COPY

MARSH AND WATER MANAGEMENT PLAN

NECEDAH NATIONAL WILDLIFE REFUGE
Necedah, Wisconsin

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ORIGINAL

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Necedah, Wisconsin

Submitted By: _____ Date: 3-3-92

Concurrence: _____ Date: 3/24/92

Concurrence: See memo (ENG) Date: _____

Approval: _____ Date: 6/24/92

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:

FWS/DEN

APR 27 1992

Memorandum

To: Refuges and Wildlife Associate Manager (WAM1)

From: Regional Engineer

Subject: Necedah NWR ~~1992~~ Water Management Program

We have reviewed the subject program and have no comments. The report looks acceptable from an engineering standpoint. We are returning the report to you.

John V. Ramsour

John V. Ramsour

Attachment

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MARSH AND WATER MANAGEMENT PLAN

I. POLICY

It is the policy of the Service to manage marsh and water to meet the needs of the entire marsh community. In pursuit of this policy, all marsh and water management efforts will be consistent with sound fish and wildlife protection, maintenance, enhancement, and utilization principles and practices.

All marsh and water management actions must be in strict compliance with the basic intent of all applicable environmental laws and regulations.

II. Objectives

The objectives for marsh and water management are:

A. To provide habitat for waterfowl, other migratory birds, and endangered or threatened species of plants and animals.

B. To provide, enhance, and maintain wildlife diversity in the marsh.

C. To provide, enhance, and maintain habitat for indigenous species of wildlife and plants.

D. To provide opportunities for compatible wildlife orientated recreation and interpretation.

III. Marsh and Water Management Planning

A. General. Wet lands serve an important role in the protection and production of wildlife, particularly waterfowl, fish, and aquatic mammals. Moreover, many species of wildlife require wetland areas for food and cover. Therefore, marsh and water areas will be developed and managed on the basis of ecological units. However, individual units may be managed to serve specific requirements of wildlife such as nesting, feeding, resting, or sanctuary areas for waterfowl or for specific species of wildlife or plants. The species of wildlife or plant to be favored and the type of use to be encouraged through management of these areas should be dictated by the habitat, habitat potential, habitat management capabilities, and the chief use or uses by wildlife.

B. Biological Factors. The management of marsh and water areas should be guided by biological factors which influence habitat conditions. Included in this category are such influences caused by rough fish, muskrat, and undesirable plants. Excessive populations of rough fish such as bullheads and carp adversely affect water quality as well as desirable submergent vegetation. Muskrats can help achieve good interspersion of emergent aquatics, but may need to be controlled to prevent problems of

overpopulation such as disease and damage to structures or plant communities. Invasions of undesirable plant species (such as wool grass, willow, purple loose-strife, and phragmites) may necessitate control measures to prevent adverse competition.

Many other factors are worthy of consideration in planning a water management program including :

1. Bottom Soils. Muck soils are most productive of both submerged aquatics as well as moist soil annual plants, where as, sandy soils are not.

2. Length of growing season is important in timing a draw down to be sure plants either do or do not obtain maturity. Maturity is a must for seed production, but is not important for green browse production. Frost can destroy newly germinated moist soil plants as well as killing them prior to seed maturity. Frost can also destroy the value of immature moist soil plants as a green browse.

3. Ice management is a useful tool. Lowering water levels just prior to or just after ice formation can prevent or reduce ice heaving of soils at the toe of dikes, around nesting islands, and on natural shores. Lowering of water levels after 6" of ice has formed protects bottom soils from air drying and wind blowing if no snow is present as well as contributing to a winter fish kill if desired.

4. Water levels managed at an excessive level will contribute to wave action damage to the toe of the dikes and the shores of nesting islands.

5. Water supplies and timing will determine whether or not a marsh unit can be reflooded in the fall when considering a moist soil drawdown for seed production. If a unit can not be reflooded reliably in the fall in most years, a seed production moist soil plant drawdown should not be attempted. Instead, an August drawdown may be an alternative for the production of green browse material where fall reflooding is not needed.

6. Water system manipulation capabilities or capacities is also an important consideration. Some water control facilities may not be set deep enough to provide adequate soil drainage for moist soil plant seed production. Some may be capable of being just adequate for the production of moist soil green browse, i.e., spike rush, where less soil drying is required. Others may not provide adequate drainage to produce either seed production or green browse production. Some controls may not have adequate capacity to pass even the slightest flood surges. In this case there is little control of water levels and therefore, moist soil plant management will most likely be unsuccessful in most years.

C. Planning Considerations - Problems, Alternatives, Remedies. Following are some of the considerations which should be kept in mind when planning and implementing a marsh management program at Necedah National Wildlife Refuge.

1. Objectives of the Marsh and Water Management Plan. One of its major responsibilities is to give sanctuary and to provide food and nesting cover for migratory waterfowl. The refuge encompasses 43,656 total acres, upon which 37

significantly sized pools with water level controls have been created by low dikes. Thus, water levels on over 4,700 acres of waterfowl habitat can be manipulated. Forty-nine water control structures are presently used in the management program. Another nine old, CCC constructed, control structures are present but are not being used for various reasons. Also, there are four significant pools without control structures and another 33 minor pools or ditch plugs.

These impoundments along with many land-locked sedge marshes and ditches throughout the refuge provide an average of approximately 5,500 acres of wetland habitat each year. This acreage equals 12.6% of the total refuge. Specifically, the goals of the water management plan are:

a. To make better use of the water that is available to the refuge. Each year approximately 24,000 acre-feet of surplus water is released out of the south end of the refuge. This water, or part of it, should be utilized.

b. To maintain water quality and quantity for optimum waterfowl production.

c. To develop and utilize water management techniques to provide improved feeding and resting habitat for waterfowl, especially during fall migration, by increasing the amount and availability of water, moist soil, and aquatic related plant foods.

2. Water Source and Supply.

a. The first source, natural runoff and precipitation within the refuge, contributes an estimated 35% of the annual water supply.

b. The second source of water is from drainage ditches leading into the refuge lands from other government-owned lands to the west. An estimated 30% of the inflow into the refuge comes from this source. There is a concrete structure in the Neal Lateral where this ditch enters the refuge in SW 1/4 of Section 35, T. 20 N., R. 2 E. A few boards should be kept in this so it will serve as a weir and measurements can be taken to give a better estimate of the water from this source.

c. The third source of inflow for the refuge is through the Remington structure at the north refuge boundary. An estimated 35% enters the refuge from this source. The Remington structure diverts water from the Remington ditch which drains the 32,640-acre Remington Drainage District located north and northwest of the refuge in Jackson and Wood Counties. This water enters the refuge's Little Yellow River Ditch which bisects the refuge north and south. Pool gauge readings and flow through control structures provide some basis for the estimation of inflow into refuge impoundments. The method for making this calculation is shown in the reference material attached to the end of this plan.

Flood Flows. Although flooding can occur during the summer and fall months, the most critical runoff events generally occur in the spring as a result of snow melt and frozen ground conditions. Stream flow data is limited since no U. S. Geological Survey gauging stations are present in the area. No major flood studies have been made for this area to date. Rough estimates were made for the 100-year flood discharge for the drainage areas listed in the table below. These estimates were based on methods outlined by Conger (1971) and should be considered approximate. The discharges shown in this table are relatively low due to high percentages of swamp and depression storage areas (50-60% in many of the basins) and channel slopes less than 0.1%.

DISCHARGE ESTIMATES FOR THE 100-YEAR PEAK DISCHARGE

TRIBUTARY	DRAINAGE AREA SQUARE MILES	DISCHARGE C.F.S.
West Branch Little Yellow River	10.9	270
East Branch Little Yellow River	9.0	170
Rattail Lateral	9.7	225
Rynearson Pool #2	40.9	810
Rynearson Pool #1 (Spencer-Robinson Ditch)	15.8	350
South Branch Yellow River	58.6	960

Historically, ice jams have occurred in the late fall, but most often with the spring break-up, on the main Yellow River located east of the refuge. When this occurred, or during extreme flood periods in ice free periods, water backed up through culverts under State Highway 80 and entered the refuge. Several times flood waters from the Yellow River backed up the Remington Ditch, flooded over the County Line Road, and flowed south across the old Johnson farm (now cranberry beds) in the northern portion of Section 4, Finley Township and entered the refuge via the upper Spencer-Robinson Ditch.

Low Flow. The most reliable sources of inflow to the refuge are the East Branch Little Yellow River which is fed by the Remington Ditch diversion structure, the West Branch Little Yellow River from the Meadow Valley Flowage, and the Spencer-Robinson Ditch. Except for the Remington structure, there are no recording gauges on these streams. Accurate estimates of low flow conditions are not available. However, all of these streams will probably experience no flow at infrequent intervals. During the dry summer of 1975 and again in 1988 the Spencer-Robinson Ditch was completely dry and there was no flow in the West Branch Little Yellow River. Flow in the West Branch is subject to control by the Meadow Valley State Wildlife Area and therefore can run dry when the gates are closed at the main pool. The East Branch Little Yellow River did carry a small amount of flow during the summer of 1975 due primarily to diverted flow from

the Remington Ditch drainage basin. All the ditches and all the pools dried up by mid-August 1988, except Pool 2 and Suk Cerney.

Water supplies during most years in most major pools have been adequate for those pool management programs outlined herein. Normally the water flow slows or stops in July, August, and early September which usually causes few problems. As the trees and other vegetation become dormant during the period of mid-September through early April, stream flow throughout the refuge is usually constant; fortunately requiring little adjustment of stoplogs in frozen control structures.

Ground Water. Ground water moves through the refuge in a northwest to southeast direction traveling toward the Yellow and Wisconsin Rivers. Surficial glacial lake deposits provide for storage of ground water and release of water to streams and ditches passing through the refuge. Generally, a relatively impervious layer of calcareous marl is present about 3-4 feet below pervious sandy top soils which tend to hold water near the surface.

The depth to ground water varies from 0 to 20 feet in the glacial lake deposits that dominate the ground surface of the refuge. Numerous shallow wells in the refuge area tap this source of ground water with yields of up to 50 gpm. The water quality is typically high in iron content with a pH of approximately 6 and the dissolved solids and hardness concentrations are low. An abandoned refuge well located near Sprague taps this strata at a depth of 91 feet.

Glacial lake deposits are underlain by an aquifer comprised of Late Cambrian sandstone. The Wells at the Meadow Valley State Wildlife Area headquarters and the village of Necedah tap this aquifer at depths of 88 and 125 feet respectively. The quality of water in the aquifer is similar to that of the overlying glacial lake deposits.

Ground water recharge occurs primarily from percolation of precipitation through the loamy sands on the refuge. Locally high ground water occurs adjacent to pools as a result of seepage through the sand dikes.

An adequate water supply at specific times can be critical. For instance, too much water may completely inundate actively growing moist soil plants for several days causing plant destruction and/or seed production failure. However, if the tops of these plants are left above the water surface, seed production failure is much less likely to occur. Also, planning a moist soil plant drawdown for seed production is fruitless if this pool does not have the likely capability of being reflooded in the fall making the seed available to migrant waterfowl.

3. Pollution. Air or water borne pollution problems have not been apparent. However, run-off from cranberry production areas located north and northwest of the refuge may have the potential of carrying pesticides or fertilizer residues into the refuge impoundments.

4. Water Chemistry and Clarity. Typically, the water would be fairly clear if it weren't for suspended materials which may reduce Secchi disk readings from about 3 feet to 7 inches. The water is obviously stained amber color about the color of weak iced tea.

Acid conditions have a retarding effect on growth of many aquatic and marsh plants, but the acidity factor is believed to be much less important in the development of waterfowl feeding grounds here at Necedah than some of the other factors such as water depth, color, and turbidity. Until 1988, water acidity measurements were unknown. However, soil pH levels in unlimed agriculture soils on the refuge are approximately 4.4. The periodic drawdowns of impounded areas is suspected of causing increased pH readings or decreased acidity of water upon reflooding in subsequent years. This has yet to be proven.

The most widespread problem with acid water conditions exist in the numerous natural sedge meadow marshes of the refuge. Historically, waterfowl usage of these types (5,960 acres est.) is practically nil.

Apparently waterfowl food production capabilities have long passed with succession and habitat is largely eliminated through the gradual filling in of former water areas with organic debris. For some unknown reason, even when plenty of water is present to flood these sedge meadows, waterfowl do not respond. Acidity may check the work of nitrifying bacteria and other decay organisms, invertebrates, etc., in breaking down vegetable matter into nutrients useful to more valuable invertebrates and food plants. Few of the invertebrates, so important as a waterfowl food source, may be able to tolerate this suspected high acidity.

Land-locked or ditchless depressions are generally sedge meadow types having little value to waterfowl. Acidity was suspected to be much higher in these than in impounded areas because water filling these depressions is derived from surface run-off from surrounding woodlands or overflow from other sedge meadow bogs.

On the other hand, major impounded water areas seem to be much more productive of plants and invertebrates of value to waterfowl. Waterfowl do respond to impounded areas in obvious preference, rather than to sedge meadows. Water pH was suspected to be higher in impounded areas because of the nature of its water source. Rather than surface run-off as their major source of water, much if not most, is supplied by subsurface seepage which is tapped by the numerous old drainage ditches leading into and through impoundments. Most of these ditches have the depth to penetrate to impervious marl subsoil layers that prevent rainfall from seeping deeper than four feet through the upper layer of sandy soils. It was suspected that when the rainfall seeps down through the upper sandy layers, it comes in contact with and flows horizontally along the top of the deeper impervious marl layer. In doing so, it takes up calcium carbonate in solution and carries it along until it surfaces within intersecting old drainage ditches whereby it is carried into the impoundments. It was suspected

may be raised or improved over the water that is retained in natural poorly drained sedge meadow potholes.

To test the above theory concerning acidity of waters within the Necedah Refuge, the following research project was accomplished in 1988.

Necedah NR88 - "Refuge Water Acidity Determinations" - 32530-06

INVESTIGATOR: Richard G. Nord

AFFILIATION: Refuge Biologist, Necedah NWR

OBJECTIVES: To determine acidity (pH) of both natural and man-made impounded waters of the Necedah NWR. This information is useful in contributing to base-line data for understanding why some refuge impoundments are more attractive to waterfowl than others and why nearly all impoundments are more attractive to waterfowl than natural marshes of the refuge.

METHODS USED: On site testing was accomplished in 1988 after ice-out, April 1, May 1, June 10, and July 28. Further monitoring was discontinued because the drought had caused most impoundments and their tributary inflows to dry up.

A Cole-Parmer, model 5941-00, pH tester was used. It is inexpensive, self-contained, battery operated, pocket sized, having a LCD readout, pH range of 0-14 pH, resolution of 0.1, and accuracy of +or- 0.2 pH.

RESULTS:

a. The assumption that all Necedah NWR waters were acidic or highly acidic was found to be erroneous. In fact, most man-made impoundments were near neutral to slightly alkaline.

b. Impoundments with one or more miles of drainage ditch contributing water or impoundments receiving seepage or diverted water from adjacent impoundments having a mile or more of contributing drainage ditch appeared to be almost universally near neutral to slightly alkaline with pH readings ranging from 6.8 to 8.3.

c. Impoundments with less than a mile of drainage ditch within the basin or in the watershed or impoundments located at the extreme upstream end of the drainage ditch system or land-locked sedge marshes and brush swamps had the lowest pH readings indicating highest acidity. Readings as low as 6.1 pH were found in impoundments that did possess at least some footage of the old drainage ditch system.

Water in impoundments where the natural outlet was blocked by a water control structure, where there is no evidence of an old drainage ditch within the basin or within its watershed, where only surface water is retained rather than sub-surface water, pH readings ran more to the acid side, to a range from 5.7 down to 5.4.

On the other hand, as expected, land-locked ditchless sedge meadows, having no outlet to discharge accumulated acidity, proved to be the most acidic with pH readings from 5.1 down to 4.9.

CONCLUSIONS:

a. The past assumption that the refuge major water impoundment systems were acid and therefore unproductive of waterfowl food materials was not supported, in fact that assumption was disproved.

b. The data supported results of past invertebrate sampling where a relatively high rate of mussel and snail production was found in the major refuge impoundments. Four genera of snail and two mussel genera are common. Contrarily, low production of these hard-shelled animals is to be expected in acid waters because of low lime content.

c. The data supported or tended to explain why observed waterfowl use was concentrated within the major impoundments where pH readings were high rather than on land-locked sedge meadows and impoundments near the top of the watershed where pH readings were low. High waterfowl use appeared to be in a direct relationship with water areas having a higher pH reading.

d. The data suggests that acidity of impounded surface waters is improved by neutralization or is made slightly alkaline by the injection of subsurface or ground waters, collected at levels near the bottom of the old drainage ditches. It is theorized that: ***rain water readily percolates through the sandy surface soils generally present throughout the refuge; it readily percolates downward until it comes upon an impervious subsurface layer, about 4 to 5 feet down, forcing the water (now ground water) to travel horizontally until it emerges at the surface near the bottom of an old drainage ditch leading ultimately to one of the impoundments. As the ground water travels horizontally prior to its emergence at the bottom of one of the ditches, it is presumed to accumulate acid neutralizing minerals such as lime in solution.***

e. This data can also be used in setting priorities for future marsh development or marsh restoration projects. The emphasis should be placed on those sites where impounded waters will likely have neutral or slightly alkaline water as a result of the presence of an old drainage ditch located either within the basin or within the watershed area. Water development projects that will impound only surface waters with little or no retention of ground water would be of low priority on the Necedah NWR as these are likely to have the least waterfowl value.

f. The data also suggested that there was a tendency for impounded waters to become less acid as the summer progressed. At least this was the case in the summer of 1988 which was affected by drought conditions. Because of the drought, less rainfall occurred which was likely to increase the normal percentage of ground water content within the impoundments, causing pH levels to rise.

5. Disease. Historically, disease or lead poisoning among waterfowl at Necedah has not been a problem even in drought years or on moist soil drawdown units. Tularemia among beaver and possibly muskrats has occurred and water borne vectors may be possible. A fungal disease, or "smut", affecting the blooming seed head of nodding smartweed, *Polygonum Lapathifolium*, causes considerable seed production losses. No other variety of smartweed is known to be affected. However, the barnyard grass form of wild millet is sometimes affected.

6. Water Rights and Agreements. Basically Wisconsin operates under the system of riparian rights which means a landowner on the watercourse is entitled to have the stream flow by or through his land substantially undiminished in quantity or quality. The right to the natural flow of the stream, however, is subject to the privilege on the part of an upper riparian owner to make a reasonable use of the water as it flows past his land. The U.S. Fish and Wildlife Service, as a riparian landowner on all streams or ditches flowing through the refuge, can make reasonable use of the water flowing in them to the extent it does not injure lower riparian owners. To date the situation has been that landowners below the refuge have never complained about the refuge using water but usually want the refuge to hold back all it can.

   The riparian right in Wisconsin has to a considerable degree been affected by legislative enactment. The 1935 legislature added Section 311.14 to the Statutes which provides for permits from the Public Service Commission for the diversion of water from any stream. Permits to divert surplus water (water not being beneficially used) may be granted if there is no perceptible injury to the public rights in the stream. Permits for water other than surplus water require the consent of any riparian owner who may be injured by the diversion.

   In 1942 the Public Service Commission granted the U. S. Fish and Wildlife Service permission to divert surplus water from the Remington Ditch into the refuge. Surplus water made available to the refuge by this agreement was defined as "flows in the river (Yellow River) greater than the capacity of the water wheel (at Necedah) are surplus waters and may be diverted by the applicant through the diversion canal." This water wheel, originally operated by the Wisconsin Power and Light Company, is no longer in operation. In fact, this power house and dam washed out and was destroyed in the spring of 1982. Therefore, apparently this no longer has any bearing on the amount of water diverted to the refuge from the Remington Ditch, unless the dam and power house is replaced.

   In the agreement with the Public Service Commission, the refuge recognized the prior rights pertaining to the operation of Dam R#1 and Dam R#11. These two control structures are located between the point of diversion of water into the refuge and the Remington Ditch termination at the Yellow River. Both of these control structures were at one time operated for agricultural purposes but the land ownership and land use has since been changed. Prior to 1988, one structure was utilized by a fur farm (Dam R#1 located SW1/4 SW1/4, Sec. 33, T 21 N, R 3 E) and the other is inactive (Dam R#11). Mr. Raymond Stellmacher of Wisconsin Rapids, the fur farm operator, did not actually use water from the

Remington Ditch but asked only that we maintain a level in the ditch high enough that his ponds do not drain by seepage into the ditch. This can easily be done by maintaining stoplogs in Dam R#1 and in the Remington structure. Stellmacher's water source is obtained from the area north of his ponds rather than from the west. All surplus water in the Remington ditch will still flow into the refuge. MR. Stellmacher has no permit from the Public Service Commission and apparently the prior rights of Dam R#1 and Dam R#11 are simply riparian or vested rights.

Further diversion of water from the Remington Ditch by any party will require approval and consideration for the rights of Dam R#1, Dam R#11, and the Remington structure. The Necedah Refuge should use and record all water available to them through the Remington structure to insure maintaining their right to this water. Water from this source will become increasingly important as refuge development continues. Refuge personnel should make sure no other water is diverted from the Remington ditch without consideration of the Refuge's prior rights.

It should also be noted that in 1969, authority for regulating water was transferred from the Wisconsin State Water Regulatory Board (Public Service Commission) to the Wisconsin Department of Natural Resources. This puts the responsibility for regulating flows with Wisconsin's Game Management Division which means personnel managing the Federally-owned and State-managed Meadow Valley Conservation Area adjacent to the refuge can regulate flows in the Remington Ditch. This is a situation refuge personnel should be aware of since the state at one time wanted Remington Ditch water for the Meadow Valley Flowage. If the State implemented moist soil plant management in the Meadow Valley Flowage and used water diverted from the Remington Ditch to reflood this unit in the fall, the State and the Refuge would likely be in direct conflict for this water at the same time of the year.

The previous five paragraphs are quoted from the 1984 edition of the Necedah Refuge Marsh and Water Management Plan. Since that time two cranberry farms were developed on lands near the Remington Ditch located downstream from the Government-owned diversion dam. Both of the cranberry farmers, Gene Miller and Gary Vanatta, have indicated they may offer some competition for the water presently used by the refuge. To date, the conflict over the use of this water has not developed, but it certainly has potential. Refer to the memo to the files: " Water Rights - Remington Structure, Subject - Meeting 07/26/90 Re: Gene Miller's (cranberry farmer) request to raise water levels of the Remington Ditch to facilitate his operations; and his complaints that the refuge was using his water." Copies are included in the appendix of this plan as well as in the refuge's Water Rights file.

7. Flooding Nests. Water level manipulations, as outlined in this plan, do not require nor necessitate planned raising of water impoundment levels during the nesting season. Uncontrollable flood waters may have a harmful result, however.

8. Drainage of Brood Habitat. Drawdowns of impoundments commencing in mid-May that continue through the growing season for moist soil plant seed production will deprive nesting waterfowl of brood habitat. In consideration of this, the simultaneous drawdown of two adjacent pools is to be avoided. Birds nesting around a drained pool only have to move their broods less than a mile to brood cover available in the adjacent pool. It has been demonstrated that the loss of brood habitat during one year in a drained pool will be more than made up by habitat improvement after reflooding during the following year.

9. Upstream or Downstream Flooding of Private Lands. To date, landowners below the refuge have never complained about the refuge using water but usually want the refuge to hold back all it can. Because of their location, existing water control structures are incapable of holding water onto private lands. Beaver dams have annually created problems on the Morse Lateral Ditch near the Remington structure, on the Miller Ditch at the southeast corner of the refuge, and on the Suk Cerney outlet ditch near State Highway 21, all of which can affect private land.

10. Flooding Public Facilities. Discharge waters must be metered through control structures so that the volume does not exceed the carrying capacity of down-stream culverts and bridges under township roads and highways. Washed out culverts and road beds could cause an extreme hazard to night time drivers plus the refuge may be assessed the cost of repair. Flood waters overflowing emergency spillways cannot always be avoided, and damage to public roads may not be attributed to negligent operators in these cases. Attention to these problems should be addressed in the releasing water through Dams 1 and 2 affecting the concrete culvert downstream under State Highway 21; the culverts under Sprague-Mather Road below Dams 30, 31, and 33; the bridges on Hanson Road below Dams 30 and 31; the bridge on Grand Dike Road below Dam 1; the culvert under Coaver Road below Dam 30; the bridge on Speedway Road below Dam 30; the double culvert on Speedway Road below Dam 29; and the culverts under Finley Road below Dams 27 and 28; and the Remington structure.

11. Mosquito Control. Not applicable at Necedah Refuge.

12. Maintenance of Downstream Water Quality and Flow. Consideration should be given to prevent complete stopping off of water running through Dams 1 and 2 during the reflooding processes. Sudden drops in tail-water flows may strand large fish populations below these dams. This procedure, besides being ethically wrong, is illegal by state law. The pools should be refilled gradually and the stoplogs so set as to allow at least some flow over the stoplogs to maintain some water depth below the dam so that fish populations can escape down stream.

    Water quality below Dams 1 and 2 may be degenerated for a day or two during the last stages of drawing down these two pools. Bottom mucks deposited within the ditch above these dams when the pool is flooded begin to move downstream through the dam as water recedes below the adjacent mudflats. This situation should be watched closely so that valuable sport fish below the dam are not suffocated because of the muck suspended in the water. If this

should develop, the gate may be closed to the point where the muck ceases to move.

13. Protection of Dikes and Water Control Structures.

    a. Water levels managed too high, especially prior to the annual development of submerged aquatic vegetation on the surface, create large expanses of open water where waves can develop and cause unnecessary wave action damage to the toe of dikes not protected by rock rip rap. Dikes which are not rip rapped but do have sod cover are not considered sufficiently protected from wave action damage. In this case, one year of high water levels may kill the sod on the dike toe leaving it completely unprotected from wave action in succeeding years of high water levels.

    b. Limited winter drawdowns may be useful by protecting the toe of dikes, located adjacent to large expanses of open water, from being heaved by ice action. Otherwise, live sod on the toe of a dike may be dislodged and destroyed; then the benefits in protecting the dike from wave action are lost in succeeding summer months.

    c. Mowing. Dikes should be mowed or the woody vegetative growth kept from developing into large trees which could be uprooted by the wind causing a breach in the dike. The decay of large tree root systems leaves voids in the dike soils promoting washouts. Mowing every two or three years should be sufficient.

    d. Rock riprap may be necessary to prevent erosion of dikes and control structures from either wave action or overflow damage. It is also useful in preventing muskrats, beaver, woodchucks, etc., from burrowing into the back fill adjacent to control structures and road culverts causing the eventual failure of these facilities.

    e. Vegetative Planting. Planting reed canary grass is a universally used practice in an attempt to prevent erosion of water control facilities. Here at Necedah, it is not recommended if other methods could be used. Past seedings of this grass on dikes did not stay on the dikes, but was able to out compete native vegetation and spread around some marsh edges. And, being much more tolerant to flooding, it caused increased problems in the effective moist soil management of these marshes.

14. Waterfowl Production Habitat, Quality, and Quantity. Waterfowl production capabilities of the Necedah Refuge are not high compared to the prairie marshes of the west. Therefore, the emphasis of marsh management here is not primarily for the purpose of waterfowl production. Waterfowl production is considered but is secondary to the marsh management practices leading towards providing the best possible migratory stop-over habitat. Refer to Section C-6 regarding the suggestion of not draining two adjacent pools at the same time.

15. Salinity Control or Management. Not applicable.

16. Planting Aquatics, Including Aerial Seeding. Aerial seeding of millets and buckwheat on exposed mud flats and annual mechanical seed-bed preparation and seeding of moist soil units have been attempted in the past. In general, it was felt that seed production of artificially seeded moist soil plants was not superior to naturally seeded. Therefore, it was discontinued especially when a seed crop was to be produced during the same growing season that it was planted. On the other hand good moist soil seed production was achieved several times using mechanical seed bed preparation, ie., during the late growing season of one year, the seed bed was mechanically prepared; then the soil was left idle to settle allowing the residual seed to grow naturally and mature during the following growing season without further mechanical disturbance.

    Today, without mechanical seed-bed preparation, most moist soil plant seed production is natural and is done solely through properly timed water level manipulations. But these manipulations are not done annually within the same pool, as this does not work for long, as the perennial plants take control. Instead the pools are drawn down every other year or every 2 to 3 years. The intermediate years of full pool levels curtails the growth of the unwanted perennial competitive vegetation.

    Submerged aquatics or emergent plants were planted in the early years on the refuge. This has not been done for many years now and is not proposed as a necessary part of this plan.

17. Submergent Vegetation Production and Control of Pests. Submergent aquatic plant production is most effectively encouraged by removal of rough fish and the provision of adequate sunlight near the marsh bottom. At the Necedah Refuge, moist soil drawdown management or drainage of all pools, except the Sprague and Goose Pools, is effective in forcing most rough fish out. The sills of Dams 30 and 33 are not low enough to effectively drain the borrow ditches of the Sprague and Goose Pools. Therefore, rough fish removal in these pools cannot be effectively achieved unless a winter kill occurs.

    To prevent a rough fish reinfestation of the whole refuge each year, the radial gate of Dam #2 should never be raised during any high flow periods unless it is an absolute necessity for flood control. Likewise, all of the stoplogs of Dam #1 should not be removed unless absolutely necessary. These two dams are the primary fish barriers preventing high numbers of rough fish in the Wisconsin River system from re-entering the refuge. This is most effective if all out-flows through these dams are allowed to pass only by dropping a sufficient height over the stoplogs.

    Winter drawdowns and/or draining of pools can be attempted in all pools to control rough fish for subsequent improved submerged aquatic plant production. Two problems could occur if this procedure is followed. The first is that once the water control is opened, the cold weather is likely to freeze it so that any further adjustment of stoplogs or gates is impossible until a thaw occurs. The second problem occurs if the pools are de-watered prior to the formation of 6 inches or more of ice. The bottom muck soils in open water areas are exposed

to freeze-drying action and may be subject to wind erosion all winter especially if a crust of snow does not develop. These muck soils, rather than sandy soils, should not be lost because they are the most productive for both moist soil and submerged aquatic plants. Also, if the control structure is frozen, covering the muck soils by reflooding to prevent the wind erosion losses is impossible.

Submergent Plant Competitors of Unknown Effect are Listed as Follows:

a. Filamentous type algae (green algae), commonly known as pond scum, formed dense mats occasionally, either floating on water surface or blanketing submerged objects as well as submerged aquatic plants. Actual destructive losses to waterfowl food production is unknown at Necedah. However, the potential is there through the effects caused by the exclusion of sunlight.

   After an unusually warm period in May, 1991, a filamentous algae growth developed on dead moist soil plant growth from previous year in Pool #2. When this pool was again drained by June 1, 1991, this algae was so dense that it draped above the ground like a blanket over the dead moist soil plants of the previous year. This algae blanket excluded much of the sunlight penetration to the soil surface. As a result, the only moist soil plant that germinated or grew during that 1991 season was rice cutgrass. The cutgrass was able to grow under the algae mat and even penetrated the mat later during the growing season. The rice cutgrass was still able to mature and produce seed. In October, this pool held about 6,000 geese which did not fly out to feed off the refuge. The cutgrass was flooded prior to it being frost killed and it is not known whether green cutgrass vegetation, seed, or tubers provided the goose food.

b. Gelatinous algae are present which may attach themselves to aquatic plants in large enough quantities to injure them by retarding the necessary exchange of gases between the plants and the water.

c. Minute one-celled green (or brown algae), free drifting and suspended in water, may occur in the later half of summer in such hugh numbers as to cause a "bloom" in the water and to the extent that submerged aquatics may be deprived of sunlight.

18. Public Hunting. Except for Pool 27, Pool 28, and Suk Cerney Pool, the current water management of most refuge pools does not provide direct opportunity for public hunting. Waterfowl hunting is not permitted, nor is it planned, on existing refuge pools located between the Grand Dike Road and the Finley Road. Marsh and water management practices applied, as outlined, are intended to provide the best possible waterfowl habitat within a waterfowl sanctuary. The benefits of a successful program here will spill over to benefit the waterfowl hunters on Pool 27, Pool 28, Suk Cerney Pool, and in the surrounding area outside the refuge boundaries. The refuge will continue the management of the Suk Cerney Flowage where public waterfowl hunting will continue and that water management of this pool must take this into account -- that waterfowl

habitat must be provided in sufficient amounts to continue or improve public hunting opportunity. But, this does not necessarily mean that the Service should manage these pools as moist soil units in order to increase public hunting opportunity. Moist soil units can be made so attractive to waterfowl that the end result is not different from shooting over bait.

