Moose River Impoundment Project

GENERAL

The project, which is a two pool design, was a cooperative effort of the Red Lake Watershed District and the Mn department of Natural Resources for flood control and wildlife management. Flood damages will be reduced by impounding floodwaters in the upper reaches of the watershed. Wildlife and associated recreational benefits will be enhanced by water retained in the two pools. The project is constructed on lands managed by and the Mn department of Natural Resources.

LOCATION

The project is located at the headwaters of the Moose and Mud Rivers in northwestern Beltrami County, approximately 15 miles northeast of Grygla, MN.

PURPOSE

Multi-purpose – designed to provide flood control, streamflow maintenance, increase wildlife values, and benefit fire control

PROJECT COMPONENTS

North Pool: The North Pool outlets into the Moose River (JD #21). The major components of the north pool are: 5 miles of diversion ditch, 4 miles of earthen dike with a top elevation of 1218.0, one gated outlet structure, one rock lined emergency spillway at an elevation of 1216.0. Approximately 1/3 (41.7 sq. mi.) of the total project drainage area (125.0 sq. mi.) drains to the Moose River.

South Pool: The South Pool outlets into the Mud River (JD #11). The major components of the south pool are: 3 miles of diversion ditch, 9 miles of earthen dike with a top elevation of 1220.0, 4 miles of earthen dike between the north and south pools, one gated outlet structure, two rock lined emergency spillways at an elevation of 1218.0. Included between the pools is an interpool structure which may be used to pass water between the pools. Approximately 2/3 (83.3 sq. mi.) of the total project drainage area (125.0 sq. mi.) drains to the Mud River.
Moose River Impoundment Project

FUNCTIONAL DESIGN DATA

<table>
<thead>
<tr>
<th></th>
<th>North Pool</th>
<th>South Pool</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Dam Elev. (ft.-msl)</td>
<td>1218.0</td>
<td>1220.0</td>
<td></td>
</tr>
<tr>
<td>Freeboard Flood Elev. (ft.-msl)</td>
<td>1217.2</td>
<td>1219.3</td>
<td></td>
</tr>
<tr>
<td>Freeboard Flood Storage (ac.ft.)</td>
<td>16,250</td>
<td>38,250</td>
<td>54,500</td>
</tr>
<tr>
<td>Emer. Spillway Elev. (ft.-msl)</td>
<td>1216.0</td>
<td>1218.0</td>
<td></td>
</tr>
<tr>
<td>Emer. Spillway Storage (ac.ft.)</td>
<td>12,000</td>
<td>24,250</td>
<td>36,250</td>
</tr>
<tr>
<td>Gated Pool Elev. (ft.-msl)</td>
<td>1215.3</td>
<td>1217.4</td>
<td></td>
</tr>
<tr>
<td>Gated Pool Storage (ac.ft.)</td>
<td>9,750</td>
<td>19,750</td>
<td>29,500</td>
</tr>
<tr>
<td>Typical Summer Elev. (ft.-msl)</td>
<td>1211.7</td>
<td>1213.6</td>
<td></td>
</tr>
<tr>
<td>Typical Summer Storage (ac.ft.)</td>
<td>2,000</td>
<td>4,000</td>
<td>6,000</td>
</tr>
<tr>
<td>Typical Winter Elev. (ft.-msl)</td>
<td>1210.5</td>
<td>1212.4</td>
<td></td>
</tr>
<tr>
<td>Typical Winter Storage (ac.ft.)</td>
<td>800</td>
<td>1,800</td>
<td>2,600</td>
</tr>
<tr>
<td>Max No-Flood Elev. (ft.-msl)</td>
<td>1212.5</td>
<td>1214.5</td>
<td></td>
</tr>
<tr>
<td>Max No-Flood Storage (ac.ft.)</td>
<td>3,000</td>
<td>6,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Project Drainage Area (sq. mi.)</td>
<td>41.7</td>
<td>83.3</td>
<td>125.0</td>
</tr>
</tbody>
</table>

OPERATION & MAINTENANCE

Operation of the floodgates is the responsibility of the Red Lake Watershed District. A local person monitors and records the pool elevations and streamgages and operates the floodgates as directed by the Red Lake Watershed District. Outflows from the pools are coordinated with Agassiz National Wildlife Refuge and Thief Lake Wildlife Management Area. Maintenance items are the responsibility of the Red Lake Watershed District and the State.

