former land owners, former land users, and veterans. Careful investigation should be made of the applicants present farming operation, making certain that the additional land will not over-extend his labor or equipment. Experience has shown that most farmers give first consideration to the land they own and second consideration to refuge land. Farm land in the local area is at a premium, therefore, applications by potential cooperators is high.

F. Records

1. Headquarters - Several records are to be kept for all farming units. Primarily a file is to be kept for each agricultural unit. The following items are to be found in each unit folder:

- a) An aerial photograph of the cropland unit.
- b) The current year plat of the cropland unit showing the cooperator, crop acreage, and crops to be planted in each field of the unit for the current year.
- c) Soil test results, if any tests were conducted.
- d) Complete liming history of each farm unit.

A separate file will also be kept for all cooperative farming agreements for each year. Photo copies of completed contracts may be made for each cooperator, placed in a three-ring binder, and used for field work. Field observation of actual practices may easily be documented on the individual cooperator sheets and the record conveniently transferred to office files.

Once the cooperator has agreed to the conditions set forth in his agreement, he and the designated refuge official sign and date the document. The cooperator will receive one copy of the agreement, a plat showing the crops, acreage, and fields to be farmed, and a copy of the refuge special farming conditions. One copy of the agreement will be forwarded to the Regional Office while one copy of the agreement with appropriate plat will be filed in that year's cooperative farming agreement file.

2. Cooperator - It should be optional that the cooperator be required to keep and report to the refuge accurate records of all expenditures and income received from his operations on refuge lands. Most farmers utilize this practice of record keeping so it should cause no inconvenience. The records thus received by the refuge can be utilized in determining if any adjustments may be necessary in the share determination process. These records should include all machinery costs, fertilizer costs, pest control (insecticides and rodenticides) costs and labor costs, as well as dates, seeding rates and yields, etc. Rather than have mandatory reporting by all cooperators, the option may be that certain individual cooperators be selected on an alternating basis to keep records of refuge operations for one year. After being selected for any one year the cooperator would then agree to provide the requested information. Failure to deliver the report would be grounds for suspension of the next year's permit.

G. Terms of the Cooperative Farming Agreement

1. Share determination and computation of refuge share -

A canvass of the local farming community including the SCS Office, Elk River; the Univ. of Minn. Agric. Extension Service, St. Paul; County Extension Agent, Elk River; Wredbergs Mill, Princeton; Princeton Co-op, Princeton; and local farmers has shown that the basic cash land rental rate is somewhere between \$8.00 and \$22.00/acre. All agreed that a cash rental rate of \$15.00/acre was

appropriate for 1977 for soils of the Zimmerman-Isanti-Lino type complex. This soil type is predominately a sandy soil which is characteristic of Central Sherburne County, more especially the Sherburne NWR.

- a) The basic share division on all crops produced under this management plan will be based upon the local cash rental rate of \$15.00/acre for comparable cropland in the vicinity of the refuge.
- b) The cooperator will "pay" what would be the total cash rent for all cropland acres farmed under his cooperative agreement (at the \$15.00/acre rate), in acres of crops produced on the refuge for wildlife use. The number of acres he must produce for wildlife use will be equal (in cost of production) to what he would pay in cash rent. The number of acres of each crop the cooperator must produce for wildlife use on the refuge, to equal what he would pay in cash rent, are to be listed on the cooperative farming agreement.
- c) The cost of producing crops on the refuge for wildlife use will be based upon the Univ. of Minn. Agric. Extension Services Fact Sheet AE-13, "Custom Rates in Southern Minnesota" (Appendix 3) for the current year, and upon local costs for seed, fertilizer, pesticides and other farm supplies. (An example of how the cooperator will "pay" his rent in acres of crops produced for wildlife use on the refuge is attached as Appendix 4).

- d) In the event a cooperator requests the refuge to assist with certain field operations the same "rate for custom work in southern Minnesota" will be used in determining the cost of the operation. This cost to the refuge may then be applied to additional acres of crops to be received from the cooperators share.
- e) Crop divisions, based upon the cooperative farming agreement, and all conditions stated therein, must be agreed upon in the field by the cooperator and the refuge manager or his assistant prior to harvest.
- f) The refuge share of corn will be left standing in the field unless otherwise specified by the refuge manager. Shares will be divided on the basis of the number of rows present in each field. Normally, the cooperator will harvest his share of rows, alternately leaving the refuge share, then taking another share for himself, etc. For instance, the cooperator should harvest 12 rows then leave 4 rows across the entire field in the case of 3/4-1/4 share division. When total acres produced for wildlife is used as a division guideline, then the refuge's percentage of the crop will be computed from the total acreage planted by the cooperator. This percentage may be applied to each individual field for proper crop distribution in the field or it may be desirable to leave the refuge share in one large block

in a certain area. Various situations may arise from time to time. These situations will be handled on an individual basis with an agreement between the cooperator and the refuge manager. An example is if the cooperator plants 36 acres of corn and the refuge share is determined to be 12 acres left for wildlife. This would be a $2/3-1/3$ division and field will be divided as noted above.

- g) Due to variable circumstances, in some years wildlife may not fully utilize the entire corn crop left in the field. Depending upon the spring weather, soil aeration, and wildlife use, a certain amount of ear corn will be left available for harvest. It is the refuge policy to make the best possible use of this grain since it will usually be the refuge's share that remains. Therefore, the cooperator who has the contract for this farming unit may harvest this crop providing that 50% of the yield is delivered to the refuge. In the event the contract holder is not interested in harvesting the crop, it may be offered to any other cooperator or interested party for harvest. Special permission for this operation must first be obtained from the refuge manager before any spring corn picking may be started.

2. Fertilizer Requirements - every cooperator will be required to fertilize his crop according to the terms set forth in the cooperative agreement. The rates of application will be based on soil

tests, and recommendations from the Univ. of Minn. Agric. Extension Service, Sherburne Co. Extension Service, private and commercial applicators and from data gathered over the years from previous experience on farming refuge lands. The recommended rates for fertilizer for each crop are found in Table # 10.

3. Cost sharing - The cooperator will have full responsibility for all costs involved with his farming operation on the refuge (Appendix # 5). If the cooperator is asked to do any additional farming operations for the refuge, such as harvesting some of the refuge's share of the standing corn, hauling corn to the bin, or others, the refuge will reimburse the cooperator by increasing his share of the crop.