The state, under a land exchange agreement, has assumed water management of Pools 27 and 28, located north of Finley Road. These two pools are open to public hunting, including waterfowl hunting.

19. Public Fishing. The purpose of the presently used rotational drawdown marsh management is two-fold. It provides for the optimum waterfowl food production through moist soil plant management and at the same time reduces the effects of rough fish upon submerged aquatic plants after reflooding. This management procedure can accomplish its purpose in all pools except in Sprague and Goose Pools. As rough fish are pushed out of most pools every three years or so under the rotational drawdown program, sport fish are also pushed out. Sport fish can not grow to be of sufficient size in a three year period to be of much value to the sport fisherman. Sprague and Goose Pools are the only refuge marshes that retain public fishing interest because these pools can not be drained sufficiently. It is in these two pools where most refuge public fishing occurs.

Most of the fishing is done along the borrow pit at the foot of the main Sprague Pool dike where the water is the deepest. Even when Sprague or Goose Pools are drawn down (for waterfowl management purposes) to the point where the only water left is confined to the borrow ditches, the public fishing continues and the catch has sometimes improved. This is because the fish that were scattered all over the pool prior to the drawdown are then confined to this narrow borrow ditch where the fishermen can get at them much easier with baits and lures. Many limits of northern pike are caught in early June or immediately after a drawdown.

In summing up, planned marsh management procedures used at Necedah are not intended to maintain a sport fishery, instead they are geared towards maintaining optimum waterfowl habitat. Never the less, sport fishing does exist.

20. Facilitating Waterfowl Banding Operations. Currently the four waterfowl banding sites used are located on dike slopes or on natural peninsulas where upland vegetation is either naturally absent or is mowed. Thus, there is no need to manipulate water levels in impoundments primarily for bird banding purposes.

21. Opportunities to Provide Public Wildlife Observation. Marsh and water management practices, as described herein, are intended to provide the most attractive waterfowl habitat possible. Benefits of success in attracting large numbers and varieties of waterfowl to refuge habitats spill over to benefit or enhance the public opportunity for waterfowl observation and appreciation. Once the birds arrive, the public should be given increased opportunity of unobstructed observation from sites that do not cause significant disturbance to the waterfowl. An overlook tower is presently overlooking Pool #1. Waterfowl may be observed

from a public road between Goose Pool and West Sprague Pool. Other observation sites are planned.

22. Timber and Brush control. Prescribed burning practices are to be applied periodically on all islands and marsh edges in and effort to prevent the encroachment of woody vegetation and to preserve a prairie-like habitat more attractive to sandhill cranes and to nesting waterfowl. (See Prescribed Burning Plan.)

    Burning, mowing, and/or spot herbicide applications are to be used to control encroaching woody vegetation on dikes and to maintain brush-free emergency spillways which otherwise tend to clog up with floating debris.

    Maintaining high water levels for more than one year on impoundments not subject to wave action damage to the dikes, may be used to kill or set back encroaching woody vegetation. Flooding the root collars of most brush species for two to three consecutive growing seasons, especially in July through September, causes them considerable damage. Sprouted advantageous roots may be allowed to dry by dropping water levels during the winter months between flooded periods causing additional stress on undesirable vegetation

23. Emergent Vegetation Production and Control.

    a. Cattail, phragmites, are present in limited areas and so far haven't indicated obvious expansion whereby they might threaten desired habitats. No control practices are now deemed necessary at this refuge.

    b. Purple loosestrife that has become established and is threatening many other state marshes has not become established here yet.

    c. Woolgrass. Waterfowl food plants of various degrees of utility often are in active competition with one another, which may result in the detriment of more useful plant species. There are some plants of practically no food value to waterfowl that compete actively with useful species and often take over huge areas completely, rendering them practically worthless as waterfowl feeding grounds. The "useless" plants at the Necedah Refuge which offer the most problems in general are woolgrass (Scirpus Cyperinus) and willow (Salix sp.) Reed canary grass is a more local problem in the Pool #2 and upper Rice Pool areas. Reed Canary grass should never be planted as erosion protection on new dikes or roadways because it invades the natural marsh causing moist soil management problems. Woolgrass and willow can invade drawdown edges of pools or even deeper portions of pools within two years of successive summer drawdowns.

The three-year rotational drawdown water management program currently being used is designed to drown out worthless competitive perennial vegetation and at the same time improve submerged aquatic vegetation. Two to three years of successive flooding kills most perennial emergent vegetation and allows time for

decay of that dead vegetation mat, and sets up competitionless conditions for moist soil annual plant production in the third or fourth year of the rotation.

24. Waterfowl Foods and Availability. Although this subject is listed last in the list of considerations in planning a marsh and water management program, it is the most basic consideration of the whole program. For if the proper waterfowl food materials are not provided on or near the refuge, there will be no waterfowl use.

The protection provided by the refuge for waterfowl from hunters did not necessarily mean that waterfowl would respond to the natural marshes on the Necedah Refuge, even during the hunting season. The natural marshes on the Necedah Refuge are acid sedge meadow types that are not attractive to waterfowl at any time of the year.

Water impoundments were constructed in the early days and waterfowl immediately responded to each when first put into operation. After a few years, it became apparent that with stabilized water levels, waterfowl use declined with each passing year. Within the impoundments waterfowl food production declined each year with corresponding increases in rough fish populations. Waterfowl food production steadily decreased within the impoundment. It was never available in thousands of acres of sedge marshes in and around the refuge. And the few remaining small farms within the large expanse of woodlands around the refuge were hunted heavily. All that prevented adequate food availability.

When some impoundments were drained to facilitate dike or dam repair during the 1950's and 60's, it was noted that moist soil annual plants naturally developed on mud flats. When these areas were reflooded, waterfowl flocked to them. Also, a great improvement was noted in submerged aquatic plant development in subsequent years because rough fish were forced out when the pools were drained the previous year. Widgeon and diving ducks responded to improved aquatic beds.

These marsh improvements in the production of waterfowl food materials and the resulting responses to them by waterfowl were a result of drainage and reflooding brought on by emergency dike repair measures. Never the less, native waterfowl food plants responded so favorably that the procedures were then planned and implemented to induce artificially similar habitat changes to rejuvenate these marshes on a periodic basis. It is a well known fact that marshes in the most productive waterfowl areas of the prairie states do dry out periodically through natural drought conditions.

So it came to be that periodic drying out of the refuge impoundments became the basis of the water management program. This program depends solely on the manipulation of water levels and the seasonal timing of these manipulations. No artificial seeding, no mechanical disturbance of bottom soils, and no chemical applications are used nor proposed in this program in areas below that high water levels of the managed impoundments. When these three procedures are

discounted, the marsh management program then relies on the capability of flooding each impoundment to a sufficient depth over sufficient acreage to drown out undesirable vegetation; also, on the capability of sufficiently draining each impoundment which is necessary for rough fish removal and the development of moist soil annual food plants on exposed mud flats.

Most of the impoundment basins here at the Necedah Refuge are unique in that they were ditched in earlier unsuccessful attempts to make farmland. These ditches are still present and are used to drain the marshes periodically so that moist soil plants can thrive. These ditches are also used now to move or divert water from one impoundment to another for the necessary reflooding purposes. The water control facilities and the water resources are adequate and timely so that prescribed draining and reflooding generally can be done at will. Because of the unique and available facilities and resources, a water manipulation program has developed over the years that is capable of successfully producing desirable waterfowl food materials, both plant and animal, and at the same time has the capability of controlling competitive undesirable vegetation within certain limitations.

D. Policies, Procedures, and Legal Requirements. When considering wetland modification, there are some important procedures and policies to follow.

1. NEPA Procedures Handbook. This book covers procedures used in planning relative to environmental assessment and impact statement requests and preparation.

2. Memorandum for Director, dated September 30, 1977, regarding Executive Orders 11988 and 11990. This memo pertains to interim implementation guidelines for construction activities in wetlands and floodplains. Emphasis is placed on careful planning of projects proposed for location in such areas and focuses on the requirement for full consideration of alternatives to such locations.

3. Corps of Engineers, Environmental Protection Agency and equivalent State agencies each have publications which give in detail their requirements and procedures for applying for Section 10 and Section 404 permits when planning work in wetlands. Since these procedures are lengthy, it is imperative that these State and Federal agencies be contacted as soon as possible for advice on what permits will be required and procedures to follow.

4. Section 7 Consultation Report. When an endangered species or its habitat may be affected, procedures prescribed in Section 7 of the Endangered Species Act, must be followed. (See 7 RM 2, Endangered Species Management.)

E. Marsh and Water Management Plan. A management plan will be developed to guide the management of refuge marsh and water areas. (See 4 RM3, Management Planning.) As part of this management plan, an annual work program is required to outline the previous year's progress toward the management objectives and planned

elevations for the program year. (See Exhibit 1, Annual Water Management Program Outline.)

IV. Resources Available/Current Program

A. Management Program Summary - Current outputs in Relation to Objectives.

OUTPUTS	CURRENT LEVEL	OBJECTIVE LEVEL	MANAGEMENT DEFICIT/EXCESS
Maintenance (usedays)			
Geese	663,000	350,000	+313,000
Diver Ducks	121,500	300,000	-178,500
Marsh & Shorebirds	128,700	269,000	-140,300
Puddle Ducks	990,300	950,000	+40,300
Waterfowl Production:			
Geese	90	70	+20
Diver Duck	95	530	-435
Puddle Duck	795	4,360	-3,565

B. Management Program. The current program is based on maintenance of approximately 4,700+ acres of permanent marsh within 36 impoundments. Rotational water level drawdown management within at least 13 impoundments provide migratory waterfowl annually, on the average, about about 650+ acres of moist soil seed producing annual plants, about 1,300 acres of moist green browse, and 980 acres of open water submerged aquatic vegetation. There are 49 water control structures and 12.5 miles of dike used in the program. No marsh planting is done to provide cover or food requirements. Water levels are manipulated to encourage desirable marsh vegetation and to discourage the undesirable.

To meet objective levels of increasing waterfowl and other waterbird maintenance, the following management activities are proposed in the current Master Plan.

1. Construct new pool - "Speedway Pool" - 650 acres.

2. Construct new pool - "Hanson Road Pool" - 625 acres.

3. Increase Suk Cerney Pool from 70 to 880 acres by rebuilding an existing dike. This dike was rebuilt and raised 1.5 feet in 1988. The area of the pool was increased to about 100 acres, much less than the planned 880 acres. Grand Dike Road would have to be raised if this pool acreage is to be increased.

C. Program Description, Problems, and Solutions. Gravity flow is the simplest and most economical method for flooding wetland developments. The Necedah Refuge is fortunate in that this method is easily used here. Water enters the north end of the refuge and flows through the relatively flat topography of the refuge to exit on the south end due to the gradual slope of approximately 3 feet per mile.

Impoundments have been developed by constructing dikes across ditches and drainage areas. However, the problem is that not enough dike construction has been done to develop the refuge to its fullest potential for waterfowl. Also, some of the earlier impoundments constructed on the refuge have deteriorated and lost much of their value to waterfowl. This deterioration occurred because dikes were not constructed high or wide enough to hold high enough water levels to flood out undesirable vegetation that has encroached. This plan envisions building up dikes on some of these pools so larger and deeper water areas can be held and constructing several new impoundments to make better use of refuge water. These recommendations are described later and are shown on the attached map.

The water development program began at Necedah in 1936 when Rynearson Pools 1 and 2 were constructed. In 1939, the smaller pools on the north end (Pools 13, 19, 18, 27, and 28) were developed. It wasn't until 10 years later (in 1949 and 1950), that the largest impoundment, Sprague-Mather Pool, was developed. In 1965, the dike and control structure for Pool 9 were put in. The Carter-Woggon Pool was constructed in 1969 and the Canfield control structure was set in 1970.

A water management program involving drawdowns began at Necedah Refuge in 1943 when Pool 19 was drained. Upon reflooding, it was observed that this small pool attracted more ducks than the larger Rynearson Pools. After this initial success, a management program was developed involving summer drawdowns and growing moist soil foods for Rynearson Pools 1 and 2 on alternate years. The program of alternating drawdowns with Pool 1 was discontinued in 1952 because of difficulties in obtaining complete and rapid drainage of Pool 1. However, Pool 1 was re-entered in the rotational drawdown program since 1979. Rynearson Pool 2 has since been drawn down almost every other summer.

In general, drawdowns of refuge impoundments, especially Rynearson Pool 2, to grow moist soil foods have been very successful and should point the way toward the type of management that should be expanded upon. An example of this is gained by comparing fall waterfowl use of Rynearson Pool 2. In 1967, it was not drawn down and had a total of 211,695 waterfowl use days during the fall. In 1968, the pool was drained in the summer, millet and smartweed were grown, and it had 514,465 waterfowl use days during the fall. Observations over the years, show that when a drained pool full of millet is reflooded in the fall, waterfowl prefer it over refuge agriculture crops of corn and buckwheat. With more areas developed for millet production, we should be able to drop our expensive farming program and at the same time provide more desirable natural food.

One of the problems at Necedah is that there is not enough good pools for drawdowns so that they can be managed on a rotation basis. Some can't be flooded adequately to drown out perennial vegetation. Another is too large. The Sprague-

Mather Pool, for instance, should be divided into several sub-units. At any rate, there are a number of advantages to managing ponds on a rotation basis. For example, if the same pool is used to grow moist soil foods each year, there is usually a mat of vegetation covering the bottom that must be plowed or disked to get good seed germination of preferred foods. If this same pool is managed on a rotation basis, the mat of vegetation has a chance to decompose. Then when the pool is drawn down bare mud flats are exposed where naturally seeded moist soil annual plants grow without working the soil. Draining the same pool each year also had the disadvantage of allowing such undesirable perennial plant species as willow and woolgrass to thrive and out compete desired annual species. Leaving a pool flooded, with a couple of feet of water for at least 1 to 2 years, will kill out most of these unwanted perennial plants. This will also allow enough time for dead mats of vegetation to decompose so that it does not prevent germination and growth of annual plants once the pool is drained again for moist soil plant production.

D. Program Units. Generally water management practices at Necedah should take the following points into consideration.

1. Drought and flooding are not extremely important factors influencing water management. Precipitation averages 32.6" per year and is fairly well distributed throughout the year.

2. Consider keeping the pools on the north end full through the summer so that water will be available for release in the fall to flood moist soil food units in the southern part of the refuge. However, it is not believed necessary to keep all northern pools full every summer. Rotational summer drawdowns should be planned for these pools as well.

3. Manage moist soil food units on a rotational basis.

4. Impoundment water levels should be lowered one foot in early winter, before controls lock up with ice, as insurance against the anticipated surge of spring run-off. Rapid snow melt with heavy spring rains should be expected and planned for.

Rynearson Pool #1. This pool should be managed at an elevation of 924.0 feet for the normal peak elevation. This elevation allows for one foot of freeboard for the pool to absorb high and rapid run-off shocks as those produced by heavy thunderstorms before uncontrolled water would flow over the emergency spillway. At this elevation, the pool is approximately 730 acres.

It has had good stands of wild celery, pondweed, Elodia, and some wild rice which have been well used by waterfowl. It has been one of the best pools on the refuge for diving ducks. Rough fish problems have occurred contributing to the decline of submerged aquatic plant beds in some years. For this reason, this pool has been included in the rotational drawdown program and has proven to be an excellent moist soil plant production area, especially in the years of 1979, 1983, 1985, and 1988. Excellent submerged aquatics were present in the interim.

Since the late 1960's, jack pine and oak has been removed around this pool's margins and controlled burning has brought back grassland and improved nesting habitat. Late summer burning of parts of this grassland has provided natural green browse for geese during the fall migrations. Some potholes have been developed around this pool by AMNO blasting and dozing and there is room for many more. A water level near 924.0 also helps maintain water in these potholes. Islands in Pool 1 have traditionally been good nesting sites for Canada geese and the pool serves as a brooding area for their young. Pool 1 also serves as a brooding area for waterfowl hatched around Pool 2 during years when Pool 2 is drawn down for moist soil food production. The brooding area and moist soil production areas are reversed when Pool 1 is drawn down in rotation.

An occasional partial late summer (August) or fall (October) drawdown will help keep the pool more productive. Exposed mud flats and associated vegetation (spike rush) could be most attractive to geese. October drawdowns expose loafing sites and invertebrates to benefit all waterfowl.

Rynearson Pool #2. This pool should be managed no higher than 924.0 feet for the normal peak elevation. At this elevation, the pool is approximately 455 acres and it allows a one foot freeboard for the pool to absorb rapid flood shocks before uncontrolled water flows over the emergency spillway. This pool has had good stands of submerged aquatic plants and is the most successful and easily managed of the moist soil drawdown units. The capacity of the radial gate controlling this pool allows for rapid and adequate draining. Flow capacity is also capable of passing most flood waters without backup causing damage to moist soil plants. Lateral ditches extending from the Little Yellow Ditch have improved draining the pool areas where sheet water had existed previously. The water source for reflooding in the fall is generally reliable by diversion from the Goose or West Sprague Pool. This pool has ranked with the top three in waterfowl usage over the years. Drawdown management should continue to be rotated with the adjacent Pool #1. For instance, both of these pools (#1 and #2) should never be drained for moist soil seed production in the same summer.

Carter-Woggon Pool. At the north end of Rynearson Pool #2, this unit was developed in 1968 by raising a road to serve as a dike. This area, 165 acres, was solid willow and woolgrass and received no waterfowl use prior to flooding. Currently, about 80 acres of this pool can be managed as a less than optimum moist soil unit. The Problem is adequate drainage if the pool is to be drawn down without drawing down Rynearson Pool #2 at the same time. When Pool 2 is full, water backs up into the outlet control structure of the Carter-Woggon Pool and prevents proper drainage for smartweed seed production. Instead Bidens and rice cutgrass is dominant. If smartweed and wild millet is to be produced, this pool must be drained in the same cycle of early June drawdown as Pool #2. However, early August drawdowns for green browse production or October drawdowns for invertebrate exposure can be done independent of water levels in Pool 2. Peak high water levels should be kept at no higher than elevation 926.0' for fear of wave action damage to the toe of the dike.

Sprague-Mather Flowage. This pool was constructed in 1950 primarily as a storage reservoir so that water would be available to reflood the Rynearson Pools when they

were drawn down. It also turned out to be a preferred area for waterfowl, particularly wood ducks, widgeon, mallards, and Canada geese.

The Sprague-Mather Pool is divided into two parts, Goose Pool and Sprague Pool, if water levels are relatively high (939.0'+). These two high water pools are separated by the Bewick Road dike. At lower water levels (below 939.0') the Sprague Pool, because of natural high land separations, is divided and managed as three separate sub-pools. These sub-pools are known as the West Sprague Pool (controlled by Dam 31), the Middle Sprague Pool (controlled by Dam 30), and the East Sprague Pool (controlled by Dam 29).

Goose Pool. The Western part of the Sprague-Mather Pool has a water area of approximately 300 acres at full pool elevation (942.0') and is referred to as the Goose Pool. It has been used as a moist soil food unit. The first drawdown of the Goose Pool was in 1964 and was partially successful. The major problem then was inadequate drainage and the problem continues today. Only about 90 acres can be successfully managed for moist soil plant seed production. Even though Bidens and rice cutgrass are dominant here rather than smartweed or millet, good response by feeding waterfowl during the fall migration is the rule. Since deep draining is out, early August drawdowns for green browse production may be a more reliable alternate course of action instead of managing this pool for seed production.

Sprague Pool. The Sprague Pool, being a composite of the sub-pools mentioned, consists of all the area east of the Bewick Road dike. Surplus water from this pool is used to flood moist soil plants in the fall in either Pool 1 or 2. Water levels above 938.5' are considered surplus in the fall and the release will not seriously reduce waterfowl habitat within the Sprague Pool. This entire area has a designed peak water elevation of 943.0' with a water acreage of approximately 2,400 acres. However, its recent average managed acreage has been reduced to about 1,400 acres because the high normal water levels had to be reduced to 939.0' to prevent wave action damage to the recently repaired dike. To bring this pool up to designed marsh acreage potential and for extensive drawdown and reflood management, rock riprap should be applied to protect the toe of the about 5 miles of dike.

Because any one water management manipulation practice affects such a large acreage, it is considered less than ideal. Therefore, it is proposed that this large acreage be sub-divided into smaller management units which can be manipulated easier on a rotation basis using reduced design water levels. This means that a system of cross-dikes must be constructed utilizing natural high land ridges which now separate the sub units which are described below.

West Sprague Pool. If water levels in the Middle Sprague Pool (behind Dam #30) are managed at or below 938.5', the West Sprague Pool (behind Dam # 31) can be managed as a top notch 147 acre moist soil unit for either green browse for geese or for smartweed seed production. Tremendous smartweed and millet production occurred every other year for the last decade. The area is easily reflooded in the fall by diverting water from the Goose Pool or overland from the Middle Sprague Pool. October drawdowns have also been successful in attracting waterfowl during the intermediate years when the pool was flooded during the growing season. Rotational

drawdown programs should continue as outlined elsewhere in this plan. Rock riprap application to the toe of this dike would facilitate the expansion of this intensified management acreage in the vast area of low-value woolgrass in the upper reaches of this pool. In the event that the main dike of the Middle Sprague Pool is someday rip rapped allowing needed higher water level management there, a new dike is then proposed to separate the West Sprague Pool from the Middle Sprague Pool. This new dike would be about 1,000 feet long and extend north across a shallow flat from the wooded peninsula now separating these two portions of the pool. In this new dike, a rock spillway should be installed with a flow line of about 941.0' which would allow flood water from the Middle Sprague Pool to enter the West Sprague Pool and then be passed on through Dam #31. Without this overflow spillway in the proposed new dike, a very valuable and currently used means of passing flood water to the south of the Sprague Road would be cut off.

West Sprague Pool outflow is currently controlled by a slide gate in Dam #31. This slide must not be opened more than 13". Otherwise not enough water will pass through the Sprague Road culvert just downstream. Water will back up above the culvert, then overflow the road causing a possible washout of the road or a hydro-planing motor vehicle accident. Between this road culvert and Dam 31, there is an old C.C.C. stoplog dam. This C.C.C. dam is not useful in controlling water in the West Sprague Pool when the water there is to be managed at 939.0'. However, the C.C.C. dam is used as a metering control and as a barrier to keep rough fish from passing upstream from Pool #2 when the West Sprague Pool is drawn down for moist soil plant production.

Below Dam 31, another large culvert should be placed along side of the existing culvert under the Sprague Road. This would eliminate the present flow capacity restriction and would allow Dam 31 to be opened to full capacity to pass flood waters without causing a road washout or motor vehicle accidents.

Middle Sprague Pool. The Middle Sprague Pool (controlled by Dam #30) is the largest of the Sprague sub-pools. At current maximum managed water levels of 939.0', about 1,100 acres are flooded. Of this, about 580 acres have the capability of producing moist soil plants. An area of about 240 acres is deeper water which can not be drained adequately for moist soil plant production and thus has only submerged aquatic plant production capabilities. Currently, June drawdowns for moist soil plant seed production are seldom done on this portion of the Sprague Pool because it is needed in the fall to reflood moist soil plants produced downstream in Pools 1 and 2. Fall drawdowns to 938.0' are often done. Lowering the water levels in the fall expose mud flats and sand bars which produce a short growth of needle rush and spike rush. This has provided excellent browse for migratory geese and should be a planned management practice at Necedah.

Care should be taken to make sure this pool is not managed with water levels higher than 939.0', so as to prevent wave action damage to the toe of the dike system. Water higher than this level can be released through Dams 29 and 31 in addition to the main control at Dam 30. Dam 30 is a radial gate structure modified with stoplog bays placed upstream of the radial gate. The stoplogs are normally used to control water levels in the pool. The radial gate is used only now to meter flood waters

through the dam so that they do not exceed the capacity of the culverts and bridges on the township roads located downstream. The metal skin on this radial gate is in dire need of being replaced. It looks like a sieve with rusted through pin holes and is about ready to collapse. If this should happen while the radial gate is under pressure of 2 plus feet of flood water, there's no telling what might happen to the roads and bridges downstream. The greatest fear is that a high speed nighttime driver traveling along the Sprague Road may crash into a washout hole in the road bed or go hydro-planing out into the woods.

It should be re-emphasized that the highest water levels in this pool are normally managed at about 2 feet below design levels and that this must continue if the dikes are to be protected from wave action erosion. If rock riprap could be placed to protect the dike, the waterfowl habitat acreage could be nearly doubled and brought up to what was originally planned.

East Sprague Pool. The East Sprague Pool is a 150 acre pool at full pool elevation of 940.0'. It is a pool that is easily drained through Dam #29 and is separated from the Middle Sprague Pool by a very low-level dike having a rock spillway. Currently, only 27 of the 150 acres are capable of moist soil plant production. This limitation doesn't exist because of drainage problems, but because water levels cannot currently be raised high enough to flood out perennial woolgrass competition in the majority of this pool. Dam #29 has the capacity to hold higher water levels, but the water escapes over the rock spillway in the low-level dike between this pool and the Middle Sprague Pool. This rock spillway should be raised at least 6" but no more than 1'. A couple of truck loads of rock should do it. Then, the many nesting islands (push-ups) would be better isolated with the surrounding water and the potential moist soil acreage would be enlarged.

If the other Sprague sub-pool dikes are ever riprapped, then the increased water level management there would require riprapping the East Sprague Pool dike also.

In the past decade, this pool was kept full to rock spillway level from January through July to facilitate the nesting season and then drained from August 1 through November each year for 27 acres of green browse production. These successive annual August drawdowns, so far, continue to be successful as 800 to 1,000 geese stay on these 27 acres each fall. Duck use has been minimal. Successive annual green browse producing drawdowns are used in this particular pool rather than the moist soil plant seed production June drawdowns because the water shed is small and it cannot be relied upon to provide enough water in the fall to reflood the seed producing plants.

Another suggested management proposal needed on this pool is that trees and brush should be kept off the spoil pile islands along the center ditch to maintain waterfowl nesting sites.

Pool 13. Pool 13 has had limited waterfowl use in most years. The limitation is based on the limited capacity of the water control structure to hold water deep enough to flood out woolgrass and willow which are the dominant vegetation in most of this basin. About 70% of the 190 acre basin, at full pool levels, contains this

vegetation. This leaves about 40 acres that can be flooded to an adequate depth to discourage perennial emergent plants in favor of the rotational drawdown management for either submerged aquatics or moist soil plant production. Smartweeds and wild millets have grown profusely on the dike slopes and on the better drained portion of the lower pool; the poorer drained mud flats become predominantly rice cutgrass and Bidens. Never the less, greatly improved puddle duck and goose usage has occurred in this pool in those years when moist soil plants were produced and have been flooded in the fall.

Because this pool is subject to high run-off flows, all but the bottom stoplogs in each bay of the control structure should be removed to allow highest capacity flood flows through the dam during moist soil drawdowns. The removal of this many stoplogs helps to prevent inundation and destruction of moist soil plants during flood flows and also provides for the best possible drainage of pool bottom soils for maximum smartweed and wild millet production. Pool 13 is not to be drawn down for moist soil plant production at the same time the adjacent Pool 9 is drawn down. Drawdowns in these pools are to be alternated.

During the water management rotation when high water is to be maintained to discourage the growth of perennial vegetation, it is suggested that this be best done if water levels in this particular pool are maintained stable at levels high enough to trickle over the emergency spillway throughout the entire length of the growing season.

Pool 18. Pool 18 is essentially two sub-pools connected by a diversion ditch. The southern sub-pool dikes were rebuilt in 1978 allowing maintenance of increased water depths, thus increasing pool acreage. A stoplog structure and an emergency rock spillway were also constructed so that water level manipulation could be achieved in the southern or lower portion.

The plan was to divert water from the upper Pool 18 via an old diversion ditch into the lower pool 18. Following the above mentioned improvements, the water diversion was only partially successful. Water levels were elevated in the lower pool about 18" which was about one foot less than planned high water levels. Additional water could not be diverted from the upper dam because water at the upper dam was dangerously close to the top of the upper dike and water control structure. Also, the water was lost as it topped the emergency overflow at the west end of the upper Pool 18 dike.

Raising the rock spillway and the upper dike by one foot would resolve water management problems in the lower pool and allow the water levels to be maintained there at planned levels. However, if this were done, water would likely top this upper dike and control structure causing a washout failure of the whole system.

Therefore, it is also suggested that the top of the upper control structure and dike be raised about three feet and the upper rock emergency spillway raised at least two feet. This would resolve all water diversion problems in the lower pool, increase the safety factor against wash-out of the upper diversion structure and dike, expand the size of the upper Pool 18 from one acre of waterfowl habitat to about 50+ acres, and

increase waterfowl habitat acreage in the lower pool from 27 acres to 53 acres as originally planned.

Pool 9. Pool 9 was constructed in 1964. A wash out of the water control structure prevented flooding in 1965 and 1966. In 1967, an attempt was made to manage this area as a green tree reservoir. However, considerable damage occurred over the years as the timber died. Most of the timber damage occurred in August 1980, when flood waters could not be released fast enough through the outlet control structure. The pool area includes ridges, which when flooded to approximately 946.0', provide nesting sites protected from predation by fairly deep water levels. Highest water levels have been maintained for several years in a successful attempt to eliminate undesirable perennial vegetation. This unit has proved to be a good moist soil food production unit. A rotation of alternate drawdowns has been established with either Pool 13 or the Goose Pool. At elevation 946.0', the pool is approximately 335 acres and a good addition to Necedah's water units.

The water control structure is a corrugated metal riser with stoplogs. A problem has developed which needs repair. On the downstream side of the stoplogs, and possibly on the upstream side, a gap apparently exists between the riser pipe and the horizontal pipes. This allows water to suck the adjacent backfill into the lower horizontal pipe causing the backfill to slump, creating holes in the dike adjacent to the riser pipe. Continuous annual refilling these holes with rock riprap so far has failed to resolve the problem. The backfill around the riser needs to be removed and a concrete collar poured to block this apparent gap in the pipes.

Another problem concerns the flow capacity of the emergency spillway. The rock spillway over the Turkey Track Road is apparently adequate but flood waters are not allowed to escape below the spillway due to a flow restriction in the ditch below. The restriction is a 15" culvert under the West Goose Pool Road. This culvert should be removed and replaced with a rock lined dip in the road bed. The dip should be at least as wide as the ditch. This restriction is believed to be partially to blame for the long time flooding which killed the trees in the impoundment in 1980.

Pool 19. Pool 19 was established as a 220 acre impoundment. But the actual size has been closer to 60 acres for several years because of narrow low-level dikes and a low control structure. Pool elevations have been held at less than maximum allowing encroachment of undesirable woolgrass and willows. Waterfowl use has been disappointing, especially in the lower portion. This pool has good potential for duck nesting and has had Canada geese nesting on islands. Water levels nearer 950.0' would provide more water area and prevent encroachment of undesirable vegetation. Increased water level management would require widening and elevating the north dike. In 1990, a control structure was added in the east dike so that the southern portion of this pool can be drained occasionally to improve the growth of aquatic vegetation.

Pool 27. This small pool at the north end of the refuge is included with the land that is managed by the State under a land management exchange agreement. The management and maintenance of this pool has been assumed by the State of

Wisconsin. Therefore, proposed management and maintenance programs and projects for this pool are no longer a part of the Refuge Marsh and Management Plan.

Pool 28. This small pool is also part of the land management exchange agreement as Pool 27. Proposed management programs and maintenance projects are no longer included in this plan for the same reasons as Pool 27.

Suk Cerney Pool. Suk Cerney Pool (100 acres) is the largest of the pools on the refuge that is open to public fishing and waterfowl hunting. While this pool may have potential for raising moist soil plants for seed production, it may be difficult to reflood in the fall. This pool generally has insufficient watershed without a lengthy ditch system entering the pool to accumulate water for reflooding purposes especially needed in the fall. Supplementary water can be diverted from Pool 2. This is usually done in the spring or early summer in order to raise water levels in Suk Cerney to full pool levels. Pool 2 must be near full pool level at the time to accomplish the diversion. Historically, raising Pool 2 in the fall, rather than allowing water levels to recede slowly or reflooding moist soil plants too deeply causes a reduction in the waterfowl attractiveness in Pool 2. Therefore, this pool is one of the few pools on the refuge that is not manipulated for moist soil plant production.

Moist soil units are so attractive to waterfowl, that it is believed to be unethical for professional refuge managers to set the hunter up in a situation that is not much different from shooting over bait. Instead, the present management of this pool calls for keeping water levels close to full pool through the summer brooding season and on through the waterfowl hunting season. Waterfowl hunters are inclined to be satisfied with a pool having water rather than one that had been drawn down for moist soil plant production and then could not be reflooded in time to hunt over. Also, fishermen are not likely to complain about the effects of intentional drawdowns. Historically, significant natural drawdowns and winter fish kills have occurred in this pool often enough to maintain the marsh integrity without an induced drawdown.

Parhm and Turkey Track Pools are both relatively small pools; they are easily filled with the spring runoff and are willow brush marshes. Both have been managed in a similar manner for several years. If they don't go dry naturally by August 15, they are drawn down intentionally to prevent killing the willow brush used for waterfowl brood cover. These two marshes are managed strictly for waterfowl production rather than for optimum fall waterfowl habitat.

Killdeer Pool is another small pool, 15+/- acres, that usually fills with the spring run-off but often goes dry naturally by late summer or fall. It can be managed for spike rush green browse production, if desired, with an August drawdown if it doesn't occur naturally. However, if it were drawn down in June for moist soil seed production it most likely could not be reflooded in the fall because of the lack of adequate watershed.

Upper Rice Pool is a relatively new pool, constructed in 1989. It is about 70 acres in size and presently consists mainly of flooded, nearly dead willow. Because of the relatively small flow capacity of the outlet control structure in relation to the normal inflow, there is little potential for successful moist soil seed production. Draining and

keeping the pool drained during the summer growing season will be difficult. As the inflow entering this pool from the Sprague Pool wanes, as it normally does by late summer, the potential for a successful late summer drawdown for spike rush production in this pool is increased. Consideration should occasionally be given to this management technique in this pool, especially in dry years.

Otter and Mink Pools were constructed in 1989. Both apparently suffer from higher rates of outbound seepage, evaporation, and transpiration than the inflow. Neither pool has ever filled to full pool levels. Both remain small in area, less than 3 acres, where their potential is 20+ acres each if more water is diverted into them from Pool 29. Apparently this must be done to successfully flood these pools.

Rattail, Cranberry, Upper Cranberry, Little Goose, Beaver, Coaver Road South, Coaver Road East, Stub Ditch, East Turkey Track Pools and the four pools south and east of the Turkey Track Diversion Dam are all new pools, relatively small, and have not been operated long enough to develop a history of their management capabilities. Therefore, initially they will all be operated in a similar manner described as follows:

> Efforts will be made to raise the water to full pool level at ice out in the spring. Levels will be maintained through August 1, then lowered gradually until dry by August 20 to prevent flooding out the existing willows used as brood cover. The pools shall remain dry through the winter, then reflooded in the spring. Until a history is developed concerning the water management capabilities of individual pools, all will be managed as waterfowl production marshes safeguarding their brood cover as long as possible before moist soil plant management is implemented.

V. Water Management Program - Procedures

The water management program, as planned herein, calls for periodic manipulations of water levels in all impoundments. No impoundments are to be managed with the philosophy of maintaining relatively high and stable water levels year after year. This philosophy has proven unproductive in the long term due mainly to rough fish activity.

A two-, three-, and sometimes four-year rotational moist soil drawdown marsh management program is currently used and is the basis for the production of optimum waterfowl food materials. This two-, three-, or four-year rotational marsh management program therefore must be worked into the determination of the capability to sustain waterfowl usedays on an average annual basis. Some formulas quoted in the literature are sometimes used to determine potential waterfowl usedays where it is assumed moist soil units are drawn down annually and seed production remains constant each year. Realistically, this does not occur at Necedah Refuge without disturbance of the bottom soils (either mechanical, flooding or freezing). Seed production falls off rapidly and the annual plant species compositions change with each successive annual drawdown until perennials of

little value to waterfowl (woolgrass and willow) become dominant and out compete the annual moist soils plants.

To prevent or reduce woolgrass domination of moist soil units, each unit is managed on the two-, three-, or four-year rotational program. A pool is drained during one growing season and reflooded for the next one (or two or three) successive growing season(s), before it is again drained for moist soil seed production. Existing woolgrass is drowned out or seedling woolgrass is prevented from germinating and getting a foot hold in the deeper portions of the moist soil units during years of flooding. Thus, when the pool is drawn down, rough fish are forced out and there is little live perennial vegetation to compete with the annual moist soil plant seedlings. And, when these pools are reflooded in subsequent years, submerged aquatic plants thrive for 2 or 3 years with reduced rough fish activity. Even in those years when the pools are in the flooded portion of the cycle, consideration should be given to the flexibility of prescribing a late summer or fall drawdown for the various purposes explained later in this section. The proper seasonal timing and duration of the water level manipulations will determine the success or failure of the four drawdown techniques explained next.

A. Early June Drawdowns

1. Purpose: Production of moist soil annual plants for seed production. These native plants are reflooded in the fall making this food source available to ducks and geese during fall migration. Refer to the table on page 31: List of Moist Soil Annual Plants Important as Waterfowl Food Listed in General Order of Occurrence in Early June Draw-Down Units.

2. Procedure: Completely dewater the basin so that the flowing water still in the drainage ditch above the control structure is at a level at least 1' below the level of the adjacent mudflats. Commence dewatering about May 20th so that the basin is completely dewatered by June 1st. Delayed drainage pretty well eliminates the danger of frost damage to the tender, just germinated moist soil annual plants. The basins are kept drained through September 15th before the reflooding process begins. At no time during the active growing season is water allowed to completely inundate the moist soil plants. This is especially critical shortly after germination when the plants are still short and more easily inundated by increased flows. Later as these plants get taller, they can tolerate flooding for several days without a significant seed production loss as long as the flowering seed head is not submerged.

   Ideally, the reflooding should proceed gradually in steps so that new areas are flooded as the seed in the previously flooded areas is consumed. However, because the land is so level in some impoundments and the high seed production portions are so small in some pools, the step reflooding process may have but a few steps before the moist soil plants are flooded too deep to be available for puddle ducks. The pools are brought up to near full pool for the winter and on through the next summer when they may be again drawn down in an August or October drawdown, explained later. It should be pointed out that this procedure is successful only on flats devoid of live perennial emergent vegetation and devoid of a mat of dead perennial vegetation. The required intermediate year

or two of flooding in this three-year rotational drawdown program allows time to curtail or kill the perennial vegetation and allow the necessary time for the mat of dead vegetation to decay resulting in a bare mudflat at the beginning of the drawdown.

MOIST SOIL ANNUAL PLANTS IMPORTANT AS WATERFOWL FOOD LISTED IN GENERAL ORDER OF OCCURRENCE IN EARLY JUNE DRAWDOWN UNITS AT NECEDAH NATIONAL WILDLIFE REFUGE	
1. Nodding smartweed	Polygonum lapathifolium
2. Rice cutgrass	Leersia oryzoides
3. Beggar tick	Bidens sp.
4. Wild millet	Echinochloa crusgalli
5. Big seeded smartweed	Polygonum penslyvanicum
6. Tearthumb smartweed	Polygonum sagitatum
7. Dotted smartweed	Polygonum punctatum
8. Wild millet	Echinochloa walteri
9. Panicum	Panicum sp.
10. Chufa	Cyperus esculentus
11. Sedge	Carex rostrata
12. Lesser ragweed	Ambrosia artemisiifolia

B. Early August Drawdowns

1. Purpose: Production of immature moist soil annual plants grown for green browse is accomplished by this procedure. This material is grown on exposed mudflats primarily for goose consumption during the fall migration. Refer to table on page 32: List of Moist Soil Plant Seedlings or Greens Important to Geese Listed in General Order of Occurrence on Early August Drawdown units.

2. Procedure: This drawdown for green browse production differs from early June drawdowns not only by the seasonal timing difference but also by the extent of drainage. Green browse production drawdowns commence in late July so that the intended mudflats are exposed from August 1 through November 15. The pools are only partially drained. Rather than pulling water down so that the

remaining water in the ditch is one foot below the level of the adjacent mudflats, as in the seed production procedure, this procedure calls for lowering the water only to the ditch top (never below) level. Adjacent mudflats are not allowed to dry out and crack but are left in a moist to almost soggy condition. Sheet water is left only in the very deepest portions of the pools. In large pools, sufficient acreage may be exposed above the water level around the edges of the pool so that it is necessary to drain only a fraction of normal acreage of the full pool. These pools are kept flooded from late November through August 1. Here again, it should be pointed out that this procedure will be successful only on flats devoid of live perennial emergent vegetation and devoid of a mat of dead vegetation. The required year or two of prior flooding for eradication of unwanted emergent perennial vegetation is required especially in the initial year for green browse production, the same as in the June drawdown for seed production. However, after the perennial vegetation has been killed and the mat of dead vegetation has decayed, it is possible to have respectable green browse production every year on the same flat without perennial vegetation encroachment. This has been accomplished in the East Sprague Pool. Here the watershed is short and reflooding in the fall is not reliable, so this pool has been set up as a green browse drawdown unit annually for most of the last decade. It was drained every year on August 1 through November 30, and flooded from late November through July 30. Full pool flooding during the early growing seasons has prevented re-establishment of perennial vegetation. When the pool is drawn down on August 1, there is no live perennial vegetation or dead vegetation mat to interfere with green browse production. This procedure works well with waterfowl production as it is flooded to full pool levels each year until after most of the brooding season is over.

LIST OF MOIST SOIL PLANT SEEDLINGS OR GREENS IMPORTANT TO GEESE LISTED IN ORDER OF OCCURRENCE ON EARLY AUGUST DRAWDOWN UNITS AT THE NECEDAH NATIONAL WILDLIFE REFUGE	
1. Slender spike rush	Eleocharis acicularis
2. Common spike rush	Eleocharis palustris
3. Seedlings of nearly all annual plants occurring on early June drawdown units.	

C. Fall Drawdowns

1. Purpose: The purpose is to improve waterfowl usage of a full pool when there is an obvious lack of waterfowl use. This procedure may be initiated just prior to the opening weekend of the local waterfowl hunting season when the

expected waterfowl use should be high, but for some apparently unknown reason it is not.

The purpose is two-fold. Exposed mud bars are created for waterfowl loafing sites and invertebrates, minnows, insect larva, etc., are concentrated and exposed in the deeper portions of the pool when the water is lowered so that puddle ducks can tip up and reach them on the bottom in otherwise deeper water areas. An enormous animal food supply is now available to feeding puddle ducks as well as divers. Also, the residues of moist soil seeds produced in prior year drawdowns, are again within the reach of the puddle ducks and geese.

2. Procedure: As mentioned above, this procedure is usually initiated just prior to or after the opening of the waterfowl hunting season. However, waterfowl use of a pool that has been relatively full for at least 10 months previously can be enhanced for a period of 2-3 weeks with a drawdown during any ice-free period of the year. But it is especially useful in the late summer and fall. It is this time of the year that most natural marshes tend to lose water levels through natural drought. And, the intent here is to induce a natural phenomenon artificially through water level manipulations within an impoundment which might have otherwise been managed with stable high water levels.

   The impounded water levels are lowered about 6" and held there for a couple of days, or longer if the birds respond. If not, another 6" of water is released. Here at Necedah a total drawdown of not more than 12" usually does the trick. The 12" reduced level is held for about 2 weeks or to a point in time when the puddle ducks are "tipping up" in an obvious attempt to reach the bottom. Then it is time to consider another 6" drawdown.

   In large pools having sufficient depth, this fall drawdown procedure can be an extension of the August drawdown which was used for moist soil green browse production. In this case, a partial drawdown in August later produces the greens on mudflats around the perimeter of the marsh. Immediately after the commencement of the drawdown in the first week of August, puddle ducks and geese will congregate on or near the exposed flats. It will be noted then that the puddle duck number will be high at first, then decrease after a week or 10 days, but the geese will remain. No additional drawdowns of this pool are initiated until October 1 or later. Depending then on the overall depth of the pool, several additional drawdowns of 6" or so may be considered, as long as the water remaining in the major portion of the deepest part of the pool is maintained at not less than one foot deep.

   On several occasions, when the writer applied the technique of fall drawdowns on pools having little or no waterfowl use at the time, success was achieved in all instances in attracting both puddle ducks as well as geese. It was tried once on Goose Pool, twice on Pool 2, and three times on West Sprague Pool. In all instances the birds responded within 24 hours of the completion of the drawdown. It was so successful that many puddle ducks, especially mallards and pintails, as well as geese were drawn off adjacent reflooded moist soil units.

It should be mentioned that if this procedure is to be successful, the pool being drawn down must have sufficient depth for a sufficient length of time for populations of minnows, snails, clams, crustaceans, other invertebrates, etc., to develop since the previous drawdown. If this pool has been maintained at near full pool level for at least 10 months prior, there should be sufficient time for invertebrate populations to explode, especially if invertebrate feeding fish populations have been reduced through a prior year drawdown.

Water levels should not be raised again to near full pool during the winter. The process should be delayed until the early spring thaw. Water levels should not be raised especially after the ice has formed before the refuge trappers have completed their muskrat trapping activities. Raising of water levels after the ice has formed during the winter is especially hard on muskrats that have survived the trapping season and also on hibernating turtles. It uproots submerged aquatic plant tubers that are frozen within the ice in the shallows and it also contributes to the lifting of bog mats.

D. Winter Drawdowns

1. Purpose: The primary purpose of a winter drawdown is to control rough fish populations by encouraging a winter kill situation or forcing the fish out of the impoundment and on downstream. In subsequent years after reflooding, water clarity is improved for better sunlight penetration and thus conditions are improved for better submerged aquatic plant and invertebrate development for waterfowl consumption. A partial winter drawdown can also protect shorelines of dikes and nesting islands from the damaging effects of ice heaving which later results in wave action damage during ice free periods.

2. Procedure: Dewatering should be as complete as possible. It should begin after at least 6" of ice has formed and after the refuge trappers have completed their muskrat trapping activities. The delay facilitates the most effective harvest of the available muskrat populations and the 6" of ice protects the marsh bottom soils from being exposed to air drying and wind erosion in the event there is no snow cover. The ice also protects tubers of submerged aquatic plants from air drying and freeze damage. Water levels are maintained at the lowest possible level until the ice thaws in the spring or until about March 31, whichever occurs first. Then reflooding can commence.

AQUATIC PLANTS IMPORTANT AS WATERFOWL FOOD LISTED IN GENERAL ORDER OF OCCURRENCE IN NON-DRAWDOWN AREAS AT NECEDAH NATIONAL WILDLIFE REFUGE	
1. Water weed or Elodea	Anacharis sp.
2. Naiads	Najas flexiles
3. Flatstem pondweed	Potamogeton zosterformes
4. Pondweed	Potamogeton pusillus
5. Pondweed	Potamogeton pectinatus
6. Sago pondweed	Potamogeton
7. Wild celery	Vallisneria spiralis
8. Bladderwort	Utricularia vulgaris
9. Coon tail	Ceratophyllum demersum
10. Wildrice	Zizania aquatic

VI. Proposed Master Planned Projects That Cannot Be Accomplished with Current Funding

The Average acreage of open water considered waterfowl habitat included in all impoundments within the Necedah Refuge has been calculated at 4,700+ acres. This represents only 10.8% of the total refuge area and there is considerable room for creating additional waterfowl habitat. In order to better meet refuge waterfowl maintenance and other objectives, two new pools are proposed in the 1978 Master Plan plus improvements to another existing pool. The development of these pools would increase the impounded water acreage from 4,700 to 6,000 (13.7% of the total refuge area). Two Master Planned actions are proposed to increase waterfowl maintenance and production capabilities on the refuge: 1) Development of Speedway Pool (650 acres), and 2) Development of Hanson Pool (650 acre). Project development forms are included in the Appendix.

It should be pointed out here that information for these proposals are approximate. Only a preliminary topographic map with a limited amount of field checking was available to rough in the general outlines for these pools which are shown on the attached maps. More topographic work would of course be needed at the time any of these pools are built. The sites for them were chosen because from the topographic information available at this time, they appear to be feasible and the conditions for water supply and drawdown are ideal.

A. Speedway Pool

This pool will be located in Sections 21, 28, and 27 northeast of Rynearson Pool 1, adjacent to Speedway Road, and will be utilized as a waterfowl maintenance and production area. Twenty percent of the area is currently marsh with very little open water. Sixty percent is low area dominated by aspen. The remaining 20% has jack pine. The area has no waterfowl use at present.

The Spencer-Robinson Ditch will be the principal source of inflow to this pool which will impound an area equal to 650 acres and a maximum depth of 5' (930 M.S.L.). Water released from this pool will flow via the Spencer-Robinson Ditch into the Rynearson Pool 1.

Speedway Road will be raised 3' for a 5700' distance to serve as a dike on the southern border of the pool. The road will be graveled, with side slopes seeded and mulched with grasses. The pool side will have 6:1 slopes with the roadway slope being maintained. An additional 3,450' of dike will be required connecting the sand ridges on the east and northeast borders of the pool. These dikes will have a 12' top with side slopes 6H:IV on the pool side and 3H:IV on the landward side. All borrow material will be taken from borrow ditches excavated on the interior of the impoundment and running parallel to the proposed dike.

A stoplog control structure will be located on the upstream side of Speedway Road on the Spencer-Robinson Ditch to control levels in the pool. Filling of the pool will be accomplished by gravity flow.

Beyond being an additional area for waterfowl nesting and a sanctuary for migrating waterfowl, the use of the Speedway Road as a dike would allow the increasing numbers of refuge visitors a view of waterfowl from their cars. The development of this pool would substantially add to public enjoyment and increase waterfowl use making better use of our surplus water resources.

B. Hanson Road Pool

The 650-acre pool will be located in the central part of the refuge, in Sections 8, 9, 16, and 17. The area is bounded by Hanson and Speedway Roads to the south and west, Sprague-Mather Road on the north, and the Spencer-Robinson Ditch on the east. The area is currently 25% marsh, 65% low aspen, and 10% jack pine and oak. It has no waterfowl use other than what might occur on beaver flowages.

The principle sources of inflow will be Danielson Lateral which drains the Sprague-Mather Pool at Dam 30 and seepage in the upper reaches of Rattail Lateral. A 2,200' long diversion ditch running from Danielson Lateral, under Speedway Road and into Hanson Road Pool will be constructed. Two proposed culverts with stoplog controls located under Speedway Road will control the inflow of water to the pool. Discharge will be into the Rattail Lateral which flows into Rynearson Pool 1. The existing Hanson Road will serve as the south dike for the pool. This road will be raised an average of one foot for a distance of 5,000' and will be resurfaced with gravel. The

side slopes will be 6H:IV on the pool side, equal to the existing side slope on the opposite side and will be mulched and seeded with grasses.

Approximately 2,900' of the existing west spoilbank of the Spencer-Robinson Ditch will be raised to form the east boundary of the pool side. This dike will have a 12' top with 6H:1V slopes on the pool side and 3H:IV on the ditch side. All dike materials will be taken from borrow ditches on the interior side. Dikes will be cored with mineral soil and peat used to top dress the side slopes.

A stoplog control structure located upstream of Hanson Road will be installed to control water levels. Filling will be by gravity. No pumps will be utilized. The pool will impound 625 acres, with a maximum depth of 5' (935 M.S.L.).

VII. Proposed Projects Not Currently Master Planned That Cannot Be Accomplished Without Significant Increases in Funding

A series of Project Worksheets describing projects in this funding category are included in the Appendix of this plan:

NCD/003 Raise Dike and Control Structure of Dam 18 North
Dike Rehab of Pools 19, 27, and 29
Water Rights, Contour Mapping, Soil Survey
Upper Canfield Moist Soil Unit
NCD/87043 Iron Top Pool Construction
Middle Canfield Moist Soil Unit
Lower Canfield Moist Soil Unit
Ward Lateral Pool
Pools 9 and 13 Cutoff
High Culvert Pool
Avery and Bewick Lateral Pools
NCD/87058 Subdivide Sprague-Mather Pools
Neal Lateral Pool

A few more that should be kept in mind are listed below, however, project worksheets have yet to be completed.

A. Rock riprap Sprague-Mather Pool dike.

B. Create a new Pool by raising old Becker Road bed across the Spencer-Robinson arm of Pool 1.

C. Build new dike and control structure between West Sprague Pool and Middle Sprague Pool.

VIII. Proposed Projects Not Currently Master Planned That Can Be Accomplished Without Significant Increases in Current Funding

A series of Project Worksheets describing projects in this funding category are included in the Appendix.

A few additional projects are listed below on which no project worksheets have yet been completed:

A. Dig drainage ditches for better moist soil plant production:

1. West arm of Pool #1.
2. East arm of West Sprague Pool.
3. East arm of Pool 9.
4. East side of Pool # 1, south of banding site.
5. East side of Pool #1, north of banding site.
6. East side of Pool #1, north of Becker Road.
7. East side of Pool #1, south of Becker Road.

B. Place another large culvert under Sprague Road below Dam 31 to carry flood waters.

C. Clean fallen trees out of ditch below Dam 30.

D. Create new pools with inexpensive metal water control structures:

1. Diversion ditch in center of upper Canfield field.
2. South end of lower Canfield field after main Canfield control is replaced.
3. Under West Goose Pool Road downstream from emergency spillway of Pool 9.
4. Seepage marsh below Dam 2, west side of main ditch, consider siphon pipe to fill.
5. Seepage marsh southwest of Dam 29 between Sprague Dike and Spencer-Robinson Ditch. Consider adding siphon pipe through Sprague Dike to fill.
6. At Bewick Lateral Ditch at a point just south of Canfield Road.

E. Survey possibilities of creating new pools.

1. Southwest of Dam 13 and southeast of Dam 13 using a diversion pipe to southwest and emergency spillway to the southeast.

2. Southeast or southwest of Dam 1 in seepage areas. Consider diversion or siphon pipe to increase ability to flood.

3. Two pools, one on each side of ditch using old C.C.C. dam just below Dam 9, by forcing water east and west through new cuts in spoil piles on each side of ditch. New dikes may be necessary farther south.

F. Raise and riprap low-level dike between East Sprague Pool and Middle Sprague Pool and then raise emergency spillway in the dike one to two feet to improve moist soil production in East Sprague Pool by improving ability to drown out woolgrass areas.

G. Build new dike or raise old road bed located east of Bewick turn-around in north end of West Sprague Pool, might use old C.C.C. dam in easy bay for control structure.

IX. Physical Plan and Equipment Use Requirements

Each water unit on the refuge requires weekly gauge readings and stoplog manipulation depending on the flow. Additional checks on water levels will be necessary during periods of heavy rainfall. During the period when pools are frozen over, biweekly or monthly checks will be adequate to accomplish these checks. Dikes should always be inspected at the same time gauge readings are taken. Readings taken during the weekly check will be recorded on the weekly gauge reading form and compiled at the end of each year for the annual water management program.

Equipment needed to carry out this plan is available at the refuge. The weekly water check and stoplog manipulation can be made with a 4 x 4 pickup. Dragline, crawler tractors, and dump trucks for dike work are on hand. It is possible that Army Engineer units would do some of the work and use their equipment. In the past Army Engineer personnel have stopped at the refuge to see about projects in the area.

X. Fund and Manpower Requirements

During the last three years, the Necedah Refuge has spent an average of $11,000 per year on custodial maintenance and operation of water management facilities, mainly dikes, structures, and ditches. Maintaining the existing facilities, and those outlined in the Master Planned section of this plan would cost an estimated $14,000 per year. No development costs are included for proposed new pools. It is felt that much of improvement work described in this plan could be accomplished by refuge force accounts within our present operating cost budget. Engineering assistance would be required to check the feasibility of proposed projects, help design and stake out the work, and make periodic checks in the field.

XI. Annual Water Management Program Outline

All marsh and water areas on refuges fall into two broad categories: those in which water levels can be controlled with stoplogs or gates (no pumps are used at Necedah NWR at present); and those in which water levels cannot be controlled.

For marsh or water areas where water elevations can be controlled, the Annual Water Management Program will contain:

A. Report on efforts of controlled water management.

1. Water surface elevations for past year. (Exhibit 1)

2. The effects of past years water levels on the ecology of the management unit and amount of water used as compared to water levels. (Exhibit 2)

B. Planning levels for the coming year.
1. Planned elevation for the program year. (Exhibit 1)
2. A statement of objectives for the proposed levels. (Exhibit 2)

For marsh or water areas where water elevations cannot be controlled, the Annual Water Management Program will contain:

A. A report on water conditions occurring in the type or unit during the past year.

B. The effects of those conditions on the ecology of the area.

(Note Exhibits 1 and 2 on the following pages)

Exhibit 1

WATER MANAGEMENT PROGRAM OUTLINE

Refuge:_____Water Unit Name No._____

Maximum elevation permissible:_____

Flowline elevation of lowest drain structure:_____

Elevation of general pool bottom (not borrow pit bottom):_____

Emergency spillway flow level:_____

Level of dike top:_____

Level of dam top:_____

Special notes box

A. 1. Water Surface Elevations For Past Year _____		B. 1. Planned Elevation for Program Year _____
Date	Water Surface Elevations	Water Surface Elevations
Jan. 1		
15		
Feb. 1		
15		
Mar. 1		
15		
Apr. 1		
15		
May 1		
15		
Jun 1		
15		
Jul. 1		
15		
Aug. 1		
15		
Sep. 1		
15		
Oct. 1		
15		
Nov. 1		
15		
Dec. 1		
15		
31		

Annual Water Management Program Outline

A. 2. Effects of past year's water levels on the ecology of the management unit.

This section will be in two parts: 1) a report on the water supply, and amounts used; and 2) a full report on biological conditions and wildlife use as they relate to water management this past year.

Part 1 of this section should state whether there were shortages or surpluses during the past year and when they occurred. Any significant differences between planned and actual water surface elevations related to supply should be explained.

Part 2 will be a report of the effects of water levels on habitat conditions and wildlife use, on dikes or structures, mosquito control (where applicable), and other pertinent data.

For those units where water levels can be controlled, you should always include in Part 2 whether each objective that had been set up in the program a year ago was reached. Under B. 2. (Exhibit 1) is an example of the sort of information to be included in a program planned for a coming year. The report (Section 1. B.) on the program in that example made up the year following would indicate whether holding at 0.6' below normal level prevented damage to dikes, and if appropriate, whether it could or should have been held higher or lower. Did the late winter drawdown actually rid the unit of carp or did problems arise? Did the full pool level maintained during the spring actually provide the maximum quantity and the maximum quality of duck breeding pair and muskrat habitat as expected or would another level have been better? Did it prevent encroachment of cattails around the margin, etc.? Any significant unexpected results either beneficial or adverse should, of course, also be reported.

The purpose of this section is to assure a record of information needed to guide water management during the program and succeeding years. As new data is acquired, old premises are found to be erroneous, and new major water management considerations become apparent; the basic water management plan should be revised.

B. 2. A statement of objectives for the proposed levels.

This section should be organized chronologically, i.e., like a narrative. The level as it relates to full pool or "normal pool" level should be stated by time periods, and the reason(s) given why you chose a particular level or why a change in level, such as a drawdown, is planned. The reasons for your choice are your objectives. Whether the chosen level can be expected to affect any major water management considerations other than your objective should be stated. Below is an example of how this section of a water program should appear.

EXAMPLES

Example 1: "Water levels will be 0.6' below normal full pool level from January 1 until February 1. At this level, ice damage to dikes is prevented, but the level is at the same time sufficiently high to preclude muskrat mortality."

Example 2: "On February 1, we will begin to draw down the unit to control carp. The unit will be drained as rapidly and completely as possible. It will be done to its lowest level by February 15. By that time, most surplus muskrat will have been harvested and muskrat losses will therefore be minimized."

Example 3: "The Pool will be brought up to normal full pool level as soon as possible beginning March 1 and maintained at that level through June 15. This level will provide the maximum quantity and quality of duck breeding pair habitat, and the relatively high level will at the same time inhibit the encroachment of willow and woolgrass around the margins of the pool."

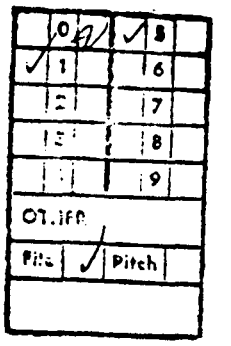
Example 4: "Beginning July 15, water levels will gradually be drawn down so that the unit is about one foot below normal full pool level by July 30. This drawdown is to lower

the water table in the 'dry marsh area' to permit the development and growth of spike rush and other green browse on exposed mud flats. There will be only minor detrimental effects of submergent food production."

XII. Program Data - Appendix

Reference Material

1. Necedah Refuge Narrative Reports.
2. Necedah Refuge Annual Water Plans.
3. Aerial photographs of refuge taken 4/11/68.
4. USGS Topographic maps:
   Necedah SW, Wisc N44-00-00 W90-07-30
   Necedah NW, Wisc N44-07-30 W90-07-30
5. Trippensee, R.E., Wildlife Management, Volume II The American Forestry Series 1953.
6. Linde, A.F., Techniques for Wetland Management, Wisconsin Research Report 45, 1969.
7. Kadlac, J.A., The Effects of Water Level Manipulation on Two Central Wisconsin Marshes, University of Michigan, 1956.
8. Coates, G.R., Recent and Proposed Legal Control of Water in Wisconsin, 1953 Wisconsin Law Review



U. S. FISH AND WILDLIFE SERVICE
Twin Cities, MN 55111

EN-January 26, 1982

NOTICE:

SUBJECT: Modified Gauge Reading Reporting Requirements

The attached report entitled "Record of Gauge Reading" (Form 3-1547) is an integral part of the Service's effort to document and record monthly water usage on Region 3 field stations. This recording process is part of a Servicewide program to quantify water uses and needs and to document these needs for water rights purposes. The instructions on the reverse side of the subject form indicate that it is to be prepared monthly and to be forwarded to the Regional Director (EN) by the tenth day of the month following its preparation. The purpose of this Notice is to modify this submission requirement from monthly to quarterly. The subject reports should continue to be prepared monthly and should be accumulated and submitted to the Regional Director on a quarterly basis.

It has been noted that a number of field stations are using forms similar to Form 3-1547 which have been specially formated for specific station impoundments. This procedure is acceptable as long as the information recorded conforms to that shown on Form 3-1547.

Questions regarding this form should be directed to the Branch of Engineering at FTS 725-3550.

David W. Eubank
Regional Engineer

Distribution: AO

Attachment

RECORD OF GAUGE READING

Refuge: Necedah NWR, Necedah, WI

Dam: Rynearson Pool #2

Gauge Location: SE¼, S.6, T18N, R3E

0.0 on gauge: 920.00

Month _____ Year _____

Bottom of Outlet: 912.01

Observer _____

Crest of Spillway: 925.0

2 Bays with 8' stoplogs and 16' radial gate (Top 929.0)

DATE	Time AM	Time PM	Gauge Reading	Quantity C.F.S. Over Stoplogs	Quantity C.F.S. Thru Gate	REMARKS
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
			Maximum Deviation	Total Acre Feet Released from Refuge		
TOTALS						

Discharge Tables

- For Sharp Crested Weirs (Stoplog Structures)
- For Radial or Slide Gates

DISCHARGE TABLES FOR SHARP-CRESTED WEIRS

Depth in feet	Q	5 foot	6 foot	7 foot	8 foot	Additional	
.1	.105	.53	.63	.74	.84	Depths	Q
.2	.30	1.50	1.80	.74	.84	1.6	6.74
.3	.55	2.75	3.3	3.85	4.40	1.7	7.38
.4	.84	4.20	5.04	5.88	6.72	1.8	8.04
.5	1.18	5.90	7.08	8.26	9.44	1.9	8.72
.6	1.55	7.75	9.30	10.85	12.40	2.0	9.42
.7	1.95	9.75	11.70	13.65	15.60	2.1	10.13
.8	2.38	11.90	14.28	16.66	19.04	2.2	10.87
.9	2.84	14.20	17.04	19.88	22.72	2.3	11.62
1.0	3.33	16.65	19.98	23.31	26.64	2.4	12.38
1.1	3.84	19.20	23.04	26.88	30.72	2.5	13.16
1.2	4.38	21.90	26.28	30.66	35.04	2.6	13.96
1.3	4.94	24.70	29.64	34.58	39.52	2.7	14.77
1.4	5.52	27.60	33.12	38.64	44.16	2.8	15.60
1.5	6.12	30.60	36.72	42.84	48.96	2.9	16.45
						3.0	17.30

DISCHARGE TABLES FOR RADIAL OR SLIDE (in CFS)

Gate opening in inches	Ryn. No. 2 8'x16' Radial Gate: 5' head	Dam No. 30 Sprague-Mather 7'x14': 5' head	Dam No. 31 Sprague-Mather 5'x5' Lift gate: 8½' head
1"	14.6	12.8	5.8
2"	29.2	25.6	11.6
3"	43.8	38.5	17.4
4"	58.6	51.3	23.2
5"	73.0	64.0	29.1
6"	87.6	77.0	35.0
7"			40.7
8"	116.8	102.7	46.4
9"			52.0
10"	146.6		58.3
11"			64.2
12"	175.2		70.0
13"			
14"			
15"			
16"			
17"			
18"			
24"			
30"			
36"			
	1' of opening is 11 cfs x 16' gate width = 176 cfs 5' head	1' of gate opening is 11 cfs x 14' gate width = 154 cfs 5' head	1' of gate opening is 70 cfs 8.5' head

Computing Refuge Inflow

The following table illustrates a method that may be used in determining refuge inflow, outflow, consumptive water use, or total water use on an annual basis. (This table was submitted by the Slade Refuge Manager with his annual water management plan for 1966.)

Slade Refuge Inflow-Outflow for 1965							
	A Ave. Annual Evap	B 1965 Lake Rise	C Net Gain A+B	D Surface Acres	E Ac-ft Gain CxD	F Outflow in ac-ft	G Total inflow ac-ft E+F
S. Marsh	2.83'	0.35'	3.18'	36	114	200	314
H. Lake	2.83'	0.64'	3.47'	280	972	None	972
SE. Slough	2.83'	2.00'	4.83'	68	328	1,286	1,614
NW. Slough	2.83'	0.49'	3.32'	94	312	300	612
U.H. Lake	2.83'	0.70'	3.53'	63	222	None	222
Hdqtrs.	2.83'	0.65'	3.48'	25	87	None	87

Column A: This is the estimated average annual evaporation if feet from a water area in a specific regional location. (See sheet 2 for suggested figures at a specific refuge location.) A more accurate value for any year would be about 70% of the measured pan evaporation at a nearby USWB climatological station. Column A is actually the consumptive use figure exclusive of transpiration!

Column B: This is the net increase or decrease in pool levels in feet from January 1 to December 31 in each year as a result of climatological or operational factors. (This column automatically includes precipitation.)

Column C: This is the total water use in feet by the respective refuge pool for the year. If the Column B figure is minus rather than plus, it would be subtracted from Column A to arrive at Column C.

Column D: This is the average pool water surface acreage for the year from April through October. This period represents the period when the majority of pool evaporation takes place.

Column E: This is the total water use in acre-feet by the respective refuge pool for the year.

Column F: This is the observed outflow from the refuge in acre-feet. This figure must either be estimated, computed from structural gate openings, etc., or obtained from established Geological Survey gauging station records downstream. (The latter is preferable.) In some instances the outflow may be "zero".

Column G: This is the computed inflow in acre feet by simply adding Columns E and F. If there is a Geological Survey gauging station located upstream from the refuge, the computed inflow on this table can be checked against the records from this gauge.

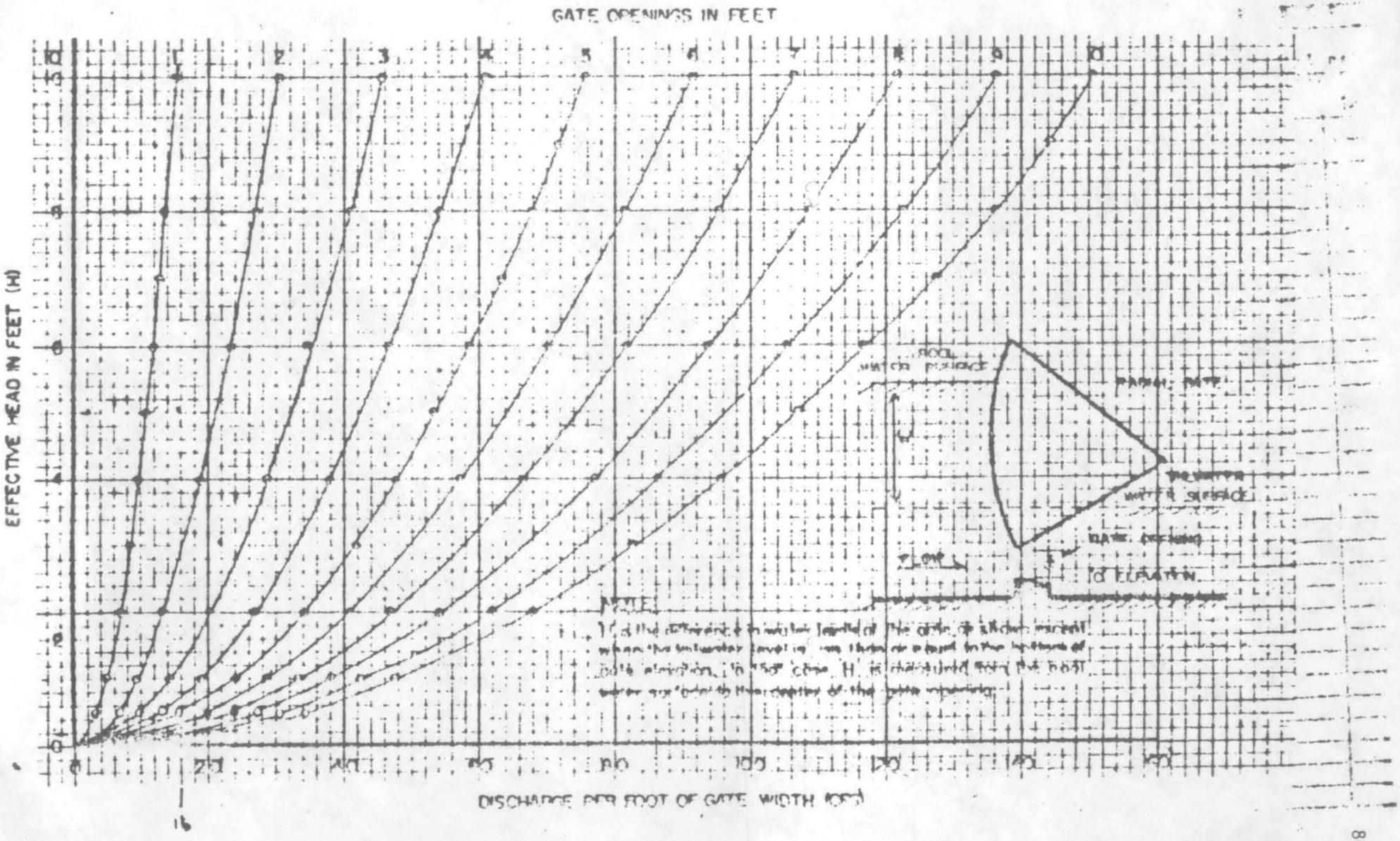
APPROXIMATE DISCHARGE IN CUBIC FEET PER SECOND OVER A SHARP-CRESTED WEIR FOR EACH FOOT OF LENGTH
$Q = 3.33\ H\ 3/2$

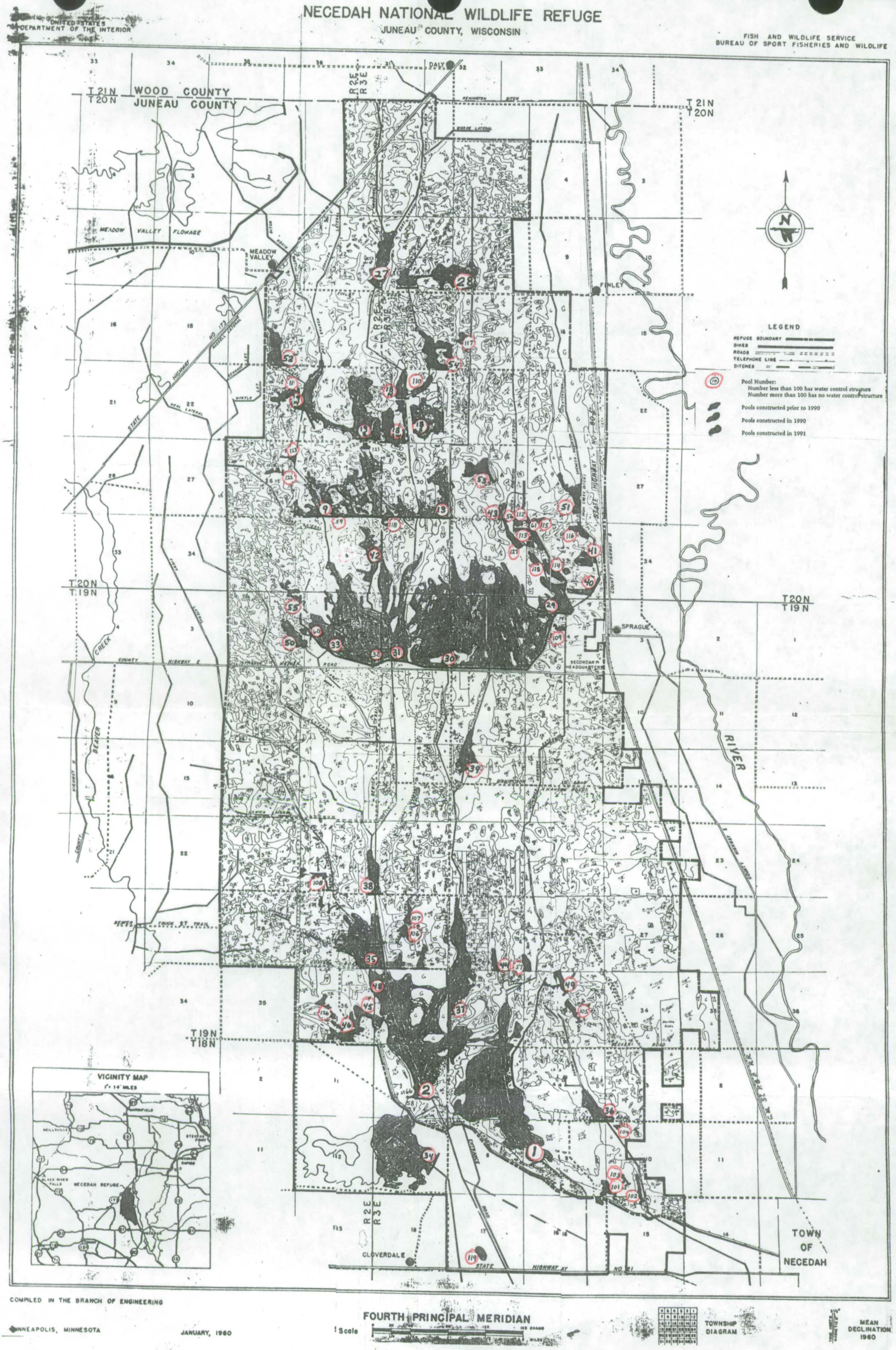
Depth in Feet (H)	Q	Depth in Feet (H)	Q
0	0	3.6	22.75
.1	.105	3.7	23.70
.2	.30	3.8	24.67
.3	.55	3.9	25.65
.4	.84	4.0	26.64
.5	1.18	4.1	27.65
.6	1.55	4.2	28.64
.7	1.95	4.3	29.64
.8	2.38	4.4	30.75
.9	2.84	4.5	31.79
1.0	3.33	4.6	32.85
1.1	3.84	4.7	33.93
1.2	4.38	4.8	35.02
1.3	4.94	4.9	36.12
1.4	5.52	5.0	37.23
1.5	6.12	5.1	38.35
1.6	6.74	5.2	39.49
1.7	7.38	5.3	40.63
1.8	8.04	5.4	41.79
1.9	8.72	5.5	42.95
2.0	9.42	5.6	44.13
2.1	10.13	5.7	45.32
2.2	10.87	5.8	46.51
2.3	11.67	5.9	47.72
2.4	12.38	6.0	48.94
2.5	13.16	6.1	50.17
2.6	13.96	6.2	51.41
2.7	14.77	6.3	52.66
2.8	15.60	6.4	53.92
2.9	16.45	6.5	55.18
3.0	17.30	6.6	56.46
3.1	18.18	6.7	57.75
3.2	19.06	6.8	59.05
3.3	19.96	6.9	60.36
3.4	20.88		
3.5	21.81		

Extracted from "Kings Handbook of Hydraulics" (1954)

APPROXIMATE DISCHARGE IN CUBIC FEET PER SECOND UNDER A RADIAL OR SLIDE GATE FOR EACH FOOT OF GATE WIDTH

$(Q = CA\sqrt{2gh})$





UNITED STATES DEPARTMENT OF THE INTERIOR
NECEDAH NATIONAL WILDLIFE REFUGE
JUNEAU COUNTY, WISCONSIN
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
T 21 N
T 20 N
WOOD COUNTY
JUNEAU COUNTY
R 2 E
R 3 E
DALY
MEADOW VALLEY FLOWAGE
MEADOW VALLEY
STATE HIGHWAY NO 173
FINLEY
LEGEND
REFUGE BOUNDARY
DIKES
ROADS
TELEPHONE LINE
DITCHES
Pool Number:
Number less than 100 has water control structure
Number more than 100 has no water control structure
Pools constructed prior to 1990
Pools constructed in 1990
Pools constructed in 1991
T 20 N
T 19 N
SPRAGUE
SECONDARY HEADQUARTERS
COUNTY HIGHWAY E
BEAVER CREEK
RIVER
T 19 N
T 18 N
VICINITY MAP
1" = 14 MILES
NEILLSVILLE
STEVENS POINT
BLACK RIVER FALLS
NECEDAH REFUGE
CLOVERDALE
STATE HIGHWAY NO 21
TOWN OF NECEDAH
COMPILED IN THE BRANCH OF ENGINEERING
MINNEAPOLIS, MINNESOTA
JANUARY, 1960
FOURTH PRINCIPAL MERIDIAN
Scale
TOWNSHIP DIAGRAM
MEAN DECLINATION 1960

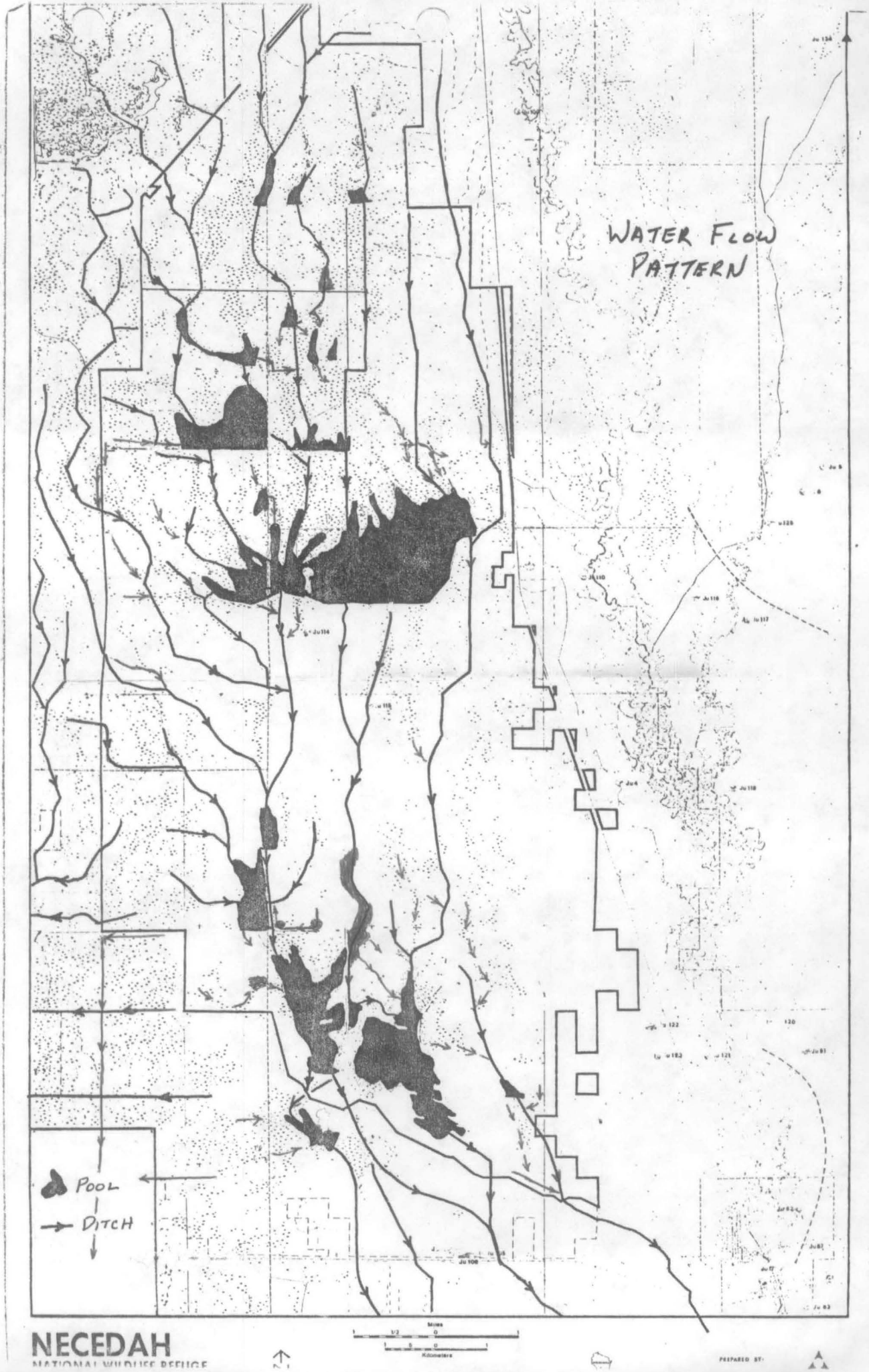

WATER FLOW
PATTERN
POOL
DITCH
NECEDAH
NATIONAL WILDLIFE REFUGE
Miles
Kilometers
PREPARED BY:

Table 1 - Water Control Structure Data and Locations

TABLE 1
NECEDAH NWR WATER CONTROL STRUCTURE DATA *

Pool Name and Number	Existing Optimum Management Elevation	Surface Acres @ Optimun Elevation	Dike Elevation	Structure Property NO.	Spillway Crest Elevation	Outlet Invert Elevation	Emergency Spillway Crest Elevation	Structure Type and Size	Year Construction	Control Structure Number/Location (#/ TWP,RANGE,SEC, ETC.)
Rynearson Pool #1	924.5	790	929.0	19	925.0	911.0	N/A	Concrete stoplog weir, 5 - 6' bays	1936**	1/ T18N, R3E, S9, SW 1/4
							925.4	1 - 187' concrete emergency spillway		
Rynearson Pool #2	924.5	500	929.0	20	925.0	912.0	N/A	1 - 16' radial gate, concrete stoplog weir, 2 - 8' bays	1936	2/ T18N, R3E, S6, SE 1/4
							925.4	1 - 104' concrete emergency spillway		
				26			N/A	Concrete stoplog weir 2 - 4' bays	1939	26/ T18N, R3E, S6, NE 1/4
				66	925.0	N/A	N/A	Concrete weir, 1 - 8' bay		66/ T18N, R3E, S6, SW 1/4
Sprague-Mather Pools	939***	1,100	946+/-	30	943.0	935.0	N/A	Radial or 2 - 7' stoplogs	1950	30/ T19N, R3E, S6, SE 1/4
	939***	453		31	943.0	929.0	N/A	5'x5' lift gate, concrete	1950	31/ T19N, R3E, S6, SW 1/4
	940***	133		29	943.0	929.7	N/A	Concrete stoplog weir, 4 - 5' bays	1949	29/ T19N, R3E, S4, N 1/2
							943+/-	1 - 200' emergency spillway	1949	__/ T20N, R3E, S33, SW 1/4
							943+/-	1 - 700' emergency spillway	1949	__/ T20N, R3E, S29, SE 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** Control structure totally rebuilt in 1989
*** Reduced from 942.0 (design level) to protect dike from wave action damage

TABLE 1
NECEDAH NWR WATER CONTROL STRUCTURE DATA *

Pool Name and Number	Existing Optimum Management Elevation	Surface Acres @ Optimun Elevation	Dike Elevation	Structure Property NO.	Spillway Crest Elevation	Outlet Invert Elevation	Emergency Spillway Crest Elevation	Structure Type and Size	Year Construction	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.)
Coaver Road Pool	926.5	165	928+/-	49	926.5		926.5	30" dia. CMP with riser and 5' stoplogs	1969	35/ T19N, R3E, S30, SW 1/4
Canfield Road Pool	928	40+/-	929+/-	73				72" arch CMP with riser and 8' stoplogs	1970	38/ T19N, R3E, S24, SE 1/4
Goose Pool	942.0	300+	946+	33	942.0	936.0	N/A	Concrete stoplog weir, 2 - 5' bays	1951	33/ T19N, R2E, S1, SW 1/4
			945.0	32	942.0	937.0	N/A	Concrete stoplog weir, 1 - 4' bay	1950	32/ T19N, R2E, S1, SE 1/4
							943+/-	1 - 300' emergency spillway	1949	__/ T19N, R2E, S1, NE 1/4
							943+/-	1 - 700' emergency spillway	1949	__/ T19N, R2E, S1, SW 1/4
Pool #9	946.0	335+/-	948+/-	40			946.6	72" CMP arch with riser and stoplogs	1964	9/ T20N, R2E, S25, SW 1/4
								Emergency spillway		__/ T20N, R2E, S26, SE 1/4
Pool #13	943.4	70	946+/-	42	943.8		943.4	Concrete stoplog weir, 2 - 5' bays	1939	13/ T20N, R3E, S30, SE 1/4
								Emergency spillway		
Pool #18 North	947.0	10	950+/-	44	948.0	944.5	N/A	Concrete Stoplog weir, 2 - 5' bays	1939	18N/ T20N, R3E, S19, NW 1/4
								Emergency spillway		

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).

TABLE 1
NECEDAH NWR WATER CONTROL STRUCTURE DATA *

Pool Name and Number	Existing Optimum Management Elevation	Surface Acres @ Optimun Elevation	Dike Elevation	Structure Property NO.	Spillway Crest Elevation	Outlet Invert Elevation	Emergency Spillway Crest Elevation	Structure Type and Size	Year Construction	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.)
Pool #18 South	UNK	53	UNK		UNK	UNK		CMP and riser, 5' stoplogs	1978	18S/ T20N, R3E, S19, SE 1/4
								Emergency spillway		
Pool #18SW	UNK	UNK	UNK		UNK	UNK	UNK	CMP and riser, 2' stoplogs	1991	18SW/ T20N, R3E, S19, SW 1/4
Pool #19W	949.6	60	950+/-	43	950.7	942.7	N/A	Stoplog weir, 2 - 7' bays	1939	19W/ T20N, R2E, S23, SE 1/4
				26			N/A	Emergency spillway		
Pool #19E								CMP and riser, 2' stoplogs	1990	19E/ T20N, R2E, S24, SE 1/4
Roger's Pool	951+/-	15	953+/-					No control structure installed yet - only dike and spillway	Prior to 1979	54/ T20N, R3E, S18, SE 1/4
Pool #27	951.6	20	956	45	953.1	944.5	N/A	Concrete stoplog weir, 2 - 7' bays	1939	27/ T20N, R2E, S12, SE 1/4
Pool #28		60	956.3	46	955.2		N/A	Concrete stoplog weir, 2 - 7' bays	1939	28/ T20N, R3E, S12, SW 1/4
Suk Cerney Pool	923.2	165	925.0		923.5	916.7	923.5	Concrete stoplog weir, 1 - 8' bay	1939**	34/ T18N, R3E, S7, SE 1/4
Upper Rice Pool	927.0	70	929.0		927.0	919.0	927.0	CMP and riser, 2½' stoplogs	1989	37/ T19N, R3E, S32, SW 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** Raised dike and control structure in 1987.

TABLE 1
NECEDAH NWR WATER CONTROL STRUCTURE DATA *

Pool Name and Number	Existing Optimum Management Elevation (**)	Surface Acres @ Optimun Elevation	Dike Elevation	Structure Property NO.	Spillway Crest Elevation	Outlet Invert Elevation	Emergency Spillway Crest Elevation	Structure Type and Size	Year Construction	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.)
Otter Pool	**-1.0'	20	**-0.6'		**-1.0'	**-6.6	None	CMP and riser, 2' stoplogs	1988	40/ T20N, R3E, S33, SE 1/4
Mink Pool	**-1.0'	10	**-0.0'		**-1.0'	**-6.0'	None	CMP and riser, 2' stoplogs	1988	41/ T20N, R3E, S33, NE 1/4
Pahrm Pool	**-4.0'	30	**-3.0'		**-4.0'	**-10.0'	**-3.5'	CMP and riser, 4' stoplogs	1940's***	36/ T18N, R3E, S4, SE 1/4
West Turkey Track Pool	**-2.1'	15	**-0.0'		**-2.0'	**-4.0'	**-2.0'	CMP and riser, 3' stoplogs	1987	43/ T20N, R2E, S29, SE 1/4
Killdeer Pool	**-1.5'	20	**-0.0'		**-1.5'	**-4.0'		CMP and riser, 3' stoplogs	1987	42/ T20N, R2E, S36, NE 1/4
Camp Road Pool	**-2.4'	15						CMP and riser, 3' stoplogs	1988	52/ T20N, R2E, S14, SE 1/4
Rattail Pool	**-2.5'	20						CMP and riser, 2½' stoplogs	1989	39/ T19N, R3E, S17, NW 1/4
Cranberry Pool		25						CMP and riser, 2' stoplogs	1990	45/ T19N, R3E, S31, SW 1/4
Upper Cranberry Pool		10						CMP and riser, 2' stoplogs	1991	46/ T19N, R2E, S36, SE 1/4
Little Goose Pool		30						CMP and riser, 2' stoplogs	1991	50/ T19N, R2E, S2, SE 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** No water level gauges on these control structures - Water level measured from the top of riser, right side. (** = top of riser)
*** Rebuilt in 1985

TABLE 1
NECEDAH NWR WATER CONTROL STRUCTURE DATA *

Pool Name and Number	Existing Optimum Management Elevation (**)	Surface Acres @ Optimun Elevation	Dike Elevation	Structure Property NO.	Spillway Crest Elevation	Outlet Invert Elevation	Emergency Spillway Crest Elevation	Structure Type and Size	Year Construction	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.)
East Turkey Track Pool								CMP and riser, 2' stoplogs	1991	51/ T20N, R3E, S28, SE 1/4
Turkey Diversion		N/A						CMP and riser, 5' stoplogs	1991	56/ T20N, R3E, S29, SE 1/4
West Goose Pool	**-0.9'	5						CMP without riser, 3' boards on end	1988	55/ T19N, R2E, S2, NE 1/4
Stub Ditch Pool	**-1.8'	4						CMP and riser, 2' stoplogs	1990	44/ T19N, R3E, S29, SE 1/4
Beaver Pool								CMP and riser, 2' stoplogs	1991	49/ T19N, R3E, S33, NW 1/4
Coaver Road South Pool								CMP and riser, 3' stoplogs	1991	48/ T19N, R3E, S31, SW 1/4
Coaver Road East Pool								CMP and riser, 2' stoplogs	1991	57/ T19N, R3E, S28, SW 1/4
Crane Pool								No control placed yet	1991	53/ T20N, R3E, S29, NE 1/4
Pool 2 Diversion	N/A***	N/A	929.0		924+/-	923.5 (+/-)	None	CMP and riser, 3' stoplogs	1950's	58/ T18N, R3E, S6, SW 1/4
Pool 9 Diversion	N/A***	N/A	949.0		946.6	946.0	946.6	Corrugated plastic pipe, 6" diameter	1991	59/ T20N, R2E, S25, SW 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** No water level gauges on these control structures - Water level measured from the top of riser, right side. (** = top of riser)
*** Used to divert water to downstream pool.

TABLE 1
NECEDAH NWR WATER CONTROL STRUCTURE DATA *

Pool Name and Number	Existing Optimum Management Elevation	Surface Acres @ Optimun Elevation	Dike Elevation	Structure Property NO.	Spillway Crest Elevation	Outlet Invert Elevation	Emergency Spillway Crest Elevation	Structure Type and Size	Year Construction	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.)
Goose Pool Diversion	N/A**	N/A	945.0		943.0	939.7	943.0	Corrugated plastic pipe, 6" diameter	1991	60/ T19N, R2E, S1, SW 1/4
East Turkey Diversion	N/A**	N/A	945.0		943.0	941+/-	943.0	Corrugated plastic pipe, 6" diameter	1990	61/ T20N, R3E, S33, NW 1/4
Remington Structure	958.0	N/A	N/A	34	958.0	953.0		Concrete stoplog weir, 4 - 5' bays	1951	__/ T21N, R3E, S32, SW 1/4
Old Control #4	N/A	N/A		59			N/A	Concrete stoplog weir, 4 - 5' bays	1939	__/ T19N, R3E, S6, SW 1/4
Old Control #9	N/A	N/A	N/A	60			N/A	Concrete stoplog weir, 2 - 5' bays	1939	__/ T20N, R2E, S36, NW 1/4
Old Control #14	N/A	N/A	N/A	61			N/A	Concrete stoplog weir, 2 - 5' bays	1939	__/ T20N, R3E, S29, NE 1/4
Old Control #15	N/A	N/A	N/A	62			N/A	Concrete stoplog weir, 4 - 5' bays	1939	__/ T20N, R3E, S28, NE 1/4
Old Control #16	N/A	N/A	N/A	63			N/A	Concrete stoplog weir, 2 - 5' bays	1939	__/ T20N, R3E, S21, NW 1/4
Old Control #17	N/A	N/A	N/A	64			N/A	Concrete stoplog weir, 2 - 5' bays	1939	__/ T20N, R3E, S20, SW 1/4
Old Control #26	N/A	N/A	N/A	65			N/A	Concrete stoplog weir, 2 - 5' bays	1939	__/ T20N, R2E, S12, SW 1/4
Old Control #8	N/A	N/A	N/A	74				Concrete stoplog weir, 2 - 5' bays	1939	__/ T20N, R2E, S35, SW 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** Used to divert water to downstream pool.

TABLE 1
NECEDAH NWR WATER CONTROL STRUCTURE DATA *

Pool Name and Number	Existing Optimum Management Elevation	Surface Acres @ Optimun Elevation	Dike Elevation	Structure Property NO.	Spillway Crest Elevation	Outlet Invert Elevation	Emergency Spillway Crest Elevation	Structure Type and Size	Year Construction	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.)
Old Control #10 (inundated by West Sprague Pool)								Concrete stoplog weir, 2 - 5' bays	1939	__/ T19N, R3E, S6, NW 1/4
Old Control #12	N/A	N/A	N/A	13				Concrete stoplog weir, 2 - 5' bays	1939	__/ T20N, R3E, S31, NW 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** Used to divert water to downstream pool.

Table 1A - Water Control Structure Data and Locations
(Pools Where Water Levels Cannot Be Manipulated)

TABLE 1A
NECEDAH NWR WATER CONTROL STRUCTURE DATA * (Levels cannot be manipulated)

Pool Name and Number **	Approximate Surface Acres at Full Pool	Structure Property No.	Structure Type and Size	Year Construction	Comments	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.) **
118			Earthen dike	1991		118/ T20N, R3E, S31, NW 1/4 NW 1/4
119	3		Dug-out	1970's		119/ T18N, R3E, S17, SW 1/4 SE 1/4
120	2		Earthen dike	1991		120/ T20N, R2E, S24, SE 1/4 SW 1/4
121	2		Earthen dike	1991		121/ T20N, R2E, S25, NE 1/4 NE 1/4
122			Earthen ditch plug	1990		122/ T20N, R2E, S26, NE 1/4 SW 1/4
123			Earthen ditch plug	1990		123/ T20N, R2E, S26, NE 1/4 NE 1/4
124			Earthen ditch plug	1990		124/ T19N, R2E, S25, NW 1/4 NW 1/4
125			Earthen ditch plug	1990		125/ T19N, R2E, S25, NW 1/4 E 1/2
126			5 small ditch plugs	1990		126/ T19N, R2E, S36, SW 1/4 E 1/2
127			Earthen dike	1990		127/ T20N, R3E, S32, NE 1/4 NE 1/4
128			Earthen dike	1990		128/ T20N, R3E, S33, SW 1/4 NW 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** WCS that cannot be manipulated are numbered sequentially beginning with 101.

TABLE 1A
NECEDAH NWR WATER CONTROL STRUCTURE DATA * (Levels cannot be manipulated)

Pool Name and Number **	Approximate Surface Acres at Full Pool	Structure Property No.	Structure Type and Size	Year Construction	Comments	Control Structure Number/Location (#/TWP, RANGE, SEC, ETC.) **
101			Earthen ditch plug	1991		101/ T18N, R3E, S10, SW 1/4 SW 1/4
102			Earthen ditch plug	1991		102/ T18N, R3E, S15, NW 1/4 NE 1/4
103			Earthen ditch plug	1991		103/ T18N, R3E, S10, SW 1/4 SE 1/4
104			Earthen ditch plug	1991		104/ T18N, R3E, S10, NW 1/4 NW 1/4
105			Earthen ditch plug	1991		105/ T19N, R2E, S33, SE 1/4 NW 1/4
106			Earthen ditch plug	1990		106/ T19N, R3E, S30, SW 1/4 NE 1/4
107			Earthen ditch plug	1990		107/ T19N, R3E, S30, NW 1/4 SE 1/4
108			2 earthen ditch plugs	1990		108/ T19N, R3E, S24, SW 1/4 SE 1/4
109			Earthen ditch plug	1990		109/ T19N, R3E, S4, NW 1/4 SE 1/4
110			Earthen ditch plug	1990	Diverts water to Pool 18S	110/ T20N, R3E, S19, NW 1/4 SE 1/4
111			Earthen ditch plug	1990		111/ T20N, R2E, S23, NE 1/4 SE 1/4
112			Earthen ditch plug with rock spillway	1990		112/ T20N, R3E, S33, NW 1/4 NW 1/4
113			Earthen ditch plug	1990		113/ T20N, R3E, S33, NW 1/4 SW 1/4
114			Earthen ditch plug	1990		114/ T20N, R3E, S33, NW 1/4 NE 1/4
115			Diversion tube through dike, corrugated plastic	1990		115/ T20N, R3E, S33, NW 1/4 NW 1/4
116			Earthen dike and ditch plug	1990		116/ T20N, R3E, S33, NE 1/4 N 1/2
117			Earthen dike	1991		117/ T20N, R3E, S17, SW 1/4 NW 1/4

* Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972).
** WCS that cannot be manipulated are numbered sequentially beginning with 101.

Elevations (msl) and Corresponding Surface Acreage

ELEVATIONS (msl) AND ACRES FOR REFUGE IMPOUNDMENTS

Rynearson No.1		Rynearson No.2		Goose Pool		Sprague Pool		Pool 13		Pool 19		Pool 18		Pool 27	
Elevation	Acres	Elevation	Acres	Elevation	Acres	Elevation	Acres	Elevation	Acres	Elevation	Acres	Elevation	Acres	Elevation	Acres
924.7	820	924.7	520	941.0	550	941.0	1,500	943.9	190	950.1	200	950.0	310	953.5	
.6	810	.6	510	940.9	500	940.9	1,490	.8	180	950.0	150	949.9	300	.4	
.5	790	.5	500	.8	450	.8	1,480	.7	170	949.9	120	.8	280	.3	
.4	780	.4	490	.7	400	.7	1,470	.6	160	.8	90	.7	260	.2	
.3	770	.3	480	.6	370	.6	1,460	.5	150	.7	80	.6	250	.1	60*
.2	760	.2	470	.5	340	.5	1,450	.4	140	.6	60	.5	240	953.0	57
.1	750	.1	460	.4	300	.4	1,440	.3	130	.5	55	.4	230	952.9	55
924.0	730	924.0	450	.3	280	.3	1,430	.2	120	.4	50	.3	220	.8	52
923.9	710	923.9	440	.2	250	.2	1,420	.1	110	.3	45	.2	210	.7	50
.8	680	.8	420	.1	230	.1	1,400	943.0	105	.2	40	.1	200	.6	47
.7	660	.7	400	940.0	210	940.0	1,380	942.9	100	.1	35	949.0	190	.5	45
.6	630	.6	370	939.9	190	939.9	1,370	.8	90	949.0	30	948.9	180	.4	40
.5	610	.5	350	.8	180	.8	1,350	.7	85	948.9	30	.8	170	.3	37
.4	580	.4	330	.7	170	.7	1,350	.6	80	.8	30	.7	160	.2	35
.3	560	.3	310	.6	160	.6	1,320	.5	70	.7	20	.6	155	.1	32
.2	530	.2	300	.5	140	.5	1,300	.4	65	.6	20	.5	150	952.0	30
.1	500	.1	270	.4	130	.4	1,290	.3	60	.5	20	.4	140	951.9	27
923.0	470	923.0	250	.3	120	.3	1,270	.2	55	.4	15	.3	130	.8	25
922.9	450	922.9	240	.2	110	.2	1,260	.1	50	.3	15	.2	120	.7	22
.8	430	.8	230	.1	100	.1	1,240	942.0	50	.2	15	.1	115	.6	20
.7	410	.7	210	939.0	90	939.0	1,230	941.9	45	.1	10	948.0	110	.5	17
.6	400	.6	190	938.9	80	938.9	1,210	.8	40	948.0	10	947.9	100	.4	15
.5	380	.5	170	.8	70	.8	1,200	.7	40	947.9	5	.8	95	.3	10
.4	370	.4	150	.7		.7	1,180	.6	35	.8	5	.7	90	.2	7
.3	360	.3	140	.6	50	.6	1,170	.5	30		**	.6	85	.1	5
.2	340	.2	120	.5	40	.5	1,160	.4	30			.5	80	951.0	**
.1	320	.1	110	.4	30	.4	1,150	.2	30			.4	70		
922.0	300	922.0	100	.3	20	.3	1,140	.1	25			.3	65		
921.9	280			.2	10	.2	1,130	940.0	20			.2	60		
.8	260			938.1	0	.1	1,120	940.9	5			.1	55		
.7	250					938.0	1,110	.8	**			947.0	50		
.6	230					937.9	1,100					946.9	45		
.5	210					.8	1,090					.8	40		
.4	200					.7	1,080					.7	35		
.3	190					.6	1,070					.6	30		
.2	170					.5	1,060					.5	25		
.1	150					.4	1,050					.4	20		
921.0	140					.3	1,040					.3	20		
920.9	130					.2	1,030					.2	15		
.8	120					937.1	1,020					.1	10		
.7												946.0	0		

* Top of structure
** Drained

Management Elevations - Surface Acreage - Maximum Depths

NECEDAH NATIONAL WILDLIFE REFUGE
EXISTING IMPOUNDMENTS

Impoundment	Existing Management Elevation	Surface Area Areas	Approximate Maximum Depth Feet**
Rynearson Pool 1	924.5'	1,150	14
Rynearson Pool 2	924.5'	785	10
Coaver Road Pool	927'	165	2
Middle Canfield	928'	15	2
Sprague-Mather ***	939.5'	1,385	9
Goose Pool	942'	215	9
Pool 9	946'	335	2
Pool 13	944'	190	4
Pool 18	947'	120	3
Pool 18S	947'	80	2
Pool 19	949.6'	85	2
Pool 27	952'	75	5
Pool 28	954.6'	20	2
Suk Cerney	920'	85	
Otter	1.0'*	20	5.5
Mink	1.0'*	10	5
Pahrm	4.0'*	30	6
Turkey Track	2.1'*	15	2
Killdeer	1.5'*	20	2.5
Camp Road	2.0'*	10	2.0
Upper Rice	927.0'	70	6
Rattail	UNK*	20	UNK
Cranberry	UNK*	25	UNK

* No water level gauge - water level measured from top of riser less number of feet.

** Depth of water in ditch immediately above control structure

*** The Sprague Pool is divided into 3 sub-units by natural rises in the in the land or low level man-made dikes. The are only manageable as separate units during run-off periods or low water level elevations below 939.0'.

Existing Waterfowl Habitat by Type Within Impoundments Having Water Control structures

EXISTING WATERFOWL HABITAT BY TYPE WITHIN IMPOUNDMENTS HAVING WATER LEVEL CONTROL STRUCTURES
Necedah NWR - 1991

Pool Name	Existing maximum management elevation	Approximate surface acres @ managed elevation	June-September drawdown acreage with optimum moist soil plant seed production capability 1 year of 3 years	August-September drawdown acreage capable of good production of moist soil green browse plants 2 of 3+ years	Open Water Acreage remaining after August drawdown capable of good submerged aquatic plant production and invertebrate exposure	Acres of perennial marsh grasses and sedges/brush	Acres of Streams or ditches	Average annual acreage total
Rynearson Pool #1	924.0	790	293	294	293	203		
Rice Pool	No Control Structure yet	55	0	0	40	15		
Upper Rice Pool	927.0	70	0	47	3	20		
Rynearson Pool #2	924.0	500	227	213	227	60		
Carter-Woggon Pool (aka Coaver Road Pool)	926.0	165	80	80	0	85		
Coaver Road South Pool	unk	40 +/-	unk (2)	unk (2)	unk	40 +/-		
Coaver Road East Pool	unk	20	0	unk (2)	0	20 +/-		
Canfield Road Pool		40 (3)	40	0	0	20		
Sprague Mather:	939.0	1,686						
West Sprague #31	939.0	453	147	147	0	306		
Main Sprague #30	939.0	1,100	580	580	240	280		
East Sprague #29	940.0	150	27	27	2	106		
Goose Pool	942.0	300	130	130	80	90		
Pool #9	946.0	335 +/-	213	213	2	120		
Pool #13	943.0	70	40	40	0	110		
Pool 18 North	947.0	10	0	0	0	10		
Pool 18 South	unk	53	unk (2)	unk (2)	27	unk (2)		
Pool 18 Southwest	unk	unk	unk (2)	unk (2)	unk			
Pool 19 West	949.6	60	27	27	2	31		
Pool 19 East	949.6	80	unk (2)	unk (2)	(poor aquatics) 40	40		
Roger's Pool	951.0 +/-	15	0	0	7	8		

(Continued)

EXISTING WATERFOWL HABITAT BY TYPE WITHIN IMPOUNDMENTS HAVING WATER LEVEL CONTROL STRUCTURES
Necedah NWR - 1991

Pool Name	Existing maximum management elevation	Approximate surface acres @ managed elevation	June-September drawdown acreage with optimum moist soil plant seed production capability 1 year of 3 years	August-September drawdown acreage capable of good production of moist soil green browse plants 2 of 3+ years	Open Water Acreage remaining after August drawdown capable of good submerged aquatic plant production and invertebrate exposure	Acres of perennial marsh grasses and sedges/brush	Acres of Streams or ditches	Average annual acreage total
Pool 27	951.6	20	15	15	0	10		
East Pool 28	954.4	40	10	10	0	30		
West Pool 28	unk	27	0	0	13	14		
Suk Cerney Pool	923.2	165	85	85	0	80		
Otter Pool	*** - 1.0'	20	unk (2)	unk (2)	0	20		
Mink Pool	*** - 1.0'	10	unk (2)	unk (2)	0	10		
Pahrm Pool	*** - 4.0'	30	unk (2)	20	3	17		
West Turkey Track	*** - 2.1'	15	unk (2)	unk (2)	0	15		
East Turkey Track	unk	unk	unk (2)	unk (2)	unk	unk		
Killdeer Pool	*** - 1.5'	20	0	15	0	5		
Camp Road Pool	*** - 2.4'	15	0	5	0	10		
Rattail Pool	*** - 2.5'	20	0	unk (2)	0	20		
Cranberry Pool	unk	unk	unk	unk (2)	0	30		
Upper Cranberry Pool	unk	unk	unk	unk (2)	0	15		
Little Goose Pool	unk	30 +/-	unk (2)	unk (2)	unk	30 +/-		
West Goose Road Pool	** - 0.9' (** = top of culvert)	5	0	0	0	5		
Stub Ditch Pool	*** - 1.8'	4	0	0	0	4		
Beaver Pool	unk	unk	0	0	0	unk		
Crane Pool	No control structure yet	unk	0	unk (2)	unk	unk		
Total Acreage		4,710+	1,914+	1,948+	979+	1,879+	212	

(Continued)

EXISTING WATERFOWL HABITAT BY TYPE WITHIN IMPOUNDMENTS HAVING WATER LEVEL CONTROL STRUCTURES
Necedah NWR - 1991

Pool Name	Existing maximum management elevation	Approximate surface acres @ managed elevation	June-September drawdown acreage with optimum moist soil plant seed production capability 1 year of 3 years	August-September drawdown acreage capable of good production of moist soil green browse plants 2 of 3+ years	Open Water Acreage remaining after August drawdown capable of good submerged aquatic plant production and invertebrate exposure	Acres of perennial marsh grasses and sedges/brush	Acres of Streams or ditches	Average annual acreage total
Average acreage available annually			631+ (4)	1,285+ (5)	646+ (6)	1,879+		4,441+
Average annual goose habitat acreage			631+	1,285+	646+	1,879+		4,441+
Average annual puddle duck acreage (impoundments)			631+	-	646+	1,879+		3,156+
Average annual puddle duck acreage (streams)			-	-	-	-		212
Average annual diver duck acreage			-	-	646+	-		646+
Percentage of total impounded and stream acreage available annually			14%	29%	14%	42%	100%	

FOOTNOTES

(1) Data obtained through Necedah Refuge personnel, U.S.G.S., 7.5' series quadrangles (1969); and aerial photographs (1972)

(2) Unknown at this date. Pool hasn't been operated as a moist soil unit yet.

(3) Acreage includes both upper and lower pools - not operable because control is washed out.

(4) Total acreage with capacity of moist soil plant seed production X 33%. Production limited to one year out of three caused by perennial plant encroachment, if drawn down annually and time necessary for decay of dead vegetation mats.

(5) Total acreage with capability of moist soil plant green browse production X 66%. Production limited to two years out of three because of rotational drawdown management cycle of one year in three for moist soil seed production eliminates moist soil green browse production in one out of three years.

(6) Total acreage of open water remaining after August drawdown, for moist soil green browse production, capable of good submerged aquatics plant production X 66%. Production limited to two years out of three because rotational drawdown management cycle of one year in three for moist soil seed production eliminates aquatic production in one out of three years.

*** No water level gauge. *** = top of riser (** = top of culvert). Maximum level = *** minus (X number of feet).

Map 3 - Duck Maintenance - Optimum and Acceptable Habitat

DUCK MAINTENANCE

OPTIMUM HABITAT – AREAS HAVING GOOD CAPABILITY FOR DRAWDOWN MANAGEMENT FOR MOIST SOIL PLANT SEED PRODUCTION ONE YEAR OUT OF THREE AND GOOD SUBMERGED AQUATIC PLANT PRODUCTION TWO YEARS OUT OF THREE

ACCEPTABLE HABITAT – AREAS HAVING FAIR TO POOR CAPABILITY OF MOIST SOIL PLANT SEED PRODUCTION BECAUSE AREAS CAN NOT BE ADEQUATELY DRAINED OR BECAUSE OF PERENNIAL PLANT COMPETITION

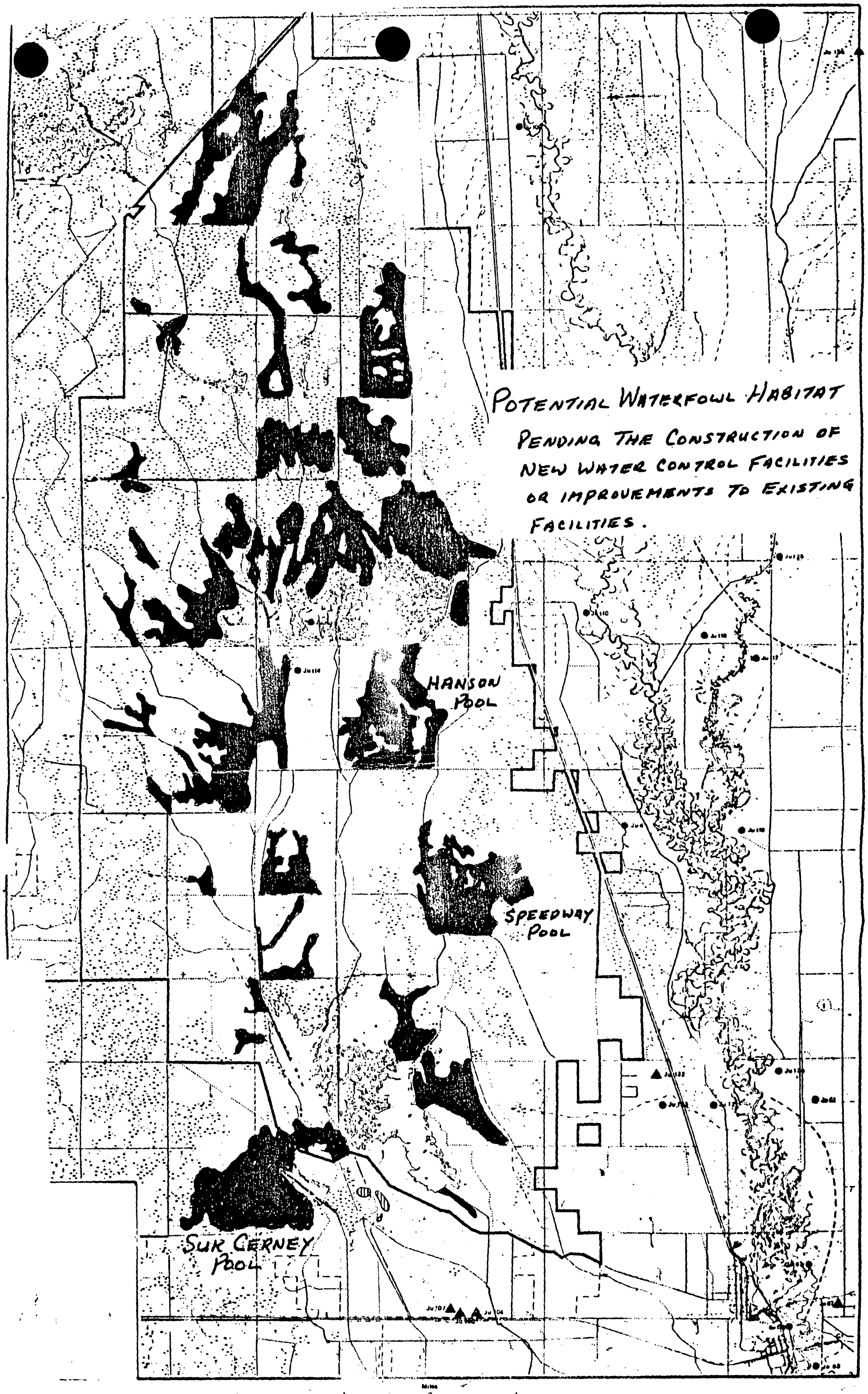
↘ DRAINAGE DITCHES

3 POOL NUMBERS

27
28
18
19
13
9
KILLDEER POOL
29
23
31
30
RATTAIL POOL
CANFIELD
COVER Rd
RICE POOL
CRANBERRY POOL 2
2
PAHREM POOK
SUK CERNEY

NECEDAH

Map 4 - Potential Waterfowl Habitat Areas Pending Construction of New Water Controls



EDAH
AL WILDLIFE REFUGE

RECORD OF PRECIPITATION
Necedah National Wildlife Refuge

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
1940	0.70	0.90	1.61	2.78	5.53	7.06	1.83	6.65	1.01	2.66	3.01	1.10	34.84
1941	1.23	0.60	1.63	2.93	7.23	4.45	1.26	1.26	8.33	4.60	1.63	2.23	37.38
1942	0.50	1.61	0.97	1.54	6.55	4.92	4.00	2.75	5.83	3.55	3.07	1.06	36.35
1943	2.60	0.70	1.63	1.00	8.09	7.97	1.35	3.08	2.68	2.58	2.21	0.10	33.99
1944	1.24	2.22	2.45	2.89	2.63	6.62	1.94	4.90	2.34	0.75	2.36	1.91	32.25
1945	0.20	1.50	3.19	3.75	7.62	5.26	3.20	4.42	3.71	0.65	5.75	1.48	40.73
1946	1.83	1.30	2.35	0.71	3.05	7.63	0.71	2.06	6.49	2.31	2.97	1.43	32.84
1947	1.57	0.15	1.19	3.15	4.32	6.46	5.96	1.91	6.36	2.61	1.90	1.12	36.70
1948	0.30	2.17	1.86	2.32	2.61	2.71	2.32	0.58	2.08	1.37	2.92	1.65	22.89
1949	0.80	0.40	2.67	2.19	2.83	4.30	2.59	1.29	0.97	0.90	0.65	0.35	19.94
1950	0.88	0.39	1.42	3.52	2.06	6.31	4.83	2.82	0.91	0.87	0.34	3.90	28.25
1951	1.30	0.77	4.18	4.51	2.29	4.06	4.89	2.59	2.86	4.35	1.94	1.60	35.34
1952	2.15	1.10	2.12	0.86	2.84	8.00	3.47	5.03	0.84	0.25	2.56	1.79	31.01
1953	0.71	1.65	1.89	4.29	2.53	4.05	5.17	2.71	0.82	0.35	1.00	1.61	26.78
1954	1.00	0.81	1.63	4.48	3.90	4.16	8.53	2.66	6.77	5.62	0.88	0.60	41.04
1955	0.60	0.77	0.80	3.78	6.51	3.71	5.61	2.03	1.07	3.33	0.98	1.31	30.50
1956	0.85	0.50	3.09	2.75	4.18	2.86	4.87	6.69	1.58	1.10	2.91	0.77	32.15
1957	0.60	0.33	0.88	2.13	5.21	3.49	6.11	2.19	3.02	0.70	3.47	0.89	29.02
1958	0.39	0.11	0.34	1.64	1.10	2.04	5.20	1.59	3.78	1.15	1.72	0.21	19.27
1959	0.97	2.23	2.22	1.85	6.52	3.57	2.53	9.37	5.52	5.62	2.47	2.08	44.95
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20yr AVG	1.02	1.01	1.91	2.65	4.38	4.98	3.82	3.33	3.35	2.27	2.24	1.36	32.31
1960	0.90	0.62	0.17	4.44	6.64	7.22	0.66	2.78	3.84	2.84	1.20	0.39	31.70
1961	0.20	1.50	2.29	2.02	2.30	4.83	2.13	3.78	6.60	2.98	2.80	1.27	32.70
1962	0.37	2.52	2.24	2.53	4.71	3.72	2.84	5.45	2.43	3.29	0.26	1.06	31.42
1963	0.72	1.23	2.86	2.52	1.85	2.90	5.31	3.64	4.25	1.71	1.79	0.97	29.75
1964	0.65	0.08	1.02	3.19	5.56	5.39	1.40	3.24	4.39	0.34	1.30	0.68	27.24
1965	0.68	0.76	2.55	4.83	6.45	1.90	5.68	6.30	12.27	1.71	2.08	2.62	47.83
1966	1.12	1.57	4.44	1.72	1.78	1.65	6.02	2.04	1.49	1.02	0.78	1.81	25.44
1967	2.62	1.07	1.47	3.46	1.72	10.04	2.26	3.11	4.02	3.55	0.75	0.90	34.97
1968	0.98	0.23	0.68	4.15	6.35	6.50	4.72	2.35	8.69	1.57	1.11	2.98	40.31
1969	2.44	0.13	1.47	2.66	3.43	5.85	2.60	2.61	1.64	4.44	0.57	1.76	29.60
1970	0.59	0.19	2.01	2.23	5.61	1.59	3.10	2.27	6.95	3.46	3.10	1.54	32.64
1971	2.02	2.63	0.78	1.68	4.23	4.20	5.92	3.73	3.03	2.07	4.24	2.31	36.84
1972	0.85	0.61	2.76	2.13	1.85	1.92	5.76	7.74	10.25	3.19	1.51	2.64	41.21
1973	0.87	1.58	4.09	6.29	7.70	3.80	1.36	5.78	3.21	2.14	1.76	1.55	40.13
1974	0.51	1.03	3.57	2.47	4.89	4.93	3.15	4.84	1.49	2.40	1.74	1.30	32.32
1975	1.16	1.61	1.87	4.34	1.86	3.60	1.76	13.32	1.60	0.44	3.45	1.11	36.12
1976	1.43	1.28	2.83	3.94	1.66	1.82	1.57	1.24	0.37	0.54	0.00	0.47	17.15
1977	0.70	1.29	3.64	2.82	3.56	3.80	3.69	2.48	4.12	2.34	3.42	1.80	33.66
1978	1.13	0.23	0.36	3.99	2.91	4.06	7.08	3.06	6.01	2.14	2.47	1.04	34.48
1979	1.47	1.28	3.22	1.61	4.86	3.10	4.68	7.76	0.72	3.64	2.07	0.55	34.96
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20yr AVG	1.07	1.07	2.22	3.15	4.00	4.14	3.58	4.38	4.37	2.29	1.82	1.44	33.52
40yr AVG	1.05	1.04	2.06	2.90	4.19	4.56	3.70	3.85	3.86	2.28	2.03	1.40	32.92

RECORD OF PRECIPITATION
Necedah National Wildlife Refuge

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
1980	1.68	0.70	0.98	1.24	2.36	4.98	2.73	12.02	5.20	2.92	0.43	0.62	35.86
1981	0.22	2.61	0.38	4.99	0.68	2.85	6.60	6.70	2.71	3.42	3.68	1.15	35.99
1982	1.77	0.18	1.96	3.16	5.28	3.03	4.45	3.43	2.43	2.27	4.99	2.58	35.53
1983	1.13	2.07	2.06	1.42	5.17	0.74	5.17	6.04	6.45	4.03	3.12	1.31	38.71
1984	0.65	1.18	1.64	3.62	1.69	4.03	4.50	2.71	4.28	5.87	3.17	2.35	35.69
1985	0.76	1.51	2.90	1.60	4.77	3.50	3.39	4.49	6.22	1.81	4.92	1.65	37.52
1986	0.49	1.48	2.00	1.63	1.59	6.89	7.43	2.09	9.31	2.23	1.46	0.47	37.07
1987	1.00	0.36	1.49	3.70	4.23	6.20	5.22	1.84	1.08	1.58	4.17	1.84	32.71
1988	1.35	0.53	1.68	1.51	0.80	1.34	4.70	2.46	6.34	1.58	3.38	0.68	26.35
1989	0.42	0.44	0.89	1.12	6.27	1.17	2.97	1.68	0.75	4.18	1.37	0.35	21.61
50yr AVG	1.03	1.05	1.97	2.80	4.01	4.34	3.90	3.95	3.98	2.42	2.24	1.38	33.07
1990	1.58	0.14	3.18	2.35	4.02	6.21	3.51	9.40	1.79	1.89	0.74	2.81	37.62
1991	0.53	5.47	1.47	3.39	4.98	3.54	5.27	2.87	2.96	2.30	3.20	0.85	36.83
Twenty-year average (1971-91)	1.05	2.22	2.21	2.85	4.34	4.70	4.23	5.41	2.91	2.20	2.06	1.68	35.84

To the Files: WATER RIGHTS - REMINGTON STRUCTURE

Subject: Meeting 07/26/90, RE: Cranberry farmer, Gene Miller's request to raise water levels of the Remington Ditch to facilitate his operations; and his complaints that the refuge was using his water!

From: Richard G. Nord, Biologist, Necedah NWR

Among the people present at the meeting were Gene Miller, owner of the cranberry marsh downstream on the Remington Ditch; Miller's younger son and operator of Miller's new cranberry beds and operator of Miller's dam (the old Stellmacher dam); Tom Lockner, Executive Director of the State Cranberry Grower's Association, Wisconsin Rapids, WI; Tom Smith, Water Management and Regulatory Section of the Wisconsin Department of Natural Resources, Wisconsin Rapids, WI; Dale Lang, Water Management Coordinator with the Wisconsin Department of Natural Resources, Rhinelander, WI; and Richard G. Nord, Biologist, Necedah National Wildlife Refuge, Necedah, WI.

First on the agenda of the meeting was Miller's complaint that the Government's Remington structure was "leaking." It indeed was leaking between three short stoplogs in the center-west bay below elevation 957.5'. Some 1/2" diameter wood sticks were lodged between these stoplogs separting them enough to cause water to leak between them. Refuge Biologist Nord agreed to fix these leaks as soon as possible. They were fixed the next day.

The water level above the Remington structure on the day of this meeting (07/26/90) was 958.05'. This made it possible for water to pass through the one-inch or so gap between the top of the stack of short stoplogs in all four bays (957.9') and the bottom of the long stoplogs at 958.0'. Miller claimed this water was also leakage and he wanted it stopped.

Nord countered by saying that he didn't believe Miller had prior right to any water passing between the stoplogs above 957.5' and below 958.0'. Nord went on to explain that the refuge had been using this water for years, and that the stoplogs had been set to allow all water between 957.5' and 958.0' to pass into the refuge through the Remington structure as far back as at least February 1979 when Nord entered on duty at the Necedah Refuge.

Nord said, "The stoplogs were set this way when I came and I assumed they were set that way for many years prior to that."

Nord also stated that the refuge is not only entitled to the one inch or so of water presently leaking between elevation 957.9' and 958.0', but also all of the water that would normally pass through all four bays between elevation 957.5' and 958.0'. And that there would be much more water entering the refuge at the time except for the fact that the refuge had on May 4, 1989, temporarily shut off most of the water it had been using for years, to accommodate the construction work on replacing Rynearson Dam #1 downstream. Nord also explained that once construction work is completed on the Rynearson Dam that up to four of the short stoplogs, one in each of the four bays, would likely be removed if the refuge needs required that action. This would return the stoplog settings to the position they were in for many years prior to May 4, 1989.

Miller requested that the refuge raise the stoplog openings which pass water into the refuge up to 959.0' or higher, because "the refuge was taking water from him that he had a prior right to for agricultural purposes."

Refuge Biologist Nord expressed that he could not agree to this request for the following reasons:

1) He, Nord, was personally involved in the operation of the Remington control

structure for the past 11 years (since February 1979), so he was well aware of how these stoplogs were set in recent years. He represented the refuge and the U. S. Fish and Wildlife Service at this meeting and intended to protect whatever water rights that the Government had to the continued use of this water. No more, no less.

2) He stated that if he agreed to raising the level at which water would enter the refuge, he would in effect give up or diminish the government's right to use the water above 957.5', which the government had been using for many years. He felt he had no authority to do that.

3) By raising the level at which water would begin to enter the refuge to 959.0', water above the Remington Structure would have to raise considerably above this for the refuge to receive any substantial flow over the stoplogs. Water above the structure would have to raise to at least 959.5' or higher in order for the refuge to receive the same amount of water it had been receiving. If water levels above the Remington Structure were allowed to raise to 959.5', the water would be within one foot of topping the County Line Road on either side of the Remington control structure. Water would be up against the north side of the County Line Road embankment and up against the east and west embankments of State Highway 173 most of each year. Both the State and Township road officials could be expected to complain about roadbed damage by muskrats as a result of the new higher water levels being maintained in the Remington Ditch.

4) Increased water levels of the Remington Ditch to 959.5' would inundate more land on either side of and immediately adjacent to the Remington Ditch including at least three acres of Government-owned land between the County Line Road and the Remington Ditch. Flooded cottonwood trees and willows, up to 20" in diameter, growing on these government-owned lands would die and possibly fall

onto the County Line Road or Highway 173 roadways creating another safety hazard.

5) With increased water levels maintained in the Remington Ditch, water tables on private lands located to the south and east of the Remington Structure will no doubt be increased by seepage. Increased water levels could cause damage to nearby private wells and septic systems.

