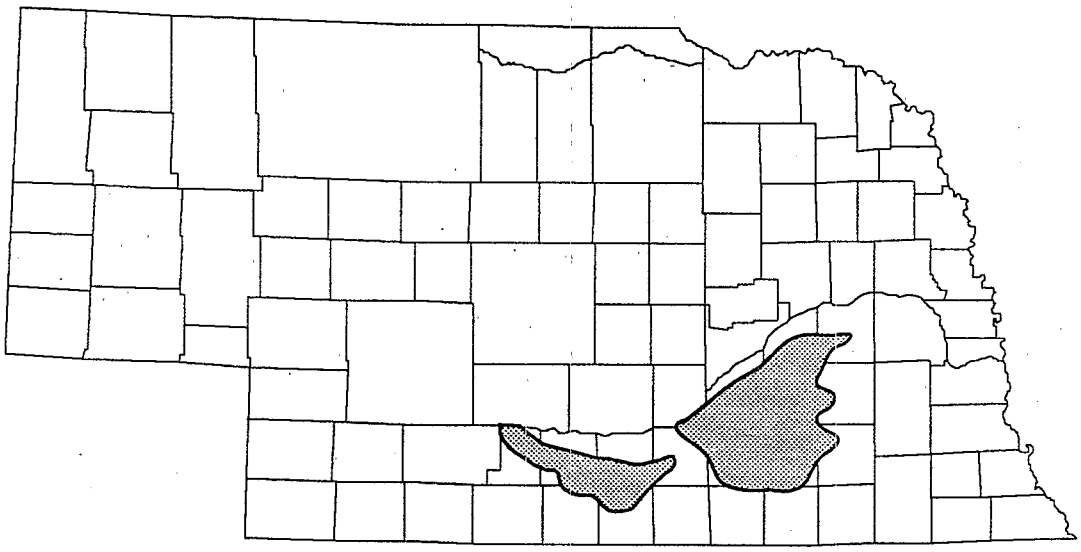
REGULATORY PLANNING FOR NEBRASKA'S RAINWATER BASIN WETLANDS — ADVANCED IDENTIFICATION OF DISPOSAL AREAS —



by

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U. S. Fish and Wildlife Service
Grand Island, Nebraska
Denver, Colorado

Nebraska Game and Parks Commission
Lincoln, Nebraska

October 1990

Regulatory Planning for Nebraska's Rainwater Basin Wetlands

(Advanced Identification of Disposal Areas)

A Cooperative Effort

by

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FOREWORD

In 1986, the U.S. Environmental Protection Agency (EPA) initiated an Advanced Identification of Disposal Areas program (40 CFR § 230.80) for the Rainwater Basin wetlands complex in southcentral Nebraska. EPA, working jointly with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the Nebraska Game and Parks Commission, with assistance from the Nebraska Department of Environmental Control and the USDA Soil Conservation Service, established five objectives: (1) designate wetlands potentially regulated under Section 404 of the Clean Water Act and those that may be suitable or unsuitable for fill under the review requirements contained in EPA's Section 404(b)(1) Guidelines; (2) increase the wetland information data base to support future regulatory policy and wetlands management initiatives; (3) collect information necessary for making wetlands jurisdictional and delineation determinations; (4) increase public awareness of the Section 404 permit process; and (5) increase public awareness of wetland values/functions.

This report provides the basis for site designations under the Advanced Identification of Disposal Areas program. The first part of this report provides a discussion of project purpose and need based upon a review of resource literature and prior administration of the Section 404 program. An overview of technical studies conducted in response to public and interagency scoping efforts also is provided. Results of the technical studies conducted (including economic assessment, waterfowl studies, functional assessment evaluation, and vegetation/mapping studies) are presented. These studies were conducted to provide a rationale

for designation in consideration of both potential Corps of Engineers' jurisdiction and documented wetland values/functions. Results of these studies are integrated into the last part of this document for advanced identification determinations. The view of the participating agencies on categories of discharges (activities) and options for future Section 404 program administration and wetland protection in the Rainwater Basin also are provided.

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EXECUTIVE SUMMARY

The Rainwater Basin is an area covering parts of 17 counties and some 4,200 square miles south of the Platte River in central Nebraska. In 1986 the Environmental Protection Agency (EPA) and the Corps of Engineers initiated the Rainwater Basin Advanced Identification Study. The public was informed that the study would identify wetlands potentially regulated under Section 404 of the Clean Water Act and designate those that may be suitable or unsuitable for fill based upon the review requirements contained in the Section 404(b)(1) Guidelines.

The technical rationale for considering designation of disposal areas (sites) as generally suitable or unsuitable for fill was based on the findings of the supporting technical appendices and analysis presented in this report. Major study findings are outlined as follows:

1. Most Rainwater Basin wetlands are subject to the Section 404 provisions of the Clean Water Act.

2. All Rainwater Basin wetlands have HIGH values for waterfowl use.

3. All Rainwater Basin wetlands have the potential to provide HIGH functional values.

To apply study findings to site designations, U.S. Fish and Wildlife Service National Wetlands Inventory data were utilized. A total of 54,630 acres of wetlands were identified within the study area boundaries.

Of these wetlands, a total of 34,103 acres of Palustrine System wetlands were identified as the "traditional depressional rainwater basins." These wetlands were subsequently identified as Class I wetlands. The remaining Palustrine System wetlands were examined to determine if important similar or support functions to the "traditional depressional rainwater basins" were potentially being provided. A total of 3,125 acres of these areas were identified and grouped into the category Class II wetlands. All remaining wetlands of the Palustrine, Riverine, and Lacustrine Systems were identified as Class III wetlands, totaling 17,402 acres. These wetlands were viewed as providing important functional values, but not in a similar capacity as the Class I and II categories.

The wetlands exhibiting or potentially providing the highest degree of value were viewed as areas where the discharge of dredged or fill material would not likely be in compliance with the Section 404(b)(1) Guidelines (Class I and Class II wetlands). For Class III wetlands, compliance with the Section 404(b)(1) Guidelines was recommended to be determined on a case-by-case basis pending a review of functional value impacts. Based on the conclusions of the technical appendices, analyses presented in this report, and review of mapping data, the following designations were recommended:

Class I

Wetlands generally unsuitable for fill based on documented high functional values (traditional depressional rainwater basins).

Class II

Wetlands generally unsuitable for fill based upon the probability of providing high functional values (other Palustrine System wetland types providing similar or supportive functions as Class I wetlands).

Class III

Wetlands generally subject to Department of the Army permitting requirements (all remaining Palustrine, Riverine, and Lacustrine System wetlands not contained in Classes I and II). Evaluated on a case-by-case basis for suitability determinations.

To supplement the Class designations, a review of fill activities potentially affecting the regional resource was conducted. High, moderate and low probability ratings of compliance with the Section 404(b)(1) Guidelines were assigned for common categories of discharge. A high probability of compliance for an activity was considered as suitable for disposal of dredged or fill material in Class I and Class II wetlands. Moderate or a low probability of compliance for an activity was considered as generally unsuitable for fill in all Class I and Class II wetlands. Activities affecting Class III wetlands were recommended to be evaluated on a case-by-case basis for suitability and compliance determinations.

Post-Advanced Identifiation Study options were identified for future Section 404 program administration. Protection options address areas of wetland regulation, acquisition, management and enhancement, public outreach, and identification of information needs.

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ACKNOWLEDGEMENTS

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INTRODUCTION

PURPOSE AND NEED

Resource Background

The conversion of wetlands to agricultural land is the major factor contributing to wetland loss and degradation in the United States (Tiner 1984). In few other areas is this loss more apparent than in the Rainwater Basin of Nebraska (The Conservation Foundation 1988).

The Rainwater Basin is an area covering parts of 17 counties and some 4,200 square miles south of the Platte River in central Nebraska (Figure 1). Wetlands range in size from less than one acre to over 1,000 acres. Soil survey maps from early in this century indicated that the Rainwater Basin area once contained nearly 4,000 individually identified wetland basins totaling 94,000 acres. Nebraska Game and Parks Commission (1984) estimates indicated that less than 10 percent (approximately 375) of these original mapped wetland basins and 22 percent of their acreage (20,000 acres) remained. Over 10,000 acres are owned and managed by State or Federal wildlife agencies.

Destruction of the Rainwater Basin wetlands began in the early 1900's but proceeded slowly because of inadequate technology and equipment. Following World War II, as earth-moving equipment became available, wetland destruction rapidly accelerated. The primary objectives of wetland conversions have either been to gain additional agricultural land or to achieve more efficient farming practices by eliminating wetlands interfering with irrigation systems. Nearly 90 percent of this wetland destruction was accomplished by combining drainage

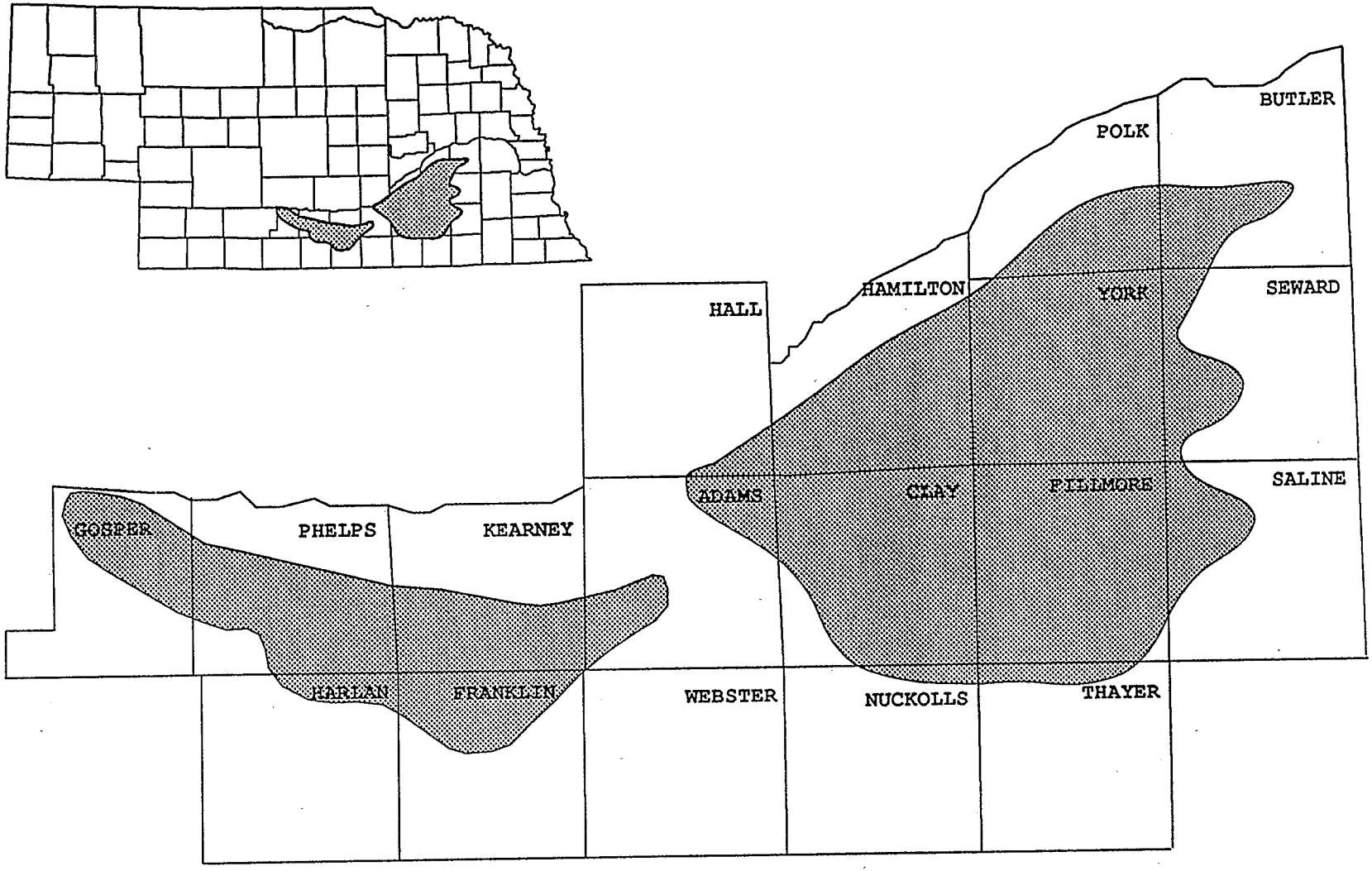

Figure 1. Nebraska's Rainwater Basin wetland region (Adapted from Nebraska Game and Parks Commission 1972).

ditches with deepened roadside ditches or dugouts (Nebraska Game and Parks Commission 1984). Depositing excavated material from the dugouts further degraded the wetlands. Land leveling associated with gravity irrigation and dugout construction has accounted for additional destruction. Since the 1960's, economic conditions have spurred agricultural intensification and deep well irrigation in south-central Nebraska (Swanson 1986). During this time, drainage ditches, dugouts and associated filling activities have accounted for the vast majority of wetland losses. Wetland degradation also has resulted from upland farming practices which have accelerated basin siltation. In recent years, wetland conversion to cropland has been strongly correlated with natural dry cycles in the Rainwater Basin area (Nebraska Game and Parks Commission 1984; U.S. Fish and Wildlife Service and Nebraska Game and Parks Commission 1986).

A major implication of wetland destruction is the loss of wildlife habitat for millions of waterfowl and other wildlife that use the Rainwater Basin area. This wetland complex serves as essential waterfowl spring staging habitat for five to seven million waterfowl. Waterfowl utilize this area for courtship, for pair formation, and most significantly as spring staging habitat where birds buildup fat reserves needed for the remaining migration and successful initiation of nesting on northern production grounds. Over 92 species of birds are known to breed and rear offspring in the Rainwater Basin with ducks alone producing over 10,000 young to flight stage in an average water year (U.S. Fish and Wildlife Service and Nebraska Game and Parks Commission 1986). The Rainwater Basin area also provides significant values to fall migrants.

The loss of wetland habitat in the Rainwater Basin area has caused waterfowl to be crowded into fewer suitable roosting, loafing, and feeding sites during spring migration. This crowding has increased the susceptibility of these birds to catastrophic losses from natural environmental disasters such as severe spring storms, drought, and disease. Avian cholera outbreaks, which have occurred annually in the Rainwater

Basin since 1975 (Schildman and Hurt 1984), are symptomatic of habitat loss and are now considered to be enzootic to the region (R. Windingstad; pers. comm.). Approximately 200,000 ducks and geese died from avian cholera in the Rainwater Basin between 1975 and 1984 (Schildman and Hurt 1984). Mortality has been highest for mallards, northern pintails, greater white-fronted geese and Canada geese. The loss of greater white-fronted geese is of special concern as nearly the entire mid-continent population stages in the Rainwater Basin area each spring (Benning 1987). In 1980, five percent of this population died from avian cholera. Mallard and northern pintail mortality is also of concern because of their declining populations in the Central Flyway.

This wetland area also serves as important migration habitat for endangered species and other migratory water birds. The Rainwater Basin area is recognized as important migration habitat for whooping cranes and sandhill cranes. Further, geographic location and limited occurrence records suggest that the Rainwater Basin area has the potential to provide migration values for shorebirds and wading birds that approach the known habitat values provided by waterfowl (Gersib et al. 1990). This area also provides essential habitat for resident wildlife species (e.g., pheasant, deer, rabbit).

Regulatory Background

The Department of the Army's regulatory program is one of the oldest in the Federal government. The initial mission of the program was to protect the navigational servitude of the Nation's waterways. Changing public needs, new statutory mandates, and increased stress on natural resources have changed the complexion of the program. In no area have the changes been greater or more controversial than in the regulation of wetlands.

The Federal Water Pollution Control Act Amendments of 1972 added what is commonly called Section 404 authority (33 U.S.C. 1344) to the Department of the Army's regulatory program. The Secretary of the Army,

acting through the Chief of Engineers may issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material into waters of the United States at specified disposal sites. The selection of such sites must be in accordance with evaluation criteria developed by the Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army. These regulations are known as the Section 404(b)(1) Guidelines (Federal Register 1980).

The Section 404(b)(1) Guidelines (Guidelines) evaluation criteria contain several provisions which prohibit issuance of a permit for activities which have avoidable or significant impacts to wetlands. For "non-water dependent projects", i.e., those that do not need to be located in or near water to fulfill their basic purpose, the Guidelines presume that less environmentally damaging practicable alternatives to filling wetlands exist. The purpose of the "water dependency test" is to recognize special aquatic sites (i.e., wetlands), and to avoid their unnecessary destruction, particularly when practicable alternatives are available in non-aquatic areas to achieve the basic purposes of a project. The Guidelines also prohibit projects which would jeopardize the continued existence of a federally threatened or endangered species, violate State water quality standards, or involve significant environmental degradation. In addition, the Guidelines require that unavoidable impacts be mitigated to the maximum extent possible. These Guidelines, in effect, provide the standard criteria for evaluation of Clean Water Act Section 404 permits. In addition to complying with the Guidelines, in order for a Clean Water Act Section 404 permit to be issued, the project must not be contrary to the public interest.