4. Planting dates and rates -

<u>Crop</u>	<u>Planting Date</u>	<u>Rate of Seeding</u>
corn	prior to May 20	10-14 lbs./acre (12-14,000 plants/acre)
fall rye	Prior to Sept. 1	1½-1½ bu./acre (6"-8" rows)
clover	Early spring (May)	6-8 lbs./acre
oats	Early spring (May)	2½ bu/acre
sunflower	Mid-May	3-4 lbs./acre

Recommended Types

Corn - 90-102 day variety (brand is personal preference)

Rye - Cougar, Rymin, Van Lochow varieties

Clover - 1 yr. med. red or 2 yr. red clover or mammoth red clover

(Peterson seed or personal brand)

Oats - Lodi, Froker, Rodney, Chief, Dell, Garland varieties.

Sunflower - oil variety or bird seed variety (brand is personal pref.)

Table 10 Recommended Rates of FertilizerCorn

plow down	0-0-60(potash)	@ 200 lbs./acre
starter (planter)	6-12-24	@ 100 lbs./acre
Anhydrous Amm.(Side dressing)	82-0-0	@ 125 lbs./acre
Alternate starter:	20-60-20	@ 160 lbs./acre

Rye

plow down	5-20-20	@ 150 lbs./acre
or	10-20-20	@ 120 lbs./acre
or	30-30-30	@ 150 lbs./acre
top dressing	34-0-0	@ 75 lbs./acre
plus	(amm. nitrate) 0-0-6 (potash)	@ 25 lbs./acre

Clover or Clover and Oats

plow down	0-0-60	@ 175 lbs./acre
top dressing	30-30-30	@ 165 lbs./acre

5. Miscellaneous special requirements (App. # 6)

- a) Crop residue - All cropland residues are to remain on the field to be plowed under. Only under special conditions may the residues be removed.
- b) Removal of silage - A silage production operation does not have a place in the refuge farming program. Silage may be made from corn only in the event of a crop failure and only when special permission is given by the refuge manager. A crop failure may occur from drought, early frost, wind, hail, etc. Crop failure is defined as a crop that when harvested in the normal manner will not provide a reasonable income. Any cooperator who does not fulfill the conditions of his contract forfeits his rights for silage removal in the event the crop failure is due to his negligence.
- c) Burning - No burning will be allowed on refuge cropland.
- d) Weed control - The cooperator will be responsible for weed control treatment on all cropland acreage under his control. The cooperator shall notify the refuge manager well in advance of any proposed application of herbicide and shall not carry out any pesticide operation without prior approval of the refuge manager. *Before the refuge manager can give his approval the chemical proposal must be approved in the Regional Office* This includes insecticide as well as herbicides and rodenticides. Beginning in October 1977 all cooperators must have an appropriate pesticide applicators license before applying any pesticide on refuge license.

- e) Plowing - all plowing will be done in the spring for corn and clover. Fall plowing is acceptable for rye.
- f) Seed treatment - Seeds treated with mercury compounds shall not be used on refuge lands.
- g) One harvest of red clover either seed or hay will be permitted after July 20 of the second year.
- h) No fields will lay fallow (plowed) over the winter months. An effort will be made to keep the soil black during the shortest time possible.
- i) Refuge buildings, equipment and manpower availability -
The majority of all farming on the refuge will be handled by the cooperators. Some instances will occur when the refuge force account will be required to farm select areas or seed DNE following ground preparation by a cooperator. The cooperator may also request assistance with certain operations of farming. Payment for this assistance is explained in Item # 1. In light of these operations, a few support facilities are required. The east $\frac{1}{2}$ of the oil storage building has been designated for use as a seed, feed, pesticide, and fertilizer storage area. Seeds, pesticides, and fertilizers which are required by the refuge to complete force account crop and moist soil farming are stored there. Canada goose captive flock food supplements are also stored here over winter until spring and

summer feeding depletes the supply. Cooperators supplies are not stored here. Another building just north and east of Orrock Lake has been designated as a seed cleaning building and has been equipped with fan mill and hammer mill to enable the refuge to clean seed that may be required for refuge use. No cooperators supplies are stored here.

- j) Cooperators equipment may be stored in the sub-head-quarters (shop) area overnight or over weekends to accommodate the cooperators when prevention of equipment vandalism and excessive travel time may be involved.

SIGNATURE PAGE

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Date: December 31, 1976



Your LAND is the foundation of your farm program. Plan it within its capabilities and treat it according to its needs. The Soil Conservation District will help you develop a Farm Conservation Plan.

The colored Soil Survey Map shows the kinds of soil on your farm and their capabilities for use. Land can be placed into eight classes depending upon the risks of soil damage or limitations on its use.

Soils in Class I have few limitations that restrict the choice of plants. Good management practices are necessary.

Soils in Class II have some limitations that reduce the choice of plants or require moderate conservation practices.

Soils in Class III have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Soils in Class IV have very severe limitations that restrict the choice of plants, require special conservation practices, very careful management, or all three.

Soils in Class V have little or no erosion hazard, but have other limitations that are impractical to remove that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Soils in Class VI have severe limitations that make them generally unsuited for cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Soils in Class VII have very severe limitations that make them unsuited for cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Soils and land forms in Class VIII have limitations that make them unsuitable for commercial plant production and restrict their use to recreation, wildlife or water supply.

Four different kinds of limitations are recognized. They are (1) erosion hazard, (2) wetness, (3) root zone limitations, and (4) climate.

classes of land may not appear on one farm. On the pages that follow is information about the soils that make up your land.

(over)



WHAT THE NUMBERS AND LETTERS ON YOUR SOIL CONSERVATION SURVEY MAP MEAN

Numbers and letters on the map show what kind of soil you have, how sloping the the land and how much of the topsoil has been washed away or blown away. These numbers and letters are grouped like this:

158 2 R soil
soil-slope-erosion or slope or soil
erosion slope-erosion

The first number is the kind of soil, the middle number or letter is the slope of the land in percent, and the last number or letter shown is the amount of erosion.