6) If bodily injury or property damage occurred as a result of roadbed damage which was caused by an increase in the water table in the area, the government could be held partly responsible if it joined Miller in the action of raising water levels in the Remington Ditch. Raising water levels in the Remington Ditch requires both parties (Miller and the government) to raise the stoplogs in their respective dams. If the government refused Miller's request to raise its stoplogs and the government continued to operate its structure like it has for the last 40 years, at least the government did not act and therefore did not contribute to the problem of increased water levels, nor did it enhance its liability or responsibility for future flood damage that is bound to be claimed by affected parties. Miller owns and operates the dam that actually controls water levels in the Remington Ditch, (the government structure is only a diversion structure, a water metering device, not a controlling device) and if he continues to hold water to the top of his dam, he will have raised the water in the Remington Ditch at least two feet higher than it has ever been managed by previous owners. By keeping his dam at full pool levels, he leaves no free board to operate in to absorb flash floods if he is not around to pull logs and release more water. These flash floods could top the County Line Road adjacent to the government-owned structure and cause considerable flood damage to refuge and township road facilities downstream within the refuge. Instead of receiving a metered amount of diverted water from the Remington Ditch, the refuge would become the recipient of uncontrolled

flood waters that normally, and up to recently, had been kept out of the refuge because of normally lower level flows down the Remington Ditch to the Yellow River.

Compounding the flood water problem that the refuge anticipates receiving because of Miller's operation of his dam are the following two factors:

1. (Noted on July 20, 1990) Miller had completely filled the channel immediately above his dam #1 with sand fill material to the level of the top of his stoplogs which were set 17" below the top of the walkway across his dam. The fill material was banked up against the upstream surface of his stoplogs. This action obviously would block a significant amount of the original flow capacity of the Remington Ditch channel to carry flood waters even if he pulled all of his stoplogs in his dam. Thus, the flood waters would be held back more than normal which would increase greatly the amount of flood waters forced over the County Line Road and into the refuge. Refuge Biologist Nord complained about this fill material at the meeting on July 26, 1990, and requested Miller remove this obstacle to the normal stream flow in the Remington Ditch. Miller said he would do it as soon as he replaced old deteriorated and leaking stoplogs near the bottom of his dam. To date, January 30, 1991, this is not believed to have been accomplished.

2. Also, at the meeting with Miller and the DNR on July 26, 1990, Refuge Biologist Nord complained about and requested Miller to remove road fill and a large culvert he had recently placed in and across the channel of the Remington Ditch located about 1/4 mile downstream from Miller's #1 dam. Nord's concern was that about 50% of the normal flood water flow down the ditch channel was blocked by the new road fill.

This would, in addition to item 2 above, contribute even more flood water being backed up behind this new road fill and thus forcing it to flow over the County Line road in the vicinity of the government's control structure. This would increase the probability of flood damage downstream within the refuge. Miller responded flatly "If you want it out, I'll move it." To date, January 30, 1990, the new road fill across the Remington ditch still exists.

Refuge Biologist Nord is concerned that the refuge is likely to be dragged into a situation where it might become a co-defendant with Miller when a third party sues Miller claiming damages received as a result of Miller improperly managing his water levels. By Miller intentionally holding water levels 2 feet higher in the Remington Ditch than it has ever been at any time within the last 40 years and by Miller placing the two above mentioned earthen fills that partially block the flood flows down the Remington Ditch, certainly indicates his irresponsibility and lack of consideration for the problems he could cause the refuge, other adjacent land owners and others using near-by public roads.

Nord believes that if the refuge does go along with Miller's request to raise over flow levels of the Government's Remington control structure, it thereby will indeed become part of the action with Miller and thus will definitely become partly liable for damages caused by almost any irresponsible act or in-action on the part of Miller.

Nord also believes that the refuge should not take action that contributes to raising the water levels in the Remington ditch without a public hearing and without the approval of the State Highway Commission, Town Boards

of Kingston, Finley, and Necedah Townships, all riparian land owners along the Remington Ditch, State Department of Natural Resources, and all the other land owners in Sections 4,5, and 6 in Finley Township.

The proposed increased water levels of the Remington Ditch at any level above 958.0' (as requested by Mr. Miller) is considered a recent increase in the use of this water. According to the Permit, 2-WP-552, dated May 14, 1942, given by the Wisconsin State Public Service Commission, the refuge was granted permission to use surplus waters from the Remington Ditch or from the Yellow River during the period that water is being wasted through the Wisconsin Power and Light Company's dam at Necedah, Wisconsin. The dam at Necedah washed out several years ago and had not been functioning for a number of years prior to that. Since all water approaching WP&L's dam at Necedah is presently being "wasted", this water becomes eligible for diversion from the Remington Ditch for refuge use.

Another consideration was reviewed by the Public Service Commission in granting the permit for the refuge to divert surplus water from the Remington Ditch. A Mr. Brice McBride, on behalf of the government (applicant), testified that the applicant recognizes the prior rights pertaining to the operation of Dams #1 and #11 located downstream on the Remington Ditch for agricultural purposes and that due regard for such rights would be observed by the applicant (government) in the operation of the control works for diversion of surplus water.

Today, the refuge intends to grant the use of water in the Remington Ditch to current owners of Dams #1 (Miller) and Dam #11 (Vanetta) and other riparian owners downstream of the government's control structure

to the extent, and only to the extent, that the surface water of the Remington Ditch was actually used by historical riparian owners for agricultural purposes prior to May 14, 1942, the date on which the government was granted the permit to divert all water surplus to their agricultural use. It is the government's position that any increased or additional uses of this water developing after May 14, 1942 is subject to the needs of the refuge. And, since Miller's and Vanetta's cranberry developments began in 1988 and their requests for more water occurred since then, the government contends that the water that they are requesting would be a new and increased use of the water of the Remington ditch and therefore is subject to the prior rights and needs of the refuge.

S.C.S. (Soil Conservation Service) put in many dams like the Stellmacher (Miller's) Dam #1 on the refuge area and surrounding lands in the late 1930's during the depression. Because the sandy soils locally were conducive to poor crop production, there was an effort to sub-irrigate lands for increased crop production. There is no evidence that surface waters were ever diverted or pumped out of the Remington Ditch for irrigation or other agricultural purposes. The only historical agricultural benefit received by adjoining land owners appears to be that which was provided by sub-surface irrigation through a raise in the ground water table brought about by holding water in the Remington Ditch behind these dams.

Since surface waters were impounded but never used by previous riparian land owners prior to 1988, all flowing waters above 958.0 were surplus waters authorized by the state for diversion and use by the refuge since 1942. Since the refuge began actually using the surplus waters in 1950,

the refuge thereby has established the right to continue to use all surplus surface waters that it needs. Since 1941, anyone wishing to establish new or increased use of the flowing waters is subject to refuge needs.

Refuge Biologist Nord and Gene Miller both expressed that they would like to peacefully settle the differences both have on the management of water levels and water uses at the meeting of July 26, 1990. Miller wanted water levels in the Remington Ditch kept as "high as possible-about 959.0." Nord disagreed, stating it was too high and requested Miller to suggest a lower level that would still be acceptable to him (Miller). Nord also suggested that if his proposed level was satisfactory that he (Nord) would maintain the stop log settings so that the Remington control structure would continue operating automatically without daily adjustments of stop logs by refuge personnel as a matter of operating convenience.

By operating automatically, Miller would be required to adjust his stoplogs to hold water above the level at which water is diverted into the refuge. For instance, if the stop logs were set in the Government's structure so that water began to flow into the refuge at 957.5', Miller must hold water levels above his dam at or above 958.0' before he could release water over his dam or divert or pump water out of the Remington ditch from any point above his dam.

This would assure continued water flows into the refuge in the approximate amounts that have been received in the last 40 years, provided that 0.5 feet vertical opening is maintained in each of the 4 short (5 foot) bays or in each of the two 11 foot bays for a metered amount of water to flow in to the refuge while at the same time excluding unwanted flood waters.

During the July 26, 1990, meeting, Nord suggested that he would like to see a written agreement between the refuge and Gene Miller outlining mutual agreeable water level management procedures and time tables. This way both parties would know exactly what water is surplus and what is not usable on behalf of both parties. A written agreement would not only be of value to current operators of the refuge seeking peaceful co-existence with neighboring land owners but it would be of immense value to future refuge managers who would be unaware of the history of this problem or conflict. Both contesting parties and the DNR officials present at this meeting indicated that this is the route to go to settle the controversy avoiding litigation which no one wanted.

Miller's response was agreeable to the above agreement proposal. He indicated that he was new in his field and inexperienced in knowing what the water needs were in the operation of his cranberry property. Therefore, he proposed that he be allowed an additional year to become knowledgeable of his needs before he entered into serious negotiations for drawing up a written agreement.

All parties present at the meeting then agreed with Miller's latest request and the meeting adjourned.

Notes to files - from R. G. Nord, July 27, 1990

Re: Remington Control Structure - Water Rights - and conflict over water uses of the Remington Ditch with cranberry farmers downstream.

Nord suggested that if the refuge was not receiving water it needed from the Remington ditch because Gene Miller dropped the water level above his dam to less than 958.0' for any reason, without permission of the refuge manager, he would be in effect wasting or utilizing refuge water without authorization. And if this occurred, especially during the month of October during the height of fall waterfowl migration when refuge water needs would likely be the highest, the refuge could remove all the short stop logs in the government's structure necessary to recover the water being lost or wasted by Gene Miller's action.

In the event that it becomes necessary to contest the dispute over the use of water in the Remington ditch through litigation, the following fact may provide important evidence in protecting government rights to the continued use of these waters.

It is suggested that the refuge, on behalf of the Federal Government, has the original and upper most right to the continued use of surface waters of the Remington Ditch. Surface water originally traveled its natural course southward from a point near the refuge's control structure across presents day refuge lands rather than to the east. The original survey map of this area shows this to be true. Not until the Remington Ditch was constructed did this surface water flow east as it does today. Thus the

government contends that it has the original and prior first rights to the use of all the surface water flowing down the Remington Ditch that is generated upstream from the present day point of diversion from its natural channel. This is believed to be so because present day refuge land is made up of lands that held original riparian rights to the flowing waters along the original and natural stream channel.

If the Necedah Refuge does not get the use of the diverted Remington Ditch waters to the extent it has used these waters since 1942, the refuge should request State permission to return at least part of the waters diverted east down the Remington Ditch to its original channel.

According to the original survey map, waters being diverted east by the construction of the Remington Ditch is diverting water from the upper reaches of the East Branch of the Little Yellow River, a Navigable Stream, which originally flowed south across present day refuge lands. The question then arises as to whether the work of diverting these navigable waters, via the construction of the Remington Ditch, done under the auspice of the Remington-Wood County Drainage District, was done legally in the first place. If not, the refuge is entitled to all the water of the Remington Ditch it needs.

Moreover, since the Remington-Wood County Drainage District has long been disbanded and no longer serves as a drainage function it is only proper that at least part of the water, that part needed by the refuge, be returned to flow its natural course, and that part surplus to the needs of the refuge be allowed to continue to flow east down the Remington Ditch. Generally, it is considered that the refuge needs would be satisfied most of the time by receiving no more than the 6" of water passing over the

stop logs of all 4 bays of the Remington Structure. More than this amount of water received at one time, would cause management problems down stream. Any surplus of this amount would be allowed to continue to flow east down the Remington Ditch for use by the cranberry developments created since 1987.

Although two water regulating specialists from the Wisconsin Department of Natural Resources were present at the meeting July 26, 1990, it became clear during a discussion afterwards that these officials and the refuge biologist (Miller and others not present) that all parties were unsure the State has jurisdiction over the administrative proceedings of the matter of the water use conflict between the refuge and Gene Miller. The question is: Are whatever water rights that the refuge (federal government) has in this matter protected from adjudication in State administrative proceedings by the federal government having sovereign immunity. If the federal government has sovereign immunity, state courts have no jurisdiction and the matter may be required to be litigated if necessary in
a Federal Court.

Notes to Files:

RE: Remington Control Structure - Protection of Water Rights
from R. G. Nord - July 27, 1990.

The State Public Service Commission approved the permit to construct the Government owned structure and to divert water from the Remington Ditch on May 14, 1942. Of course, this was subject to the agricultural needs of landowners downstream on the Remington Ditch. Since 1949, the agricultural needs of the landowners downstream have been met while still allowing the diverted water to pass through the government structure.

The refuge has been using the water for 41 years with no landowner complaints of not satisfying agricultural needs downstream during this time. Any increase in water use from the Remington Ditch by the power company or others since the Federal Wildlife Service permit was issued are subject to the refuge needs.

All actual use of surface water from the Remington Ditch, during the period from 1950 to 1989, was by the Government. All use of surface water now claimed by the new cranberry development or any additional use of the water that has developed since the date of the Refuge Permit is therefore subject to the refuge needs.

There is no apparent recent history of agricultural use of the surface water from the Remington Ditch by Stellmacher, the previous owner, of the Miller projects located north of the county line road. Stellmacher told me (R. G. Nord) sometime in the mid-1980's that the only water he used or impounded was for minnow or fur production, not crop production, and

that came from the north, not the west. Stellmacher did not use surface water in the Remington ditch for any purpose other than holding water in the ditch up to 957.5' solely to prevent water retained by him in pools located north of the Remington Ditch from seeping through his dike into the Remington Ditch.

Water was surplus to the needs of all downstream riparian landowners prior to the Miller and Vanetta coming on the scene. Surplus water which was used by the Government since 1950 (40 years) is now claimed by these cranberry developers who started their developments in 1988.

Since 1987, Mr. Miller cleared about 50 acres of woods and swamp and cleared about 30 acres of willows which had encroached upon abandoned wet hay lands on his property south of County Line road. This entire 80 acres has now been converted to cranberry beds. Since 50 acres of this land was woods and undrained brush swamps until just prior to 1989, the cranberry operations should not be considered as having a prior history of agricultural use requiring surface water from the Remington Ditch.

The Johnson Farm was the only nearby active farm until Vannetta converted this conventional farm to cranberry beds (Vanetta's Cranberries). This farm, which is located south of the County Line and adjacent to Highway 80, never used surface water from the Remington Ditch. There was no diversion ditch to the farm nor were pumps used until Vannetta put them in in 1989. In fact in the early 1980's, Johnson had a center pivot irrigation system drawing water from a well on his land, not from the Remington Ditch. So there is no history of the owners of the land ever using surface water from the Remington Ditch. In fact, the Johnson farm had no riparian ownership connected to the Remington

ditch and thus never was entitled to the acquired water from this ditch.

Miller's cranberry beds south of the County Line road were formerly owned by Mr. Gaffney (sp?) and Mr. Sayre. Gaffney and Sayre did not use surface water from the Remington Ditch. These lands were separate from the Stellmacher properties and have had no riparian connection to the Remington Ditch. No diversion channel was ever present prior to these lands being acquired by Miller. Therefore, there is no history of surface water use by any owner of these lands prior to the date that the Refuge Permit was issued. There was no use of surface water until Miller dug a new ditch in 1988. This new ditch runs from the Remington Ditch above his dam and extends south across the County Line road into the 80-acre Gaffney-Sayre property which is now converted to cranberry beds. This new ditch permits water to be diverted or pumped from the Remington ditch into the newly developed cranberry beds. The use of water being carried or removed from the Remington ditch via this new ditch constitutes a new and additional use of surface waters from the Remington Ditch. This ditch was developed after the date of the Refuge Permit, therefore, the continued use of this water by Miller is subject to the needs of the refuge.

Project Descriptions and/or Worksheets
Section VI: Proposed Master Planned Projects That Cannot Be Accomplished With Current Funding

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87035 STATION RANK: 26 REGIONAL RANK: -0-

PROJECT TITLE:

SPEEDWAY POOL CONSTRUCTION

THRUST: WETLAND RESTORE

COST ESTIMATE: $524,999 YEAR NEEDED: 92 JOB ORDER NEEDED: Y

PROJECT DESCRIPTION:

SHORT DIKES WOULD CONNECT SAND RIDGES ALONG WITH SPEEDWAY ROAD. RAISE 3' FOR 5,000'. DIKES AND ROAD WOULD BE SLOPED AND SEEDED.

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: C
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,WP

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WT,WF

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

d #: NCD / 0035 Station: Necedah NWR Date: 10 /14 /83

Project Title: Speedway Pool Cost: $500,000

Refuge Manager's Priority: 45 Refuge Manager's Sequence: ___

Division Supervisor's Priority: ____ Division Supervisor's Sequence ___

Recommended For Funding in FY __ (RO only)

Project Description (What):

Short dikes would connect sand ridges along with Speedway Road. Raise 3' for 5,000 lin. ft. Dikes and road would be sloped and seeded.

Project Justification (Why):

This project is proposed under the updated Refuge Master Plan and endorsed by the public.

FWS-Region 3
September, 1983

INITIAL PROJECT WORKSHEET

Side 2

Record #: _NCD_ / _0035_ Station: Necedah NWR Date: 10 /14 / 8

Ranking Factors

A. Locational: 1. State (_55_) 2. Congressional District (_06_) 3. Unemployment Area (_ _ _ _)

B. Planning Related Factors:

1. In Master Plan - - - - - - - - - - - - -(X)
2. In a Management Plan - - - - - - - - - -( )
3. Helps Resolve a Threat/Conflict - - -( )
4. Has Local or Congressional Interest -( )
5. In the 5-year CRMS Plan - - - - - - - -( )
6. In the 3-year ARMM Plan - - - - - - - -( )
7. Scheduled for Funding in FY - - - - -(_ _)

8. Regional Resource Plan:

Strategy

1.(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _
2.(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _
3.(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _
4.(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _

C. Maintenance Classification:

Digit 1 (2) Maint. Group	Digit 2 (1) Maint. Use	Digit 3 (6) Maint. Purpose	Digit 4 (2) Prog. Primarily Bene[illegible]d
Code	Code	Code	Code
1 - Habitat	1 - Managed Waters	1 - Health & Safety	1 - Endangered Species
2 - Water Mgmt. Facilities	2 - Natural Wetlands	2 - Cultural Resources	2 - Migratory Birds
3 - Building & Utilities	3 - Managed Uplands	3 - Handicap Access	3 - Resident Wildlife
4 - Roads and Trails	4 - Wildlands	4 - Restoration	4 - Public Use
5 - Equipment & Vehicles	5 - Wildlife Populations	5 - Replacement Item	5 - Fish
6 - Fire Protection	6 - Buildings & Utilities	6 - New Item	
7 - Other Facil.	7 - Equipment	7 - Energy Efficiency	
8 - Research/Maps/ Surveys		8 - Dam Safety	
9 - Feasibility Studies		9 - Completion Project	

D. Benefits/Outputs:

Code	Output	Unit	Loss Avoid.	Antic Gain
71	Waterfowl Maint.	UD		275,000
72	Other Migratory Bird Maint.	UD		35,000
73	Mammal Maint.	UD		73,000
80	Waterfowl Production	#		800

U.S. FISH [redacted] ILDLIFE SERVICE
Division of [redacted] Wildlife Refuges

PROJECT DESCRIPTION W[redacted]HEE
(June 1980)

Refuge Name: Necedah NWR **Org. No:** 32530

Administering Office:

Project Title: Speedway Pool

Location: Spencer-Robinson Ditch at Speedway Road

GENERAL	1 Project Number IPW# NCD/0035 ~~12~~		
	2 Major Program	1210	
	3 Refuge Rank	12	
	4 Area Office Rank	210	Adjusted Estimate (R.O. Use Only)
	5 Regional Office Rank	316	
INPUTS	6 ONE-TIME FUNDING, Total	430,000	
	7 New Facilities, Total	430,000	
	8 Construction Cost	383,000	
	9 Engineering, Plann., Permits	47,000	
	10 Existing Facilities, Total		
	11 Construction Cost		
	12 Engineering, Plann., Permits		
	13 Resource Planning/Research		
	14 RECURRING FUNDING, Total	13,000	
	15 Operations and Maintenance	2,000	
	16 Cyclical Maintenance	11,000	
	17 MANPOWER, Total		
	18 Permanent Full Time		
	19 All Other		
	20		

		Loss Avoid.	Antic. Gain
OUTPUTS	21 Threatened Spp Maintenance		200
	22 Waterfowl Maintenance		275,000
	23 Other Migratory Birds Maint		35,000
	24 Waterfowl Production		800
	25		
	26		
	27		

JUSTIFICATION

This project is proposed under the updated refuge master plan and endorsed by the public. Its bene-fits lie in the utilization of a presently under-utilized dependable water source to create approxi-mately 650 acres of excellent waterfowl brood and maintenance habitat. This shallow water developmer would have an irregular shoreline with scattered islands. All aquatic and semi-aquatic wildlife spe should benefit.

Development of this pool utilizes sand ridges by cc necting them with short dikes to hold water. This would maintain fresh water seepage as a major inflo source to the pool. Speedway Road will act as a di and would be raised, graded and the sides resloped and seeded. A concrete control structure will be u to regulate flows.

Although the potential for Necedah to create many pools is realized, this project is felt to be one o the more cost efficient and productive alternatives to waterfowl habitat enhancement on the refuge.

(Related to MP project #6)

ANNUALIZED COSTS	Capital Invest. (excl. rehab.)	Recurring Costs	TOTAL

PERSONNEL	Appt. Type	Title	Grade	M.D./Yr.

Cost estimates are based on _____

Assuming this project will be authorized in FY ___

the engineering design will be completed by _____

_____, construction is expected to start ___

_____ and be completed _____

ELEM.	DESCRIPTION (Quantity, size, type, spec's, etc. - Be Specific!)	Est. Co[illegible]s of 11/ 3/ 81	Eng. Revie
a.	Raise Speedway Road, 5700', approximately 3' to serve as dike, gravel road 22' wide, 6:1 slopes, seeded. Dike at elev. 931. (No. 208) 53,000 cu yd additional	193,000	
b.	Construct 3450' core dike, 12' wide 6:1 slopes, seeded. (NO. 208) Av ht 4' 15,300 cu yd	76,000	
c.	Construct concrete control structure 4-8' bays with stop logs. (No. 208)	114,000	
d.			
e.			
f.			
g.			
h.			
i.			

Proje[illegible] oposed by: Lowell Smith Date: 11-3-81 [illegible]neering Review by: _____ Date: _____

Approval by: _____ Da[illegible]

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87036 STATION RANK: 27 REGIONAL RANK: -0-

PROJECT TITLE:

HANSON ROAD POOL CONSTRUCTION

THRUST: WETLAND RESTORE

COST ESTIMATE: $251,999 YEAR NEEDED: 92 JOB ORDER NEEDED: Y

PROJECT DESCRIPTION:

HANSON ROAD WILL SERVE AS A DIKE AND WILL NEED TO BE RAISED AND RESHAPED. SOME DITCH BANK WILL NEED TO BE RAISED AN EAST AND WEST EDGES OF POOL WITH CONTROL ON EAST SIDE. SPILLWAY ON WEST SIDE. WATER WILL BE SUPPLIED FROM SEEPAGE AND OUTLET

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: C
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,WP,PU

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WF,OB

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

Ord #: NCD / 0036 Station: Necedah NWR Date: 10 / 14 / 83

Project Title: Hanson Road Pool Cost: $240,000

Refuge Manager's Priority: 46 Refuge Manager's Sequence: ___

Division Supervisor's Priority: _____ Division Supervisor's Sequence ___

Recommended For Funding in FY __ (RO only)

Project Description (What):

Hanson Road will serve as a dike and will need to be raised and reshaped. Some ditch bank will need to be raised on east and west edges of pool, with control on east side. Spillway on west side. Water will be supplied from seepage and outlet in Sprague Dike.

Project Justification (Why):

This shallow water development would create about 625 acres of excellent waterfowl maintenance and brood habitat. This is one of the projects identified in the Refuge Master Plan and endorsed by the public.

...s Region -
September, 1983

INITIAL PROJECT WORKSHEET

Side 2

Record #: _NCD_ / _0036_ Station: Necedah NWR Date: _10_/_14_/(

Ranking Factors

A. Locational: 1. State (55) 2. Congressional District (06) 3. Unemployment Area (____)

B. Planning Related Factors:

1. In Master Plan - - - - - - - - - - - - -(X)
2. In a Management Plan - - - - - - - - -( )
3. Helps Resolve a Threat/Conflict - - -( )
4. Has Local or Congressional Interest -( )
5. In the 5-year CRMS Plan - - - - - - - -( )
6. In the 3-year ARMM Plan - - - - - - - -( )
7. Scheduled for Funding in FY - - - - -(__)

8. Regional Resource Plan:

Strategy

1.(____)(____)(____)(____)(____)
2.(____)(____)(____)(____)(____)
3.(____)(____)(____)(____)(____)
4.(____)(____)(____)(____)(____)

C. Maintenance Classification:

Digit 1 (2) Maint. Group	Digit 2 (1) Maint. Use	Digit 3 (6) Maint. Purpose	Digit 4 (2) Prog. Primarily Ben...ted
Code	Code	Code	Code
1 - Habitat	1 - Managed Waters	1 - Health & Safety	1 - Endangered Species
2 - Water Mgmt. Facilities	2 - Natural Wetlands	2 - Cultural Resources	2 - Migratory Birds
3 - Building Utilities	3 - Managed Uplands	3 - Handicap Access	3 - Resident Wildlife
4 - Roads and Trails	4 - Wildlands	4 - Restoration	4 - Public Use
5 - Equipment & Vehicles	5 - Wildlife Populations	5 - Replacement Item	5 - Fish
6 - Fire Protection	6 - Buildings & Utilities	6 - New Item	
7 - Other Facil.	7 - Equipment	7 - Energy Efficiency	
8 - Research/Maps/ Surveys		8 - Dam Safety	
9 - Feasibility Studies		9 - Completion Project	

D. Benefits/Outputs:

Code	Output	Unit	Loss Avoid.	Antic Gain
71	Waterfowl Maint.	UD		265,000
72	Other Migratory Bird Maint.	UD		35,000
73	Mammal Maint.	UD		73,000
80	Waterfowl Production	#		700
70	Threatened Species Maint.	UD		175

U.S. FISH [redacted]ILDLIFE SERVICE
Division of N[redacted]al Wildlife Refuges

PROJECT DESCRIPTION W[redacted] HEE
(June 1980)

Refuge Name: Necedah NWR **Org. No:** 32530

Administering Office:

Project Title: Hanson Pool

Location: Spencer-Robinson Ditch at Hanson Road

GENERAL	1 Project Number IPW # NED/0036 ~~13~~		
	2 Major Program	1210	
	3 Refuge Rank	13	
	4 Area Office Rank	211	Adjusted Estimate (R.O. Use Only)
	5 Regional Office Rank	317	
INPUTS	6 ONE-TIME FUNDING, Total	310,000	
	7 New Facilities, Total	305,000	
	8 Construction Cost	272,000	
	9 Engineering, Plann., Permits	33,000	
	10 Existing Facilities, Total		
	11 Construction Cost		
	12 Engineering, Plann., Permits		
	13 Resource Planning/Research		
	14 RECURRING FUNDING, Total	10,000	
	15 Operations and Maintenance	1,000	
	16 Cyclical Maintenance	9,000	
	17 MANPOWER, Total		
	18 Permanent Full Time		
	19 All Other		
	20		
		Loss Avoid.	Antic. Gain
OUTPUTS	21 Threatened Spp Maintenance		500
	22 Waterfowl Maintenance		264,000
	23 Other Migratory Birds Maint.		35,000
	24 Waterfowl Production		700
	25		
	26		
	27		

JUSTIFICATION

This proposed shallow water development would create about 625 acres of excellent waterfowl maintenance and brood habitat. This is one of the projects identified in the refuge master plan and endorsed by the public. All aquatic or semi-aquatic wildlife species should benefit. It is expected that the many scattered islands that would be created would be ideal habitat for various threatened species that are present at the refuge. This area would also stabilize the groundwater through seepage. This seepage would be a major source of fresh water flow into the pool during late summer and early fall periods.

Hanson Road will serve as a dike and will need to be raised and reshaped. In addition, a portion of the ditch bank will be raised and a control structure built to regulate water levels. A ditch will be constructed to tap into a lateral to provide water to the new pool.

(Related to MP project #5)

ANNUALIZED COSTS	Capital Invest. (excl. rehab.)	Recurring Costs	TOTAL

PERSONNEL	Appt. Type	Title	Grade	M.D./Yr.

Cost estimates are based on _____

Assuming this project will be authorized in FY ____

the engineering design will be completed by _____

_____, construction is expected to start ____

_____ and be completed _____

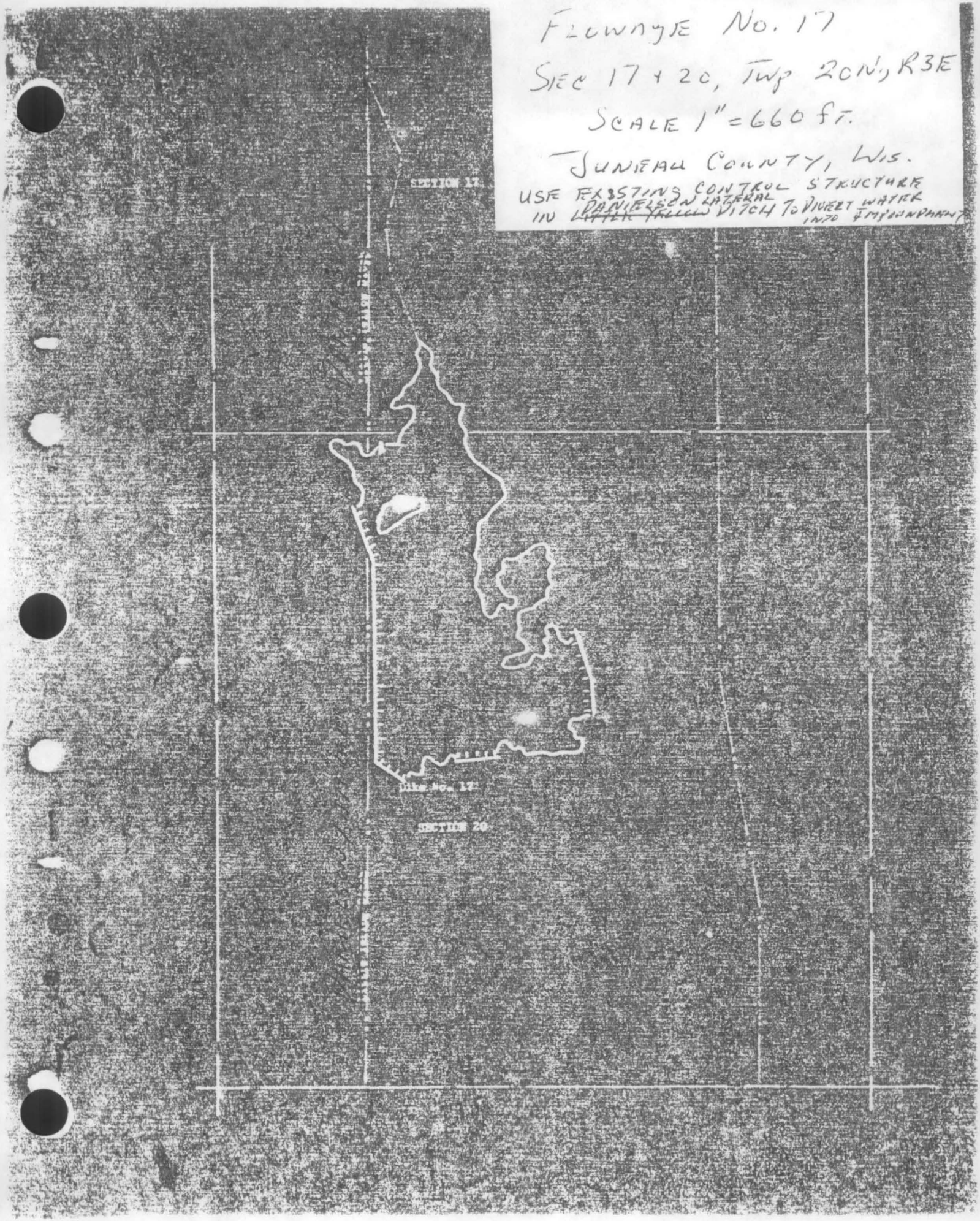
ELEM.	DESCRIPTION (Quantity, size, type, spec's, etc. - Be Specific!)	Est. Costs of 1/3 Proj.	Eng. Review
a.	Raise 5000' of Hanson Road to serve as dike, 36' wide w/shoulders, gravel, 6:1 seeded slopes, 1' raise. (No. 205)	121,000	
b.	Raise west bank of Spencer-Robinson Ditch to serve as east dike of pool 12' top, 6:1 seeded slopes. (No. 205) raise 2' 19,000 cu yd	33,000	
c.	Construct concrete control structure 2-8' bays with logs on Rattail Lateral under Hanson Road. (No. 205)	81,000	
d.	Construct ditch from Danielson Lateral to pool and CMP control structure to control water supply to pool. (No. 205) 15' bottom, 4' deep, 2200 ft long.	37,000	
e.			
f.			
g.			
h.			
i.			

Proposed by: Townsend Land Co. Date: 11-3-5

Engineering Review by: _____ Date: _____

Approval by: _____

Project Descriptions and/or Worksheets
Section VII: Proposed Projects Not Currently
Master Planned That Cannot Be Accomplished
Without Significant Increases in Current Funding


Flowage No. 17
Sec 17 + 20, Twp 20N, R3E
Scale 1" = 660 ft.
Juneau County, Wis.
USE EXISTING CONTROL STRUCTURE IN DANIELSEN LATERAL DITCH TO DIVERT WATER INTO IMPOUNDMENT
SECTION 17
Dike No. 17
SECTION 20

Record #: NCD/0003 Station: Necedah NWR Date: 10/14/83

Project Title: Raise Dike and Control Structure of Dam #18 North Cost: 18,400 Contract

Refuge Manager's Priority: 25 Refuge Manager's Sequence: ---

Division Supervisor's Priority: ____ Division Supervisor's Sequence ---

Recommended For Funding in FY __ (RO only)

Project Description (What):

Raise 1/16th of a mile of dike and water control structure about 2 feet. (Est. cost $5000)
Add bridge top on water control structure (Est. cost $10,400)
Install 24" pipe with corrigated sheet metal riser type control with stop log between north and south pools. (Est. cost $3000)

Project Justification (Why):

By raising the dike top and top of concrete control structures as well as spill level of emergency spillway, the capability to divert water from upper pool 18 into lower pool 18 will be assured. This was the intent when the lower pool 18 dike was rebuilt in 1978. However, surveyed water levels were in error by about 1 foot. This proposed will complete the project as intended to reflood at will a possible moist soil unit in lower Pool 18. At the same time, increase marsh habitat from a 5 acre reed canary grass choked flat to 40+ acre manageable marsh with moist soil management capabilities. Bridge top will allow vehicular access to lower pool 18 control structure.

Record #: NCD / 00003 Station: Necedah NWR Date: 10 / 14 / 8

Ranking Factors

A. Locational: 1. State (55) 2. Congressional District (06) 3. Unemployment Area (____)

B. Planning Related Factors:

1. In Master Plan - - - - - - - - - - - - -( )
2. In a Management Plan - - - - - - - - - -(X)
3. Helps Resolve a Threat/Conflict - - -( )
4. Has Local or Congressional Interest -( )
5. In the 5-year CRMS Plan - - - - - - - -( )
6. In the 3-year ARMM Plan - - - - - - - -( )
7. Scheduled for Funding in FY - - - - -(__)

8. Regional Resource Plan:

Strategy

1. (1115)(1011)(1012)(1127)(121
2. (1825)(____)(____)(____)(___
3. (4110)(4120)(4121)(____)(___
4. (4519)(4512)(____)(____)(___

C. Maintenance Classification:

Digit 1 (2) Maint. Group	Digit 2 (1) Maint. Use	Digit 3 (9) Maint. Purpose	Digit 4 (2) Prog. Primarily Ben
Code	Code	Code	Code
1 - Habitat	1 - Managed Waters	1 - Health & Safety	1 - Endangered Species
2 - Water Mgmt. Facilities	2 - Natural Wetlands	2 - Cultural Resources	2 - Migratory Birds
3 - Building & Utilities	3 - Managed Uplands	3 - Handicap Access	3 - Resident Wildlife
4 - Roads and Trails	4 - Wildlands	4 - Restoration	4 - Public Use
5 - Equipment & Vehicles	5 - Wildlife Populations	5 - Replacement Item	5 - Fish
6 - Fire Protection	6 - Buildings & Utilities	6 - New Item	
7 - Other Facil.	7 - Equipment	7 - Energy Efficiency	
8 - Research/Maps/ Surveys		8 - Dam Safety	
9 - Feasibility Studies		9 - Completion Project	

D. Benefits/Outputs:

Code	Output	Unit	Loss Avoid.	Antic Gain
71	Waterfowl Maint.	UD		120,000
72	Other Migratory Bird Maint.	UD		20,000
80	Waterfowl Production	#		150
73	Mammals Maint.	UD		

U.S. FISH [redacted]LDLIFE SERVICE
Division of [redacted]al Wildlife Refuges

PROJECT DESCRIPTION W[redacted]HEE
(June 1980)

Refuge Name: Necedah NWR **Org. No:** 32530

Administering Office:

Project Title: Dike Rehab. Pools, No. 19, 27 and 28

Location: Northern third of Refuge

GENERAL	1 Project Number	6	
	2 Major Program	1210	
	3 Refuge Rank	6	
	4 Area Office Rank	204	Adjusted Estimate (R.O. Use Only)
	5 Regional Office Rank	310	
INPUTS	6 ONE-TIME FUNDING, Total	210,000	
	7 New Facilities, Total		
	8 Construction Cost		
	9 Engineering, Plann., Permits		
	10 Existing Facilities, Total	203,000	
	11 Construction Cost	181,000	
	12 Engineering, Plann., Permits	22,000	
	13 Resource Planning/Research		
	14 RECURRING FUNDING, Total	9,000	
	15 Operations and Maintenance	3,000	
	16 Cyclical Maintenance	6,000	
	17 MANPOWER, Total		
	18 Permanent Full Time		
	19 All Other		
	20		
		Loss Avoid.	Antic. Gain
OUTPUTS	21 Waterfowl Maintenance	25,000	
	22 Other Migratory Birds, Maint	300	
	23		
	24		
	25		
	26		
	27		

JUSTIFICATION

Presently there is very little water in the norther end of the refuge. The increased water holding capacity will permit reflooding of former wetlands drai in the 1900's. More importantly, rehabilitation is required to avoid losing water management capabilit and thereby losing control over water levels in oth pools and moist soil areas. The areas flooded provide excellent brood areas and sheltered habitat for spring and fall migrant waterfowl.

These northern water areas were restored in the WPA and CCC construction periods. Very little addition work has been attempted on these pools. Pool resto ation will insure water management capabilities tha will otherwise deteriorate.

(Related to MP project #9)

ANNUALIZED COSTS	Capital Invest. (excl. rehab.)	Recurring Costs	TOTAL

PERSONNEL	Appt. Type	Title	Grade	M.D./Yr.

Cost estimates are based on _____
Assuming this project will be authorized in FY ____
the engineering design will be completed by _____
_____, construction is expected to start _____
_____ and be completed _____

ELEM.	DESCRIPTION (Quantity, size, type, spec's, etc. - Be Specific!)	Est. Cost (1/3)	Eng. Review
a.	Rebuild dikes on impoundments 19 and 28 (2 miles) to 6:1 slope plus ditch from 27 to 28 (No. 347, 348, 314, 316, and 318) 20,000 cu yd	51,000	
b.	Rehabilitate water control structure No. 27 and dike to 955.0, slope 6:1 and reseed (No. 310 and 311) stop log, single bay	74,000	
c.	Elevate Finley Road to farm dike at elevation 955.0, 3/4 mile. Finley Road is a township road. (No. 313) raised ave 1 A, 22' wide	56,000	
d.			
e.			
f.			
g.			
h.			
i.			

Project proposed by: AWC Date: 11-3-81 Engineering Review by: _____ Date: _____

Approval by: _____ Date: _____

U.S. FISH & WILDLIFE SERVICE
Division of Refuges & Wildlife

PROJECT DESCRIPTION WORKSHEET
(June 1980)

Refuge Name: Necedah NWR **Org. No:** 32530

Administering Office:

Project Title: Water Rights, Contour Mapping, Soil Sur

Location: Entire Refuge

GENERAL	1 Project Number	4	
	2 Major Program	1210	
	3 Refuge Rank	4	
	4 Area Office Rank	202	Adjusted Estimate (R.O. Use Only)
	5 Regional Office Rank	308	
INPUTS	6 ONE-TIME FUNDING, Total	240.00	
	7 New Facilities, Total		
	8 Construction Cost		
	9 Engineering, Plann., Permits		
	10 Existing Facilities, Total		
	11 Construction Cost		
	12 Engineering, Plann., Permits		
	13 Resource Planning/Research	238,000	
	14 RECURRING FUNDING, Total		
	15 Operations and Maintenance		
	16 Cyclical Maintenance		
	17 MANPOWER, Total		
	18 Permanent Full Time		
	19 All Other		
	20		
		Loss Avoid.	Antic. Gain
OUTPUTS	21		
	22		
	23		
	24		
	25		
	26		
	27		

JUSTIFICATION

Investigate refuge water rights relative to the ri of neighboring cranberry growers, other agricultur interests, and agricultural wells. Surface water inflow to the refuge is normally adequate, however during dry years, water rights could become an iss

Topographic data is badly needed as presently only contours are available and these are outdated. As base data item, the maps will assist in forestry, I&R, endangered species and particularly in manage of migratory birds. The operation and knowledge o water and topography are of paramount concern and lack of this information could lead to serious pla ning inefficiencies and increase costs in survey. Mapping is planned at 200' scale with 2' intervals.

A soils survey HAS BEEN COMPLETED by the SCS ~~is underway~~ at Necedah ~~part of an ongoing county soils survey~~. This base information will assist in engineering, water manag ment, moist soil management and for all development plans. It would also be a valuable reference in appraising land for revenue sharing. Payment will provided "when feasible."

(Related to MP project #11)

ANNUALIZED COSTS	Capital Invest. (excl. rehab.)	Recurring Costs	TOTAL

PERSONNEL	Appt. Type	Title	Grade	M.D./Yr.

Cost estimates are based on _____

Assuming this project will be authorized in FY ____

the engineering design will be completed by _____

_____, construction is expected to start _____

_____ and be completed _____

ELEM.	DESCRIPTION (Quantity, size, t[illegible]pec's, etc. - Be Specific!)	Est. Co[illegible] of11/ 3/[illegible]	Eng. Revie
a.	Water rights investigation relative to Cranberry growers.	19,000	
b.	Water rights investigation relative to agriculture wells.	3,000	
c.	Hydrologic Investigation-Identify major sources of inflow, storage requirements and evaluate water supply quantity.	38,000	
d.	Contour mapping for 45,000 acres on a 200' scale at 2' contour intervals. — COVERED UNDER IPW # NCD/0059	108,000	
e.	~~Soil survey of the refuge by S.C.S. for 45,000 acres - to include mapping by type at $1.55 per acre~~ Completed by SCS in 1980's	~~69,000~~	
f.			
g.			
h.			
i.			

Proj[illegible]oposed by: [illegible] Date: 11-3-81 [illegible]ineering Review by: _____ Date: _____

. Approval by: _____ D[illegible]

U.S. Fish and Wildlife Service
Divisi f National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR ION WORKSHEET

Org. No 330

1	Project Number	14	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	23	
5	Area Office Rank	2	
6	Regional Office Rank	12	Adjusted Estimate*
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	83,000	
9	New Construction (Expansion)	74,000	
10	Existing Facilities (Rehab)		
11	Preliminary Planning		
12	Engineering	9,000	
13	EA/EIS/Permits		500.00
14	RECURRING COSTS, TOTAL	3,000	
15	Operations and Maintenance	1,000	
16	Cyclic Maintenance	2,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		200,000
33	Other Mig. Birds Maintenance		50,000
34	Mammals Maintenance		
35	Waterfowl Production		200
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Upper Canfield Moist Soil Unit

Location: SW Corner Danielson & Bewick Roads

Project Purpose: Increase Waterfowl Maintenance

DESCRIPTION

Construct a 300 yd. dam across the Little Yellow River Ditch, 12' top, 6:1 slopes and 4' to 5' high and seed down. Construc concrete structure on ditch to control water levels. Construct concrete structure in Neal Lateral to permit regulated water transfer west and east as necessary.

The area this development is being proposed for is presently farmed for waterfowl and Greater Sandhill Cranes. Crops are mainly corn and buckwheat. This proposal would convert from row crops on this area to moist soil management to produce the necessary food requirement for migratory waterfowl. Either spring or fall flooding would be possible.

Waterfowl use at Necedah Refuge has been dropping in the last few years and this is felt due to the limited availability of an attractive food source. Moist soil management will be more economical and can be produced through simple water manipulation. This is one of several moist soil units which will be manipulated on a rotational basis.

If needed, this area has a complete draw down capability to permit mechanical manipulation in seed bed preparation. The moist soil unit is estimated to include 80 - 100 acres or more.

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Submitted by: James M. Carroll, Jr. Date: 6/20/77

Submitted by: Dennis W. Strom (Acting) Date: 03/7/78

PROJECT ELEMENT BREAKO[illegible] REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Construct 300 yd. dam across Little Yellow River Ditch, 12' top, 6:1 slope, 4' to 5' high, seed.	23,000	X 2,000	GCM
b.	Construct concrete structure on ditch, 2 bay with lift, est. 935.0 elevation at crest	17,000		GCM
c.	Construct concrete structure in Neal Lateral to permit water transfer west if necessary.	20,000		GCM
d.				
e.				
f.				
g.				
h.	Inflation (20%)	12,000		
	Engineering (15%)	9,000		
i.	Overhead (2% of above items)	2,000		
	TOTAL COST OF PROJECT	83,000		
		Total	2,000	

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits		X		
Const/Rehab			X	
O & M				X
R.O. Schedule				

Earliest Starting Date: Immediately

BLHP Cost with YACC = $81,000

Engineering Review by: Lloyd C Mohl Date: 7/21/77

R.O. Approval by: R. Wayne Stein Date: 7/21/77

W. Ellis Klett

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87043 STATION RANK: 5 REGIONAL RANK: -0-

PROJECT TITLE:

IRON TOP POOL CONSTRUCTION

THRUST: WETLAND RESTORE

COST ESTIMATE: $41,999 YEAR NEEDED: 92 JOB ORDER NEEDED: N

PROJECT DESCRIPTION:

RAISE 1000 LF OF DIKE NORTH AND EAST OF IRON TOP BRIDGE WITH SPILLWAY AND CULVERT. BUILD UP 1200 LF OF BEWICK ROAD NORTH OF HANSON ROAD. PLACE STOPLOG RISER ON STRUCTURE ALREADY INSTALLED.

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,PU

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WT,RS

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

U.S. Fish and Wildlife Service
Divist ᶜ National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR ION WORKSHEET

Org. No. 330

This project was rewritten & now covered under IPW #NCD/0043

1	Project Number	13	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	22	
5	Area Office Rank	3	Adjusted Estimate*
6	Regional Office Rank	3	
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	89,000	
9	New Construction (Expansion)	79,000	
10	Existing Facilities (Rehab)		
11	Preliminary Planning		
12	Engineering	10,000	
13	EA/EIS/Permits		$500.00
14	RECURRING COSTS, TOTAL	4,000	
15	Operations and Maintenance	1,000	
16	Cyclic Maintenance	3,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		50,000
33	Other Mig. Birds Maintenance		70,000
34	Mammals Maintenance		
35	Waterfowl Production		250
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Iron-top Pool

Location: Avery Lateral at Little Yellow River

Project Purpose: Increase Waterfowl Production and Maintenanc

DESCRIPTION

Construct concrete water control structure on Avery Lateral, raise the Bewick Road to form dike for 1200' with 6:1 slopes and 12' top, raise or reroute Bewick Road on east side of pool to prevent inundation. Construct inlet from the Neal Lateral to the NW with a small control structure to provide additional water source for the pool.

The potential of Necedah NWR to provide habitat for waterfowl and other forms of aquatic or semi-aquatic wildlife forms has never been fully explored. The refuge area was drained in the late 1800's and early 1900's. An extensive ditch system exists which drains many former wetlands. The refuge totals 39,607 acres with only approx. 3,500 acres or about 9 % in wetlands.

The area could be managed to produce more waterfowl and provid better spring and fall migrational habitat. A gradual slope o approx. 3 feet per mile with sand ridges exists which affords excellent possibilities to make better use of the water passin through the refuge by restoring many former marshy areas and enhance others.

This proposal involves the enhancement of a present marshy area which is presently about a Type II wetland. The Avery Ditch effectively drains the area. The proposed structure and dike would reflood this area creating excellent waterfowl maintenance and brood habitat. It would have and irregular shoreline with a few scattered islands. All aquatic or semi-aquatic wildlife species would be benefited.

This area is so situated that it would be a major source of water for a moist soil development proposed further down the drainage system. It could possibly be rotated as a moist soil unit itself.

Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKOUT REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Construct concrete water control structure, 2 bay, in Avery Lateral, at Iron-top bridge.	22,000		GCM
b.	Construct dike on Bewick over Iron-Top, 6:1 slope, 12' top, 1200'	20,000		GCM
c.	Raise or reroute Bewick on east side to prevent flooding, .4 mile	11,000		GCM
d.	Construct inlet to NW to provide water source with small control structure off the Neal Lateral Ditch.	11,000		GCM
e.				
f.				
g.				
h.	Inflation (20%)	13,000		
	Engineering (15%)	10,000		
i.	Overhead (2% of above items)	2,000		
	TOTAL COST OF PROJECT	89,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits		X		
Const/Rehab			X	
O & M				X
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C Mehl Date: 7/21/77

R.O. Approval by: R. Wayne Heier Date: 7/21/77

W. Ellis Kleeb

U.S. Fish and Wildlife Service
Divis[1] f National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR[1]ION WORKSHEET

Org. No 530

1	Project Number	12	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	21	
5	Area Office Rank	2	
6	Regional Office Rank	2	
7	INPUTS		Adjusted Estimate*
8	ONE-TIME COSTS, TOTAL	51,000	
9	New Construction (Expansion)		
10	Existing Facilities (Rehab)	45,000	
11	Preliminary Planning		
12	Engineering	6,000	
13	EA/EIS/Permits		$500.00
14	RECURRING COSTS, TOTAL	2,000	
15	Operations and Maintenance	1,000	
16	Cyclic Maintenance	1,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		70,000
33	Other Mig. Birds Maintenance		25,000
34	Mammals Maintenance		
35	Waterfowl Production		100
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Middle Canfield Moist Soil Unit

Location: NW side of Danielson Lateral

Project Purpose: Increase Waterfowl Maintenance

DESCRIPTION

Raise existing road 2 - 3 feet with a 14' top with 6:1 slopes seeded. Remove and replace existing structure with a concrete structure to control water levels.

The area this development is being proposed on is presently farmed for waterfowl and Greater Sandhill Cranes. Crops are mainly corn and buckwheat. This proposal would convert from row crops on this area to moist soil management to produce the necessary food requirements for migratory fowl either spring or fall flooding would be possible.

Waterfowl use at Necedah Refuge has been dropping in the last few years and this is felt due to the limited availability of an attractive food source. Moist soil management will be more economical and can produce through simple water manipulation. This is one of several moist soil units which will be manipulated on a rotational basis.

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Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKOUT REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Raise road-dike 400 yds., to a 14' top with 6:1 slope	20,000		GCM
b.	Replace existing structure with a concrete structure to control water, 2 bays with lift, approx. 930.0 elevation at crest.	17,000		GCM
c.				
d.				
e.				
f.				
g.				
h.	Inflation (20%)	7,000		
	Engineering (15%)	6,000		
i.	Overhead (2% of above items)	1,000		
	TOTAL COST OF PROJECT	51,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits		X		
Const/Rehab			X	
O & M				X
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C Mohl Date: 7/21/77

R.O. Approval by: R. Hayne Heier Date: 7/21/77

W. Ellis Keith

U.S. Fish and Wildlife Service
Divisi ᶜ National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR. ION WORKSHEET

Org. No. 530

1	Project Number	11	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	20	
5	Area Office Rank	2	
6	Regional Office Rank	2	Adjusted Estimate*
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	64,000	
9	New Construction (Expansion)	50,000	
10	Existing Facilities (Rehab)	7,000	
11	Preliminary Planning		
12	Engineering	7,000	
13	EA/EIS/Permits		$500.00
14	RECURRING COSTS, TOTAL	3,000	
15	Operations and Maintenance	1,000	
16	Cyclic Maintenance	2,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		150,000
33	Other Mig. Birds Maintenance		20,000
34	Mammals Maintenance		
35	Waterfowl Production		100
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Lower Canfield Moist Soil Unit

Location: Danielson Lateral at Little Yellow River

Project Purpose: Increase Waterfowl Maintenance

DESCRIPTION

Elevate the ditch bank on the west side of unit to 933.0 elevation for 1 1/4 mile, elevate Coaver Road to form low dike, both with a 12' top, 6:1 slope on inside slope (with a dragline). Replace an existing culvert at two locations with simple control structure with gate. Construct drain at lower end of pool into Little Yellow River Ditch to give draw down capabilities (culvert type).

The area this development is being proposed is presently being partially farmed for waterfowl and Greater Sandhill Cranes. Buckwheat is the major crop. The remaining area is basically Type II meadow which could be effectively managed as a moist food unit. This area could be flooded and drained by gravity flow to provide nccessary food for migratory waterfowl in either spring or fall.

Waterfowl use at Necedah Refuge has been dropping the last few years and this is felt due to the limited availability of an attractive food source. Moist soil management will be more economical and can be produced through simple water manipulation. This is one of several moist units which will be manipulated on a rotational basis.

above 935-6 water level

53

Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKOUT REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Raise west ditch bank to 933.0 elevation, 1 1/4 mile, elevate Coaver Rd. dike both with 12' top, 6:1 on inside slope (dragline)	35,000		GCM
b.	Replace existing culvert at two locations with simple control structure with gate.	6,000		GCM
c.	Construct drain from just north of Coaver Road into Little Yellow River Ditch	6,000		GCM
d.				
e.				
f.				
g.				
h.	Inflation (20%)	9,000		
	Engineering (15%)	7,000		
i.	Overhead (2% of above items)	1,000		
	TOTAL COST OF PROJECT	64,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits		X		
Const/Rehab			X	
O & M				X
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C. Wohl Date: 7/21/77

R.O. Approval by: R. Wayne Stein Date: 7/21/77

W. Ellis Keith

U.S. Fish and Wildlife Service
Divisi f National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR ION WORKSHEET

Org. No 330

1	Project Number	20	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	25	
5	Area Office Rank	2	Adjusted Estimate*
6	Regional Office Rank	2	
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	36,000	
9	New Construction (Expansion)	27,000	
10	Existing Facilities (Rehab)	5,000	
11	Preliminary Planning		
12	Engineering	4,000	
13	EA/EIS/Permits		500.00
14	RECURRING COSTS, TOTAL	1,000	
15	Operations and Maintenance		
16	Cyclic Maintenance	1,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		50,000
33	Other Mig. Birds Maintenance		10,000
34	Mammals Maintenance		
35	Waterfowl Production		100
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-111

PROJECT TITLE: Ward Lateral Pool

Location: Ward Lateral at Turkey Track Road

Project Purpose: Increase Waterfowl Maintenance

DESCRIPTION

Construct concrete water control structure in Turkey Track Road and Ward lateral to impound water at about 947.00 level Raise the Turkey Track Road one to two feet for 100 yards.

This control structure would reflood a wetland area that was drained in the early 1900's. The area would provide stable water for brood habitat and migrating waterfowl. The area t be flooded is lowland brush and sedges.

Associated water bird habitat will be enhanced.

Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKOUT REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Construct concrete structure to impound water at elevation 947.00.	22,000		GCM
b.	Elevate Turkey Track Road one to two feet for 100 yards.	4,000		GCM
c.				
d.				
e.				
f.				
g.				
h.	Inflation (20%)	5,000		
	Engineering (15%)	4,000		
i.	Overhead (2% of above items)	1,000		
	TOTAL COST OF PROJECT	36,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits	X			
Const/Rehab		X		
O & M			X	
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C. Mau Date: 7/21/77

R.O. Approval by: R. Wayne Stein Date: 7/21/77

W. Gail Kent

U.S. Fish and Wildlife Service
Divis of National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESC. TION WORKSHEET

Org. N. 32530

1	Project Number	26	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	30	
5	Area Office Rank	2	
6	Regional Office Rank	2	Adjusted Estimate*
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	30,000	
9	New Construction (Expansion)	27,000	
10	Existing Facilities (Rehab)		
11	Preliminary Planning		
12	Engineering	3,000	
13	EA/EIS/Permits		
14	RECURRING COSTS, TOTAL	1,000	
15	Operations and Maintenance		
16	Cyclic Maintenance	1,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		
33	Other Mig. Birds Maintenance		
34	Mammals Maintenance		
35	Waterfowl Production		
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Pools 9 and 13 Cutoff

Location: Pools 9 and 13

Project Purpose: Increase Waterfowl Maintenance and Produc

DESCRIPTION

(Combination of projects 27 and 28 on Project Planning Sheets

Install a metal culvert with STOP LOG gate in the Turkey Track Road at Pool No. 9 and Pool No. 13. (Two structures)

These two water outlets will permit the flooding of natural moist food areas that can be created by drawing down the west end of the Sprague-Mather pool. This flooding can be done in spring or fall benefiting migrating waterfowl species. No other means of shallow reflooding is presently possible.

If flooded in the spring these areas provide excellent brood areas with the standing dead vegetation and resultant inverte brate populations that occur.

Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKOU[illegible], REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Pool No. 9 Cutoff - Install a 4' sluice gate structure to give water below No. 9.	11,000		GCM
b.	Pool No. 13 Cutoff - Install a 4' sluice gate culvert to let water into west Sprague Pool.	11,000		GCM
c.				
d.				
e.				
f.				
g.				
h.	Inflation (20%)	4,000		
	Engineering (15%)	3,000		
i.	Overhead (2% of above items)	1,000		
	TOTAL COST OF PROJECT	30,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits				
Const/Rehab		X		
O & M				
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C. Mohl Date: 7/21/77

R.O. Approval by: R. Wayne Stein Date: 7/21/77
W. Eldridge

U.S. Fish and Wildlife Service
Divisi[on] of National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR[IP]TION WORKSHEET

Org. No. 530

1	Project Number	25	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	29	
5	Area Office Rank	2	
6	Regional Office Rank	2	Adjusted Estimate*
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	27,000	
9	New Construction (Expansion)		
10	Existing Facilities (Rehab)	24,000	
11	Preliminary Planning		
12	Engineering	3,000	
13	EA/EIS/Permits		500.00
14	RECURRING COSTS, TOTAL	1,000	
15	Operations and Maintenance		
16	Cyclic Maintenance	1,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		70,000
33	Other Mig. Birds Maintenance		10,000
34	Mammals Maintenance		
35	Waterfowl Production		100
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: High Culvert Pool

Location: Bellman Lateral at Bewick Road

Project Purpose: Increase Waterfowl Maintenance

DESCRIPTION

Remove the existing metal culvert and replace with a concrete water control structure under the Bewick Road. Elevate Township road th[r]ee to four feet where necessary.

This structure and resulting pool area would restore marsh areas that were drained in the early 1900's. Excellent waterfowl brood habitat will be restored and quiet water rest areas provided for spring and fall migrating waterfowl made available. Increase pair dispersal water will be available. All animals dependent on marshy habitat will be favorable affected.

Lowland brush will be flooded. The pool will help maintain the ground water table and provide water for down stream pools.

57

Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKDOWN REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Remove existing metal culvert and replace with concrete control structure at elevation 935.00 crest.	17,000		GCM
b.	Elevate township road three to four feet where necessary	2,000		GCM
c.				
d.				
e.				
f.				
g.				
h.	Inflation (20%)	4,000		
	Engineering (15%)	3,000		
i.	Overhead (2% of above items)	1,000		
	TOTAL COST OF PROJECT	27,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits	X			
Const/Rehab		X		
O & M				
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C McKee Date: 7/21/77

R.O. Approval by: R. Wayne Heier Date: 7/21/77

W. Eldridge

U.S. Fish and Wildlife Service
Divisi- of National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESC ION WORKSHEET

Org. Nc 2530

1	Project Number	24	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	28	
5	Area Office Rank	2	
6	Regional Office Rank	2	Adjusted Estimate*
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	47,000	
9	New Construction (Expansion)	21,000	
10	Existing Facilities (Rehab)	21,000	
11	Preliminary Planning		
12	Engineering	5,000	
13	EA/EIS/Permits		500.0
14	RECURRING COSTS, TOTAL	1,000	
15	Operations and Maintenance		
16	Cyclic Maintenance	1,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		120,000
33	Other Mig. Birds Maintenance		70,000
34	Mammals Maintenance		
35	Waterfowl Production		175
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Avery and Bewick Lateral Pools

Location: On Avery and Bewick Laterals

Project Purpose: Increase Waterfowl Maintenance and Product

DESCRIPTION

(Combination of projects 24 and 26 on Project Planning Sheet

Construct concrete water control structures on the upper Avery lateral and Bewick lateral at the Canfield Road.

These two lowland areas were drained in the early 1900's. The structures would restore marsh areas and create exceller brood habitat and resting areas for waterfowl. The areas would also maintain the water table at a higher level and provide a more stable source of water for the lower pools and moist soil units.

Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKOUT REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Avery Lateral Pool - Construct concrete water control structure in Avery Lateral to impound water.	17,000		GCM
b.	Bewick Lateral Lower Pool - Remove existing metal culvert and replace with concrete water control structure under Canfield Road, crest about 930.00.	17,000		GCM
c.				
d.				
e.				
f.				
g.				
h.	Inflation (20%)	7,000		
	Engineering (15%)	5,000		
i.	Overhead (2% of above items)	1,000		
	TOTAL COST OF PROJECT	47,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits	X			
Const/Rehab		X		
O & M				
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C. Mohl Date: 7/21/77

R.O. Approval by: R. Wayne Steier Date: 7/21/77

[illegible]

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87058 STATION RANK: 28 REGIONAL RANK: -0-

PROJECT TITLE:

SUBDIVIDE SPRAGUE-MATHER POOL

THRUST: WETLAND MGMT

COST ESTIMATE: $262,499 YEAR NEEDED: 94 JOB ORDER NEEDED: Y

PROJECT DESCRIPTION:

CONSTRUCT APPROX. 2 MILES OF LOW DIKE TO SUB-DIVIDE THE SPRAQUE-MATHER POOL PERMITTING A POOL ELEVATION ON THE UPPER POOL 942.00. THE DIKE WOULD HAVE A 12' TOP W/ 6:1 SEEDED SLOPES. CONSTRUCT 2 WATER CONTROL STRUCTURES, ON IN EW DIKE AND 1 IN TH

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: C
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,WP,PU

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WF,OB

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

U.S. Fish and Wildlife Service
Divisir National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR .ON WORKSHEET

Org. No. 530

IPW #NCD/0058

1	Project Number	~~22~~	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	9	
5	Area Office Rank	3	
6	Regional Office Rank	3	Adjusted Estimate*
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	380,000	
9	New Construction (Expansion)	129,000	
10	Existing Facilities (Rehab)	232,000	
11	Preliminary Planning		
12	Engineering	19,000	
13	EA/EIS/Permits		500.00
14	RECURRING COSTS, TOTAL	5,000	
15	Operations and Maintenance	1,000	
16	Cyclic Maintenance	4,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		500,000
33	Other Mig. Birds Maintenance		100,000
34	Mammals Maintenance		
35	Waterfowl Production		
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Sprague-Mather Pool Subdivisions

Location: Sprague-Mather Pool

Project Purpose: Increase Waterfowl/Waterbird Maintenance

DESCRIPTION

Construct approximately two miles of low dike to sub-divide t Sprague-Mather pool permitting a pool elevation on the upper pool of 942.00. The dike would have a 12' top with 6:1 seede slopes. Construct two water control structures, one in east-west dike and one in north-south dike.

Excessive erosion occurs along the main Sprague-Mather dike w water levels are brought up to designed elevations. This is primarily to deep water, sand dikes, and a broad expanse of w on which excessive waves develope. The proposed dike would a impoundment of water over the remainder of the area originall included in this pool.

Waterfowl usage would be enhanced greatly by the subdivisions and associated water manipulation possibilities.

Wading bird habitat would be increased along with shorebird ha itat during draw down and slow reflooding.

The bulldozer included in this project will replace an existi D-7, acquired by the refuge from excess, manufactured in 1951. It will be used for maintenance of all appropriate refuge facilities. Recurring costs for this element are not include as they are already a part of current funding.

Submitted by: James M. Carroll, Jr. Date: 6/20/77

U.S. Fish and Wildlife Service
Divisi[on] of National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR[IP]TION WORKSHEET

Org. No. 330

1	Project Number	23	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	27	
5	Area Office Rank	2	
6	Regional Office Rank	2	Adjusted Estimate*
7	INPUTS		
8	ONE-TIME COSTS, TOTAL	33,000	
9	New Construction (Expansion)	29,000	
10	Existing Facilities (Rehab)		
11	Preliminary Planning		
12	Engineering	4,000	
13	EA/EIS/Permits		500.00
14	RECURRING COSTS, TOTAL	1,000	
15	Operations and Maintenance		
16	Cyclic Maintenance	1,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		50,000
33	Other Mig. Birds Maintenance		10,000
34	Mammals Maintenance		
35	Waterfowl Production		100
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-111

PROJECT TITLE: Neal Pool Lateral

Location: Neal Lateral at Sprague-Mather Road

Project Purpose: Increase Waterfowl Maintenance and Productio[n]

DESCRIPTION

Construct a concrete water control structure north of the Sprague-Mather Rd 7 on the Neal Lateral, push up dike. A small dike may be necessary in the immediate vicinity of the structure. 1/4 mile E

Immediately north of the Sprague-Mather Rd. is a large low brushland area that had been drained in the early 1900's. This structure would reflood this former marsh area. The area would provide more area for brood habitat and waterfowl maintenance along with maintenance of the ground water table and a possible reserve to flood moist soil units.

est 1500 acres with seasonal water

60

Submitted by: James M. Carroll, Jr. Date: 6/20/77

[Approved by: Dennis H. Strom (Acting) Date: 02/7/78]

PROJECT ELEMENT BREAKO[illegible] REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Construct concrete water control structure just north of the Sprague-Mather Road to impound water at the 940.00 elevation.	17,000		GCM
b.	Construct small dike in vicinity of structure.	6,000		GCM
c.				
d.				
e.				
f.				
g.				
h.	Inflation (20%)	5,000		
	Engineering (15%)	4,000		
i.	Overhead (2% of above items)	1,000		
	TOTAL COST OF PROJECT	33,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits	X			
Const/Rehab		X		
O & M			X	
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C Mehl Date: 7/21/77

R.O. Approval by: R. Wayne Haer Date: 7/21/77

W. Elliott

PROJECT ELEMENT BREAKOUT REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Construct approximately two miles of low dike to sub-divide Sprague-Mather Pool to permit moist soil management on smaller units, to 942.00 level, 12' top, 6:1 slope.	101,000		GCM
b.	Construct two water control structures.	28,000		GCM
c.	Replacement of D-7 bulldozer to maintain this project as well as all other areas where needed (15% for engineering is not included for this element).	150,000		
d.				
e.				
f.				
g.				
h.	Inflation (20%)	56,000		
	Engineering (15%)	19,000		
i.	Overhead (2% of above items)	7,000		
	TOTAL COST OF PROJECT	361,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering		X		
EA/EIS/Permits	X			
Const/Rehab		X		
O & M			X	
R.O. Schedule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C. Mohl Date: 7/21/77

R.O. Approval by: R. Wayne Stein Date: 7/21/77

M. Collis Cecil

Project Descriptions and/or Worksheets
Section VIII: Proposed Projects Not Currently Master Planned That Can Be Accomplished Without Significant Increases in Current Funding

INITIAL PROJECT WORKSHEET

Record #: _NCD_ / _0018_ Station: Necedah NWR Date: 10 / 14 / 83

Project Title: Repair Structure 9 Cost: $1,500

Refuge Manager's Priority: 24 Refuge Manager's Sequence: ___

Division Supervisor's Priority: _____ Division Supervisor's Sequence ___

Recommended For Funding in FY __ (RO only)

Project Description (What):

Remove fill from around stop log riser and pack inside with cement and pour cement collar around culvert seam and ~~bond~~ BAND to stop water erosion and fill from settling from above.

Project Justification (Why):

Water may cause a large cavern under Turkey Track Roadway and cause structure to wash out completely with loss of pool and road.

FWS-Region 3
September, 1983

INITIAL PROJECT WORKSHEET

Sta

Record #: _ NCD / _0018_ Station: Necedah NWR Date: 10_ /_14 / (

Ranking Factors

A. Locational: 1. State (55) 2. Congressional District (06) 3. Unemployment Area (_ _ _ _)

B. Planning Related Factors:

1. In Master Plan - - - - - - - - - - - - -( )
2. In a Management Plan - - - - - - - - - -(X)
3. Helps Resolve a Threat/Conflict - - -(X)
4. Has Local or Congressional Interest -( )
5. In the 5-year CRMS Plan - - - - - - - -( )
6. In the 3-year ARMM Plan - - - - - - - -( )
7. Scheduled for Funding in FY - - - - -(_)
8. Regional Resource Plan:

Strategy

1.(_1115_)(_1127_)(_1011_)(_1012_)(_1213_
2.(_1825_)(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _
3.(_4112_)(_4120_)(_4121_)(_4122_)(_ _ _ _
4.(_4512_)(_ _ _ _)(_ _ _ _)(_ _ _ _)(_ _ _ _

C. Maintenance Classification:

Digit 1 (2) Maint. Group	Digit 2 (1) Maint. Use	Digit 3 (8) Maint. Purpose	Digit 4 (2) Prog. Primarily Ben d
Code	Code	Code	Code
1 - Habitat	1 - Managed Waters	1 - Health & Safety	1 - Endangered Species
2 - Water Mgmt. Facilities	2 - Natural Wetlands	2 - Cultural Resources	2 - Migratory Birds
3 - Building & Utilities	3 - Managed Uplands	3 - Handicap Access	3 - Resident Wildlife
4 - Roads and Trails	4 - Wildlands	4 - Restoration	4 - Public Use
5 - Equipment & Vehicles	5 - Wildlife Populations	5 - Replacement Item	5 - Fish
6 - Fire Protection	6 - Buildings & Utilities	6 - New Item	
7 - Other Facil.	7 - Equipment	7 - Energy Efficiency	
8 - Research/Maps/ Surveys		8 - Dam Safety	
9 - Feasibility Studies		9 - Completion Project	

D. Benefits/Outputs:

Code	Output	Unit	Loss Avoid.	Antic Gain
71	Waterfowl Maint.	UD	99,000	
72	Other Migratory Bird Maint.	UD	3,000	
80	Waterfowl Production	#	75	
73	Mammals Maint.	UD	2,500	

71

Fund #: NCD / 0032 Station: Necedah NWR Date: 10 /14 / 83

Project Title: Control Structure Safety Grating & Railings Cost: $2,000

Refuge Manager's Priority: 1 Refuge Manager's Sequence: ___

Division Supervisor's Priority: ___ Division Supervisor's Sequence ___

Recommended For Funding in FY __ (RO only)

Project Description (What):

Purchase needed material to place hand rails and safety grating on water control structures. #19, 18N, 13, 33, Canfield, as determined in consultation with SA (safety Office).

done ↑ structures #32, #9, #1, #2 done in 1990 or before

Project Justification (Why):

These 5 control structures are in need of railings and grating to bring them up to safety standards, to prevent the public or refuge operators from falling into them..

FWS-Region 5
September, 1983

INITIAL PROJECT WORKSHEET

Side 2

Record #: _NCD / 0032_ Station: Necedah NWR Date: _10 / _14 / (

Ranking Factors

A. Locational: 1. State (55) 2. Congressional District (06) 3. Unemployment Area (____)

B. Planning Related Factors:

1. In Master Plan - - - - - - - - - - - - -( )
2. In a Management Plan - - - - - - - - - -(X)
3. Helps Resolve a Threat/Conflict - - -( )
4. Has Local or Congressional Interest -( )
5. In the 5-year CRMS Plan - - - - - - - -( )
6. In the 3-year ARMM Plan - - - - - - - -( )
7. Scheduled for Funding in FY - - - - - -(__)

B. Regional Resource Plan:

Strategy

1.(____)(____)(____)(____)(____)
2.(____)(____)(____)(____)(____)
3.(____)(____)(____)(____)(____)
4.(____)(____)(____)(____)(____)

C. Maintenance Classification:

Digit 1 (1) Maint. Group	Digit 2 (1) Maint. Use	Digit 3 (1) Maint. Purpose	Digit 4 (4) Prog. Primarily Bene ed
Code	Code	Code	Code
1 - Habitat	1 - Managed Waters	1 - Health & Safety	1 - Endangered Species
2 - Water Mgmt. Facilities	2 - Natural Wetlands	2 - Cultural Resources	2 - Migratory Birds
3 - Building & Utilities	3 - Managed Uplands	3 - Handicap Access	3 - Resident Wildlife
4 - Roads and Trails	4 - Wildlands	4 - Restoration	4 - Public Use
5 - Equipment & Vehicles	5 - Wildlife Populations	5 - Replacement Item	5 - Fish
6 - Fire Protection	6 - Buildings & Utilities	6 - New Item	
7 - Other Facil.	7 - Equipment	7 - Energy Efficiency	
8 - Research/Maps/ Surveys		8 - Dam Safety	
9 - Feasibility Studies		9 - Completion Project	

D. Benefits/Outputs:

Code	Output	Unit	Loss Avoid.	Antic Gain
20	Recreation Wildlife, Consumptive	AH	-----	--
30	Recreation wildlife, Non-consumptive	AH	--	--

02/24/92

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87043 STATION RANK: 5 REGIONAL RANK: -0-

PROJECT TITLE:

IRON TOP POOL CONSTRUCTION

THRUST: WETLAND RESTORE

COST ESTIMATE: $41,999 YEAR NEEDED: 92 JOB ORDER NEEDED: N

PROJECT DESCRIPTION:

RAISE 1000 LF OF DIKE NORTH AND EAST OF IRON TOP BRIDGE WITH SPILLWAY AND CULVERT. BUILD UP 1200 LF OF BEWICK ROAD NORTH OF HANSON ROAD. PLACE STOPLOG RISER ON STRUCTURE ALREADY INSTALLED.
↑(CULVERT)

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,PU

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WT,RS

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

-d #: NCD _ / 0043 _ Station: Necedah NWR Date: 10 / 14/ 83

Project Title: Iron Top Pool Cost: $8,000

Refuge Manager's Priority: 33 Refuge Manager's Sequence: ___

Division Supervisor's Priority: _____ Division Supervisor's Sequence ___

Recommended For Funding in FY __ (RO only)

Project Description (What):

Construct 1000 lin. ft. of dike north and east of Iron Top bridge with spillway and culvert type control. Build up 1200 lin. ft. of Bewick Road north of Hanson Road. Place culvert under Bewick. Divert water from Neal Lateral near north end of project to south.

Project Justification (Why):

This pool would create a shallow marsh type pool along auto tour for waterfowl maintenance and public observation. Project will increase waterfowl habitat by approximately 60 acres. This proposed unit will also have the flexibility of being drained for moist soil management.

Region 3
September, 1983

INITIAL PROJECT WORKSHEET

Side :

Record #: NCD _ / 0043 _ Station: Necedah NWR Date: 10 /14 /

Ranking Factors

A. Locational: 1. State (55) 2. Congressional District (06) 3. Unemployment Area (_ _ _ _)

B. Planning Related Factors:

1. In Master Plan - - - - - - - - - - - - -( )
2. In a Management Plan - - - - - - - - - -( )
3. Helps Resolve a Threat/Conflict - - -( )
4. Has Local or Congressional Interest -( )
5. In the 5-year CRMS Plan - - - - - - - -( )
6. In the 3-year ARMM Plan - - - - - - - -( )
7. Scheduled for Funding in FY - - - - -(_)

8. Regional Resource Plan:

Strategy

1.(1115)(1011)(1012)(_ _ _ _)(_ _ _ _
2.(1127)(1213)(_ _ _ _)(_ _ _ _)(_ _ _ _
3.(1825)(_ _ _ _)(4512)(_ _ _ _)(_ _ _ _
4.(4110)(4112)(4120)(4122)(4131

C. Maintenance Classification:

Digit 1 (2) Maint. Group	Digit 2 (1) Maint. Use	Digit 3 (6) Maint. Purpose	Digit 4 (2) Prog. Primarily Bene[illegible]d
Code	Code	Code	Code
1 - Habitat	1 - Managed Waters	1 - Health & Safety	1 - Endangered Species
2 - Water Mgmt. Facilities	2 - Natural Wetlands	2 - Cultural Resources	2 - Migratory Birds
3 - Building & Utilities	3 - Managed Uplands	3 - Handicap Access	3 - Resident Wildlife
4 - Roads and Trails	4 - Wildlands	4 - Restoration	4 - Public Use
5 - Equipment & Vehicles	5 - Wildlife Populations	5 - Replacement Item	5 - Fish
6 - Fire Protection	6 - Buildings & Utilities	6 - New Item	
7 - Other Facil.	7 - Equipment	7 - Energy Efficiency	
8 - Research/Maps/ Surveys		8 - Dam Safety	
9 - Feasibility Studies		9 - Completion Project	

D. Benefits/Outputs:

Code	Output	Unit	Loss Avoid.	Antic Gain
71	Waterfowl Maint.	UD		10,000
72	Other Migratory Bird Maint.	UD		5,000
73	Mammals Maint.	UD		1,800
80	Waterfowl Production	#		100

U.S. FISH AND WILDLIFE SERVICE
Division of National Wildlife Refuges

PROJECT DESCRIPTION WORKSHEET
(June 1980)

Refuge Name: Necedah **Org. No:** 32530

Administering Office:

Project Title: Water Control Structure Erosion Contro

Location: Five separate water control structures

GENERAL	1 Project Number	2	
	2 Major Program	1210	
	3 Refuge Rank	2	
	4 Area Office Rank	63	
	5 Regional Office Rank	158	
INPUTS	6 ONE-TIME FUNDING, Total	11,000	Adjusted Estimate (R.O. Use Only)
	7 New Facilities, Total		
	8 Construction Cost		
	9 Engineering, Plann., Permits		
	10 Existing Facilities, Total		
	11 Construction Cost		
	12 Engineering, Plann., Permits		
	13 Resource Planning/Research		
	14 RECURRING FUNDING, Total		
	15 Operations and Maintenance		
	16 Cyclical Maintenance		
	17 MANPOWER, Total		
	18 Permanent Full Time		
	19 All Other		
	20		

		Loss Avoid.	Antic. Gain
OUTPUTS	21		
	22		
	23		
	24		
	25		
	26		
	27		

JUSTIFICATION

Varying degrees of backwash have developed below a number of water control structures. Erosion of this type developes rapidly at Necedah because of the sandy soil. Backwash at these locations is particularly critical because it erodes back into the dikes. The six most critical should be rip-rapped as soon as possible. These are identified as elements on the reverse.

Also included are miscellaneous repairs to several water control structures and decking for one small bridge which is part of a control structure.

(Relates to 8/81 PDW #4 Rehab project)

ANNUALIZED COSTS	Capital Invest. (excl. rehab.)	Recurring Costs	TOTAL

PERSONNEL	Appt. Type	Title	Grade	M.D./Yr.

Cost estimates are based on _____

Assuming this project will be authorized in FY ___

the engineering design will be completed by _____

_____, construction is expected to start _

_____ and be completed _____

ITEM.	DESCRIPTION (Quantity, size, type, spec's, etc. - Be Spe	Est. Cost of 11 / 3 / 81	Eng. Review
a.	Dam 27, 60 cu yds of rip-rap (No. 312)	1,000	
b.	Canfield Structure, 110 cu yds rip-rap (No. 406) done	2,000	
c.	Dam 13, 90 cu yds rip-rap (No. 351) done !	2,000	
d.	Dam 18, 60 cu yds rip-rap (No. 334)	1,000	
e.	Williams Dike Control, 15 cu yds rip-rap and replace bridge decking (No. 438)	1,000	
f.	Coaver Road Pool Control Structure, 90 cu yds of rip-rap and misc. structure repairs (No. 422)	4,000	
g.			
h.			
i.			

Project Proposed by: JMC Date: 11-3-81 Engineering Review by: _____ Date: _____

Approval by: _____ Da

U.S. Fish and Wildlife Service
Divisic f National Wildlife Refuges

Refuge Name Necedah NWR

PROJECT DESCR ON WORKSHEET

Org. No. 530

1	Project Number	27	
2	Prerequisite Projects		
3	Major Program	1	
4	Refuge Rank	31	
5	Area Office Rank	2	
6	Regional Office Rank	2	
7	INPUTS		Adjusted Estimate*
8	ONE-TIME COSTS, TOTAL	152,000	
9	New Construction (Expansion)	135,000	
10	Existing Facilities (Rehab)		
11	Preliminary Planning		
12	Engineering	17,000	
13	EA/EIS/Permits		500.00
14	RECURRING COSTS, TOTAL	5,000	
15	Operations and Maintenance	1,000	
16	Cyclic Maintenance	4,000	
17	Manpower, Total		
18	Permanent Full Time		
19	All Other		
20	OUTPUTS	Loss Avoided	Antic. Gain
21	Interpretation		
22	Education		
23	Recreation, Wildl-Consumptive		
24	Recreation, Wildl-NonConsump.		
25	Recreation, Non-Wildlife		
26	Fish and Wildlife Information		
27	Studies & Publications		
28	Cooperative Programs		
29	Nat. Envir. Preserved		
30	Unique Areas		
31	Threatened Species Maint.		
32	Waterfowl Maintenance		150,000
33	Other Mig. Birds Maintenance		25,000
34	Mammals Maintenance		
35	Waterfowl Production		1,000
36	Species Transpl./Donated		
37	Economic Benefits		

*Entries in these blocks require changes on Part A-III

PROJECT TITLE: Miscellaneous Small Impoundments

Location: Various Locations on Refuge

Project Purpose: Increase Waterfowl Maintenance

DESCRIPTION

(Project 29 on Project Planning Sheet)

Construct 20 water control structures in existing ditch network to create small water areas for waterfowl. Exact location to be determined in field surveys.

The existing ditch system built in the early 1900's presents many opportunities to restore many smaller wetlands other than with large impoundments. These smaller areas will serve as breeding pair dispersal water and also provide brood habitat.

The water table will be stabilized and provide a more constant seepage water supply for down stream pools.

Submitted by: James M. Carroll, Jr. Date: 6/20/77

PROJECT ELEMENT BREAKOUT AND REVIEW

ELEMENT	DESCRIPTION (Quantity, size, type, spec's, etc.)	Est. Cost	Labor Int.	Eng. Review
a.	Construct 20 small water control structures along ditch network to create small impoundments for waterfowl. Exact locations to be determined by field survey.	110,000		GCM
b.				
c.				
d.				
e.				
f.				
g.				
h.	Inflation (20%)	22,000		
	Engineering (15%)	17,000		
i.	Overhead (2% of above items)	3,000		
	TOTAL COST OF PROJECT	152,000		

FLOW CHART

Year	1	2	3	4
Preliminary Plan	X			
Engineering	X			
EA/EIS/Permits	X			
Const/Rehab		X	X	
O & M				
R./ edule				

Earliest Starting Date: Immediately

Engineering Review by: Gerald C. Mell Date: 7/21/77

Approval by: R. Wayne Hein Da 7/77

MAINTENANCE MANAGEMENT: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/92002 STATION RANK: -0- REGIONAL RANK: -0-

PROPERTY DESCRIPTION: WATER CONTROL STRUCTURE

PROJECT TITLE:

REPLACE WATER CONTROL STRUCTURES AT VARIOUS REFUGE LOCATIONS

COST ESTIMATE: $5,000 YEAR NEEDED: 92 JOB ORDER REQ.: N

PROJTECT DESCRIPTION:

REPLACE DETERIORATED CONTROL STRUCTURES AS NEEDED AT VARIOUS REFUGE LOCATIONS AND PLACE AT ADDITIONAL SITES NEEDING CONTROLS TO ENHANCE EXISTING WATER IMPOUNDMENTS.

PRIORITY CLASSIFICATION: H (H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R (C-CONST, R-RES MGMT, F-FIRE)

MAINTENANCE CODE: 108

DEFICIENCY CODE: SWF

General	- GE	Animal Welfare (Research)	- AW
Fire Management	- FM	Endangered Species	- ES
Public Use	- PU	Waterfowl	- WF
Law Enforcement	- LE	Migratory Birds	- MB
Drug Enforcement	- DE	Pollution Control	- PC
Energy	- EN	Safety (Add S infront of code) (e.g. SFM)	

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

FY COMPLETED: -0-

FY EXPENDITURES: -0-

CUML. EXPENDITURES: -0-

MAINTENANCE MANAGEMENT: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/92002 STATION RANK: -0- REGIONAL RANK: -0-

PROPERTY DESCRIPTION: WATER CONTROL STRUCTURE

PROJECT TITLE:

REPLACE WATER CONTROL STRUCTURES AT VARIOUS REFUGE LOCATIONS

COST ESTIMATE: $5,000 YEAR NEEDED: 92 JOB ORDER REQ.: N

PROJTECT DESCRIPTION:

REPLACE DETERIORATED CONTROL STRUCTURES AS NEEDED AT VARIOUS REFUGE LOCATIONS AND PLACE AT ADDITIONAL SITES NEEDING CONTROLS TO ENHANCE EXISTING WATER IMPOUNDMENTS.

PRIORITY CLASSIFICATION: H (H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R (C-CONST, R-RES MGMT, F-FIRE)

MAINTENANCE CODE: 108

DEFICIENCY CODE: SWF

General	- GE	Animal Welfare (Research)	- AW
Fire Management	- FM	Endangered Species	- ES
Public Use	- PU	Waterfowl	- WF
Law Enforcement	- LE	Migratory Birds	- MB
Drug Enforcement	- DE	Pollution Control	- PC
Energy	- EN	Safety (Add S infront of code) (e.g. SFM)	

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

FY COMPLETED: -0-

FY EXPENDITURES: -0-

CUML. EXPENDITURES: -0-

MAINTENANCE MANAGEMENT: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/87064 STATION RANK: 31 REGIONAL RANK: -0-

PROPERTY DESCRIPTION: CLEAR DITCH

PROJECT TITLE:

CLEAR TREES AND DERIS FROM EAST BRANCH LITTLE YELLOW DITCH FROM DAM 30 TO ~~POOL 1~~ SPEEDWAY ROAD

COST ESTIMATE: $68,249 YEAR NEEDED: 93 JOB ORDER REQ.: N

PROJTECT DESCRIPTION:

REMOVE LEANING AND FALLEN TREES AND LARGE BRANCHES FROM DITCH BANKS AND WATER APPROXIMATELY 3 MILES.

PRIORITY CLASSIFICATION: H (H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R (C-CONST, R-RES MGMT, F-FIRE)

MAINTENANCE CODE: 437

DEFICIENCY CODE: WF

General	- GE	Animal Welfare (Research)	- AW
Fire Management	- FM	Endangered Species	- ES
Public Use	- PU	Waterfowl	- WF
Law Enforcement	- LE	Migratory Birds	- MB
Drug Enforcement	- DE	Pollution Control	- PC
Energy	- EN	Safety (Add S infront of code) (e.g. SFM)	

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

FY COMPLETED: -0-

FY EXPENDITURES: -0-

CUML. EXPENDITURES: -0-

02/24/92

MAINTENANCE MANAGEMENT: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/87092 STATION RANK: 18 REGIONAL RANK: -0-

PROPERTY DESCRIPTION: POOL 13 WCS

PROJECT TITLE:

REHAB POOL 13 WCS

COST ESTIMATE: $1,574 YEAR NEEDED: 89 JOB ORDER REQ.: N

PROJTECT DESCRIPTION:

REMOVE LOOSE CONCRETE FROM WINGWALLS. DRILL IN ANCHOR HOLES FOR RERODS. FORMUP AND POUR CONCRETE TO RETAIN FILL IN AREA OF DAM. ANCHOR WINGWALLS TO ROADWAY. INSTALL HANDRAILS ON WINGWALLS. PERSONNEL SAFETY PROBLEM: DAM 13 IS A BRIDGE FOR TURKEY TRACK Rd.

PRIORITY CLASSIFICATION: H (H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R (C-CONST, R-RES MGMT, F-FIRE)

MAINTENANCE CODE: 440

DEFICIENCY CODE: SWF

General	- GE	Animal Welfare (Research)	- AW
Fire Management	- FM	Endangered Species	- ES
Public Use	- PU	Waterfowl	- WF
Law Enforcement	- LE	Migratory Birds	- MB
Drug Enforcement	- DE	Pollution Control	- PC
Energy	- EN	Safety (Add S infront of code) (e.g. SFM)	

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

FY COMPLETED: -0-

FY EXPENDITURES: -0-

CUML. EXPENDITURES: -0-

mostly completed in 1989-90

MAINTENANCE MANAGEMENT: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/87110 STATION RANK: 11 REGIONAL RANK: 99

PROPERTY DESCRIPTION: WATER CONTROL STRUCTURE

PROJECT TITLE:

REPLACE CORRIGATED METAL GATE

COST ESTIMATE: $2,624 YEAR NEEDED: 92 JOB ORDER REQ.: N

PROJTECT DESCRIPTION:

REPLACE CORRIGATED METAL ON THE RADIAL GATE OF DAM 30

PRIORITY CLASSIFICATION: M
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R
(C-CONST, R-RES MGMT, F-FIRE)

MAINTENANCE CODE: 434

DEFICIENCY CODE: SWF

General	- GE	Animal Welfare (Research)	- AW
Fire Management	- FM	Endangered Species	- ES
Public Use	- PU	Waterfowl	- WF
Law Enforcement	- LE	Migratory Birds	- MB
Drug Enforcement	- DE	Pollution Control	- PC
Energy	- EN	Safety (Add S infront of code) (e.g. SFM)	

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

FY COMPLETED: -0-

FY EXPENDITURES: -0-

CUML. EXPENDITURES: -0-

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87084 STATION RANK: 3 REGIONAL RANK: -0-

PROJECT TITLE:

MOIST SOIL UNIT IN DNR EXCANGE LANDS - FEASIBILITY STUDY

THRUST: WETLAND MGMT

COST ESTIMATE: $8,399 YEAR NEEDED: 92 JOB ORDER NEEDED: Y

PROJECT DESCRIPTION:

AN ENGINEERING SURVEY OF THE DNR EXCHANGE LAND IS REQUIRED TO DETERMINE DIKE LOCATIONS AND DIVERSION DITCHES NEEDED TO FLOOD AREA. THE SURVEY WILL ALSO INDICATE WATER CONTROL STRUCTURE LOCATIONS.

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,WP,IE

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WT,WF

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87108 STATION RANK: 1 REGIONAL RANK: -0-

PROJECT TITLE:

INSTALL WATER GAUGES ON ALL WCS

THRUST: WETLAND MGMT

COST ESTIMATE: $3,674 YEAR NEEDED: 90 JOB ORDER NEEDED: N

PROJECT DESCRIPTION:

INSTALL WATER GAUGES ON ALL WCS WITH TREATED 2X6 BOARDS FOR THE WATER MANAGEMENT PROGRAM.

PRIORITY CLASSIFICATION: M
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,WP,PL

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WF,WT

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

MAINTENANCE MANAGEMENT: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/87054 STATION RANK: 33 REGIONAL RANK: 69

PROPERTY DESCRIPTION: CMP (LONGER THAN 20')

PROJECT TITLE:

PLACE SECOND CULVERT UNDER SPRAGUE RD. BELOW DAM 31

COST ESTIMATE: $8,399 YEAR NEEDED: 93 JOB ORDER REQ.: N

PROJTECT DESCRIPTION:

PURCHASE AND PLACE 48" x 30' COATED ROUND METAL CULVERT UNDER THE SPRAQUE- MATHER ROAD IN THE DITCH BELOW DAM #31.

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R
(C-CONST, R-RES MGMT, F-FIRE)

MAINTENANCE CODE: 439

DEFICIENCY CODE: SWF

General	- GE	Animal Welfare (Research)	- AW
Fire Management	- FM	Endangered Species	- ES
Public Use	- PU	Waterfowl	- WF
Law Enforcement	- LE	Migratory Birds	- MB
Drug Enforcement	- DE	Pollution Control	- PC
Energy	- EN	Safety (Add S infront of code) (e.g. SFM)	

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

FY COMPLETED: -0-

FY EXPENDITURES: -0-

CUML. EXPENDITURES: -0-

OBJECTIVE NEEDS: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/ 87058 STATION RANK: 28 REGIONAL RANK: -0-

PROJECT TITLE:

SUBDIVIDE SPRAGUE-MATHER POOL

THRUST: WETLAND MGMT

COST ESTIMATE: $262,499 YEAR NEEDED: 94 JOB ORDER NEEDED: Y

PROJECT DESCRIPTION:

CONSTRUCT APPROX. 2 MILES OF LOW DIKE TO SUB-DIVIDE THE SPRAQUE-MATHER POOL PERMITTING A POOL ELEVATION ON THE UPPER POOL 942.00. THE DIKE WOULD HAVE A 12' TOP W/ 6:1 SEEDED SLOPES. CONSTRUCT 2 WATER CONTROL STRUCTURES, ON IN EW DIKE AND 1 IN TH

PRIORITY CLASSIFICATION: H
(H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: C
(C-CONST, R-RES MGMT, F-FIRE)

OPERATIONAL ACTIVITY: MW,WP,PU

Marsh & Water Mgmt	- MW
Croplands Mgmt	- CR
Forest Mgmt	- FO
Grassland Mgmt	- GL
Fire Mgmt	- FM
Law Enf. & Permits	- LE
Contaminant Ass/Cleanup	- CC
WL Popl. Mgmt/Census	- WP
Fishery Mgmt	- FS
Interpret/Education	- IE
Public Use Mgmt	- PU
Boundary Marking/Posting	- BP
Studies/Investigations	- SI
Planning	- PL

BENEFIT: WF,OB

Endangered Species	- ES
Wetlands	- WT
Waterfowl	- WF
Other Migr. Birds	- OB
Resident Species	- RS
Cultural Resources	- CU
Wilderness/Nat. Areas	- WN
Public Information	- IN
Recreational Uses	- RC
Subsistence	- SU

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

(B-BASE, M-MULTI YEAR, O-ONE TIME) COST: O FTE's: -0-

PREREQUISITE PROJECTS: -0-

MAINTENANCE MANAGEMENT: PROJECT PROPOSAL WORKSHEET

STATION: NECEDAH NWR ORGANIZATION CODE: 32530

PROJECT NO: NCD/87065 STATION RANK: 32 REGIONAL RANK: -0-

PROPERTY DESCRIPTION: CLEAR DITCH

PROJECT TITLE:

CLEAR TREES AND DEBRIS FROM WEST BRANCH LITTLE YELLOW DITCH FROM DAM 31 TO ~~RYNEARSON 2~~ Junction of Avery Lateral Ditch.

COST ESTIMATE: $68,249 YEAR NEEDED: 94 JOB ORDER REQ.: N

PROJTECT DESCRIPTION:

REMOVE ALL TREES FROM BOTH DITCH BANKS WITHIN AREAS OF FIELDS. CLEAN OUT DITCH OF BRUSH AND TREAT TO KILL LIVE STUMPS. APPROX. ~~5~~ 2 1/4 MILES.

PRIORITY CLASSIFICATION: H (H-HIGH, M-MEDIUM, L-LOW)

FUNDING SOURCE: R (C-CONST, R-RES MGMT, F-FIRE)

MAINTENANCE CODE: 437

DEFICIENCY CODE: WF

General	- GE	Animal Welfare (Research)	- AW
Fire Management	- FM	Endangered Species	- ES
Public Use	- PU	Waterfowl	- WF
Law Enforcement	- LE	Migratory Birds	- MB
Drug Enforcement	- DE	Pollution Control	- PC
Energy	- EN	Safety (Add S infront of code) (e.g. SFM)	

STATE: WI COUNTY: JUNEAU CONGRESSIONAL DISTRICT: 6

FY COMPLETED: -0-

FY EXPENDITURES: -0-

CUML. EXPENDITURES: -0-