The Corps of Engineers (COE) assumed jurisdiction over isolated wetlands including many Rainwater Basin wetlands, in 1977 (Federal Register 1977). The majority of fill activities have included land-use alteration for irrigation system development, incorporating drainage, land leveling, and water reuse pit construction. The Omaha District COE assumed discretionary authority to determine, on a case-by-case basis, the need for individual Section 404 permit reviews in the Rainwater

Basin. From 1978 to 1982, there were an estimated forty-five Section 404 activities. In July 1982, significant changes occurred in the regulatory program relative to evaluating wetland fill activities. A nationwide permit was issued authorizing discharges of dredged or fill material into isolated waters (Federal Register 1982). During the administration of this nationwide permit between 1982 and 1984, filling of Rainwater Basin wetlands may have accelerated, although no conclusive data are available.

Additional modifications to the COE permitting process occurred in October 1984, including a revision of the nationwide permit for isolated wetlands (Federal Register 1984). Revised regulations defined criteria to determine whether individual or nationwide permitting was appropriate for isolated wetlands. Under these revisions, any discharge that would cause the loss or substantial adverse modification of 10 acres or more of wetlands required authorization by an individual permit. For those fill activities affecting up to 10 acres, predischarge notification and interagency review requirements were established to permit the COE to determine whether to require an individual permit for the discharge.

Since 1984, twenty-four Section 404 actions have been evaluated in the Rainwater Basin. Although the total number of permit actions for this time period is not inordinate, because of the value of the wetland resource involved and its comparative scarcity, the number of permit actions has elicited concern for significant cumulative impacts. These numbers do not reflect unreported activities or those not requiring Department of the Army authorization that may ultimately affect wetland quality or quantity.

Of those activities evaluated under the individual permit process, few would have been in compliance with the Guidelines unless mitigation for adverse wetland impacts was provided or wetland enhancement was a project purpose. In some cases however, permit decisions were affected by conflicting wetland boundary determinations and varying

opinions of wetland values between the permitting and reviewing agencies. In other cases, the conversion of wetlands to standing croplands has been so rapid that the presence or absence of a wetland was difficult to determine. For some Section 404 actions, where mitigation was required for permit issuance, fulfillment of mitigation goals or their success were not always verified.

In lieu of this case-by-case permit review, an opportunity for more responsive regional regulatory management is found in Subpart I "Planning to Shorten Permit Processing Time" in the Guidelines, Section 230.80 "Advanced Identification of Disposal Areas." Under this section, the EPA Regional Administrator and the COE District Engineer may identify specific areas for advanced identification determinations. This section establishes general procedures by which advanced identifications of dredged or fill material disposal sites can be made. The purpose of advanced identification is to determine the suitability or unsuitability of a site/area for the future disposal of dredged or fill material. The specification of any given site/area as either suitable or unsuitable for discharges of dredged or fill material neither constitutes a permit nor prohibits application for a permit. Either type of identification constitutes information that can be used to facilitate individual or general permit application and processing. During this process, environmental information that is normally reviewed during a Section 404 permit application is collected and analyzed.

Requirements in the Guidelines state that appropriate public notice of the identified areas shall be issued and that the permitting authority shall maintain a public record of all identified areas. A written statement of the basis for identification is also required. The following sections provide an overview of technical studies conducted to develop the basis for advanced identification determinations in the Rainwater Basin.

Economic Considerations

Evaluation of existing information regarding causes of wetland loss and deterioration in the Rainwater Basin confirmed that most wetland loss or deterioration was directly related to intensified or expanded agricultural production (Office of Technology Assessment 1984). Economic conditions in agriculture provide an opportunity to assess whether converting Rainwater Basin wetlands to agricultural use has been in the past, is now, or will be in the future actually a profitable investment.

A very general economic assessment of profitability was contained in the Office of Technology Assessment report of 1984. More detailed Basin specific information was considered necessary to address the profitability of wetland conversion. An economic study (Swanson 1986) was completed to gather the data and information necessary to determine profitability and potential future threats to Rainwater Basin wetlands (Appendix A). The framework for this analysis was a cash flow model. The model related production and cash receipts from a wetland conversion on an annual basis to expenditures between 1980 and 1985. From this analysis, a determination was made as to the projected profitability of drainage through 1990 for selected soil and wetland types. This study concluded that: (1) there has been a general decline in the profitability of draining and cropping wetlands in the region; (2) temporarily and seasonally flooded wetland basins have the greatest vulnerability from filling/draining activities; and (3) drainage of semipermanently flooded wetlands has been generally unprofitable in the past and will be increasingly so in the future. Summarization of profitability and earthwork requirements for converting wetlands to agricultural production is shown in Table 1.

Table 1. Profitability of wetland conversion (Swanson 1986).

Wetland Water Regime	Earthwork Necessary for Filling Basin[a]	Profitability of Drainage
Semipermanently Flooded	> 1,600 yd^3	Not Profitable
Seasonally Flooded	800 yd^3-1600 yd^3	Possibly Profitable
Temporarily Flooded	300 yd^3-800 yd^3	Profitable

[a]Break-even point ("profitability") for 1980-1984 = 1,025 yd^3/acre, 1985-1989 = 950 yd^3/acre, and 1990 = 812 yd^3/acre.

Ecological Considerations

Initial evaluation of existing information regarding Rainwater Basin resources confirmed that little ecological data had been collected in a systematic manner. Wetland inventory data (Nebraska Game and Parks Commission 1972, 1984) were the primary source of information. Estimates on total waterfowl use and avian cholera deaths since 1975 also were available from the U.S. Fish and Wildlife Service and the Nebraska Game and Parks Commission. Only sparse data were available on vegetation characteristics, wetlands functions, and specific waterfowl activities during spring migration.

Prior to recent wetland inventory efforts by the U.S. Fish and Wildlife Service (Service), the most useful data were from the Nebraska Game and Parks Commission (NGPC) inventories of the 1960's and early 1980's. Wetlands were classified in accordance with Martin et al. (1953). A purpose of the 1960's survey was to provide baseline information regarding Nebraska's wetland areas overlooked by nationwide inventory works conducted in the 1950's (U.S. Department of the Interior

1954). Wetland inventory work in the early 1980's by the NGPC was conducted to determine the changes that had occurred during the approximate 20-year interval since earlier survey efforts.

Such data have been of limited utility from a regulatory standpoint since detailed vegetational community composition information and potential non-waterfowl functions were not addressed. These inventories do, however, provide a significant record of the historic numbers and distribution of Rainwater Basin wetlands and their general waterfowl values.

In order to document the potential scientific and environmental significance of the wetlands in the Rainwater Basin, additional baseline data were needed. An updated inventory using the Service's National Wetland Inventory (NWI) conventions was initiated to document wetlands within the Rainwater Basin region. Mapping was based on photo interpretation of 1981 aerial photography with wetlands classified according to Cowardin et al. (1979). The area illustrated in Figure 2 represents study boundaries for this report. The NWI classified wetlands within this area constitute the "population" for consideration in the Advanced Identification program.

RESOURCE CHARACTERIZATION

Maintenance of habitat values for waterfowl and other migratory birds was recognized as a prime motivating factor for multiagency cooperative efforts in the Rainwater Basin. In recognition of this resource need and information derived from interagency/public scoping efforts, three major technical resource characterization studies were identified. Documentation of waterfowl use, assessment of wetland functions, and characterization of Rainwater Basin plant communities were the principal studies initiated to fulfill the Advanced Identification of Disposal Areas program requirements. Palustrine System wetlands, comprised of temporarily flooded, seasonally flooded, and semipermanently flooded

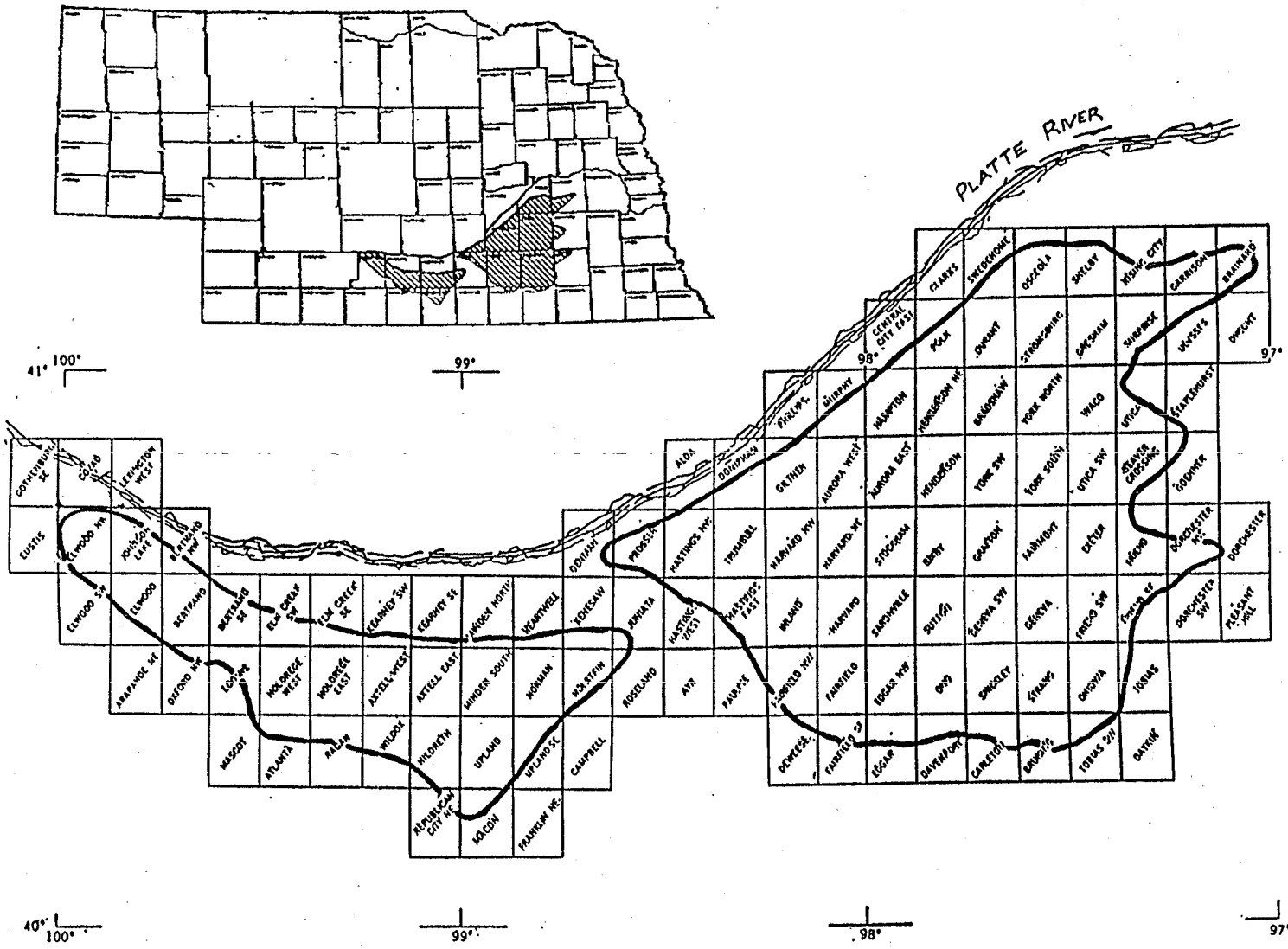

Figure 2. Rainwater Basin Advanced Identification of Disposal Areas Study boundaries (adapted with modifications from Folkers 1988).

water regimes, served as the categories of interest for resource characterization studies.

Information on the diurnal behavior of waterfowl species during spring staging was collected using activity time budget analyses. Concurrently, census data were obtained to provide estimates on the numbers of waterfowl using wetlands. These data, in conjunction with an extensive literature review, are presented in Appendix B to provide a continental perspective of the Rainwater Basin wetland values to waterfowl. Application of the Federal Highway Administration functional assessment methodology (Adamus and Stockwell 1983) provided the opportunity to objectively assess non-waterfowl functions (Appendix C). Vegetation-soil characteristics were evaluated through field surveys and mapping of individual study sites (Appendix D). This investigation also provides descriptive information on species composition and plant communities.

Extracted results of these studies were applied to the development of the technical rationale for designation under Section 230.80 of the Guidelines. Demonstration of Rainwater Basin wetlands as jurisdictional "waters of the United States" and as areas providing significant values were determined to be the two criteria necessary for candidacy under the advanced identification process.

The assumption of jurisdiction under the Section 404 program also is activity based. Therefore, a "categories of discharge" review was conducted to address generic types of fill activities. This analysis was initiated to provide a preliminary determination of compliance of a proposed discharge with the Guidelines in light of the environmental data collected. Additionally, this application can be used as an indication of permit predictability for the affected public and as an opportunity for procedural modifications within the authorities of the Clean Water Act.

METHODS

STUDY SITE SELECTION AND GENERAL METHODOLOGY

Study site selection was based on a stratified random sample from NGPC (1984) wetlands inventory data. Wetlands were stratified, proportionate to those remaining, on an east-west distributional basis and by wetland type (Martin et al. 1953). Agricultural Stabilization and Conservation Service's aerial photographs, soil surveys, draft NWI maps[1], historic site documentation, and 1986 aerial photography were reviewed to derive the study sites for investigation. The final determination of an individual wetland for study was based on the prerogative of the principal investigator for each of the technical resource investigations. Sites analyzed and the type of study conducted are provided in Table 2. A total of fifty-seven study sites were selected for waterfowl, Adamus, and vegetation/mapping studies. Overlap of all studies at all sites was not achieved due to the varying site selection criteria and experimental design requirements for each investigation. Time allocated for completion of each work component, limited access, and adverse site conditions at the time of investigation also proved to be limiting factors. Sufficient sampling overlap was achieved to allow inference regarding the Rainwater Basin wetland characteristics by Cowardin et al. (1979) water regimes.

Wetland value assessment data were consolidated by site and water regime through matrix construction or tabular format for purposes of

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[1]Final NWI maps were not available at the time of study site selection.

Table 2. Rainwater Basin wetland study sites by county. Number for each site derived from Nebraska Game and Parks Commission wetland inventory data (1984).

Site	Legal Description[a]			USGS 7.5'	Wetland	Type of Study Conducted		
	Sec	Tnshp	Rnge	Quadrangle Name(s)	Type[b]	Waterfowl[c]	Adamus[d]	Vegetation/Mapping[e]
Butler 010a	36	14N	1E	Rising City	4			X
Butler 018	21	15N	3E	David City East	1			X
Clay 002	36	8N	8W	Inland	4	X	X	X
	31	8N	7W					
	1,2	7N	8W					
	6	7N	7W					
Clay 009	15	6N	6W	Edgar NW	3			X
Clay 011	16	6N	6W	Fairfield	3			X
				Edgar NW				
Clay 013	15	6N	6W	Edgar NW	1			X
Clay 024	30	6N	6W	Fairfield	3			X
Clay 032	23	6N	6W	Edgar NW	*	X		
Clay 033	25,26	6N	6W	Edgar NW	4	X		X
Clay 035	31	6N	5W	Edgar NW	4			X
	36	6N	6W					
Clay 052	7	5N	5W	Edgar NW	1		X	X
Clay 053	7	5N	5W	Edgar NW	1	X		X
Clay 094	29	6N	5W	Edgar NW	3		X	X
Clay 152	29	7N	6W	Harvard	3			X
Clay 216	25	6N	6W	Edgar NW	1		X	X
Clay 227	33	7N	6W	Harvard	1	X		X
Fillmore 013	25,26	6N	4W	Shickley	3	X	X	X
Fillmore 019	30,31	6N	4W	Ong	1	X	X	X
Fillmore 022	23	6N	4W	Shickley	3	X		X
Fillmore 024	13	6N	4W	Shickley	4	X		
	18	6N	3W					
Fillmore 028	10	6N	3W	Shickley	*	X		
Fillmore 046	32,33	8N	3W	Geneva SW	3			X
	4-6	7N	3W					
Fillmore 054	5	5N	2W	Fairmont	1	X		
Fillmore 084	10	7N	4W	Sutton	3	X	X	X
Fillmore 086	5	7N	4W	Sutton	3		X	X
Fillmore 091	21,22	5N	3W	Shickley	4	X	X	X
Fillmore 105a	7	6N	2W	Geneva	*	X		
Fillmore 112	18	5N	4W	Ong	3			X
Franklin 001	25,26	3N	15W	Macon	3			X
	35,36	3N	15W					
	30,31	3N	14W					
Franklin 004	5	3N	15W	Hildreth	3	X		X

Table 2. (Concluded)

Site	Legal Description[a]			USGS 7.5'	Wetland	Type of Study Conducted		
	Sec	Tnshp	Rnge	Quadrangle Name(s)	Type[b]	Waterfowl[c]	Adamus[d]	Vegetation/Mapping[e]
Gosper 004	15	6N	21W	Oxford NW	3			X
Gosper 008	19	7N	20W	Bertrand	1	X		X
	24	7N	21W					
Gosper 015	6	8N	23W	Elwood NW	1		X	X
Gosper 017	35	8N	23W	Elwood SW	1		X	X
Hamilton 009	33	10N	8W	Giltner	1	X	X	X
Hamilton 020	21	10N	8W	Giltner	1	X	X	X
Kearney 003	16	6N	16W	Axtell E&W	3	X	X	X
Kearney 013	30	5N	14W	Minden S	1			X
Kearney 017	32	5N	13W	Upland SE	1			X
Kearney 020	27	5N	16W	Wilcox Hildreth Axtell E&W	3			X
Phelps 001	36	5N	17W	Wilcox	3	X		X
Phelps 007	23,24	5N	19W	Holdrege W	3			X
Phelps 021	27,28	7N	20W	Bertrand SE	3	X	X	X
Phelps 024	15,16	6N	17W	Axtell W	4	X[f]	X	X
Phelps 042	9,10	6N	17W	Axtell E&W Holdrege	3	X[f]		
Polk 018	36	14N	1W	Rising City Shelby	1			X
Seward 002	29,32	11N	2E	Staplehurst	3	X		
York 020	33,34	9N	2W	Fairmont	4	X	X	X
	3,4	8N	2W					
York 027	26	9N	2W	Fairmont	4	X		
York 029	35	9N	2W	Fairmont	3	X		
York 061	1,2	12N	3W	Stromsburg	4			X
York 062	10,11	12N	3W	Durant	3	X	X	X
York 065	7	12N	3W	Durant	3	X		
York 066	18	12N	3W	Durant	3	X		X
York 069	9,10	12N	3W	Durant	3	X	X	X
York 077	2,11	10N	1W	Utica SW	3			X
York 103	13,24	10N	1W	Utica SW	1		X	X
n=57						n=31	n=20	n=47

[a] Location(s) to nearest section(s)
[b] Wetland type according to Martin et al. (1953). Sites with an * indicate areas were not inventoried in one or both of Nebraska Game and Parks Commission (1972, 1984) wetland inventories.
[c] Listing is for sites where activity time budget data was collected only. An estimated 125 sites were surveyed for waterfowl counts.
[d] Adamus and Stockwell (1983).
[e] Listing is for sites where vegetation/wetlands mapping data was collected.
[f] Includes data from other sites within the Funk Lagoon wetlands complex.

analysis. Wetland mapping and vegetational survey data served as the basis for evaluating Federal jurisdiction. These data were aggregated for all study sites and grouped by water regime for analysis.

VALUE-BASED ASSESSMENT

Waterfowl Values

Waterfowl data were considered to be the primary component of the value-based evaluation process. For this analysis, results were extracted from project waterfowl studies (Gersib et al. 1989a), known habitat needs of waterfowl available from the literature, best professional judgments, and study site characteristics derived from project mapping. A "determinant" water regime was assigned to each study site based on mapping data from Gilbert (1989). The determinant regime accounted for greater than 25 percent of a study sites' area and was considered to be the water regime most likely to influence waterfowl use.

A study site's potential to fulfill identified waterfowl needs was evaluated. High, moderate, or low probability ratings to seasonal habitat categories were assigned. Seasonal habitat categories used in this analysis consisted of spring staging, production, and fall migration. Assignment of ratings was conducted separately for ducks and geese for spring staging. Functional categories used in this analysis for spring staging consisted of feeding, loafing, and courtship behavior. The NGPC (1984) inventory data and NWI data were used to assess each study site's opportunity to function as part of a wetland complex.

In consideration of all seasonal habitat and functional categories, a site's value to waterfowl was determined. Methodology for this assignment was consistent with Adamus and Stockwell (1983). These authors state that if an overall rating must be assigned, the highest rating should be used. These functional category values were then consolidated into an overall spring staging value. These data were

further grouped by determinant water regime and seasonal habitat category. Finally, an overall value for a water regime was then assigned based upon the highest rating within each seasonal habitat category.

Wetland Functions

Non-waterfowl functional assessment data were considered to be a second component of the value-based evaluation process. Data for this analysis were extracted from the functional assessment portion of this study, known functional values of Rainwater Basin wetlands available from the literature, and best professional opinion. The determinant water regime also was assigned in this analysis for grouping of sites.

Results of the application indicated a composite high probability that overall wetland functions and values are occurring at each study site (Gersib et al. 1989b). This allowed the analysis of water regimes by individual functional category (e.g., ground water recharge, sediment trapping). Functional categories were further consolidated to an analysis of general wetland functions (physical, chemical, biological, and social significance) for each water regime. An overall value for a water regime was then assigned based upon the highest rating within each general wetland functional category.

JURISDICTIONAL ASSESSMENT

Jurisdictional assessments reflect a reasonable probability that the temporarily flooded, seasonally flooded, and semipermanently flooded water regimes are "waters of the United States." Assessment of potential jurisdiction was based upon vegetation, soils, and hydrology criteria derived from data in Gilbert (1989). Both wetland mapping and vegetation survey data were used in this application to describe cases where one, two, or all three criteria of the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation 1989) were met. Jurisdictional assessments were not considered to constitute final delineations.

Both mapping and vegetation survey data were summarized by water regimes and observations where criteria were negative or positive. These data also provided the opportunity to identify discrepancies between criteria.

Mapping Data

For wetlands/soils mapping data, the aggregated cross-tabulation results for 47 study sites were used to evaluate potential jurisdiction. Cowardin et al. (1979) mapping types intersecting soil mapping units were grouped to compare water regimes versus non-hydric or hydric soil series.

In this application, water regimes were treated as positive indicators for both hydrology and vegetation. Hydric soil series were considered a positive indicator for the soils criteria. An "upland" designation was considered as a negative indicator for hydrology and vegetation. A non-hydric soil mapping unit was considered a negative indicator for the soils criteria.

Vegetation Data

Corollary data for jurisdictional assessments were derived from the vegetation study's survey data sets. The most probable Cowardin et al. (1979) water regime was assigned to each vegetation sample. Determination of a water regime assignment was based upon the hydric value[2], percent composition of indicator species, species composition, and the professional judgments of the interagency work team. A water regime assignment was considered to be a positive indicator for the hydrology criteria. A generic designation as upland (U) for a sample was considered a negative indicator. Water regimes assigned consisted of

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[2]A prevalence index utilized prior to the development and adoption of the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation 1989).

temporarily flooded, seasonally flooded, and semipermanently flooded. A positive indicator of soils was based upon USDA Soil Conservation Service (SCS) hydric soils criteria (U.S. Department of Agriculture 1987). The hydric value was used to determine the vegetation criteria. These three criteria were summarized in spreadsheet format for each of 272 samples.

RESULTS AND DISCUSSION

Matrices in this section are the result of the Advanced Identification technical studies, existing literature, and best professional judgments. The value-based and jurisdictional assessments form the technical rationale for designation. Complete economic study results are presented in Appendix A.

VALUE-BASED ASSESSMENT

Waterfowl Values

The results of detailed field studies compared the relative importance of three Palustrine System emergent wetland types (temporarily, seasonally, and semipermanently flooded) by examining waterfowl occurrence and use. Activity time budget results are presented in Appendix B.

Each major wetland type provides unique waterfowl spring staging, production, and fall migration values. The following results are from Table 3: (1) most temporarily flooded wetlands provide HIGH spring staging values, LOW to MODERATE production values, LOW fall migration values with a HIGH overall site value for waterfowl; (2) most seasonally flooded wetlands provide MODERATE to HIGH spring staging, production, and fall migration values with a HIGH overall site value for waterfowl; and (3) most semipermanently flooded wetlands provide LOW to HIGH spring staging values, and HIGH production and fall migration values with a HIGH overall site value for waterfowl.

Table 3. Waterfowl values for individual study sites.

Number n=47	Study Site No.	Determinant Water Regime[a]	Waterfowl Habitat Category Values: Spring Staging Functional Category Values: Feeding Ducks	Feeding Geese	Loafing Ducks	Loafing Geese	Courtship	Spring Staging	Production	Fall Migration	Site Value
1	BU 18	Temporarily	H[b]	H	H	H	M	H	L	L	H
2	CL 13	Flooded	H	H	H	H	M	H	M	L	H
3	CL 152	(A)	H	H	H	H	M	H	M	L	H
4	CL 227		H	H	H	H	M	H	L	L	H
5	FM 19		H	H	H	H	M	H	M	L	H
6	FM 22		H	H	H	H	M	H	M	L	H
7	FR 1		H	H	H	H	M	H	M	L	H
8	GO 4		H	H	H	H	M	H	L	L	H
9	HA 20		H	H	H	H	M	H	M	M	H
10	KE 13		H	H	H	H	M	H	L	L	H
11	YR 103		M	L	M	L	M	M	L	L	M
12	CL 2	Seasonally	H	M	H	H	M	H	H	H	H
13	CL 24	Flooded	H	M	H	H	M	H	M	M	H
14	CL 52	(C)	H	M	H	H	M	H	M	M	H
15	CL 53		H	M	H	H	M	H	M	M	H
16	CL 216		H	M	H	H	M	H	H	M	H
17	FM 46		H	M	H	H	M	H	H	H	H
18	FM 91		H	M	H	H	M	H	L	H	H
19	FM 112		H	M	H	H	M	H	M	M	H
20	FR 4		H	M	H	H	M	H	H	H	H
21	GO 8		H	M	H	H	M	H	M	M	H
22	GO 15		H	M	H	H	M	H	H	M	H
23	GO 17		H	M	H	H	M	H	H	M	H
24	HA 9		H	M	H	H	M	H	H	M	H
25	KE 17		H	M	H	H	M	H	M	M	H

Table 3. (Cont')

Number n=47	Study Site No.	Determinant Water Regime	Waterfowl Habitat Category Values: Spring Staging Functional Category Values: Feeding Ducks	Feeding Geese	Loafing Ducks	Loafing Geese	Courtship	Spring Staging	Production	Fall Migration	Site Value
26	PH 1		H	M	H	H	M	H	M	M	H
27	PH 7		H	M	H	H	M	H	H	M	H
28	PO 18		H	M	H	H	M	H	M	M	H
29	YR 61		H	M	H	H	M	H	H	M	H
30	YR 69		H	M	H	H	M	H	H	M	H
31	BU 10A	Semi-	M	L	H	H	M	H	H	H	H
32	CL 9	Permanently	M	L	H	H	M	H	H	H	H
33	CL 11	Flooded	M	L	H	H	M	H	H	H	H
34	CL 33	(F)	M	L	H	H	M	H	H	H	H
35	CL 35		M	L	H	H	M	H	H	H	H
36	CL 94		M	L	H	H	M	H	H	H	H
37	FM 13		M	L	H	H	M	H	H	H	H
38	FM 84		M	L	H	H	M	H	H	H	H
39	FM 86		M	L	H	H	M	H	H	H	H
40	KE 3		M	L	H	H	M	H	M	H	H
41	KE 20		M	L	H	H	M	H	H	H	H
42	PH 21		M	L	H	H	M	H	H	H	H
43	PH 24		M	L	H	H	M	H	H	H	H
44	YR 20		M	L	H	H	M	H	H	H	H
45	YR 62		M	L	H	H	M	H	H	H	H
46	YR 66		M	L	H	H	M	H	M	H	H
47	YR 77		M	L	H	H	M	H	M	H	H

[a]Cowardin et al. (1979).
[b]H = HIGH, M = MODERATE, L = LOW.

In an attempt to further simplify the waterfowl site value results identified above, a summary of water regime by seasonal habitat category is provided in Table 4. An overall waterfowl value was assigned corresponding to the highest rating associated with each water regime. All three wetland water regimes (temporarily, seasonally, and semipermanently flooded) have an overall HIGH value for waterfowl.

Table 4. Overall waterfowl value.

OVERALL WATERFOWL VALUE				
	Seasonal Habitat Category Value			
Determinant Water Regime[a]	Spring Staging	Production	Fall Migration	
Temporarily Flooded (A)	High	Moderate	Low	High
Seasonally Flooded (C)	High	High	Moderate	High
Semipermanently Flooded (F)	High	High	High	High

[a]Cowardin et al. (1979).

Results summarized in Tables 3 and 4 suggest that each Rainwater Basin wetland has the potential to provide a broad spectrum of values to waterfowl. As discussed in Gersib et al. (1989a), the actual values that each wetland provides are dependent upon the ecological factors and human activities which dictate vegetative composition and diversity.

The Rainwater Basin wetlands are known to serve as a major waterfowl spring staging area in North America, providing critical habitat for five to seven million ducks and geese annually. This wetland area provides spring staging habitat for 90 percent of the mid-continent population of greater white-fronted geese, 50 percent of the continental breeding population of mallards, and 30 percent of the continental northern pintail breeding population. This wetland area has the potential to provide all essential food and cover necessary for spring staging waterfowl. These requirements are met through the availability of temporarily, seasonally, and semipermanently flooded wetlands along with waste corn from adjacent agricultural fields.

Each major wetland water regime provides unique waterfowl feeding and resting values necessary for efficient fat deposition during spring staging. Temporarily and seasonally flooded wetlands provide higher feeding values than semipermanently flooded wetlands when water is abundant. However, when precipitation is limited, semipermanents may be the only wetlands with water to provide food values. Semipermanents provide greater values for loafing and comfort regardless of water conditions.

Rainwater Basin wetlands function as a dynamic system. Changes in vegetative character and the resulting change in functional values in response to natural hydrologic cycles, result in an integrated system that functions as a continuum. This continuum insures a broad range of wetland types without regard to wet or dry cycles, further supporting the need for protection of all water regimes to maintain functional values. The high overall value of each wetland water regime (Table 4) reflects these unique spring staging, production, and fall migration values. The loss or accelerated degradation of any one of the three water regimes would break this continuum and reduce the overall values of the entire wetland complex.

Wetland Functions

Detailed functional assessment ratings and results for the 20 study sites are presented in Appendix C. This study showed that Rainwater Basin wetlands appear to have functional ratings that are generally consistent for all study sites regardless of size, vegetation type, and hydroperiod.

Results for this application are summarized by water regime in Table 5. The following results can be drawn: (1) nearly all water regimes of Rainwater Basin wetlands can be expected to have a HIGH probability of providing flood storage, shoreline anchoring, sediment trapping, nutrient retention--long-term and seasonal, food chain support--in-basin, wildlife habitat, active recreation, and passive recreation and heritage values; (2) some Rainwater Basin temporarily flooded wetlands can be expected to have a MODERATE probability of providing active recreation, and passive recreation and heritage values; and (3) nearly all water regimes of Rainwater Basin wetlands can be expected to have a LOW probability of providing groundwater recharge, groundwater discharge, food chain support--downstream, and warmwater fishery habitat values.

To further simplify the results identified above, a summary by water regime is provided in Table 6. General wetland functions/values, represented by physical, chemical, biological, and social components, are presented. An overall wetland functional value rating was assigned corresponding to the highest rating associated with the value of interest. All three wetland water regimes have an overall HIGH value for wetland functions.

These functional assessment results, the consistency of results documented by Gersib et al. (1989b), and the consistency shown in Table 5, provided the opportunity to more reliably expand the wetland functional assessment to all Rainwater Basin wetlands.

Table 5. Wetland functional values.

	Wetland Functional Values												
	Physical					Chemical		Biological				Social	
Determinant Water Regime[a]	Groundwater Recharge	Groundwater Discharge	Flood Storage	Shoreline Anchoring	Sediment Trapping	Nutrient Retention Long-Term	Nutrient Retention Seasonal	Food Chain Support Downstream	Food Chain Support In-Basin	Warmwater Fishery Habitat[b]	Wildlife Habitat	Active Recreation	Passive Recreation and Heritage
Temporarily Flooded (A)	L[c]	L	H	H	H	H	H	L	H	L	H	M	M
Seasonally Flooded (C)	L	L	H	H	H	H	H	L	H	L	H	H	H
Semi-Permanently Flooded (F)	L	L	H	H	H	H	H	L	H	L	H	H	H

[a] Cowardin et al. (1979).
[b] M (MODERATE) if determinant water regime wetland contains an excavated area capable of overwintering fish.
[c] L = LOW, M = MODERATE, H = HIGH.

Table 6. Overall wetland functional values.

Determinant Water Regime[a]	Overall Wetland Functional Value				
	Physical	Chemical	Biological	Social	
Temporarily Flooded (A)	High	High	High	Moderate	High
Seasonally Flooded (C)	High	High	High	High	High
Semipermanently Flooded (F)	High	High	High	High	High

[a]Cowardin et al. (1979).

The Adamus and Stockwell (1983) wetland evaluation procedure was designed to objectively assess potential wetland functional values based on simple physical, chemical and biological indicators along with socio-economic trends. The methodology was originally intended to measure the potential impacts of highways upon the functional values of wetlands and to aide in the mitigation of lost wetland values. The application of this methodology was expanded by Odum et al. (1986) and Jensen (1987) to support enhanced wetland protection measures. The use of this methodology within Nebraska's Rainwater Basin wetlands extends this application further by aiding in the general characterization of the overall values provided by this wetland complex.

JURISDICTIONAL ASSESSMENT

Complete study results providing basic information on species compositions and associations, vegetation/soils relationships, and wetland community characteristics are presented in Appendix D. Results presented in this section are derived from Gilbert (1989), and evaluated criteria of vegetation, soils, and hydrology from both mapping and vegetational survey data.

Mapping Data

Summary results on the intersection of water regimes with soils data are presented in Table 7. These data indicate the following: (1) 83 percent of the temporarily flooded wetlands occurred on hydric soils; (2) 90 percent of the seasonally flooded wetlands occurred on hydric soils; (3) 95 percent of the semipermanently flooded wetlands occurred on hydric soils; and (4) for all data, 89 percent of the wetlands mapped occurred on hydric soils; 11 percent of the wetlands occurred on non-hydric soils.

Table 7. Intersection of Cowardin et al. (1979) water regimes with hydric/non-hydric soils (mapping data only).

WATER REGIME	SOILS DATA					
	HYDRIC SOILS		NON-HYDRIC SOILS		TOTALS	
	Acres	Percent	Acres	Percent	Acres	Percent
Temporarily Flooded (A)	1210.19	83	247.60	17	1457.79	100
Seasonally Flooded (C)	1796.18	90	203.22	10	1999.40	100
Semipermanently Flooded (F)	1180.08	95	57.10	5	1237.18	100
Totals	4186.45	89	507.92	11	4694.37	100

Vegetation Data

Results of the jurisdictional assessment conducted for the vegetational survey data are presented in Table 8. Similar to the mapping data, cases where all three or less than three of the criteria were met are presented.

Table 8. Assessment of vegetation, soils, and hydrology criteria from survey data (n=272).

	VEGETATION/SOILS INDICATORS			
HYDROLOGY INDICATOR:	VEGETATION+/ SOILS+	VEGETATION+/ SOILS-	VEGETATION-/ SOILS+	VEGETATION-/ SOILS-
-Upland (n=65)	0	5%	25%	70%
+Temporarily Flooded (n=65)	83%	15%	2%	0
+Seasonally Flooded (n=97)	100%	0	0	0
+Semi-permanently Flooded (n=45)	100%	0	0	0

From these data, the results are as follows:

(1) For samples that were designated as an upland water regime: (a) 25 percent of the samples have a negative indicator for vegetation and a positive indicator for soils; (b) 5 percent of the samples have a positive indicator for vegetation and a negative indicator for soils; and (c) 70 percent of the samples have negative indicators for both vegetation and soils.

(2) For temporarily flooded samples (positive indicator for hydrology): (a) 83 percent of the samples have a positive indicator

for both vegetation and soils; (b) 15 percent of the samples have a positive indicator for vegetation and a negative indicator for soils; and (c) 2 percent have a positive indicator for soils, but not vegetation.

(3) All seasonally and semipermanently flooded samples (positive indicators for hydrology) have positive indicators for both vegetation and soils.

Mapping data from Gilbert (1989) indicates a highly disturbed environment based upon the common occurrence of Cowardin et al. (1979) modifiers describing hydrologic alterations, the calculated Correspondence Index, the large percentage of uplands on hydric soils, and the occurrence of wetland types on non-hydric soils. Additionally, although vegetation survey results indicated wetland status for Fillmore, Scott, and Massie soils, the large percentage of uplands associated with the former two series determined from mapping data would indicate caution in generalizing wetland-hydric soil relationships in Rainwater Basin wetlands.

The mapping data used in the jurisdictional assessment study does not reflect the large percentage of hydric soils not supporting Cowardin et al. (1979) wetland types. It is estimated that 33 percent of the hydric soils within the mapping data base do not support wetlands. Nonetheless, a high percentage of all water regimes meet all three criteria.

This analysis only addresses hydric soils associated with existing wetlands. Sampling design for vegetation/mapping studies did not (and could not) account for large areas of hydric soils currently incapable of supporting hydrophytic vegetation due to hydrological modifications, filling or land-use practices (historic wetlands).

Gilbert (1989) suggested that low vegetation/soil correlations may indicate more reliance on vegetation for wetland delineation purposes. He also cautioned that a one-time delineation does not account

for wetland dynamics. Delineations of Rainwater Basin wetlands within the framework of the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation 1989) would require consideration of successional changes, vegetation response to disturbance or varying wet-dry cycles. Integration of existing inventories (Nebraska Game and Parks Commission 1972, 1984; NWI data; and SCS soils and wetlands data), archives of historical aerial photography, and long-term monitoring are required to support wetland delineations in future program applications.

CONCLUSIONS

A major goal of the Advanced Identification study was to identify and protect wetlands, with a strong emphasis on identification of the most valuable and vulnerable tracts. This report was developed to document the probability of jurisdiction and to document wetland functions and values. The following statements summarize the preceding analyses.

1. Most Rainwater Basin wetlands were determined to be subject to the provisions of the Clean Water Act.

2. All Rainwater Basin wetlands have HIGH values for waterfowl use.

3. All Rainwater Basin wetlands have the potential to provide HIGH functional values (e.g., flood storage, sediment trapping, food chain support--in basin).

Swanson (1986) examined economics to determine existing or future threats. His analysis suggests that most temporarily and some seasonally flooded wetlands are still susceptible to conversion. A summary of technical analyses and economic considerations for future program management are presented in Table 9.

Table 9. Summary of technical analyses and potential future threats to Rainwater Basin wetlands.

Determinant Water Regime	Probability of Meeting All Three Wetland Criteria[a]	Overall Waterfowl Value	Overall Functional Value	Profitability of Future Conversions[b]
Temporarily Flooded (A)	Moderate	High	High	High
Seasonally Flooded (C)	High	High	High	Moderate
Semipermanently Flooded (F)	High	High	High	Low

[a]Probability of meeting all three criteria of hydrophytic vegetation, hydric soils, and wetland hydrology (growing season conditions-average year).

[b]Break-even point ("profitability") for 1990 = 812 yd^3/acre (Swanson 1986).

RECOMMENDATIONS

RATIONALE FOR DESIGNATION

Implications of resource characterization findings to the Advanced Identification process and Section 404 program administration can best be evaluated while viewing the ecoregion as a whole. NWI mapping provided the opportunity to apply these study results. NWI digital tape data were transferred to the EPA Region VII Office of Integrated Environmental Assessment (OIEA) for conversion and incorporation into the Region's Geographical Information System (GIS) database. The GIS database then was used to generate customized wetland maps (Appendix E). One-hundred nine (109) 7.5 minute USGS quadrangles are contained within the study boundaries (see Figure 2). A total of 54,630 acres of wetlands were identified within these boundaries.

To define "traditional depressional rainwater basin" Palustrine System wetlands, the interagency work group team overlaid the wetland maps onto SCS soil survey maps. Each individual Palustrine System polygon occurring on Butler, Fillmore, Massie, Olbut, and Scott depressional soil units was recorded. This set of wetlands, totaling 34,103 acres, were classified as the "traditional depressional rainwater basin" wetlands. These wetlands were grouped into a category identified as Class I wetlands to distinguish them from other Palustrine System wetlands.

Discrepancies between earlier estimates of wetland numbers and acreage and those in this report are apparent. The NGPC (1972) inventory data documented 3,907 wetlands and 94,060 wetland acres based on hydric soils identified from original U.S. Department of Agriculture

soil survey maps of the early 1900's. Updated soil surveys in the 1960's through 1980's identified significantly more hydric soil acres than originally identified, resulting in NGPC data underestimating the total population and acres of wetlands (Nebraska Game and Parks Commission 1984). Further, the Cowardin et al. (1979) classification system and NWI mapping conventions allow the identification of wetlands based on soil signature even though tillage operations may periodically destroy the dominance of wetland plants. These wetland basins were also likely not included in earlier inventory efforts (Nebraska Game and Parks Commission (1984), but are reflected in the Class I category. Trend analysis data developed during NGPC surveys in the 1960's and 1980's are still considered accurate however, whether based on a survey of the total wetland population as originally thought, or on a large sample of the total population of wetlands as is known today.

Other Palustrine System polygons not occurring on the identified depressional soil units were also reviewed. These polygons, categorized as Class II wetlands, were viewed as potentially providing important or similar support functions as Class I wetlands due to similarities in water permanence and vegetation composition. The identification of these wetlands in addition to the "traditional depressional rainwater basin" wetlands was based on field experience and professional judgments of the interagency work team. A total of 3,125 acres were identified and grouped into the Class II wetlands category. This acreage data does not necessarily reflect individual basins, but rather specific Cowardin et al. (1979) wetland types.

All remaining Palustrine, Riverine, and Lacustrine System wetlands were grouped into a category identified as Class III wetlands (17,402 acres). These wetlands were viewed as potentially providing important values but not in a similar capacity as Class I and II wetlands. Acreage figures for all Classes are summarized by system and water regime in Table 10. Appendix E provides a summary of Class acreage data by individual Cowardin et al. (1979) wetland types and additional discussion of methodology.

Table 10. Class I, II, and III wetland acreages for the Rainwater Basin Advanced Identification Study.

SYSTEM[a]	CLASS I[b,c] (acres)	CLASS II (acres)	CLASS III[d] (acres)	TOTALS (acres)
PALUSTRINE				
Polygon data by water regime[e]				
A	14,919	1,330	2,529	18,778
C	12,128	1,401	683	14,212
F	7,046	394	6,580	14,020
G/H	10	0	33	43
Point data			203	203
Linear data			2,515	2,515
RIVERINE			571	571
LACUSTRINE			4,288	4,288
TOTALS	34,103	3,125	17,402	54,630

[a]Cowardin et al. (1979).

[b]Class I and II wetlands are Palustrine System polygon data only.

[c]Best available data indicate a total of 445 Class I wetland basins (Smith and Higgins 1990).

[d]Class III wetlands consist of point, linear, and polygon data for all three Cowardin et al. (1979) systems.

[e]A=temporarily flooded; C=seasonally flooded; F=semipermanently flooded; G=intermittantly exposed; and H=permanently flooded.

The wetland habitats exhibiting the highest degree of value, primarily for waterfowl, were determined to be areas where the discharge of dredged or fill material would not likely be in compliance with the Guidelines (Class I wetlands). Wetlands that potentially provide important functions also were viewed as generally unsuitable for dredged or fill activities from the standpoint of significant environmental degradation that would be caused by the loss of, or degradation to, habitat (Class II wetlands). Wetlands not identified as exhibiting the highest degree of value or providing similar or support functions were still viewed as being important, but were unclassified as to the probability of compliance with the Guidelines (Class III wetlands).

RECOMMENDED DESIGNATION

Based on the conclusions of the technical appendices, analyses presented in this report, and wetlands mapping data, the following designations are recommended:

Class I

Wetlands generally unsuitable for fill based on documented high functional values (traditional depressional rainwater basins).

Class II

Wetlands generally unsuitable for fill based upon the probability of providing high functional values (other Palustrine System wetland types providing similar or supportive functions as Class I wetlands).

Class III

Wetlands generally subject to Department of the Army permitting requirements (all remaining Palustrine, Riverine and Lacustrine System wetlands not contained in Classes I and II). Evaluated on a case-by-case basis for suitability determinations.

CATEGORIES OF DISCHARGE (ACTIVITIES)

As the assumption of Section 404 jurisdiction is two-part; establishing "waters of the United States" and an activity requiring Department of the Army authorization, a categories of discharge review was

conducted to supplement the Class designations. Table 11 presents the views of regulatory and review agencies that participated in this study regarding the acceptability of identified categories of discharge/activities as generally suitable/unsuitable for the disposal of dredged or fill material into wetlands of the Rainwater Basin. The identified activities and those requiring multiple project features will be critically reviewed for the project purpose, alternatives available, methods of construction, and impacts to wetlands for a final determination of compliance with the Guidelines.

Based upon the views presented, categories of discharge/activities with HIGH probabilities of compliance with the Guidelines will be considered as generally suitable for the disposal of dredged or fill material into Class I and II wetlands in the Rainwater Basin.

All other categories of discharge/activities evaluated in this report (MODERATE and LOW), are designated as generally unsuitable for the disposal of dredged or fill material in all Class I and II wetlands. A discharge activity receiving a MODERATE rating indicates that the final determination of compliance depends on the purpose of the project or construction methods. For example, if the purpose of a water control structure or diking is for wetland enhancement/restoration, then it would likely receive a HIGH rating. If the purpose is to redirect water away from the wetland, then the activity would likely receive a LOW rating. Other factors influencing a final determination would include a sites' determinant water regime and the relationship of the disposal site to the surrounding wetlands complex. Class III wetlands in the Rainwater Basin area will be evaluated on a case-by-case basis for functional value impacts.

For the categories of discharge/activities in Table 11, the following general criteria will be considered to facilitate future permit decisions.

Table 11. General probabilities of compliance with the Section 404(b)(1) Guidelines for common discharge activities in the Rainwater Basin region.[a]

HIGH probability of compliance
Wetland restoration/enhancement
Repair, rehabilitation, replacement of previously authorized structures
Survey activities
Return water from an upland contained dredged disposal area
Oil and hazardous substances cleanup
MODERATE probability of compliance
Center pivot wheel tracks
Water control structures/earthen plugs
Diking
Duck blinds
Loafing/nesting islands
Outfall/intake structures
Backfill, bedding for utility lines, outfall/intake structures
Bank stabilization
Road crossings
Bridges
LOW probability of compliance
Stockponds
Water reuse pits
Water concentration pits
Dugouts
Land leveling
Ditching
Channelization

[a]See text for examples and further clarification on probabilities of compliance.

a. Minor water dependent discharge activities are generally suitable pending demonstration of minimal impacts to affected wetland Classes and compliance with the Guidelines.

b. Non-water dependent activities are generally unsuitable. Non-water dependent discharges are those associated with activities which do not require access or proximity to or siting within a special aquatic site to fulfill their basic purpose. Practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise.

c. Proponents of an activity, which would have an impact on wetland values and functions, will be required to comply with the Guidelines and other program directives so that "no overall net loss of wetlands" will be achieved in the Rainwater Basin ecoregion.

d. Fill associated with wetland enhancement/restoration projects which improve the primary functions and values of these wetlands will generally receive favorable consideration (e.g., water control structures, diking).

OPTIONS FOR FUTURE WETLAND PROTECTION

The interagency work group team identified the following list of options for consideration following completion of the Advanced Identification Study for protection, restoration, and preservation of the remaining wetland resources in the Rainwater Basin of Nebraska. The options presented are not an exhaustive list, but summarize the more important options for consideration for future Section 404 program administration. The agencies involved with the Advanced Identification Study will consider and prioritize these options for possible implementation.

Regulation

- Development of an administrative procedures document/agreement to implement the findings of the Advanced Identification Study and to describe how future permit application reviews will be processed in the Rainwater Basin.

- Development of standardized review criteria to be used in permit application acceptance, review, impact analysis, permit issuance/denial, and site inspections for permit compliance.

- Development of General Permits for certain types of minor discharges and wetland enhancement/restoration activities.

- Evaluation of nationwide permits to determine whether they should be revised, modified, or even rescinded.

- Maintainence of a joint agency team approach to field evaluation, permit review, and enforcement activities.

- Development and implementation of a monitoring program to ensure that mitigation requirements of Section 404 permits adequately replace Rainwater Basin wetland functions and values.

- Determine the feasibility of prohibiting the specification or use of Rainwater Basin wetlands as disposal sites under Section 404(c) of the Clean Water Act and develop criteria for assumption of "Special Cases" in light of vegetation study results.

- Improvements in the system for detection of illegal wetland fill activities which fall under Federal jurisdiction by establishing an annual aerial photo reconnaissance of Rainwater Basin wetlands and by encouraging public reporting of apparent illegal fill activities.

- Enforcement of appropriate laws regulating activities in wetlands to encourage compliance with these laws.

Wetland Management

- Additional acquisition and management of Rainwater Basin wetlands by Federal, State, and private agencies/organizations.

- Provision of support for the implementation of the Rainwater Basin Joint Venture Project under the North American Waterfowl Management Plan by promoting information exchange and mutual technical assistance between Federal, State, and local agencies involved in wetlands regulation, protection, and enhancement.

- Establishment of a program to acknowledge private individuals, organizations, and corporations that demonstrate leadership in the protection, enhancement, or restoration of Rainwater Basin wetlands.

- Development of a private lands extension program that provides technical and financial assistance to landowners who wish to consider enhancement or restoration of Rainwater Basin wetlands.

Public Outreach

- Development of additional programs or publications to increase public awareness and appreciation of the value of Rainwater Basin wetlands.

- Distribution of customized wetland maps and information that identify and describe the Rainwater Basin wetlands to private landowners, developers, civic organizations and government agencies so they can avoid inadvertent destruction of wetlands by improper development. These materials could be distributed through the Agricultural Stabilization and Conservation Service, USDA Soil Conservation Service,

Nebraska Natural Resource Districts, U.S. Army Corps of Engineers, Nebraska Game and Parks Commission, Nebraska Department of Environmental Control, U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service. Such materials could include landowner guides to wetland vegetation, information on technical assistance programs, and guidance on permit application.

- Development of additional tools to make the public aware of the U.S. Army Corps of Engineers administered Section 404 Program and how it affects landowner activities. This could be accomplished by incorporating Section 404 regulatory information into public information/education efforts and by encouraging the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency to target Rainwater Basin counties for public information activities.

Information Needs

- Development and implementation of a Rainwater Basin wetland relational database to centralize permit data and individual wetland data necessary to support regulatory determinations, justify the use of "special cases" or Section 404(c), and prioritize acquisition sites.

- Development and implementation of a Geographic Information System (GIS) to provide objective data necessary to prioritize and target acquisition efforts at a macro scale and analyze permit actions.

- Development and implementation of a basic hydrology model to predict the probability of adequate water inputs necessary to restore wetland character and values and as a tool for impact analysis.

- Initiation of a system for archiving historical aerial photography and development of procedures for monitoring wetland trends for future regulatory/resource management needs.

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