SLOPE LEGEND

A = 0 - 2%
B = 3 - 6%
C = 7 - 11%
D = 12 - 17%
E = 18 - 24%
F = 25% +





















EROSION LEGEND

0 - No erosion
1 or P - Slight, 0 to 1/3 topsoil lost
2 or R - Moderate, 1/3 to 2/3 topsoil lost
3 or S - Severe, 2/3 of topsoil lost to 1/3 of subsoil lost
4 - Subsoil erosion - gullying
+ Deposition


Irregular topography is shown by K, M, N, P, R, or V either alone or in combination with the percent of slope.

Numbers indicate water erosion
Letters indicate wind erosion



OTHER SYMBOLS USED

	Small drainageway or crossable gully		Severely eroded spot
	Intermittent stream		Rock outcrop
	Small stream		Small area of sand
	Gully not crossable with implements		Small area of gravel
	Deep caving gully		Surface stones or boulders
	Drainage ditch		Quarry
 	Small pothole		Small gravel pit
 	Wet or seep spot		Small area of high lime
 	Small steeper area or escarpment		

THESE ARE THE SOILS THAT HAVE BEEN FOUND ON YOUR FARM

MAPPING UNIT	SHORT SOIL DESCRIPTION	CLASS
20 - Class II	<p>ALLUVIAL SOILS</p> <p>Mixed bottomland soils bordering rivers and streams that are subject to occasional flooding but usually well to moderately well drained. They are likely to be moderately acid (pH5.6-6.0) and moderately fertile. Major problems: crop damage from overflow and delayed planting dates. Otherwise suited to most crops.</p>	<p>Yellow</p> 
<p>95 - Class II</p> <p>Slope 0 to 6</p> <p>Erosion-Max. 2 to R</p>	<p>CASS LOAM</p> <p>Deep, dark colored, well to moderately well drained loam soil to a depth of 2-2 1/2 feet, underlain by limey sand and gravel. It is neutral to slightly acid in the reaction (pH6.1-6.6) with moderate to high fertility and moderate water holding capacity. Major problems: drainage in low areas.</p>	
<p>132 - Class II</p> <p>Slope 0 to 6</p> <p>Erosion-Max. 2 to R</p>	<p>HAYDEN FINE SANDY LOAM</p> <p>Deep, light colored, well drained fine sandy loam with a firm clay loam subsoil. It is moderately acid (pH5.6-6.0) with free lime at 24-36". It is moderate in fertility and moisture holding capacity. Major problem: water erosion.</p>	
<p>152 - Class II</p> <p>Slope 0 to 6</p> <p>Erosion-Max. 2 to R</p>	<p>MILACA FINE SANDY LOAM</p> <p>Light colored, well drained fine sandy loam with a sandy clay loam subsoil which becomes hard when dry. It is moderately acid (pH5.6-6.0). Its fertility and moisture holding capacity are low. These soils are suited to most crops. Major problems: <u>water erosion, low fertility and may be stony.</u></p>	
<p>155T - Class II</p> <p>Slope 0 to 6</p> <p>Erosion-Max. 2 to R</p>	<p>CHETEK SANDY LOAM AND LOAM</p> <p>Shallow, light colored, sandy loam underlain with sand and gravel at 18-24". It is somewhat excessively drained and moderately acid (pH5.6-6.0). <u>Cobbles may be present thruout the profile.</u> Water movement thru soil is moderately rapid. Fertility and moisture holding capacity are low. Major problems: wind erosion and drouthiness due to poor water holding capacity of subsoil.</p>	
<p>164 - Class II</p> <p>Slope 0 to 6</p> <p>Erosion-Max. 2 to R</p>	<p>MORA LOAM</p> <p>Deep, light colored, loam with sandy clay loam subsoil, which becomes hard when dry, moderately well drained and moderately acid (pH5.6-6.0). Water movement thru soil is moderate. Fertility is moderate and moisture holding capacity is high. It is suited to most crops. Major problems: <u>water erosion, hard subsoil and may be stony.</u></p>	



THESE ARE THE SOILS THAT HAVE BEEN FOUND ON YOUR FARM

MAPPING UNIT	SHORT SOIL DESCRIPTION	CLASS
27T - Class III Slope 0 to 6 Erosion-Max.2 to R.	HUBBARD SANDY LOAM Dark colored, somewhat excessively drained sandy loam which is moderately acid (pH5.6-6.0). It is moderately fertile but has a low moisture holding capacity. Major problems: drouth and wind erosion.	Red 
81 - Class III	DEEP ORGANIC SOILS Peat or muck, 42" deep or more. It is very low in phosphate and potash and usually wet. Major problems: drainage, frost danger and fertility.	
152 - Class III Slope 6 to 12 Erosion- 3 & S 2 to R	The same soil as described in #152 on page 1, except that the slope and the erosion differ.	
155T - Class III Slope 6 to 12 Erosion-3 & S 2 to R	The same soil as described in #155T on page 1, except that the slope and the erosion differ.	
- Class III Slope 0 to 6 Erosion-Max.2 to R	SCANDIA SANDY LOAM Shallow, light colored sandy loam with sand and gravel at 18-36". It is somewhat excessively drained and moderately acid (pH5.6-6.0). Water movement thru soil is rapid. Its fertility is low. Major problems: water erosion, somewhat droughty due to poor water holding capacity of subsoil and cobbles may be present.	
- Class III Slope 0 to 6 Erosion-Max.2 to R	BRAHAM LOAMY FINE SAND Deep, light colored, somewhat excessively drained loamy fine sand underlain with heavier material at 18-48". It is moderately acid (pH5.6-6.0). Water movement thru soil is rapid in upper part and moderate in lower part. Its fertility and moisture holding capacity are low. This soil is suited to most crops. Major problems: wind erosion and drouth.	
179 - Class III Slope 0 to 6 Erosion-Max.2 to R	LANGOLA LOAMY SAND Deep, moderately dark colored, excessively drained loamy sand underlain with sandy clay loam material at 18-36". It is moderately acid (pH5.6-6.0). Water movement through soil is rapid. Water holding capacity and fertility are low. Major problems: wind erosion and drouth.	
- Class IV Slope 0 to 6 Erosion-Max.2 to R	HUBBARD LOAMY SAND AND LOAMY FINE SAND Very deep, dark to moderately dark colored loamy sand and loamy fine sand. The surface is 8-14" deep. It is moderately acid (pH5.6-6.0). The subsoil is loose fine sand. It is excessively drained. Moisture	Blue 


THESE ARE THE SOILS THAT HAVE BEEN FOUND ON YOUR FARM

MAPPING UNIT	SHORT SOIL DESCRIPTION	CLASS
8T - Class IV Slope 0 to 6 Erosion-Max.2 to R	<p>holding capacity and fertility are very low. Major problems: wind erosion and drouthiness.</p> <p>ZIMMERMAN FINE SAND AND HUBBARD SAND Very deep, loose sand which is moderately acid (pH 5.6-6.0) and very drouthy. Fertility is very low. Major problems: wind erosion and drouth. Not suitable for crop production.</p>	
83 - Class IV	<p>SHALLOW PEAT OVER SAND Peat or muck, underlain by sand at 12-42". It is low in phosphate and potash and is usually wet. Major problems: drainage, frost danger and fertility. Better suited to pasture and hay than regular crops.</p>	
14T - Class IV	<p>WARMAN SILTY CLAY LOAM Dark colored, poorly drained silty clay loam over sand and gravel at depths from 24-36". It is moderately acid (pH5.6-6.0) and fertility and moisture holding capacity are moderate. Organic matter content is high. It has poor surface drainage and a high water table. Major problems: wetness. Suited to shallow rooted legumes and grasses when drained.</p>	
160 - Class IV	<p>ZIMMERMAN - ISANTI - PEAT COMPLEX Deep, light colored, moderately well drained sandy soils mixed with dark colored wet sands or sandy loams plus areas of peat or muck. It is moderately acid (pH5.6-6.0). Fertility and water holding capacity are low. Water movement thru soil is moderately rapid. It usually borders wet areas. Major problems: drainage, wind erosion and drouthiness when drained.</p>	
161 - Class IV	<p>ISANTI LOAMY FINE SAND Very deep, moderately dark colored, moderately acid (pH5.6-6.0) loamy fine sand. It is very poorly drained. Water movement through soil is rapid but it has a high water table. Fertility and moisture holding capacity are low. Major problems: needs drainage for crop production and subject to wind erosion when drained. Best suited to shallow rooted legumes and grass crops.</p>	
162 - Class IV	<p>LINO LOAMY FINE SAND Very deep, light to moderately dark colored, somewhat poorly drained loamy fine sand. It is moderately acid (pH5.6-6.0). Water movement thru soil is rapid but it has a high water table. Fertility is very low. Moisture holding capacity is low. Major problems: wind erosion and drainage of wet spots. Best suited to grasses and shallow rooted legumes but o.k. for deep rooted legumes when drained.</p>	

THESE ARE THE SOILS THAT HAVE BEEN FOUND ON YOUR FARM

MAPPING UNIT	SHORT SOIL DESCRIPTION	CLASS
155T - Class IV Slope 12 to 18 Erosion-3 & S 2 to R	The same soil as described in #155T on page 1, except that the slope and the erosion differ.	
156 - Class IV Slope 0 to 6 Erosion-Max.2 to R	EMMERT GRAVELLY SANDY LOAM Shallow, light colored gravelly sandy loam or loamy sand underlain by sand and gravel at 12-18". It is excessively drained and moderately acid (pH5.6-6.0). Water movement through soil is rapid. Fertility is low and moisture holding capacity is very low. This soil is best suited to drought resistant forage crops. Major problems: wind erosion and drought.	
157 - Class IV Slope 0 to 6 Erosion-Max.2 to R	ZIMMERMAN LOAMY FINE SAND Very deep, light colored, somewhat excessively drained, moderately acid (pH5.6-6.0) loamy fine sand. Fertility and moisture holding capacity are low. Water movement through soil is moderately rapid. It is best suited to deep rooted legumes and forage crops. Major problems: droughtiness and wind erosion.	
81 - Class VI Slope 6 to 12 Erosion-3 & S 2 to R	The same soil as described in #8T on page 3, except that the slope and the erosion differ.	Orange 
20C - Class VI	ALLUVIAL SOILS These are mixed bottomland soils bordering rivers and streams which are subject to frequent flooding and tend to be very poorly to somewhat poorly drained. Fertility is usually moderate and they are probably moderately acid (pH5.6-6.0). Major problems: frequent overflow and wetness. Best use is improved pasture.	
156 - Class VI Slope 6 to 12 Erosion-3 & S 2 to R	The same soil as described in #156 above, except that the slope and the erosion differ.	
158 - Class VI Slope 6 to 12 Erosion - 3 & S 2 to R	The same soil as described in #158 above, except that the slope and the erosion differ.	
158 - Class VIII Slope 12 thru 25 Erosion - 3 & S 2 to R	The same soil as described in #8T on page 3, except that the slope and the erosion differ.	Brown 

THESE ARE THE SOILS THAT HAVE BEEN FOUND ON YOUR FARM

MAPPING UNIT	SHORT SOIL DESCRIPTION	CLASS
12 - Class VII Slope 0 thru 25 Erosion-1 thru 3, P, R, S	EMMERT GRAVEL AND SAND Light colored, loose gravel and sand. It is moderately acid (pH5.6-6.0), excessively drained and low in fertility. Major problems: drouth. Not suited to crop production.	
158 - Class VII Slope 12 thru 25 Erosion-3 & S 2 to R	The same soil as described in #158 on page 4, except that the slope and the erosion differ.	
53	MARSH Land that is usually too wet for soil survey, unclassified, non-agricultural.	Purple 

APPENDIX # 2

Tract Farming History

Records kept on file at refuge headquarters. They
are available upon request.

COOPERATIVE FARMING TOTALS BY CROP AND YEAR

	Corn	Rye(P)	Rye(H)	Clover	Oats	Oats/Clov. ^{**}	Alfalfa	Beans	Milo	Buckwheat	Swt.Clov.	Contract Acres	Total Acres
1967	268.6	187.4					12	21				489	489
1968	467	288	187.4			50		42				847	847
1969	616	262	288* 318	200		51						1447	1447
1970	724	397.5	262* 315.5	274			36		26		12	1785	1785
1971	716	266	298.5	147		39			7.5		75.5	1624	1510
1972	660	345	266* 331	124.5		104					60	1752	1588
1973	483	208	288	98.5		9.5						1195	1202
1974	500	222.5	173	93	27	27						1071	1042
1975	594	236	222.5* 265.5	84.5	61.5	65.5						1389.5	1280
1976	612.5	191	320	57		138.5	9			43(DNC)		1405.5	1371
1977													
1978													
1979													

Rye(P) = Proposed rye plantings as recorded on coop agreements.

Rye(H) = Proposed rye to be harvested (top number), rye actually harvested (bottom number).

* - Adjusted to meet figures for previous year.

** - Clover/Oats category is defined as being a seeding of oats as cover crop with clover or sweet clover.

FACT SHEET

FEB 20 1975

AGRICULTURAL ECONOMICS NO. 13-1975 TRUMAN NODLAND and PAUL HASBARGEN

Custom Rates in Southern Minnesota, 1974

Custom work serves a valuable function in spreading the cost of expensive machines over many farms. For farmers whose annual use of a machine is low, hiring custom work can result in lower costs. For farmers who have extra machine capacity and time to do custom work for others, hiring out will help spread the overhead cost of a specialized machine and bring in added earnings for the operator.

If you hire or do custom work and are faced with the problem of determining a charge for services performed, this fact sheet can help you. It summarizes custom rates in common use in southern Minnesota during 1974.

The data in tables 1-3 show custom rates in 1974 as reported in a questionnaire study. In total, 316 reports were received through the cooperation of county agricultural agents and vocational-agriculture instructors in the southern half of the state.

The data reported are the most common rate and the second and third most common rates for various custom operations in southeastern and southwestern Minnesota. Variation

between the two areas was relatively small. The rates reported are not those that should be charged to cover all costs, but rather those rates that were in use during 1974. Variations may exist in an area because of differences in the size and type of equipment used, crop yield and condition, field shape and size, and services performed. Also, some operators probably had not adjusted their rates to the higher machine and fuel prices of 1974 while others had.

Rates include charges for the use of the machine, for the time and service of the operators, and for mechanical power. Other supplies such as twine for a baler, gasoline, oil, and grease also are commonly furnished by the custom operator. In the cases reported here, fuel was furnished by the custom operator when tractor power or self-propelled units were used.

Because of inflation, custom operators need to periodically recheck their costs to determine what they should be charging. For help in making these cost estimates, obtain a copy of FM-604, "Custom Rates: How to Calculate," from your county agent.

Table 1. Custom rates charged in southeastern Minnesota, 1974

Operation	Basis of charge	Total no. reporting this operation	Most common rate		Second most common rate		Third most common rate	
			No. reporting	Rate	No. reporting	Rate	No. reporting	Rate
✓ Plowing, spring	acre	24	6	\$ 6.00	5	\$ 5.00	4	\$ 6.50
✓ Plowing, fall	acre	22	5	8.00	4	7.50	*	
					4	7.00		
✓ Plowing, chisel	acre	14	5	4.00	*		*	
✓ Discing, tandem	acre	20	7	2.00	6	2.50	4	3.00
✓ Field cultivating	acre	13	5	2.50	*		*	
✓ Planting corn, with fertilizer attachment	acre	15	6	3.00	*		*	
✓ Cultivating corn or beans	acre	24	13	2.00	4	2.50	*	
✓ Applying anhydrous ammonia	acre	37	14	2.50	9	2.00	6	3.00
✓ Applying fertilizer broadcast by truck	acre	22	9	.50	5	1.00	*	
✓ Spraying weeds, ground, no materials	acre	41	20	2.00	8	2.25	5	1.50
✓ Swathing small grain	acre	49	17	3.00	8	5.00	7	3.50
							7	4.00
✓ Combining small grain	acre	52	14	8.00	10	10.00	8	9.00
✓ Combining soybeans	acre	57	19	10.00	10	8.00	7	12.00
✓ Harvesting corn with a combine	acre	56	14	12.00	8	15.00	7	13.00
					8	14.00	6	10.00
Baling, pull wagon	bale	24	8	.15	5	.20	4	.25
Filling silo, corn silage, field chopper	hour	29	7	30.00	6	20.00	*	
Corn shelling	bushel	19	5	.07	4	.05	*	
					4	.08		
✓ Corn hauling: less than 5 miles	bushel	29	10	.05	8	.04	4	.06
5 to 9 miles	bushel	34	10	.06	9	.05	7	.04
10 miles or more	bushel	14	6	.06	*		*	

* Fewer than four reports.

Table 2. Custom rates for farm operations in southwestern Minnesota, 1974

Operation	Basis of charge	Total no. reporting this operation	Most common rate		Second most common rate		Third most common rate	
			No. reporting	Rate	No. reporting	Rate	No. reporting	Rate
Plowing, spring	acre	22	7	\$ 6.00	4	\$ 7.00	*	
Plowing, fall	acre	55	16	7.00	15	6.00	10	\$ 6.50
Chisel plowing	acre	18	6	5.00	4	6.25	*	
Discing, tandem	acre	21	5	2.50	4	3.50	*	
			5	3.00				
Field cultivating	acre	18	7	2.00	4	3.00	*	
					4	3.50		
Corn stalk chopping	acre	23	6	2.00	*		*	
			6	3.00				
Cultivating corn or beans	acre	27	12	2.00	6	3.00	*	
Applying anhydrous ammonia	acre	51	15	2.00	11	2.50	6	1.50
Applying fertilizer broadcast by truck	acre	46	16	1.00	11	1.50	6	.75
Weed spraying, ground, no materials	acre	63	21	2.00	14	1.50	10	1.75
Swathing small grain	acre	89	25	3.00	18	2.50	13	2.00
Combining small grain	acre	97	21	7.00	9	6.50	8	5.00
			21	8.00				
			21	6.00				
Combining soybeans	acre	93	27	8.00	24	10.00	14	7.00
✓ Picking corn	acre	16	5	6.00	*		*	
Harvesting corn with combine	acre	88	27	10.00	23	12.00	9	9.00
Baling, pull wagon	bale	40	19	.20	6	.15	*	
					6	.25		
Filling silo, corn silage, field chopper	hour	34	11	25.00	5	15.00	4	20.00
Corn shelling	bushel	33	8	.05	6	.04	4	.07
Corn hauling: less than 5 miles	bushel	27	11	.03	8	.04	5	.05
5 to 9 miles	bushel	28	6	.03	*		*	
			6	.04				
			6	.05				
10 miles or more	bushel	27	8	.04	*		*	
			8	.05				

Fewer than four reports.

Table 3. Custom rates charged in southern Minnesota, 1974†

Operation	Basis of charge	Total no. reporting this operation	Most common rate		Second most common rate		Third most common rate	
			No. reporting	Rate	No. reporting	Rate	No. reporting	Rate
Harrowing, springtooth	acre	18	5	\$ 2.00	4	\$ 1.00	*	
			5	4.00				
Drilling grain, no fertilizer attachment	acre	25	6	2.00	5	3.00	4	\$ 2.50
			6	2.50				
Planting corn, no attachments	acre	20	5	3.00	4	2.00	*	
			5	2.50				
Planting corn with fertilizer, herbicide, and insecticide attachments	acre	24	7	4.00	*		*	
Planting beans, no attachments	acre	24	7	3.00	5	2.00	4	2.50
Planting beans, with herbicide attachment	acre	18	6	3.00	5	4.00	*	
Rotary hoeing	acre	15	6	2.00	5	1.00	*	
Applying liquid fertilizer by truck	acre	20	5	2.00	4	1.00	*	
Weed spraying by airplane	acre	23	9	2.00	5	2.50	*	
Harvesting corn, picker sheller	acre	16	7	12.00	5	10.00	*	
Mowing hay with conditioner	acre	32	12	4.00	5	3.50	*	
					5	4.50		
Mowing hay with windrower	acre	30	6	5.00	5	3.00	*	
					5	4.00		
Harvesting cornstalks with stack forming wagons	3-ton stack	41	8	15.00	6	20.00	*	
					6	18.00		
Stacking stacks, hydraulic stack movers (less than 2 miles)	stack	8	5	2.00	*		*	
Stack chopping, hay	hour	20	5	35.00	*		*	
			5	20.00				
Loading manure	hour	24	5	10.00	4	15.00	*	
Bulldozing	hour	50	12	25.00	8	30.00	7	35.00

†Too few cases for distribution by area.

*Fewer than four reports.

EXAMPLE OF 1977 SHARE DIVISION

1. The following crops and acres were farmed by the cooperator under the cooperative farming agreement:

Corn	40 acres @ \$15.00/acre (rental rate)	\$600.00
Rye (78)	30 acres @ \$15.00/acre	450.00
Rye (H)	20 acres @ \$00.00/acre	00.00
Clover	30 acres @ \$15.00/acre	450.00
		<u>\$1,500.00</u>

The total rental value of lands under the cooperative farming agreement is \$1,500.00.

2. The following calculation is used to determine the number of acres of crops that will be the governments share.

$$\$1,500 \text{ cash rent value} \div \$78.00 \text{ average production cost/acre}$$

$$\text{corn} = \underline{19.23 \text{ acres of corn.}}$$

The average production cost/acre figure for each crop involved in determining the government's share is calculated from the current Univ. of Minn. Fact Sheet "A-E No 13" Custom Rates in Southern Minnesota (Appendix # 3). The total cost of the crops planted for the refuge (\$1,499.94) approximately equals the total value of lands participating in the cooperative agreement (\$1,500.00).
3. In this example, the cooperator will provide the refuge with 19.23 acres of corn.

APPENDIX # 5

Information for Appendix # 5 was obtained from the ASC Office, Elk River and from the "Agricultural Economics # 13-1975," Agricultural Extension Service, University of Minnesota, Wredbergs Feed Mill, and Princeton Coop, Princeton.

(2/27/76)

CORN

Machine cost:

Plow-spring	\$6.00/acre
Disc	2.50/acre
Plant	3.00/acre
Apply Anhyd. Amm.	2.50/acre
Spray weeds	2.25/acre
Harvest corn w/combine	<u>12.00/acre</u>
Subtotal	\$28.25/acre

Fertilizer:costs for sandy soil:

Plowdown 0-0-60(Potash) 200 lb/ac @ \$100.00/Ton	=10.00/acre
Planter(starter)6-12-24 100 lb/ac @ \$140.00/ton	= 7.00/acre
Comm. apply(side dress) 125 lb/ac @ .12/lb.	= <u>15.00/acre</u>
Anhyd. Amm.	Subtotal \$32.00/acre

Alternate starter 20-60-20	160 lb/ac @ \$175.00/ton =14.45/acre
----------------------------	--------------------------------------

Seed costs:

Single cross 50 lb. bag @ \$38.00/bag or \$42.00/bu.	= \$9.33/acre
Subtotal	\$9.33/acre

Weed control costs:

Atrazine @ 2½ lb/ac. @ \$2.95/lb	\$7.38/acre
Crop oil(pre emergent)	<u>1.47/acre</u>
Subtotal	\$8.85/acre

TOTAL COST \$78.43/acre

Price for corn (2/27/76) \$2.29/bushel.

Estimated average corn production, yearly, assuming average amounts of rainfall and average number of frost-free days is 50 bushels/acre.

50 bu./acre X \$2.29/bu. = \$114.50/acre

Current land rental rate for north central Sherburne County is between \$8.00 and \$20.00 per acre with the average cash rental

Corn (cont'd)

price for Isanti-Zimmerman sand soil being about \$12.00/acre. Cooperative farmers should received \$114.50/acre gross cash income per acre. From this, \$78.43/acre for production costs must be subtracted: $\$114.50 - \$78.43 = \$36.07$. \$36.07 would be net cash profit before rent. From this, the cash land rental rate of \$12.00/acre will be subtracted: $\$36.07 - \$12.00 = \$24.07$. \$24.07 would be realized profit from each acre of land.

$\$24.07 = 2/3$ cooperator's share

$\$12.00 = 1/3$ refuge's share

(3/2/76)

RYE

Machine costs:

Plowing (fall)	\$8.00/acre
Disc	2.00/acre
Drill grain	2.50/acre
Apply fertilizer(broadcast)	.50/acre
Swathing grain	3.00/acre
Combining small grain	8.00/acre
Subtotal	<u>\$24.00/acre</u>

Fertilizer costs for sandy soil:

Plowdown (seeding)(Starter)	
5-20-20 @ 150 #/Ac. or \$111/ton or \$8.25/acre	
or 10-20-20 @ 120 #/Ac. or \$123/ton or 7.32/acre	
or 30-30-30 @ 150 #/Ac. or \$160/ton or <u>12.00/acre</u>	
Subtotal	<u>\$8.25/acre</u>

Top dress (broadcast)	
Amm. Nitrate 34-0-0 @ 75#/Ac. or \$123/ton or \$4.58/acre	
+ P ₂ O ₅ (potash) 0-0-60 @ 25#/Ac. or \$100/ton or <u>1.25/acre</u>	
Subtotal	<u>\$5.83/acre</u>

Seed costs:

Certified rye seed \$3.50/bu. @ 1.5 bu./ac. =	<u>\$5.25/acre</u>
Subtotal	<u>\$5.25/acre</u>

Weed control:

Normally none-may need spot spraying for control of thistle or mustard.

TOTAL COST \$43.33/acre

Price for rye (2/27/76) \$2.52/bushel.

Estimated average rye production, yearly, assuming average amounts of rainfall would be about 30 bushels/acre.

30 bu./acre X \$2.52/bu. = \$75.60/acre

Current land rental rate for north central Sherburne County is

Rye (Cont'd)

between \$8.00 and \$20.00 per acre with the average cash rental price for Isanti-Zimmerman sand soil being about \$12.00 /acre.

Cooperative farmers should receive about \$75.60/acre gross cash income per acre. From this, \$43.33/acre for production costs must be subtracted: $\$75.60 - \$43.33 = \$32.27$.

\$32.27 would be net cash profit before rent. From this, the cash land rental rate of \$12.00/acre will be subtracted: $\$32.27 - \$12.00 = \$20.27$. \$20.27 would be net realized profit from each acre.

\$20.27 = Cooperator's share

\$12.00 = Refuge's share

(3/2/76)

RED CLOVER

Machine cost:

Plow (spring)	\$6.00/acre
Disc	2.00/acre
Harrow or pack	2.00/acre
Seeding	1.50/acre
Mow hay w/conditioner	4.00/acre
Bale-60 bales @ .20	12.00/acre
or	
combining clover seed	
Subtotal	<u>\$27.50/acre</u>
	(clover only)

Fertilizer costs:

Plowdown 0-0-60 @ 175#/Ac. or \$100/ton	\$8.75/acre
Top dress 30-30-30 @ 165#/Ac. or \$161/ton	<u>13.54/acre</u>
Subtotal	<u>\$22.29/acre</u>
	(clover only)

Seed costs:

2 year clover(red) \$1.08/lb. or \$64.80/bu.	
7 lbs. seed/acre @ \$1.08/lb. =	<u>\$7.50/acre</u>
Subtotal	<u>\$7.50/acre</u>

Weed control:

None on red clover ground - fields should be cleaned from
2 years corn in previous standard rotation.

TOTAL COST \$57.29/acre
(clover only)

Price for red clover (2/27/76) \$.30/lb. as seed.

Estimated average red clover production in harvested seed,
assuming normal rainfall, etc. is about 125 lbs./acre.

125 lb./acre X .30/lb. = \$37.50

Current land rental rate for north central Sherburne County is
between \$8.00 and \$20.00 with the average cash rental rate for
Isanti-Zimmerman sand soil being about \$12.00/acre.

Red Clover (Cont'd)

Cooperative farmer should receive \$37.50/acre gross cash income per acre. From this, \$55.74/acre for production costs must be subtracted: $\$37.50 - \$55.74 = -\$18.24$.

-\$18.24/acre is net cash profit before rent. Deduct rent of \$12.00/acre: $-\$18.24 + \$12.00 = -\$30.24$. Cooperator will lose -\$30.24/acre.

Price for red clover hay (2/27/76) \$.80/bale.

Estimated average red clover production in hay, assuming normal rainfall, etc. is about 60-50 lb. bales/acre.

60 bales/acre X \$1.00/bale = \$60.00/acre.

Current land rental rate from north central Sherburne County is between \$8.00 and \$20.00 per acre, with the average cash rental rate for Isanti-Zimmerman sand soil being about \$12.00/acre.

Cooperative farmer should receive \$60.00/acre gross cash income per acre. Deduct \$55.74/acre for production costs: $\$60.00 - \$55.74 = \$4.26$ /acre net profit before land rental. Deduct \$12.00 cash land rental from \$4.26/acre net profit: $\$12.00 - \$4.26 = \$7.74$. Cooperator will lose -\$7.74/acre.

Red Clover (Cont'd)

Red clover with oats as cover crop.

Clover machine costs: $\frac{1}{2}$ of \$27.50 = \$13.75/acre

Fertilizer costs: $\frac{1}{2}$ of \$22.29 = \$11.14/acre

Seed costs: \$5.95/acre or $5\frac{1}{2}$ lb. seed/acre @ \$1.08
\$ 5.95/acre

Total Cost \$30.84/acre

Land rental rate would be same at about \$12.00/acre.

Total Production cost: \$30.84

Land Rental Rate: \$12.00

Total cost \$42.84

Gross Profit/Acre: \$37.50

Total cost \$42.84

~~-\$ 5.34/acre~~

Cooperator will lose ~~-\$5.34/acre.~~

(3/3/76)

OATS as Cover Crop for Red Clover

Machine Cost:

These costs can be split with the costs for sowing red clover. Assume one-half of machine cost for each: $\frac{1}{2}$

of \$27.50/acre = \$13.75/acre

Fertilizer Costs:

These costs can be split with the costs for sowing red clover since they are companion crops: $\frac{1}{2}$ of \$22.95 =

\$11.15/acre

Seed costs:

Certified oats seed @ \$3.45/bu.

$2\frac{1}{2}$ bu./acre @ \$3.45/bu. = \$8.63/acre

Weed control:

No weed control needed.

TOTAL COST \$33.53/acre

Price for oats (2/27/76) \$1.37/bushel.

Estimated average oats production, assuming normal rainfall and proper fertilizing, should be around 35 bushels/acre.

$35 \text{ bu./acre} \times \$1.37/\text{bu.} = \$47.95/\text{acre}$

* Current land rental rate is \$12.00. Cooperative farmer should receive \$47.95/acre gross cash income per acre. From this, \$33.53/acre for production costs must be deducted: $\$47.95 - \$33.53 = \$14.42$.

Oats (cont'd)

\$14.42/acre is net cash profit before rent. Deduct rent of \$12.00/acre: $\$14.42 - \$12.00/\text{acre} = \$2.42/\text{acre}$. \$2.42 would be net realized profit from each acre of land.

* Land rental on oats as cover crop may be withheld, since clover returns are poor return investment. This crop helps the farmer recover some of his loss.

SPECIAL CONDITIONS

1. All crop residue will be left on the field, except as designated by the Refuge Manager.
2. Corn will not be cut for silage except by special permission of the Refuge Manager.
3. No burning permitted on refuge cropland.
4. Cooperator is responsible for weed control on his cropland. He shall notify Refuge Manager in advance of any proposed application of herbicide, and shall not carry out any pesticide operation without prior approval of the Refuge Manager.
5. All plowing will be done in the spring for corn and clover. Fall plowing is acceptable for rye. No fields will lay fallow (plowed) over the winter months. An effort will be made to keep the soil black during the shortest time possible.
6. Seed treated with mercury compounds shall not be used on refuge lands.
7. Red clover should be seeded at 8 #/acre, either in May or August.
8. One harvest of red clover either seed or hay will be permitted after July 20 of the second year.
9. Corn should be planted prior to May 20; rye by Septemeber 1.
10. Unless specified differently in the contract, minimum fertilization for both corn and rye will be: 5 # N, 20 # P₂O₅, 40 # K₂O per acre, plus side-dress corn with 60 # N per acre, Top dress rye with 30 # N per acre. Cooperators will furnish the Refuge Manager with sales receipts for fertilizer and lime used on refuge lands.

EXAMPLE OF SPECIAL CONDITIONS TO BE ATTACHED TO THE COOPERATIVE
FARMING AGREEMENT

The Cooperative Farmer _____ hereby agrees to the following arrangement for crop shares on lands farmed under the attached Cooperative Farming Agreement.

1. The basic share division on all crops produced under this agreement will be based upon the local cash rental rate of \$15.00 per acre for comparable cropland in the vicinity of the refuge. (Subject to periodic review of local cash rental rates.)
2. The cooperator will "pay" what would be the total cash rent for all cropland acres farmed under this agreement (at the \$15.00 per acre rate), in acres of crops produced on the refuge for wildlife use. The number of acres he must produce for wildlife use will be equal (in cost of production) to what he would pay in cash rent. The number of acres of each crop the cooperator must produce for wildlife use on the refuge, to equal what he would pay in cash rent, are listed on the attached agreement.
3. The cost of producing crops on the refuge for wildlife use will be based on the University of Minnesota Agricultural Extension Services Fact Sheet AE-13, "Custom Rates in Southern Minnesota" for the current year, and upon local costs for seed, fertilizer, pesticides and other farm supplies.

Appendix # 7

4. In the event the Cooperator requests the refuge to assist with certain field operations the same "Custom Rates in Southern Minnesota" will be used in determining the cost of the operation. This cost to the refuge may then be applied to additional acres of crops to be received from the Cooperators share.
5. Crop divisions, based upon the cooperative farming agreement, and all conditions stated therein, must be agreed upon in the field by the permittee and the refuge manager prior to harvest.
6. The refuge share of corn will be left standing in the field unless otherwise specified by the refuge manager. Shares will be divided on the basis of the number of rows present in each field. The cooperator will harvest his share of rows, alternately leaving the refuge share. When total acres produced for wildlife is used as a division guideline, then the refuge's percentage of the crop will be computed from the total acreage planted by the cooperator.
7. Due to variable circumstances, in some years wildlife may not fully utilize the entire corn crop left in the field over winter. Depending upon the spring weather, soil aeration, and wildlife use, a certain amount of ear corn will be left available for harvest. The cooperator who has the contract for this farming unit may harvest this crop

Appendix # 7

providing that 50% of the harvest is delivered to the refuge. In the event the contract holder is not interested in harvesting the crop, it may be offered to any other cooperator or interested party for harvest. Special permission for this operation must first be obtained from the refuge manager before any spring corn picking may be started.

8. Unless specified differently in the contract, minimum fertilization for both corn and rye will be: 5 # N, 20 # P_2O_5 , 40 # K_2O per acre, plus side-dress corn with 60 # N per acre, Top dress rye with 30 # N per acre. Cooperators will furnish the refuge manager upon request with sales receipts for fertilizer and lime used on refuge lands.
9. The cooperator will have full responsibility for all costs involved with his farming operation on the refuge. If the cooperator is asked to do any additional farming operations for the refuge, such as harvesting some of the refuge's share of the standing corn, hauling corn to the bin, or others, the refuge will reimburse the cooperator by increasing his share of the crop.
10. All crop residue will be left on the field, except as designated by the refuge manager.
11. Corn will not be cut for silage except by special permission from the refuge manager.
12. No burning permitted on refuge cropland.

13. Cooperator is responsible for weed control on his cropland. He shall notify refuge manager in advance of any proposed application of herbicide, and shall not carry out any pesticide operation without prior approval of the refuge manager.
14. All plowing will be done in the spring for corn and clover. Fall plowing is acceptable for rye. No fields will lay fallow (plowed) over the winter months. An effort will be made to reduce the amount of time soil lies without cover.
15. Seed treated with mercury compounds shall not be used on refuge lands.
16. Red clover should be seeded at 8 #/acre, either in May or August.
17. One harvest of red clover either seed or hay will be permitted after July 20 of the second year.
18. Corn should be planted prior to May 20; rye by September 1.
19. The cooperator will keep accurate records of farming including dates, seeding rates, harvest yields, etc.
20. This Cooperative Farming Agreement is subject to annual review and revision by the Cooperative Farmer and Refuge Manager.

Date: _____

(Signature)

Cooperative Farmer
(Title)

Date: _____

(Signature)

Refuge Manager
(Title)