COST

The total project cost was approximately $3.4 million. Funding was provided by the following:

- State of Minnesota: $1,690,000
- Red Lake Watershed District: $612,000
- Red R. Watershed Management Board: $1,126,000

OPERATIONAL

1988
Lost River Impoundment Project

GENERAL

In approximately the mid 1970's, the project was constructed by the Mn Department of Natural Resources to improve waterfowl habitat. On December 14, 1978 the Red Lake Watershed District entered into a formal agreement with the Mn Department of Natural Resources to modify the original impoundment by raising the elevation of the dike and emergency spillway. Four (4) 48 in. diameter gated pipes and a spillway from ditch 200 of JD #11 supply water to the impoundment which is an "off channel" reservoir.

LOCATION

Marshall County, Grand Plain Township, approximately 20 miles northeast of Thief River Falls. The drainage area above the impoundment is 53 square miles.

PURPOSE

Multi-purpose – designed to increase wildlife values, and provide flood control

PROJECT COMPONENTS

Approximately 10 miles of earthen embankment, an outlet control structure, and an emergency spillway into Ditch 200.

FUNCTIONAL DESIGN DATA

<table>
<thead>
<tr>
<th></th>
<th>Elev. (ft. – msl)</th>
<th>Storage (ac. – ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Dam</td>
<td>1150.2</td>
<td>14,600</td>
</tr>
<tr>
<td>Emergency Spillway</td>
<td>1148.2</td>
<td>10,000</td>
</tr>
<tr>
<td>Typical Summer</td>
<td>1146.2</td>
<td>5,500</td>
</tr>
<tr>
<td>Typical Winter</td>
<td>1145.2</td>
<td>3,700</td>
</tr>
</tbody>
</table>

Drainage Area – 53.0 sq. mi.

OPERATION & MAINTENANCE

Operation and maintenance is the responsibility of the State.

COST

To modify approximately - $109,000

OPERATIONAL

1978
Elm Lake Project  
(Farmes Pool)

GENERAL

Elm Lake was drained in about 1920 by the construction of Branch #200 of Judicial Ditch #11. The Elm Lake project is a cooperative effort of the U.S. Fish and Wildlife Service, Mn Department of Natural Resources, Red Lake Watershed District, and Ducks Unlimited. Majority of funding for the project was provided by Ducks Unlimited, Inc. At the time, this was the largest Ducks Unlimited project in the lower 48 states.

LOCATION

Marshall County, approximately 17 miles northeast of Thief River Falls. The drainage area of ditch 200 above Elm Lake is 63 square miles.

PURPOSE

Multi-purpose – designed to meet three major objectives: Flood control, Increase wildlife values, and upstream drainage improvement

PROJECT COMPONENTS

Approximately 9 miles of earthen embankment, an outlet control structure, rock lined emergency spillway, and an enlargement of a portion of Ditch 200.

FUNCTIONAL DESIGN DATA

<table>
<thead>
<tr>
<th></th>
<th>Elev. (ft. – msl)</th>
<th>Storage (ac. – ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Dam</td>
<td>1145.0</td>
<td>19,700</td>
</tr>
<tr>
<td>Emergency Spillway</td>
<td>1142.0</td>
<td>11,000</td>
</tr>
<tr>
<td>Max Summer</td>
<td>1141.0</td>
<td>7,500</td>
</tr>
<tr>
<td>Typical Summer</td>
<td>1140.0</td>
<td>5,500</td>
</tr>
<tr>
<td>Typical Winter</td>
<td>1139.0</td>
<td>3,500</td>
</tr>
</tbody>
</table>

Drainage Area – 63.0 sq. mi.

OPERATION & MAINTENANCE

During significant flood events the Red Lake Watershed District will determine the need to install additional stop-logs to provide downstream flood control. Operation of the outlet structure is the responsibility of Agassiz National Wildlife Refuge. Various maintenance items are the responsibility of either the U.S. Fish and Wildlife Service, State of Minnesota, or Red Lake Watershed District.

COST

Approximately - $2 million

OPERATIONAL

1991
SCHIRRICK DAM #25
RED LAKE WATERSHED DISTRICT

LOCATION: Black River, T152N, R45W

DRAINAGE AREA: 107.7 square miles

FLOOD POOL:

<table>
<thead>
<tr>
<th>Gated Storage</th>
<th>Temporary Storage</th>
<th>Total Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000 ac.ft.</td>
<td>800 ac.ft.</td>
<td>4800 ac.ft (.8&quot;)</td>
</tr>
<tr>
<td>Elev. 962 - 987</td>
<td>Elev. 987 - 989.3</td>
<td></td>
</tr>
</tbody>
</table>

DESCRIPTION:

The Schirrick Dam was constructed in 1984. The primary purpose of the project is to provide flood relief on the Red Lake River and the Red River of the North by controlling the flow contribution from the Black River. A small permanent pool is also provided.

The dam consists of the following components: An earthen embankment and reservoir with capacity to detain up to 4,800 acre-feet of water and a gated outlet control structure.

The operable components of the dam are the stoplog bays and the flood control gates. The stoplog bays control the elevation of the permanent pool. The floodgates control the flow contribution of the Black River during floods. The outlet structure has large enough flow capacity to pass Black River flood flows with minimal waste of storage. The gates will normally be open, and will only be closed in the event of severe mainstem flooding. The flood gates will be closed 24 hours in advance of a predicted stage of 26 feet in Crookston, or 60 hours in advance of a predicted stage of 46 feet in Grand Forks.

COST: $1,019,000

OPERATIONAL DATE: January 1985
FACT SHEET

RED LAKE DAM

GENERAL: The U.S. Army Corps of Engineers operates the dam at the outlet of the Red lakes. The dam was completed in 1951. Operation of the dam provides major flood control and stream flow maintenance benefits.

LOCATION: The dam is located in Clearwater County on the western shore of Lower Red Lake. Trunk Highway 89 crosses the dam approximately 12 miles northwest of the village of Red Lake and 42 miles southeast of Thief River Falls.

RESERVOIR INFORMATION: Upper and Lower Red Lake comprise the largest lake area wholly contained within Minnesota. The Red Lakes have a surface area of approximately 290,000 acres (453 square miles). With over 1 million acre-feet of flood storage, Red Lake is by far the largest reservoir in the Red River Valley.

DISCHARGE CAPACITY: The discharge capacity of the dam is very small in relation to the size of the drainage area (and reservoir); therefore control efforts to release high water can take years. The current outflow capacity of approximately 1000 cfs can lower the lake level only .2 foot per month (assuming no inflow).

DAM OPERATION: The dam is manually operated in relation to stages in the lake and downstream on the Red Lake River at Highlanding.

a. Problem: When the lake is above target levels, water is discharged at the capacity of the downstream channel. Rainfall events, combined with high discharges from the dam, often cause flooding of ag lands along the Red Lake River. The flow travel time of 1.5 days from the dam to Highlanding, and the dam operators living off-site at Winnibigoshish, Leech, or Pokegama Dams, cause a lag in response time and contribute to the problem.

b. Solutions: One possible solution involves modification of operations to include: remote sensing of lake and river stages, and precipitation; and remote control capabilities of the dam. These modifications are presently being considered, and could lessen the lag time between hydrologic occurrences and gate operations at the dam.
FACT SHEET
GOOD LAKE PROJECT

INTRODUCTION: The Good Lake Project is a cooperative effort of the Red Lake Band of Chippewa Indians, and the Red Lake Watershed District to provide wetland habitat, flood water retention, and a potential irrigation water supply.

LOCATION: The project area lies entirely within the Red Lake Indian Reservation. The site is approximately 30 miles east of Thief River Falls, within Clearwater and Beltrami Counties.

PROJECT COMPONENTS: The project includes the following main components: approximately 9 miles of dike at elevation 1178.5, 7.5 miles of inlet channels, a reinforced concrete outlet structure, and 2 miles of outlet channel and access road.

FISH AND WILDLIFE: The project will provide expanded and enhanced wetland habitat for waterfowl, furbearers, and other wetland species. The normal water level of Good Lake will be increased approximately 3 feet, which will expand the water surface area from the existing 84 acres to 1800 acres. The reservoir will also have potential to be used for seasonal rearing of northern pike.

FLOOD CONTROL: The project will reduce flood peaks on both the Red Lake River and the Red River of the North. The dam will store runoff from the 82 square mile drainage area. Spring storage capacity is 11,300 ac.ft., equal to approximately 2.6 inches of runoff from the drainage area. The project will also reduce flooding on approximately 4000 acres of private land immediately west of the project, by intercepting overland flows.

WATER SUPPLY: The reservoir may be used as a water supply for irrigation of wildrice paddies. Paddies have not been built, but there is a potential for paddy development in adjacent areas.

COST: The total project cost is $2,129,000. Project funding or in-kind contributions were provided by the following:

- Red Lake Band of Chippewa Indians
- Red Lake Watershed District
- Red River Watershed Management Board
- State of Minnesota
INTRODUCTION:

This dam was constructed as part of an overall PL-566 project in the Burnham Creek Watershed. The dam was completed in 1988. The project was designed and built by the U.S.D.A. Soil Conservation Service. Local sponsors were the East and West Polk Soil and Water Conservation Districts and the Red Lake Watershed District.

LOCATION:

The dam is located in Polk County approximately 14 miles southeast of Crookston. The dam is built on the downstream side of a beach-ridge of glacial Lake Agassiz. Water is stored in parts of Sections 1, 2, 11, and 12 of Onstad Township (T148N, R45W).

PROJECT COMPONENTS:

The dam includes an earthen embankment approximately 1.8 miles long, with a maximum height of 18 feet. The outlet structure consists of a two-stage riser with a five foot diameter outlet pipe. Two pools were created by the project: a permanent wildlife pool consisting of a restored wetland, and a temporary flood pool.

WILDLIFE HABITAT:

A 62 acre permanent wildlife pool was created in the upper part of the impoundment by restoring a drained wetland. Over 130 bird species have been identified on the site with 60 species nesting here. The area is used heavily by migrating waterfowl including flocks of up to 5000 Sandhill Cranes. The area is managed by the Minnesota Department of Natural Resources as a waterfowl refuge.

FLOOD CONTROL:

The flood control goal of the project is to reduce flooding of agricultural lands downstream. The pool has a flood storage volume of 1023 ac.ft. and will store approximately two inches of runoff from the 8.1 square miles that drains into the dam. The dam is located in the headwater area of County Ditch 140. County Ditch 140 routinely overflowed into the Burnham Creek Watershed downstream of the dam—adding to the flood damages along Burnham Creek. The dam provides benefits to areas downstream along County Ditch 140 and Burnham Creek.

COST:

The dam cost $1,127,000. The unit flood storage cost was $1100/acre-foot.

Funding was provided by the following agencies:

Federal PL-566 Funds $919,553
Red River Watershed Management Board 105,825
Red Lake Watershed District 101,363
Burnham Creek Impoundment, Red Lake Watershed District Proj. No. 43, BR 6 Structure

Location: Section 2, T148N, R45W  
Drainage Area: 8.1 square miles  
Flood Pool:  
  Area-212 acres  
  Volume-1,023 acre-feet  
Permanent Pool:  
  Area-95 acres  
  Volume-108 acre-feet  
Description: The flood retention structure BR-6 is part of an overall PL 566 project sponsored by Polk County and by the East and West Polk Soil and Water Conservation Districts. The project is an earthfill dam.  
Cost: $1,126,741 = $1,101/A.F.  
Funding:  
  Federal PL 566 Funds $919,553  
  Red River Watershed Management Board $105,825  
  Red Lake Watershed District $101,363

Burnham Creek Channel, Red Lake Watershed District Proj. 43B

The channel work will involve enlargement and realignment of 12.5 miles of man-made ditch or previously modified channel and 1.9 miles of unmodified well-defined natural channel.  
Area: 104,000 acres in Polk County  
Cost: $2,166,175  
Funding:  
  Public Law 566 Funds $1,772,238  
  Local Assessment $393,937
Red Lake Watershed District Project #121
Louisville/Parnell Impoundment and Wetland Bank
Project Summary

Background

The project was petitioned for by the project landowner, Mr. Paul Hoff. Mr. Hoff requested that the RLWD Board consider construction of a water impoundment and wetland restoration on the project site. In August of 1996, the Board appointed HDR Engineering, Inc. as the project engineers.

Technical Information

The project has a tributary area of approximately 5 square miles. The project site receives "break-out" flows from legal drainage systems during extreme rainfall events. The flows cause significant erosion and crop loss for several miles downstream. The project is designed to control runoff from the 25-year 30 hour storm event. The project consists of 5 pools. One primary pool for flood control and 4 pools for wetland restoration and banking purposes. The total flood storage available is 400 acre feet. Approximately 39 acres of wetland bank are anticipated. The total project site is 480 acres.

Project Cooperators

The project is sponsored by the Red Lake Watershed District. Other sponsors include:

- Red River Watershed Management Board - Flood Control
- MN/DNR Flood Damage Mitigation Grant Program - Flood Control
- Minnesota Department of Transportation - Wetland Banking
- Farm Service Agency - CRP areas for agricultural wetland restoration (10 and 15 year CRP Contracts)

Technical services have been provided by:

- RLWD Engineering and Surveying Technicians
- HDR Engineering Inc. - Project Engineer
- Widseth Smith Nolting - Surveying and Construction Observation
- Midwest Testing - Soils Testing
<table>
<thead>
<tr>
<th>SITE</th>
<th>Thief Lake (Existing)</th>
<th># 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>Section 21, T158N, R41W, Marshall County Source of the Thief River</td>
<td></td>
</tr>
<tr>
<td>DRAINAGE AREA (sq. mi.)</td>
<td>About 200</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERMANENT POOL</th>
<th>Normal</th>
<th>Drawn Down</th>
<th>Drawn Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>1158.5</td>
<td>1157</td>
<td>1157</td>
</tr>
<tr>
<td>AREA (acres)</td>
<td>7000</td>
<td>5800</td>
<td>5800</td>
</tr>
<tr>
<td>Volume (acre-feet)</td>
<td>18,000</td>
<td>8,000</td>
<td>8,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLOOD POOL</th>
<th>Full Pool</th>
<th>Full Pool</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>1161</td>
<td>1161</td>
<td>1163</td>
</tr>
<tr>
<td>AREA (acres)</td>
<td>7500</td>
<td>7500</td>
<td>11,500</td>
</tr>
<tr>
<td>Volume (acre-feet)</td>
<td>35,000</td>
<td>35,000</td>
<td>54,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLOOD CAPACITY</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLUME (acre-feet)</td>
<td>17,000</td>
<td>27,000</td>
<td>46,000</td>
</tr>
<tr>
<td>RUNOFF (inches)</td>
<td>1.6</td>
<td>2.5</td>
<td>4.3</td>
</tr>
<tr>
<td>1975 High</td>
<td>1161.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INITIAL COST ($)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

**COMMENTS:**

This existing impoundment is operated by the DNR for wildlife management. The pool is normally drawn down over the winter to 1157 feet to help control spring runoff. 1163 feet is the maximum legal elevation.
SITE
Agassiz National Wildlife Refuge (Existing)

LOCATION
T156N, R42W, Marshall County
At the junction of Mud and Thief Rivers

DRAINAGE AREA (sq. mi.)
615, of which ___ sq.mi. are not controlled by the impoundments. Thief Lake and the Moose River are upstream.

PERMANENTPOOL
Normal Draw Down

ELEVATION (feet MSL)
Approved 1976 Elevations
AREA (acres) 23,100 19,500
Volume (acre-feet) 38,400 25,700

FLOOD POOL
ELEVATION (feet MSL)
AREA (acres)
Volume (acre-feet) 70,000 70,000

FLOOD CAPACITY
VOLUME (acre-feet)
RUNOFF (inches) 31,600 44,300
1.0 1.4

AGASSIZ POOL
Normal 1140.5
1975 High 1142.0
1979 High 1142.5

INITIAL COST ($)

Note: The gates are operated with regard to downstream, as well as, refuge flood conditions. Greater volumes than those indicated can be stored, and have been in the past. The amount represents what can reasonably be stored, with the existing facilities, without considerable damages on the refuge. Run-off control listed is based on the uncontrolled drainage area.

COMMENTS:
Agassiz National Wildlife Refuge is operated by the U.S. Fish and Wildlife Service primarily for the benefit of waterfowl. The total refuge area is 61,660 acres, or about 96 square miles. About 23,000 acres are normally under water.

The impoundment area includes 15 separate pools. The data listed is a summary of all the pools.

Agassiz Pool is the largest and includes the original Mud Lake. This pool is normally drawn down about 1 1/2 feet in the fall.
SITE Clearwater Lake # 14

LOCATION T149N, R35-36W, Beltrami and Clearwater Counties

DRAINAGE AREA (sq. mi.) 153

PERMANENT POOL
  ELEVATION (feet MSL) 1273
  AREA (acres) 990
  VOLUME (acres/feet)

PERMANENT POOL
  ELEVATION (feet MSL) 1273
  AREA (acres) 990
  VOLUME (acres/feet)

FLOOD POOL
  ELEVATION (feet MSL) 1277
  AREA (acres) 1120
  VOLUME (acres/feet)

FLOOD POOL
  ELEVATION (feet MSL) 1277
  AREA (acres) 1120
  VOLUME (acres/feet)

FLOOD CAPACITY
  VOLUME (acres/feet) 4180(1)
  RUNOFF (inches) 0.5

FLOOD CAPACITY
  VOLUME (acres/feet) 2820(2)
  RUNOFF (inches) 0.3

INITIAL COST ($)

COMMENTS:
(1) Storage capacity above normal lake level.
(2) Storage capacity below normal lake level if drawn down.

The existing dam was constructed by the Minnesota Department of Game and Fish in 1931. Stop logs are provided to adjust lake levels above and below normal.
SITE
Pine Lake # 19(35)

LOCATION

DRAINAGE AREA (sq.mi.)
44.7

PERMANENT POOL
ELEVATION (feet MSL)
Summer Level
drawn down
1283.5
1282.5
128.5

AREA (acres)
1310
1190
1310

VOLUME (acres/feet)
10300
8900
10300

FLOOD POOL (100 year)
ELEVATION (feet MSL)
1285.7
1287.3
1284.5

AREA (acres)
1620
1890
1400

VOLUME (acres/feet)
13800
16600
2870

FLOOD CAPACITY
VOLUME (acres/feet)
3500
7700
1400

RUNOFF (inches)
1.5
3.2
3.2

INITIAL COST (1981)
$70,000.00 ??

COMMENTS:
There is considerable shoreline development.

Potential Impoundment Sites No. #19 and #28 are upstream.
SITE

LOCATION

Baird-Beyer Dam (Existing) # 25(16)
Section 3. T151N, R45W, Louisville Twp., Red Lake County. On the Little Black River, a small tributary of the Black River, upstream from Huot.

DRAINAGE AREA (sq.mi.)

22.6 total

PERMANENT POOL

ELEVATION (feet MSL) 962
AREA (acres) 24
VOLUME (acres/feet) 70

FLOOD POOL

ELEVATION (feet MSL) 972
AREA (acres) 37
VOLUME (acres/feet) 330

FLOOD CAPACITY

VOLUME (acres/feet) 260
RUNOFF (inches) 0.7

INITIAL COST ($) ???

COMMENTS:
Goose Lake Flood Stage is 5500 feet. Drainage Area is 15.6. Runoff is 6.6".
SITE
  Abraham Dam (Existing)  # 32

LOCATION
  Northeast 1/4 Section 32, T148N, R38W.

DRAINAGE AREA (sq.mi.)
  0.3

PERMANENT POOL
  ELEVATION (feet MSL)
    AREA (acres)
      7
    VOLUME (acres/feet)
      30

FLOOD POOL
  ELEVATION (feet MSL)
    AREA (acres)
      15
    VOLUME (acres/feet)
      96

FLOOD CAPACITY
  VOLUME (acres/feet)
    66
  RUNOFF (inches)
    4.1

INITIAL COST ($)
  ???

COMMENTS:
<table>
<thead>
<tr>
<th>SITE</th>
<th>Odney Flaat Dam (Existing)</th>
<th># 33</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>Section 9, Onstad Township</td>
<td></td>
</tr>
<tr>
<td>DRAINAGE AREA (sq.mi.)</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>PERMANENT POOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>1002.0</td>
<td></td>
</tr>
<tr>
<td>AREA (acres)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOOD POOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>1004.0</td>
<td></td>
</tr>
<tr>
<td>AREA (acres)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOOD CAPACITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td>35.9</td>
<td></td>
</tr>
<tr>
<td>RUNOFF (inches)</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>INITIAL COST ($)</td>
<td>$25,000.00</td>
<td></td>
</tr>
</tbody>
</table>

COMMENTs:
SITE Ke-Wa-Sa # 34

LOCATION Greenwood Township

DRAINAGE AREA (sq.mi.) 35.6

PERMANENT POOL
   ELEVATION (feet MSL) 1175.0
   AREA (acres) 2579
   VOLUME (acres/feet) 5615

FLOOD POOL
   ELEVATION (feet MSL) 1177
   AREA (acres) 4580
   VOLUME (acres/feet) 12,610

FLOOD CAPACITY
   VOLUME (acres/feet) 6995
   RUNOFF (inches) 6.3

INITIAL COST ($)

COMMENTS:
<table>
<thead>
<tr>
<th>SITE</th>
<th>Goose Lake (Existing)</th>
<th># 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>Polk Center Township</td>
<td></td>
</tr>
<tr>
<td>DRAINAGE AREA (sq.mi.)</td>
<td>15.6</td>
<td></td>
</tr>
<tr>
<td>PERMANENT POOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>995</td>
<td></td>
</tr>
<tr>
<td>AREA (acres)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOOD POOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>996</td>
<td></td>
</tr>
<tr>
<td>AREA (acres)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOOD CAPACITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td>5,500</td>
<td></td>
</tr>
<tr>
<td>RUNOFF (inches)</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>INITIAL COST ($)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMENTS:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SITE

Knutson (Existing)  # 37

LOCATION
Section 26, Ti51N, R44W
Red Lake County

DRAINAGE AREA (sq.mi.)
2.71

PERMANENT POOL
ELEVATION (feet MSL) 1030.0
AREA (acres) 2.7
VOLUME (acres/feet) 12.6

FLOOD POOL
ELEVATION (feet MSL) 1039.2
AREA (acres) 9.4
VOLUME (acres/feet) 55

FLOOD CAPACITY
VOLUME (acres/feet) 42.4
RUNOFF (inches) .29

INITIAL COST ($)  

COMMENTS:
SITE | Thibert (Existing) | # 38
LOCATION | Section 17, T15iN, R44W Red Lake County
DRAINAGE AREA (sq. mi.) | 1.02

| PERMANENT POOL | Raised |
| ELEVATION (feet MSL) | 1005 | 1009 |
| AREA (acres) | .83 | 1.8 |
| VOLUME (acres/feet) | 4.3 | 9 |

| FLOOD POOL |
| ELEVATION (feet MSL) | 1008 | 1012 |
| AREA (acres) | 1.4 | 3 |
| VOLUME (acres/feet) | 7.7 | 15 |

| FLOOD CAPACITY |
| VOLUME (acres/feet) | 3.4 | 6 |
| RUNOFF (inches) | .06 | .11 |

INITIAL COST ($)
<table>
<thead>
<tr>
<th>SITE</th>
<th>Seeper Dam (Existing)</th>
<th># 39</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>North 1/2 Section 29, T151N, R44W</td>
<td></td>
</tr>
<tr>
<td>DRAINAGE AREA (sq.mi.)</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>PERMANENT POOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>1004</td>
<td></td>
</tr>
<tr>
<td>AREA (acres)</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>FLOOD POOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION (feet MSL)</td>
<td>1011</td>
<td></td>
</tr>
<tr>
<td>AREA (acres)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>FLOOD CAPACITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME (acres/feet)</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>RUNOFF (inches)</td>
<td>.7</td>
<td></td>
</tr>
<tr>
<td>INITIAL COST ($)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COMMENTS:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SITE

LOCATION

DRAINAGE AREA (sq.mi.)

PERMANENT POOL

   ELEVATION (feet MSL)
   AREA (acres)
   VOLUME (acres/feet)

FLOOD POOL

   ELEVATION (feet MSL)
   AREA (acres)
   VOLUME (acres/feet)

FLOOD CAPACITY

   VOLUME (acres/feet)
   RUNOFF (inches)

INITIAL COST ($)

COMMENTS: