PRIME WETLANDS EVALUATION
FOR THE
CITY OF NASHUA, NEW HAMPSHIRE

For: The Nashua Conservation Commission
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Date: June 7, 1990

NATURAL RESOURCE CONSULTING SERVICES

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I. INTRODUCTION

In 1988 Natural Resource Consulting Services (NRCS) was selected for it's first prime wetland contract with the Nashua Conservation Commission (NCC). In 1988 twenty-four wetlands were examined and at the recommendation of the NCC three wetlands were mapped and analyzed in detail.

In the spring of 1989 NRCS was retained in a second contract to complete the prime wetlands project for the City of Nashua. This phase of the project included: Scanning all wetlands in the City and intensively investigating the best candidates which were mapped. NRCS then prepared information to suggest them for "Prime Wetland Designation". 140 wetlands were considered for designation as prime wetlands in the City of Nashua. Of these a total of 116 wetlands were identified, visited and evaluated (NRCS, 1989).

The seven wetlands which received the highest rating were recommended in PRELIMINARY PRIME WETLANDS EVALUATION FOR THE CITY OF NASHUA, NEW HAMPSHIRE dated August 8, 1989 "prime candidates" and are listed below:

1. The Merrimack River
2. The Nashua River and associated wetlands
3. Salmon Brook and associated wetlands
4. Pennichuck Brook and associated wetlands
5. Lovewell's Pond and associated wetlands
6. Horse Pond and associated wetlands
7. Old Ridge Road wetlands

Five other wetlands were also identified as being good candidates, though they did not rate as highly as the above seven. The designation of some wetlands as prime is a way of telling the New Hampshire Wetlands Board (NHWB) which of a municipality's wetlands are the most important. The criteria for the selection of prime wetlands were adopted by the NHWB to ensure that each community considers the same factors in deciding which wetlands are its most important.

The process of designating prime wetlands is nothing more than the evaluation of wetlands by a municipality using a yardstick designed by the NHWB. The vote of the legislative body to adopt the prime designation indicates knowledge of and agreement with the procedures used and the results, and advises the NHWB which wetlands the town or city consider most valuable (The New Hampshire Association of Conservation Commissions, Strafford Regional Planning Commission and the Environmental Law Clinic, 1983).

II. METHODOLOGY AND WET EVALUATION

The methodology used to evaluate and designate prime wetlands in Nashua included: 1) Delineation of the wetlands on unrectified 1962 aerial photographs; 2) Evaluation of the social significance of the prime wetlands applying the Wetland Evaluation Technique (WET) volume 2; 3) Evaluation of the prime candidates utilizing criteria established by the N.H. Wetlands Board which includes; soils, fauna, flora, food chain production, hydrology, history, archeology, scientific importance, geomorphology, aesthetics, size and other considerations; 4) Professional judgement and common sense.

The first methodology called for NRCS to delineate all prime wetlands. This was accomplished utilizing 1:15,840 Agricultural Stabilization Conservation Service (ASCS) 1962 unrectified aerial photos and a portable lens stereoscope (spot ground truthing was done). Interpretation of the wetland boundaries from the aerial photos were then transferred to aerial photo enlargements which equaled the Town Tax Map scale of 1"=200'.

These boundaries were then traced onto the Town Tax Maps (1"=200') utilizing the aerial photo enlargements and known points in the field which were represented on the tax maps. Due to sufficient scale inaccuracies in both of these maps it was difficult to obtain an accurate transfer of wetland boundaries. A "best possible fit" technique was used. Segments of photos and tax maps were aligned, boundaries transferred, map and photo realigned and the next segment of boundaries drawn. Linear wetlands, such as the rivers in question, were re-aligned up to four times over the length of one aerial photograph. Also, between aligned segments it was necessary to smooth any line breaks. The problems with the tax maps and the aerial photo enlargements varied. First, the Town Tax Maps scales were incorrect. Second, "an aerial photograph, except under rare conditions, is not a map since objects on the photo are not in their correct relative positions" (Paine, 1978). Discrepancies in the use of aerial photos include but are not limited to; differences in topography, tip and tilt of the camera and radial displacement.

The second methodology applied WET (Adamus et. al., 1987) to the seven prime wetland candidates. WET assesses functions and values by characterizing a wetland in terms of its physical, chemical, and biological processes and attributes. This characterization is accomplished by identifying threshold values for predictors. Predictors are simple, or integrated, variables that directly, or indirectly, measure the physical, chemical, and biological processes or attributes of a wetland and its surroundings. Threshold values for predictors are established by addressing a series of questions concerning each predictor. Responses to the questions are analyzed in a series of

interpretation keys that define the relationship between predictors and wetland functions and values as defined in the technical literature. The interpretation results in the assignment of a qualitative probability rating of HIGH, MODERATE, or LOW to functions and values in terms of social significance, effectiveness, and opportunity.

Interpretation keys are conservative and designed to be rigorous in terms of the criteria that must be met before a HIGH or LOW probability rating is assigned. Therefore, it is normal for an evaluation to have a large percentage of the functions and values being assigned a MODERATE probability rating. Probability ratings do not have quantitative basis" (Adamus, et. al. 1987).

NRCS chose to use the Social Significance Level 1 evaluation of WET slightly tailored to the specific assumptions and circumstances in Nashua. Social significance is a measure of the probability that a wetland is of value to society because of its natural features, economic value, official status, and strategic location (Adamus, et. al., 1987). The technique entailed answering 31 comprehensive yes-no questions about the seven individual wetlands. Threshold values for predictors which directly or indirectly measure the functions or values of a wetland or its surroundings were identified. The yes/no questions and answers appear in Appendices A and B.

WET then uses a series of interpretation keys (there is one key for each function being evaluated) according to the outcome of the yes-no answers. The computer gives results in a qualitative probability rating of high, medium or low.

NRCS applied WET because of wide use and acceptance of this technique in the environmental field in evaluating wetlands. WET requires a broad spectrum of information and gives a relatively objective analysis. During the course of WET, NRCS found certain questions to be impractical and unhelpful in the evaluation process. WET, in its generalization and broad spectrum, lacks both regional and site specificity and common sense that may be addressed by a professional wetland scientist. Therefore, NRCS modified several questions and values to address Nashua's wetlands more effectively especially in regards to the linear riparian wetlands.

Several terms used in WET and are defined below:

A. Definition of Evaluation Areas

1. The Assessment areas (AA)/ Prime Wetland Candidates.

AA-1 The Merrimack River within the political boundaries of the City of Nashua.

AA-2 Pennichuck Brook within the political boundaries of the City of Nashua.
AA-3 The Nashua River within the political boundaries of the City of Nashua.
AA-4 Salmon Brook within the political boundaries of the City of Nashua.
AA-5 Lovewell's Pond and it's associated wetlands. (Fringe wetland on a standing body of water).
AA-6 Horse Pond and it's associated wetlands. (Fringe wetland on a standing body of water).
AA-7 Old Ridge Road Wetlands. (Non-fringe wetlands on a standing body of water).

2. The Watershed

The watershed of nontidal fringe wetlands and all non-fringe wetlands includes the area upslope of the AA from which water flows into the AA, or until a dam is reached. In addition, the watershed of the AA includes the watershed of contiguous wetland/deepwater areas if water from these areas enter the AA.

3. Service area

The service area is the point to which the service is delivered. If the watershed of the AA covers less than 20 square miles, consider service areas within 5 miles downslope from the AA's outlet (or until a dam is reached) to potentially benefit from wetland services. AA-5's outlet flows into AA-7, and AA-7's outlet flows into AA-4. AA-6 has no outlet, thus no downslope service area.

If the watershed of the AA covers more than 20 square miles, consider service areas within 10 miles downslope of the AA's outlet (or until a dam is reached) to potentially benefit from wetland services. AA-2, AA-3, and AA-4's outlets flow into AA-1. AA-1 reaches a dam at Lowell, Massachusetts and its service area is defined to that point.

B. Region is defined as southern New Hampshire. The most northerly boundary is Concord, the most southerly is the Massachusetts state line, to the west is the Connecticut River and to the east is the Atlantic Ocean and the Maine state line.

C. Locality is defined as the City of Nashua.

The following is NRCS's functional evaluation of the seven Nashua Wetlands proposed for prime wetland status in "PRELIMINARY PRIME WETLANDS EVALUATION FOR THE CITY OF NASHUA,

NEW HAMPSHIRE" (August 8, 1989). The interpretations and assumptions of WET (Social Significance Level 1) are answered to the best professional judgement of NRCS and are detailed below (questions can be found in Appendix B):

1. A. The Bald Eagle is a Federal and State endangered species and is known to utilize the Merrimack River as a winter travel corridor. This species may also frequent the Nashua River, Salmon Brook and Pennichuck Stream during its winter movements up and down the Merrimack River.

2. A. The City of Nashua owns several low intensity recreation areas along the Merrimack and Nashua River and Salmon Brook. Greeley Park is located in northeastern Nashua on the Merrimack River. Both Mines Falls Park and Horrigan Park are situated on the Nashua River and Degasis Park and Joyce Park Wildlife Sanctuary are located on Salmon Brook. Additionally, the Horse Pond Fish and Game Club, an organized conservation group, has set aside the entire area of Horse Pond for low intensivity recreation.

3. A. Gary Hume of the State Historic Preservation Office is sending a statewide listing of the National Register of Historic Places.

4. A. There is a bog that is part of Lovewell's Pond in southwestern Nashua. Bogs are considered rare and unusual among wetlands in this region. No other prime wetland candidates fall into this category.

5. A. According to the earlier report "PRELIMINARY PRIME WETLANDS EVALUATION FOR THE CITY OF NASHUA, NEW HAMPSHIRE" all prime wetland candidates were classified by the U.S. Fish and Wildlife Service classification system (Cowardin, et. al., 1979). None of these wetlands represent most or all of these wetland systems in Nashua.

6. A. Public and private monies have been spent to restore, protect, and ecologically manage both the Nashua and Merrimack Rivers. Both rivers have been involved with the on-going Atlantic Salmon, American Shad and River Herring restoration project. Fish passageways have been installed in both dams on the Nashua River in Nashua and recently on the Merrimack River, and at Amoskeag Dam in Manchester. Additionally, the Merrimack and Nashua Rivers must meet the federal government guidelines of the 401 Clean Water Act.

   Pennichuck Water Works, Inc. has purchased several thousand acres of land bordering Pennichuck Stream to protect the quality of the water and it's watershed. One

thousand of these acres has been set aside for preservation, development is prohibited.

7. A. No, there are no biological communities in the AA that are stressed by saline springs or abnormally high salinities, nor are there wetlands contiguous with the AA where this situation exists.

8. A. Residential owners along Salmon Stream who live on the 100 year floodplain may periodically experience flooding and inundation. The rest of the prime wetland candidates do not incorporate any social or economic areas of value that may be inundated by flooding of the wetlands.

9. A. The "area specified" for Pennichuck Stream, Nashua River and Salmon Brook is the Merrimack River. There are buildings in the 100 year floodplain of the Merrimack River.

10 A. Any spawning areas in the Merrimack would be sensitive to siltation, but there are no known areas that are sensitive to siltation (New Hampshire Fish and Game Department).

There are no known areas to be in violation of Section 401 of the Clean Water Act water quality standards due to suspended solids or toxicant levels.

11. A. The Merrimack River has been targeted for a water quality improvement project. West Manchester and Goffstown are to be tied into Manchester's sewage line, to meet the federal guidelines of the Clean Water Act.

12. A. Pennichuck Stream serves as a major source of drinking water.

13. A. No. There are no known bodies of water to be especially nutrient-sensitive or subject to regular blooms of algae, aquatic fungi, or oxygen related fish kills. Also, there are no known waters in the area specified to be in violation of Section 401 water quality standards due to nutrient levels.

14. A. No, there are no known swimming and bathing areas that are used frequently in the area specified.

15. A. Bald Eagles use the Merrimack River valley as a flight corridor and regularly inhabit the "area specified".

16. A. The U.S. Fish and Wildlife Service fish hatchery utilizes three wells that yield between 600-700 gallons per minute. The Merrimack and Nashua Rivers, Salmon Brook and

Pennichuck Stream are all located within two miles of the AA's perimeter and within the same watershed.

17. A. The Merrimack and Nashua Rivers, Salmon Brook and Pennichuck Stream are all located in the area specified that surpasses the criteria described in Question 16(c). The three remaining wetlands are not located in this area.

18. A. AA-1, AA-2, and AA-3 are the only AA's in the watershed of the closest service area or the AA is closer to the service area where the service identified in the question is delivered, in the watershed of the closest downstream service area.

19. A. No. However, any boating activity (e.g. High speed boats, jet skis) may induce shoreline erosion in areas where boating might occur.

20. A. Atlantic Salmon is a rare fish species that is supported in the Merrimack River and several other river systems in small numbers. Locally, Atlantic Salmon are supported in Salmon Brook and the Nashua River.

21 A. The seven prime wetland candidates in Nashua support several varieties of ducks (e.g. Mallard, Wood Duck, Black Duck) that are listed on the U.S. Fish and Wildlife National Species of Special Emphasis.

22. A. Nashua is located on the waterfowl use regions of major concern.

23. A. No AA's support plant or animal species with exceptionally narrow habitat requirements or extremely limited occurrence in this Region. This is for a species for which less than 1 percent of the other wetlands in the same class (e.g., forested, scrub/shrub) provide acceptable habitat.

24. A. Several schools are located closer to the Merrimack and Nashua Rivers and Salmon Brook than other wetlands and are within 2,000 feet of a public road where parking is allowed. The other candidate wetlands do not fall into this category.

25. A. The Merrimack and Nashua Rivers are part of an ongoing long-term monitoring program with the State of New Hampshire Water Supply and Pollution Control Division. Pennichuck Stream also part of a long term monitoring program because it is a major source of public drinking water.

No long term environmental research or monitoring program is known on any of the other studied water bodies.

26. A. No. Nashua is in a highly developed area of the state and is exposed to continuous growth.

27. A. Locally, consumptive activities such as fishing, hunting and trapping are limited to very few areas. These areas include the southern portion of the Nashua River and Salmon Stream, as well as, a few locations on the Merrimack River. Horse Pond is fished by neighborhood children. Lovewell's Pond, and Pennichuck Stream are private property.

28. A. Nashua River and Salmon Stream serve as major public access points to a recreational waterway, the Merrimack River.

29. A. Yes, all of Nashua is an urban area.

30. A. No, the state loss is calculated to be 35 percent.

31. A. Yes, the AA's wetland acreage is greater than the annual percentage loss rate of wetlands for the state for the seven prime wetland candidates.

Each proposed prime wetland with it's final WET evaluation ratings appears in Appendix C.

In the past, filling and draining of wetlands constituted the main theme for converting these "useless" wet areas into productive agricultural or commercial land. Only recently has the importance of wetlands and their benefits to man been recognized. Land in Nashua, during the past several decades, has gone from agriculture use and a small mill town to a highly developed urban and industrial commerce center.

In deciding prime wetlands and buffer zones Nashua must not only consider them for today but also for the future. Nashua is located in one of the fastest growing areas in the state and, like other communities, it has begun to rigorously protect what is left of its valuable wetlands.

"Courts have given particular weight to efforts to reduce flood losses, protect water supply, reduce pollution, protect groundwater discharge, reduce erosion, and serve other 'hydrologically' related objectives, and almost never find that regulatory restraints designed to serve these objectives 'take' property" (Kusler, 1987).

III. BRIEF DISCUSSION OF EACH WETLAND

The following are brief presentations of the seven prime wetland candidates. These descriptions are not the sole sources of information and evaluations for the candidates and should not be utilized in this manner. All the wetlands of the area are considered as Priority Wetlands by the USEPA (1987).

1. Merrimack River

The Merrimack River's prime wetland area is located within the City boundaries of Nashua and is limited to these boundaries. The U.S. Fish and Wildlife Service and the New Hampshire Fish and Game Department consider this river as a key river in the restoration of Atlantic Salmon, American Shad and River Herring. These fish were extirpated from New Hampshire waters. Due to significant long term commitment these fish are slowly coming back and may again play an important role in Nashua's limited outdoor recreation. During the winter, Bald Eagles use the Merrimack River valley as a travel corridor and resting area.

The Merrimack River serves as a water supply for Lowell and Lawrence, Massachusetts and as a reserve for the Pennichuck Water Works. Also, the Merrimack River is listed on the Environmental Protection Agency (EPA) Region 1 Wetland Listing as a priority waterbody.

Impacts of concern for the Merrimack River are residential and industrial encroachment. The length of the prime wetland in the Merrimack River is about 7.67 miles and generally consists of open water, riparian areas of red and silver maple with an understory dominated by scrub shrub vegetation.

2. Nashua River

The Nashua River prime wetland area is located within the City boundaries of Nashua 8.04 miles. The Nashua River and it's associated wetlands are used by many types of wildlife and support a variety of aquatic life. Most notably, this river also plays an important part in the restoration of the American Shad and River Herring. Both dams on the river in Nashua contain fish passageways and are being utilized by these fish. This wetland also contains an excellent interspersion of habitats and irregular edges and creates excellent habitat for wildlife.

Much of this river has had intensive development along it's borders and further intrusions could hinder the ability of the Nashua River corridor to provide viable wildlife habitat.

3. Pennichuck Brook

The Pennichuck Brook prime wetland area is located within the City boundaries of Nashua and covers 9.09 miles. Pennichuck Brook is a privately owned water works company and serves the City of Nashua and a small section of Derry, New Hampshire. The portion of this wetland in Nashua is "off limits" to most developmental pressures. Part of this water body is proposed to be crossed by a future state highway project.

Muddy Brook, a tributary of Pennichuck Brook contains an Audubon Wildlife Sanctuary and is the only one in Nashua and serves as a host to many varieties of wildlife.

Because of its uniqueness, Pennichuck Brook plays an important role in wildlife, fisheries and potential educational benefits.

4. Salmon Brook

The Salmon Brook prime wetland area includes the area of Salmon Brook within the City boundaries of Nashua covering 6.06 miles. Due to its proximity and accessibility in this urban area Salmon Brook has a high aesthetic, scientific and recreational value. Additionally, this wetland has a high potential for providing wildlife cover due to its location in a highly developed area. Further encroachment would severely alter this function.

Generally speaking, the previously mentioned wetlands are classed as riverine systems. These systems play a very important role in the ecological health of Nashua and the functions they perform are critical to maintaining a healthy environment. A brief description of their functions as a riverine system follows. "Like all ecosystems, wetlands have a flow of nutrients and energy, and support complex food webs. Consider the basic ecosystem interactions of a riverine marsh. The flowing water contributes inputs of nutrients and oxygen that, combined with the high water levels and abundant water, promote high rates of plant growth (primary productivity). High growth rates, particulary of herbaceous plants, contribute large amounts of dead plant material to the water and soil where it becomes incorporated into the organic peat soils and nourishes a vast community of animals.

Such wetlands function as a trap for pollutants flowing downstream in the water. Nitrogen, phosphates, and other nutrients are taken up by the plants, used to support plant growth, and held in the organic sediments. The organic particles and clays in the wetland soil trap and bind other pollutants.

Plants and the flat wetland topography slow down the flow of water. As velocity decreases, suspended particles fall out into the sediments and remove still more pollutants from the water. For these reasons, "open" wetland systems such as riverine marshes are very important in the abatement of pollution, and have been described as the "Kidneys of the Landscape" (Standly, 1989).

5. Lovewell's Pond

Lovewell's Pond (17.9 acres) is located in the least developed area in Nashua and has not been directly encroached upon by development. This isolation is a rarity in Nashua. Lovewell's Pond is unique in it that it offers open water with a completely undeveloped shore line, vegetative diversity and is hydrologically connected to a bog. "Bogs are considered very unique because of their plethoric acidity, reduced nutrient availability and extreme sensitivity to disturbance.

These wetlands contain rare or unusual vegetation which is often limited in distribution." (Neiring, 1985) Additionally, bogs are given the strictest of protection under state law RSA 483-A. This was the only bog-like area identified by NRCS in Nashua.

6. Horse Pond

Horse Pond (7.2 acres) is located off of Horse Pond Avenue in central Nashua. This wetland is privately owned by the Horse Pond Fish and Game Club and the potential for further development is limited under present ownership. Geomorphologically, Horse Pond is unique among the selected wetlands in that it is a kettle. "Kettles are basins created by the melting-out of buried or partly buried blocks of ice after sedimentation had ceased at the site of the kettle" (Flint, 1966). This wetland has no outlet and only one inlet and has a high potential for groundwater recharge and nutrient retention. Because of it's geomorphology this wetland also has a high potential for flood water retention.

7. Old Ridge Road Wetlands

The Old Ridge Road wetlands (83.5 acres) are located northeast of Lovewell's Pond and are identified as A-1 and A-2 on the preliminary report (August 8, 1989). This area is hydrologically connected to Lovewell's Pond and plays an important role in sediment trapping, nutrient retention and wildlife habitat. These wetlands are also located in the watershed of Salmon Brook and has a high potential to store flood waters.

Wetland protection and the importance to plants, wildlife and man is being recognized. It is important that these areas are protected as a whole and are not subject to piecemeal filling and development. This understanding and protection of wetlands will allow us to protect them for the future.

IV. CONCLUSION

For the foregoing reasons NRCS submits that the following seven wetlands should be officially recognized by the City of Nashua as Prime Wetlands:

1. The Merrimack River and associated wetlands
2. The Nashua River and associated wetlands
3. Pennichuck Stream and associated wetlands
4. Salmon Brook and associated wetlands
5. Lovewell's Pond and associated wetlands
6. Horse Pond and associated wetlands
7. Old Ridge Road Wetlands

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APPENDIX A

3.0 SOCIAL SIGNIFICANCE EVALUATION

Social significance assess a wetland in terms of its special designations, potential economic value, and strategic location. The evaluation consists of two levels of assessment. The first level consists of 31 questions designed to determine if the wetland has specific characteristics that indirectly indicate it may be performing functions and values beneficial to society. Responses to these questions are analyzed in a series of interpretation keys that assign probability ratings of HIGH, MODERATE, or LOW to ten wetland functions and values for social significance. A Level 1 assessment can be completed in 1-2 hours using the information resources described in Task 1.

Read the instructions for Form B (page B-4) before starting the social significance evaluation. Record your answers to the following questions in the appropriate section of Form B.

3.1 Social Significance Evaluation - Level 1 Assessment

3.1.1 "Red Flags"

1. Are any Federal or State endangered or threatened species (including officially designated "candidate" species) known to use the AA regularly? (uniqueness/heritage)**

2. Is the AA/IA part of an area owned by an organized conservation group or public agency for the primary purpose of preservation, ecological enhancement, or low-intensity recreation? For example, a park, refuge, scenic route, water bank or conservation easement, historic site, marine or estuarine sanctuary, wilderness or primitive area, landmark area, public recreation area, or research natural area. (uniqueness/heritage)

3. Is the AA/IA included in a statewide listing of historical or archaeological sites? (uniqueness/heritage)

4. Is the AA/IA known to have ecological or geological features consistently considered by regional scientists to be unusual or rare for wetlands in the region? (Answer "N" if the type is merely sensitive or threatened, answer "Y" only if the AA is indeed rare among regional wetland types.) Examples include:

   (a) Peat bogs in southern New England.
   (b) Fens in some parts of the Midwest.
   (c) Cypress swamps in northern states.
   (d) Spring communities in various regions.
   (e) Wild rice producing wetlands in the north-central U.S.
   (uniqueness/heritage)

* The AA/IA designation indicates the question should be answered for the AA or IA whichever is appropriate for the evaluation. See page 22 for discussion and delineation of the IA.

** The parenthetical phrase following each question indicates which function or value the question addresses.

5. Does the AA/IA represent most or all of this wetland system (e.g., estuarine, palustrine, lacustrine, etc.) in this locality? (all functions)

6. Have substantial public or private expenditures been made to create, restore, protect, or ecologically manage the AA/IA? Examples include, costs to resource agencies for conservation purchase, seeding, fencing, maintenance, water quality improvements, installation of fishways or impoundments, and improved accessibility. (uniqueness/heritage)

3.1.2 On-Site Wetland Social Significance

7. (Answer "I" if the AA is tidal.) Are there biological communities in the AA that are stressed by saline springs or abnormally high salinities, or are there wetlands contiguous with the AA where this situation exists? (ground water discharge)

8. (Answer "I" if AA is tidal.) Are there point sources of pollution (e.g., hazardous waste sites) or other features of social or economic value (e.g., buildings in incorporated areas, industrial developments, etc.) within or adjacent to the AA that might be inundated by flooding of the AA? (floodflow alteration)

3.1.3 Off-Site Wetland Social Significance

For Questions 9-14, consider the "area specified" to be the same downstream area used during the identification of service areas (see page 24).

9. (Answer "I" if tidal.) Are there features of social or economic value within the 100 year floodplain of the area specified or has a dam, with the primary purpose of flood control, been proposed within 5 miles upstream or downstream of the AA? (floodflow alteration)

10. Are any of the following features present within the area specified?

    (a) Harbors, channels, stormwater detention ponds, or reservoirs that are dredged or cleaned regularly.
    (b) Artificial recharge pits.
    (c) Fish spawning areas that are known to be sensitive to siltation.
    (d) Commercial shellfish beds.
    (e) Areas known to be in violation of Section 401 of the Clean Water Act water quality standards due to suspended solid or toxicant levels. (sediment/toxicant retention)

11. Are there bodies of water, within the area specified, that have been targeted by government agencies as "priority areas" for construction of wastewater treatment facilities or other water quality improvement projects because they violate official water quality standards (e.g., Section 401) for metals, organics, suspended solids, nitrogen, or phosphorous? (nutrient removal/transformation, sediment/toxicant retention)

12. Is there surface water within the AA or the area specified that is a major source of drinking water? (nutrient removal/transformation, sediment/toxicant retention)

13. Are either of the following conditions present in the area specified?

    (a) Bodies of water known to be especially nutrient-sensitive or subject to regular blooms of algae, aquatic fungi, or oxygen-related fish kills.
    (b) Bodies of water known to be in violation of Section 401 water quality standards due to nutrient levels (e.g., nitrogen, phosphorous). (nutrient removal/transformation)

14. Are there swimming/bathing areas that are used frequently in the area specified? (nutrient removal/transformation)

If any of Questions 9-14 were answered "Y," refine your answers using the following procedure:[1]

(a) Determine if condition (1) or (2) below is true. If either of these conditions is true, do not change the original "Y" answer(s) in Questions 9-14 and continue with Question 15. If neither condition (1) or (2) below is true go to (b).

    (1) The land cover of the watershed of the service area closest to the AA is covered by more than 10% **impervious surface.**

    (2) Wetlands and open water (excluding the AA) comprise less than 7% of the watershed of the service area closest to the AA.

(b) Determine if either of the conditions (1) or (2) above is true for the remaining service areas that were identified. If <u>either</u> of the conditions is true for <u>any</u> of the remaining service areas, do not change the original "Y" answer(s) to Questions 9-14 and continue with Question 15. If <u>neither</u> of the conditions is true for <u>any</u> of the remaining service areas, change all original "Y" answers in Questions 9-14 to "N", then continue with Question 15.

<u>Guidelines</u>:

[1] The rational for this refinement is as follows. Wetlands within a service area watershed with extensive areas of impervious surface, and/or few wetland/deepwater areas, are of greater relative importance in terms of providing functions and values than wetlands within a service area watershed with an insignificant area of impervious surface, and/or extensive wetland/deepwater areas

For Questions 15-18, consider the "area specified" to be the area within 2 miles of the AA's perimeter <u>and</u> within the same watershed.

15. (Answer "I" if tidal.) Does a threatened or endangered species that is **wetland-dependent** regularly inhabit the area specified? (ground water discharge)

16. (Answer "I" if tidal.) Are any of the following features present in the area specified?

(a) Sites designated by US Environmental Protection Agency (USEPA) as Sole Source Aquifers or Class II (Special) Ground Waters.

(b) Wells that serve at least 2,500 people (people using the well may be living outside the area specified).

(c) Actively used wells with yields that are greater than the yields shown for this region on the map in Figure 4.

(d) Wells that are within a major alluvial valley (i.e., watershed area of at least 100 square miles) and have yields exceeding 2,500 gallons per minute. (ground water recharge, ground water discharge)

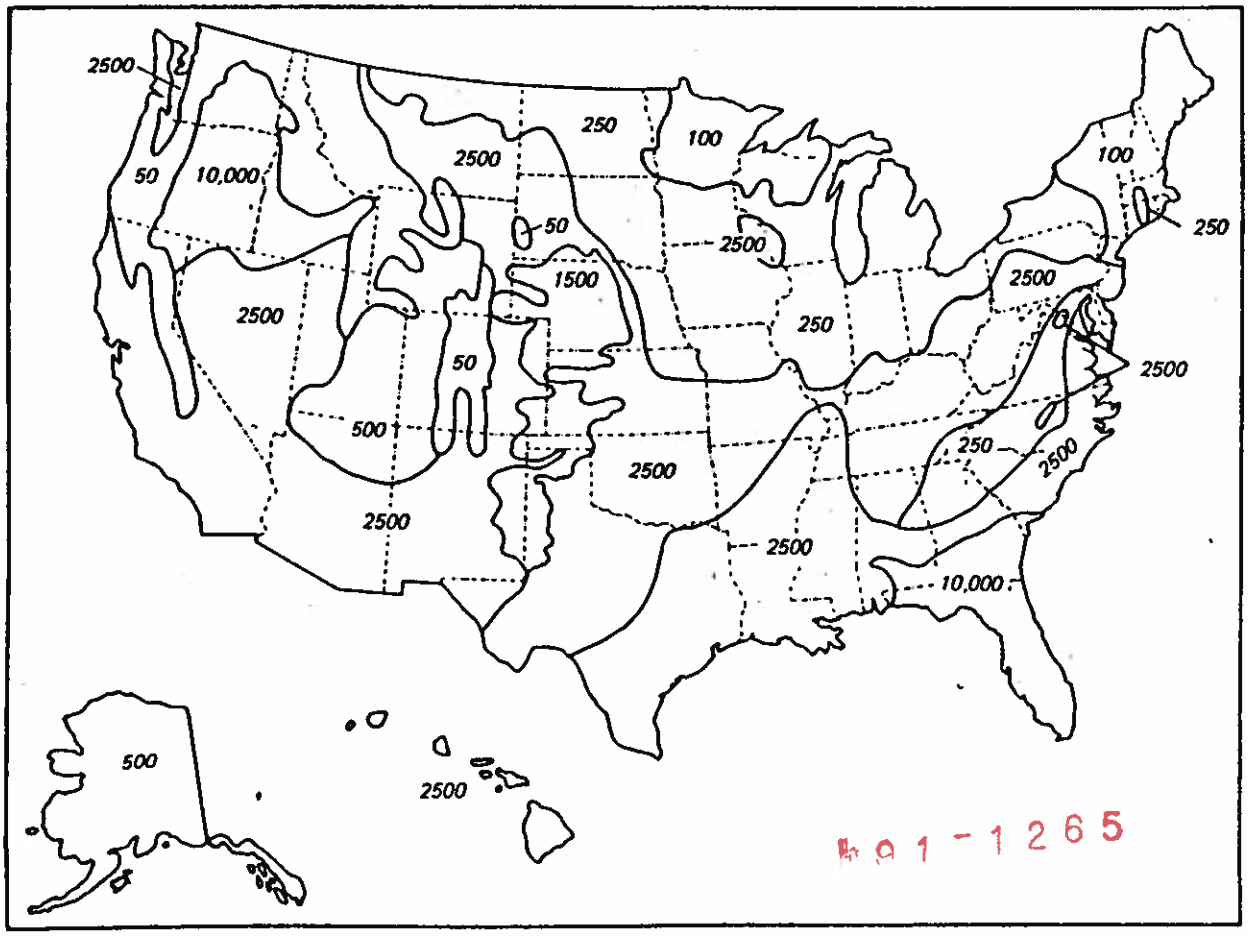

Figure 4. Ground water regions of the United States with exceptional well yields in gallons per min (USGS, 1970)

17. (Answer "I" if tidal.) Do well yields in the area specified surpass the criteria described in Question 16(c) or does the AA empty into an area (within 2 miles) where fish or wildlife use has been critically limited by excessively low water flow or low water level during dry years? (ground water recharge, ground water discharge)

18. (Answer "I" if none of Questions 9-17 were answered "Y.") Is either of the following conditions true for any of Questions 9-17 that were answered yes?

    (a) The AA is the only AA in the watershed of the closest service area.

    (b) The AA is closer to the service area where the service identified in the question is delivered, than any other AA (that could be delineated if desired) in the watershed of the closest downstream service area. For example, in Question 12, the AA is closer to the service area to which drinking water is being supplied than any other AA in the watershed of the closest service area. (all functions)

19. Does the AA/IA act as a buffer to features of social or economic value that are situated in erosion-prone or wave-vulnerable areas? (sediment stabilization)

20. Is any of the following true?

    (a) The AA/IA supports at least one fish species that is on USFWS National Species of Special Emphasis List (Table 1) and is rare or declining in the region.

    (b) The AA/IA has a State or Federal special designation relating to its recognized fishery value.

    (c) There is commercial fishing or shellfishing with the AA/IA. (aquatic diversity/abundance)

21. Is any of the following true?

    (a) The AA/IA supports at least one wildlife species that is on USFWS National Species of Special Emphasis List (Table 1) and is rare or declining in the region.

    (b) The AA/IA has a State or Federal special designation relating to its recognized wildlife value.

    (c) A fee is charged at the AA/IA for consumptive (hunting) or nonconsumptive (observation) use of wildlife. (wildlife diversity/abundance)

22. (Answer "I" if less than 1 acre of open water is present in the AA.) Is the AA in a waterfowl use region of major concern as defined by FWS (Figure 5) or has it received a priority rating in state waterfowl concept plans? (wildlife diversity/abundance)

Table 1. National Species of Special Emphasis (Source: USFWS, unpubl. data)

MAMMALS:
- Grizzly Bear
- Polar Bear
- Black-Footed Ferret
- Sea Otter:
  - Southern
  - Alaskan Population
- Gray Wolf:
  - Eastern
  - Rocky Mountain
  - Mexican
- Pacific Walrus
- West Indian Manatee

BIRDS:
- Brown Pelican:
  - Eastern
  - California
- Tundra Swan:
  - Eastern Population
  - Western Population
- Trumpeter Swan:
  - Interior Population
  - Pacific Coast Population
  - Rocky Mountain Population
- Greater White-Fronted Goose:
  - Eastern Mid-Continent Population
  - Western Mid-Continent Population
  - Tule
  - Pacific Flyway Population
- Snow Goose:
  - Greater,
    Atlantic Flyway Population
  - Lesser,
    Mid-Continent
  - Western Central Flyway Population
  - Western Canadian Arctic Population
  - Wrangel Island Population
- Brant:
  - Atlantic Population
  - Pacific Population
- Canada Goose:
  - Atlantic Flyway Population
  - Tennessee Valley Population
  - Mississippi Valley Population
  - Eastern Prairie Population
  - Great Plains Population
  - Tall Grass Prairie Population
  - Hi-Line Population
  - Short Grass Prairie Population
  - Western Prairie Population
  - Rocky Mountain Population
  - Pacific Population
- Canada Goose (cont.)
  - Lesser (Pacific Flyway Population)
    - Vancouver
    - Dusky
    - Cackling
    - Aleutian
- Northern Pintail
- Wood Duck
- Black Duck
- Mallard
- Canvasback:
  - Eastern Population
  - Western Population
- Ring-Necked Duck
- Redhead
- California Condor
- Osprey
- Bald Eagle:
  - Southeastern Population
  - Chesapeake Bay Population
  - Northern Population
  - Southwestern Population
  - Pacific State Population
  - Alaskan Population
- Golden Eagle:
  - Western Population
- Peregrine Falcon:
  - Eastern Population
  - Rocky Mountain Population
  - Southwestern Population
  - Pacific Coast Population
  - Alaskan Population (Arctic, American and Peal's)
- Attwater's Greater Prairie Chicken
- Masked Bobwhite
- Clapper Rail:
  - Yuma
  - Light-Footed
- Sandhill Crane:
  - Eastern Population-Greater
  - Mid-Continent Population-Lesser
  - Canadian-Greater
  - Rocky Mountain Population-Greater
  - Lower Colorado Population-Greater
  - Central Valley Population-greater
  - Pacific Flyway Population-Greater
- Whooping Crane
- American Woodcock
- Piping Plover

(Continued)

Table 1. (Concluded)

BIRDS
- Least Tern:
  - Interior
  - Eastern
  - California
- Roseate Tern
- White-Winged Dove
- Spotted Owl (Northern)
- Red-Cockaded Woodpecker
- Kirtland's Warbler

REPTILES AND AMPHIBIANS:
- American Alligator

FISH:
- Sockeye Salmon (Alaskan)
- Coho Salmon:
  - Non-Alaskan U.S. Stock
  - Alaskan Stock
- Chinook Salmon
- Cutthroat Trout (Western United States)
- Steelhead Trout
- Atlantic Salmon
- Lake Trout (Great Lakes)
- Striped Bass
- Cui-ui

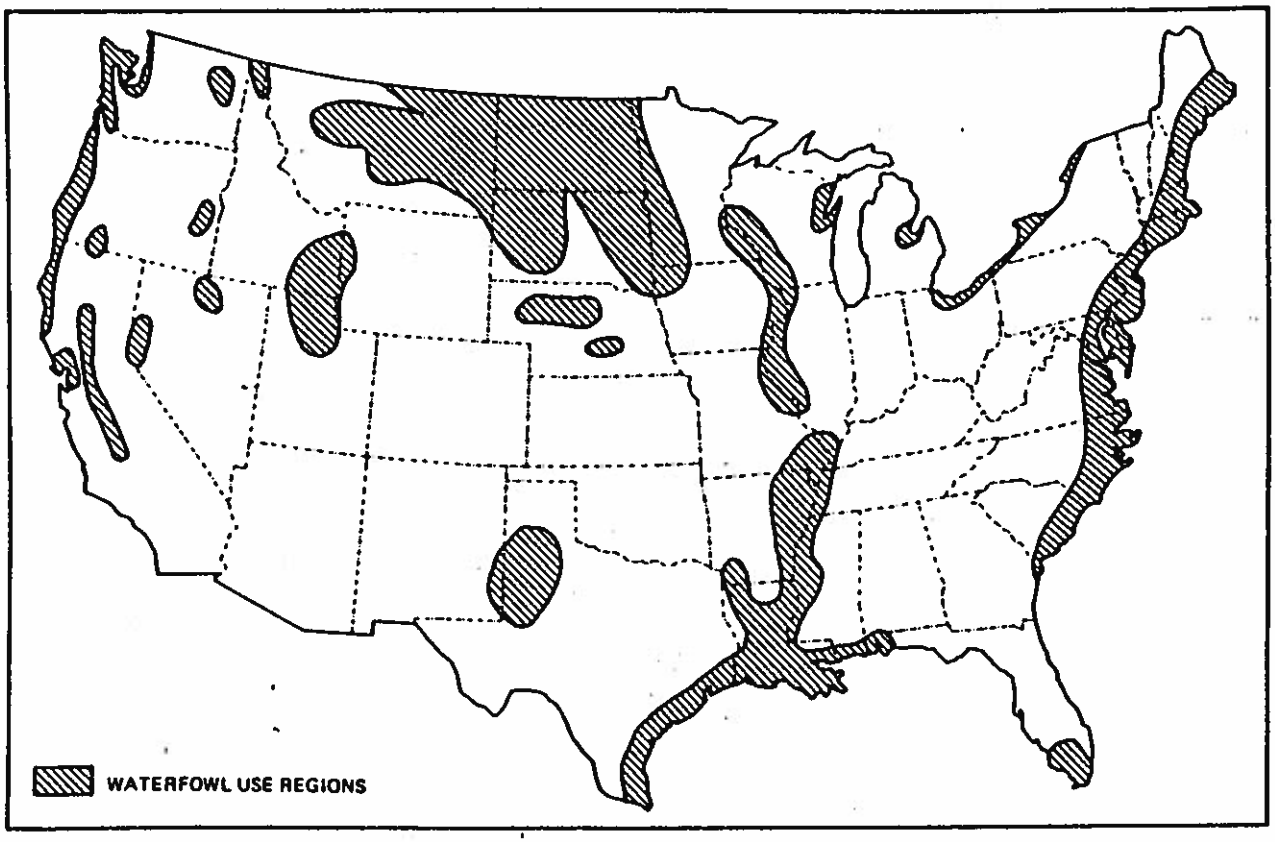

Figure 5. Waterfowl use regions of major concern (Source: USFWS, unpubl. data)

23. Does this AA/IA support plant or animal species with exceptionally narrow habitat requirements or of extremely limited occurrence in this region (e.g., desert pupfish)?[1] (wildlife diversity/abundance, aquatic diversity/abundance, uniqueness/heritage)

Guidelines:

[1] Species for which less than 1% of the other wetlands in the same class (e.g., emergent, forested, scrub/scrub) provide acceptable habitat.

24. (Answer "N" if the AA is less than 5 acres in size.) Is the AA/IA the closest wetland to any nature center, school, camp, college, or similar educational facility, and is it within 2,000 ft of a public road where parking is allowed? (uniqueness/heritage)

25. Is the AA/IA part of, and essential to, an ongoing, long-term environmental research or monitoring program? (uniqueness/heritage)

26. Is the AA and its watershed a "pristine" natural area, in the sense of having no lasting, direct or indirect, human alteration? (uniqueness/heritage)

27. Is the AA/IA used regularly for recreational or consumptive activities, for which opportunities are otherwise locally deficient as recognized by a local or state recreational plan (e.g., SCORP)? (recreation)

28. Is the AA/IA a major public access point to a recreational waterway? (recreation)

29. Is the AA located in an urban area? (all functions)

For Questions 30 and 31, if data for a more restricted region or geographic area are available, substitute it for the state data shown in Table 2.

30. Is the AA located in a state that is losing wetlands at a rate greater than, or equal to, the national annual average of 0.42%/year (Table 2)? (all functions)

31. Is the AA's wetland acreage (expressed as a percent of the acreage of wetlands in the watershed of the closest service area) greater than the annual percentage loss rate of wetlands for the state (Table 2)? For example, if the watershed of the closest service area has 200 acres of wetland and the AA comprises 20 of these acres, then 20/200 = 0.1 and 0.1 x 100 = 10%. The corresponding statewide loss rate (for Alabama) from Table 2 is 0.67%. Therefore, the answer to Question 31 for this example is "Y" since the calculated loss rate is greater than the state loss rate shown in Table 2.[1] (all functions)

Guidelines:

[1] The rational for Question 31 is as follows. This question serves a weighting mechanism in several of the social significance keys. If the wetlands in the AA represent an amount equal to, or lower than, the average state wetland loss per acre then Question 31 has no effect in the social significance keys. However, if the wetlands in the AA represent an amount greater than the average state wetland loss per acre the probability ratings for several functions are elevated.

This completes the first assessment level of the social significance evaluation. Interpret the responses to these questions using the interpretation keys in Section 3.2. or, alternatively, interpret the responses using the computer program described in Appendix E.

When the interpretation is completed three options are possible:

(1) Continue with the second assessment level of the social significance evaluation (page 41), or

(2) Begin the first assessment level of the effectiveness and opportunity evaluation in Section 4.0.

(3) Stop the evaluation at this point and complete Form D: Evaluation Summary.

Table 2. Acreage Criteria for Oases (OA) and Clusters (CL) for Emergent (EM), Scrub-Shrub (SS), and Forested (FO) Vegetation Classes, and Wetland Loss Rates. (Source: USFWS unpubl. data.)

STATE	PALUSTRINE (acres/mile^2)				ESTUARINE (acres/mile shoreline)				LOSS RATE
	EM		SS/FO		EM		SS/FO		(%/year)
	OA	CL	OA	CL	OA	CL	OA	CL	
AL	0.4	2.3	11.1	66.5	7.6	45.6	ND		0.67**
AZ	0.2	1.3	1.2	7.0	----------				0.42***
AR	0.9	5.6	9.1	54.6	----------				1.80
CA	0.3	1.6	0.2	1.0	6.1	36.8	ND		0.42***
CO	0.6	3.7	0.5	2.7	----------				0.42***
CT	0.5	2.9	7.8	47.0	5.9	35.3	1	1	0.35**
DE	0.6	3.8	9.6	57.7	47.1	282.7	1	1	0.81
FL	11.3	67.8	21.7	129.9	27.8	166.5	13	78	0.57
GA	0.7	4.2	15.6	93.6	29.3	175.7	1	1	0.35**
ID	0.2	1.4	0.6	3.8	----------				0.42***
IL	0.2	1.1	2.2	13.0	----------				0.84
IN	0.4	2.6	0.8	5.0	----------				0.67**
IA	1.3	7.6	1.6	9.7	----------				0.67**
KS	0.3	1.9	0.2	0.9	----------				0.42***
KY	0.2	1.1	0.4	2.3	----------				0.67**
LA	5.3	31.8	21.4	128.6	48.8	292.9	ND		0.84
ME	1.6	9.9	8.6	51.7	4.6	27.6	ND		0.35**
MD	0.3	2.0	3.8	22.6	10.3	62.0	1	1	0.35**
MA	1.5	9.1	10.8	64.5	3.0	18.2	1	1	0.35**
MI	3.2	19.2	9.7	58.1	----------				0.67**
MN	8.8	53.0	9.9	59.6	----------				0.67**
MS	1.3	7.9	14.7	88.3	4.8	28.7	ND		1.48
MO	0.2	1.4	1.3	7.7	----------				0.67**
MT	0.8	4.6	0.4	2.3	----------				0.42***
NE	3.5	21.1	1.0	5.9	----------				0.42***
NV	0.2	1.0*	0.1	0.1*	----------				0.42***
NH	0.6	3.6	3.0	17.8	4.3	25.6			0.35**
NJ	0.7	4.1	13.6	81.8	----------				0.35**
NM	0.6	3.7	0.1*	0.1*	----------				0.42***
NY	1.1	6.7	2.7	16.0	6.6	39.9	ND		0.35**
NC	1.7	10.2	19.0	113.9	10.4	62.5	ND		0.65
ND	7.1	42.7	0.5	3.1	----------				0.42***
OH	0.7	4.4	1.2	6.9	----------				0.67**
OK	0.4	2.6	2.5	15.1	----------				0.42***
OR	1.6	9.7	0.8	4.6	8.7	51.9	ND		0.42***
PA	0.3	1.8	1.6	9.4	----------				0.35**
RI	0.5	3.0	7.9	47.1	16.5	99.3	ND		0.35**
SC	1.3	7.8	25.1	150.8	32.4	194.3	1	1	0.35**
SD	3.2	18.9	0.2	1.1	----------				0.42***
TN	0.4	2.3	2.9	17.4	----------				0.67**
TX	1.1	6.4	1.0	6.1	32.9	197.6	ND		0.42***
UT	0.9	5.6	0.4	2.3	----------				0.42***
VT	0.7	4.2	4.1	24.5	----------				0.35**
VA	0.3	1.8	3.3	19.6	14.25	85.5	ND		0.35**

(Continued)

Table 2 (Concluded)

STATE	PALUSTRINE (acres/mile^2)				ESTUARINE (acres/mile shoreline)				LOSS RATE
	EM		SS/FO		EM		SS/FO		(%/year)
	OA	CL	OA	CL	OA	CL	OA	CL	
WA	1.6	9.7	0.8	4.6	1.8	10.7			0.42***
WV	9.2	1.0	0.5	3.2	ND		ND		0.35**
WI	3.2	19.2	9.9	59.3	----------				0.67**
WY	0.7	4.2	0.4	* 2.3	----------				0.42***

* Wetland acreage estimates were not available for this state, so data from nearby states were used. More detailed or accurate data on wetland densities from state or local agencies may be substituted if available. The following formula should be applied to improve the definition of clusters and oases: Oasis = 0.2x; Cluster = x + 0.2x (where x = mean statewide density of wetlands in acres per square mile).

** State data were statistically insignificant, and figures represent regional (flyway) data. Substitute more detailed or accurate data if available.

*** State data were statistically insignificant, and figures represent the national loss rate (0.42%). Substitute more detailed or accurate data if available.

APPENDIX B

Answer Dataset for Horse Pond

s1 - n	s21 - y	3.2 - u	9.3 - u
s2 - y	s22 - y	3.3 - u	10A - u
s3 - n	s23 - n	4.1 - u	10B - u
s4 - n	s24 - n	4.2A - u	10C - u
s5 - n	s25 - n	4.2B - u	10D - u
s6 - n	s26 - n	4.2C - u	10E - u
s7 - n	s27 - n	4.2D - u	10F - u
s8 - n	s28 - n	5.1.1 - u	11(x) - u
s9 - n	s29 - y	5.1.2 - u	11(w) - u
s10 - n	s30 - n	5.2 - u	11(d) - u
s11 - n	s31 - y	blank - u	12A(x) - u
s12 - n	1.1 - u	6.1 - u	12A(w) - u
s13 - n	1.2 - u	6.2 - u	12A(d) - u
s14 - n	1.3 - u	7 - u	12Aa(x) - u
s15 - n	2.1.1 - u	8.1 - u	12Aa(w) - u
s16 - n	2.1.2 - u	8.2 - u	12Aa(d) - u
s17 - n	2.1.3 - u	8.3 - u	12Ab(x) - u
s18 - i	2.2.1 - u	8.4 - u	12Ab(w) - u
s19 - n	2.2.2 - u	9.1 - u	12Ab(d) - u
s20 - n	3.1 - u	9.2 - u	12Ac(x) - u

Answer Dataset for Merrimack River

s1 - y	s21 - y	3.2 - u	9.3 - u
s2 - y	s22 - y	3.3 - u	10A - u
s3 - n	s23 - n	4.1 - u	10B - u
s4 - n	s24 - y	4.2A - u	10C - u
s5 - n	s25 - y	4.2B - u	10D - u
s6 - y	s26 - n	4.2C - u	10E - u
s7 - n	s27 - y	4.2D - u	10F - u
s8 - n	s28 - n	5.1.1 - u	11(x) - u
s9 - y	s29 - y	5.1.2 - u	11(w) - u
s10 - n	s30 - n	5.2 - u	11(d) - u
s11 - y	s31 - y	blank - u	12A(x) - u
s12 - y	1.1 - u	6.1 - u	12A(w) - u
s13 - n	1.2 - u	6.2 - u	12A(d) - u
s14 - y	1.3 - u	7 - u	12Aa(x) - u
s15 - y	2.1.1 - u	8.1 - u	12Aa(w) - u
s16 - y	2.1.2 - u	8.2 - u	12Aa(d) - u
s17 - y	2.1.3 - u	8.3 - u	12Ab(x) - u
s18 - y	2.2.1 - u	8.4 - u	12Ab(w) - u
s19 - n	2.2.2 - u	9.1 - u	12Ab(d) - u
s20 - y	3.1 - u	9.2 - u	12Ac(x) - u

Answer Dataset for Nashua River

s1 - y	s21 - y	3.2 - u	9.3 - u
s2 - y	s22 - y	3.3 - u	10A - u
s3 - y	s23 - n	4.1 - u	10B - u
s4 - n	s24 - y	4.2A - u	10C - u
s5 - n	s25 - y	4.2B - u	10D - u
s6 - y	s26 - n	4.2C - u	10E - u
s7 - n	s27 - y	4.2D - u	10F - u
s8 - n	s28 - y	5.1.1 - u	11(x) - u
s9 - y	s29 - y	5.1.2 - u	11(w) - u
s10 - n	s30 - n	5.2 - u	11(d) - u
s11 - n	s31 - y	blank - u	12A(x) - u
s12 - n	1.1 - u	6.1 - u	12A(w) - u
s13 - n	1.2 - u	6.2 - u	12A(d) - u
s14 - n	1.3 - u	7 - u	12Aa(x) - u
s15 - n	2.1.1 - u	8.1 - u	12Aa(w) - u
s16 - y	2.1.2 - u	8.2 - u	12Aa(d) - u
s17 - y	2.1.3 - u	8.3 - u	12Ab(x) - u
s18 - y	2.2.1 - u	8.4 - u	12Ab(w) - u
s19 - n	2.2.2 - u	9.1 - u	12Ab(d) - u
s20 - y	3.1 - u	9.2 - u	12Ac(x) - u

No 91-1265

Answer Dataset for Pennichuck Brook

s1 - y	s21 - y	3.2 - u	9.3 - u
s2 - n	s22 - y	3.3 - u	10A - u
s3 - n	s23 - n	4.1 - u	10B - u
s4 - n	s24 - n	4.2A - u	10C - u
s5 - n	s25 - y	4.2B - u	10D - u
s6 - y	s26 - n	4.2C - u	10E - u
s7 - n	s27 - n	4.2D - u	10F - u
s8 - n	s28 - n	5.1.1 - u	11(x) - u
s9 - y	s29 - y	5.1.2 - u	11(w) - u
s10 - n	s30 - n	5.2 - u	11(d) - u
s11 - n	s31 - y	blank - u	12A(x) - u
s12 - y	1.1 - u	6.1 - u	12A(w) - u
s13 - n	1.2 - u	6.2 - u	12A(d) - u
s14 - y	1.3 - u	7 - u	12Aa(x) - u
s15 - n	2.1.1 - u	8.1 - u	12Aa(w) - u
s16 - y	2.1.2 - u	8.2 - u	12Aa(d) - u
s17 - y	2.1.3 - u	8.3 - u	12Ab(x) - u
s18 - y	2.2.1 - u	8.4 - u	12Ab(w) - u
s19 - n	2.2.2 - u	9.1 - u	12Ab(d) - u
s20 - n	3.1 - u	9.2 - u	12Ac(x) - u

Answer Dataset for Salmon Brook

s1 - y	s21 - y	3.2 - u	9.3 - u
s2 - y	s22 - y	3.3 - u	10A - u
s3 - n	s23 - n	4.1 - u	10B - u
s4 - n	s24 - y	4.2A - u	10C - u
s5 - n	s25 - n	4.2B - u	10D - u
s6 - n	s26 - n	4.2C - u	10E - u
s7 - n	s27 - y	4.2D - u	10F - u
s8 - y	s28 - y	5.1.1 - u	11(x) - u
s9 - y	s29 - y	5.1.2 - u	11(w) - u
s10 - n	s30 - n	5.2 - u	11(d) - u
s11 - n	s31 - y	blank - u	12A(x) - u
s12 - n	1.1 - u	6.1 - u	12A(w) - u
s13 - n	1.2 - u	6.2 - u	12A(d) - u
s14 - n	1.3 - u	7 - u	12Aa(x) - u
s15 - n	2.1.1 - u	8.1 - u	12Aa(w) - u
s16 - y	2.1.2 - u	8.2 - u	12Aa(d) - u
s17 - y	2.1.3 - u	8.3 - u	12Ab(x) - u
s18 - n	2.2.1 - u	8.4 - u	12Ab(w) - u
s19 - n	2.2.2 - u	9.1 - u	12Ab(d) - u
s20 - y	3.1 - u	9.2 - u	12Ac(x) - u

Answer Dataset for Lovewell's Pond

s1 - n	s21 - y	3.2 - u	9.3 - u
s2 - n	s22 - y	3.3 - u	10A - u
s3 - n	s23 - n	4.1 - u	10B - u
s4 - y	s24 - n	4.2A - u	10C - u
s5 - n	s25 - n	4.2B - u	10D - u
s6 - n	s26 - n	4.2C - u	10E - u
s7 - n	s27 - n	4.2D - u	10F - u
s8 - n	s28 - n	5.1.1 - u	11(x) - u
s9 - n	s29 - y	5.1.2 - u	11(w) - u
s10 - n	s30 - n	5.2 - u	11(d) - u
s11 - n	s31 - y	blank - u	12A(x) - u
s12 - n	1.1 - u	6.1 - u	12A(w) - u
s13 - n	1.2 - u	6.2 - u	12A(d) - u
s14 - n	1.3 - u	7 - u	12Aa(x) - u
s15 - n	2.1.1 - u	8.1 - u	12Aa(w) - u
s16 - n	2.1.2 - u	8.2 - u	12Aa(d) - u
s17 - n	2.1.3 - u	8.3 - u	12Ab(x) - u
s18 - i	2.2.1 - u	8.4 - u	12Ab(w) - u
s19 - n	2.2.2 - u	9.1 - u	12Ab(d) - u
s20 - n	3.1 - u	9.2 - u	12Ac(x) - u

Answer Dataset for Old Ridge Road Wetlands

s1 - n	s21 - y	3.2 - u	9.3 - u
s2 - n	s22 - y	3.3 - u	10A - u
s3 - n	s23 - n	4.1 - u	10B - u
s4 - n	s24 - n	4.2A - u	10C - u
s5 - n	s25 - n	4.2B - u	10D - u
s6 - n	s26 - n	4.2C - u	10E - u
s7 - n	s27 - n	4.2D - u	10F - u
s8 - n	s28 - n	5.1.1 - u	11(x) - u
s9 - n	s29 - y	5.1.2 - u	11(w) - u
s10 - n	s30 - n	5.2 - u	11(d) - u
s11 - n	s31 - y	blank - u	12A(x) - u
s12 - n	1.1 - u	6.1 - u	12A(w) - u
s13 - n	1.2 - u	6.2 - u	12A(d) - u
s14 - n	1.3 - u	7 - u	12Aa(x) - u
s15 - n	2.1.1 - u	8.1 - u	12Aa(w) - u
s16 - n	2.1.2 - u	8.2 - u	12Aa(d) - u
s17 - n	2.1.3 - u	8.3 - u	12Ab(x) - u
s18 - i	2.2.1 - u	8.4 - u	12Ab(w) - u
s19 - n	2.2.2 - u	9.1 - u	12Ab(d) - u
s20 - n	3.1 - u	9.2 - u	12Ac(x) - u

APPENDIX C

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Summary of Evaluation Results for Horse Pond

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	M	L	*
Ground Water Discharge	M	L	*
Floodflow Alteration	M	M	L
Sediment Stabilization	M	M	*
Sediment/Toxicant Retention	M	L	L
Nutrient Removal/Transformation	M	L	L
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	M	*
Wildlife D/A Wintering	*	M	*
Aquatic Diversity/Abundance	M	M	*
Uniqueness/Heritage	H	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated

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Summary of Evaluation Results for Merrimack River

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	H	L	*
Ground Water Discharge	H	L	*
Floodflow Alteration	H	M	L
Sediment Stabilization	M	M	*
Sediment/Toxicant Retention	H	L	L
Nutrient Removal/Transformation	H	L	L
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	M	*
Wildlife D/A Wintering	*	M	*
Aquatic Diversity/Abundance	H	M	*
Uniqueness/Heritage	H	*	*
Recreation	M	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated

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Summary of Evaluation Results for Nashua River

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	H	L	*
Ground Water Discharge	H	L	*
Floodflow Alteration	H	M	L
Sediment Stabilization	M	M	*
Sediment/Toxicant Retention	M	L	L
Nutrient Removal/Transformation	M	L	L
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	M	*
Wildlife D/A Wintering	*	M	*
Aquatic Diversity/Abundance	H	M	*
Uniqueness/Heritage	H	*	*
Recreation	M	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated

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Summary of Evaluation Results for Pennichuck Brook

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	H	L	*
Ground Water Discharge	H	L	*
Floodflow Alteration	H	M	L
Sediment Stabilization	M	M	*
Sediment/Toxicant Retention	H	L	L
Nutrient Removal/Transformation	H	L	L
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	M	*
Wildlife D/A Wintering	*	M	*
Aquatic Diversity/Abundance	M	M	*
Uniqueness/Heritage	H	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated

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Summary of Evaluation Results for Salmon Brook

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	H	L	*
Ground Water Discharge	H	L	*
Floodflow Alteration	L	M	L
Sediment Stabilization	M	M	*
Sediment/Toxicant Retention	M	L	L
Nutrient Removal/Transformation	M	L	L
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	M	*
Wildlife D/A Wintering	*	M	*
Aquatic Diversity/Abundance	H	M	*
Uniqueness/Heritage	H	*	*
Recreation	M	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated

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Summary of Evaluation Results for Lovewell's Pond

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	M	L	*
Ground Water Discharge	M	L	*
Floodflow Alteration	M	M	L
Sediment Stabilization	M	M	*
Sediment/Toxicant Retention	M	L	L
Nutrient Removal/Transformation	M	L	L
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	M	*
Wildlife D/A Wintering	*	M	*
Aquatic Diversity/Abundance	M	M	*
Uniqueness/Heritage	H	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated

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Summary of Evaluation Results for Old Ridge Road Wetlands

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	M	L	*
Ground Water Discharge	M	L	*
Floodflow Alteration	M	M	L
Sediment Stabilization	M	M	*
Sediment/Toxicant Retention	M	L	L
Nutrient Removal/Transformation	M	L	L
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	M	*
Wildlife D/A Wintering	*	M	*
Aquatic Diversity/Abundance	M	M	*
Uniqueness/Heritage	M	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated