

**MAIN BRANCH
MEDUXNEKEAG RIVER WATERSHED
AROOSTOOK COUNTY, MAINE**

FINAL

**WATERSHED PROTECTION PLAN
/ ENVIRONMENTAL ASSESSMENT**

PREPARED AND SPONSORED BY:

**SOUTHERN AROOSTOK SOIL AND WATER CONSERVATION DISTRICT
RR 3, BOX 45, HOULTON, ME 04730**

and the

**HOULTON BAND OF MALISEET INDIANS
(A Federally Recognized Indian Tribe)
BOX 748, BELL ROAD, HOULTON, ME 04730**

ASSISTED BY:

**UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
5 GODFREY DRIVE, ORONO, ME 04473**

and the

**UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
P.O. BOX 640, DURHAM, NH 03824**

JUNE 1993

FLY SHEET

**WATERSHED PROTECTION PLAN / ENVIRONMENTAL ASSESSMENT
MAIN BRANCH MEDUXNEKEAG RIVER WATERSHED
AROOSTOOK COUNTY, MAINE**

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ABSTRACT

This document describes a plan for water quality improvement and watershed protection, within the Main Branch Meduxnekeag River Watershed, through accelerated planning assistance, installation of conservation practices, and initiation of management practices. Recommended measures include diversions, waterways, sediment basins, sub-surface drainage, erosion control structures, road ditch stabilization, waste management systems, planned grazing systems (Voisin), nutrient and sediment control systems (NSCS), and forest management practices. Alternatives considered in the planning process include various combinations of the above measures, as well as 'No Project'. Economic benefits exceed the cost of the proposed plan by a 2.0 to 1.0 ratio. The Sponsors and landowners will pay about 61 percent of the estimated \$3,645,800 project cost.

No significant adverse environmental impacts were identified during the environmental evaluation. Beneficial off-site effects include improved water quality from reduced runoff and delivery of nutrients, pesticides, and sediment to the river and its tributaries. On-site benefits include reductions in lost productivity from erosion; better utilization of pastures, animal waste, and forests; and improved roadside conditions. This entire document serves as the environmental assessment and as the basis for a request for project authorization under the Public Law 83-566 (PL-566) Small Watershed Program.

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 U.S.C. 1001-1008) and according to Section 102(2)c of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 U.S.C. 4231 et seq.)

Prepared by:

Southern Aroostook Soil and Water Conservation District
Leviandou Houlton Band of Maliseet Indians
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of Agriculture, Forest Service

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WATERSHED AGREEMENT

WATERSHED AGREEMENT

between the

Southern Aroostook Soil and Water Conservation District

Houlton Band of Maliseet Indians

(Referred to herein as **Sponsors**)

State of Maine

and the

Soil Conservation Service

United States Department of Agriculture

(Referred to herein as **SCS**)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for works of improvement for the Main Branch Meduxnekeag River Watershed, State of Maine, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to SCS; and

Whereas, there has been developed through the cooperative efforts of the Sponsors and SCS a plan for works of improvement for the Main Branch Meduxnekeag River Watershed, State of Maine, hereinafter referred to as the Watershed Protection Plan / Environmental Assessment (WPP/EA), which WPP/EA is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through SCS, and the Sponsors hereby agree on this WPP/EA and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this WPP/EA and including the following:

1. The SCS will assist the Sponsors in providing technical assistance to land owners or operators to plan and install land treatment practices shown in the WPP/EA. Percentages of technical assistance costs to be borne by the Sponsors and SCS are as follows:

WATERSHED AGREEMENT

Works of Improvement	Sponsors (percent)	SCS (percent)	Estimated Technical Assistance Costs (dollars)
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Land Treatment and Forest Management Practices	0	100	1,160,000
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2. The Sponsors will obtain agreements with land owners or operators to operate and maintain the land treatment practices for the protection and improvement of the watershed.
3. The Sponsors and SCS will each bear the cost of project administration that each incurs, estimated to be \$13,500 and \$121,000, respectively.
4. The costs shown in this WPP/EA are preliminary estimates. Final costs to be borne by the parties hereto, will be the actual costs incurred in the installation of works of improvement.
5. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by SCS in carrying out the WPP/EA is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.
6. A separate agreement will be entered into between SCS and Sponsors before either party initiates work involving funds of the other party. Such agreements will state in detail the financial and working arrangements and other conditions that apply to the specific works of improvement.
7. This WPP/EA may be amended or revised only by mutual agreement of the parties hereto, except that SCS may deauthorize or terminate funding at any time it determines that the Sponsors have failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the Sponsors in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the Sponsors or recoveries by SCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between SCS and the Sponsors having specific responsibilities for the measure involved.
8. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this WPP/EA, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

WATERSHED AGREEMENT

9. The program conducted will be in compliance with the nondiscrimination provisions as contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and in accordance with regulations of the Secretary of Agriculture (7 CFR 15, Subparts A & B), which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex, religion, marital status, or handicap be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.

10. Certification Regarding Drug-Free Workplace Requirements (7 CFR 3017, Subpart F).

By signing this watershed agreement, the Sponsors are providing the certification set out below. If it is later determined that the Sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the SCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

Conviction means a finding of (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including:

(i) all direct charge employees;

(ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and,

and

WATERSHED AGREEMENT

(iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll.

This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of subrecipients or subcontractors in covered workplaces).

Certification:

A. The Sponsors certify that they will or will continue to provide a drug-free workplace by:

- (1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (2) Establishing an ongoing drug-free awareness program to inform employees about:
 - (a) The danger of drug abuse in the workplace;
 - (b) The grantee's policy of maintaining a drug-free workplace;
 - (c) Any available drug counseling, rehabilitation, and employee assistance programs; and
 - (d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.
- (3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);
- (4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will:
 - (a) Abide by the terms of the statement; and
 - (b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later

WATERSHED AGREEMENT

than five calendar days after such conviction;

- (5) Notifying the SCS in writing, within 10 calendar days after receiving notice under paragraph (4) (b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;
- (6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employee who is so convicted:
- (a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
 - (b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.
- (7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6).
- B. The Sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.
- C. Agencies shall keep the original of all disclosure reports in the official files of the agency.
11. Certification Regarding Lobbying (7 CFR 3018) (applicable if this agreement exceeds \$100,000).
- A. The Sponsors certify to the best of their knowledge and belief, that:
- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Sponsors, to any person for influencing or attempting to influence an officer or employee of an agency,

WATERSHED AGREEMENT

Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The Sponsors shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

B. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

12. Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions (7 CFR 3017).

A. The Sponsors certify to the best of their knowledge and belief, that they and their principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

WATERSHED AGREEMENT

- (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph A (2) of this certification; and
- (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.
- B. Where the primary Sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.
13. The Sponsors will acquire, with other than Public Law 83-566 funds, such real property as will be needed in connection with the works of improvement. (Estimated Cost \$ 0.)
14. The Sponsors hereby agree that they will comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 *et seq.* as implemented by 7 CFR Part 21) when acquiring real property interests for this federally assisted project. If the Sponsors are legally unable to comply with the real property acquisition requirements of the Act, it agrees that, before any Federal financial assistance is furnished, they will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the Sponsors agree that they will reimburse owners for necessary expenses as specified in 7 CFR 21.1006(c) and 21.1007.

The cost of relocation payments in connection with the displacements under the Uniform Act will be shared by the Sponsors and SCS as follows:

WATERSHED AGREEMENT

Estimated
Relocation
Payment
Costs 1/
(Dollars)

Sponsors (Percent)	SCS (Percent)	Costs 1/ (Dollars)
Relocation Payments 60.7	39.3	0

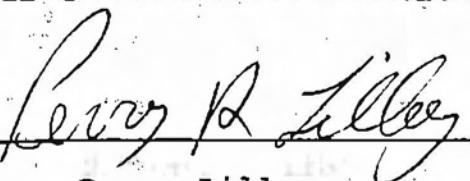
1/ Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost shared according to the percentages shown.

15. The Sponsors will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to State law as may be needed in the installation and operation of the works of improvement.
16. The Sponsors will acquire or provide assurance that landowners or water users have acquired all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

Signature Block

(a) Southern Aroostook Soil and Water Conservation District
RR 3, Box 45
Houlton, ME 04730

By:



Perry Lilley

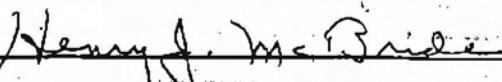
Title:

Chair

Date:

7/12/93

The signing of this WPP/EA was authorized by a resolution of the governing body of the Southern Aroostook Soil and Water Conservation District adopted at a meeting held on

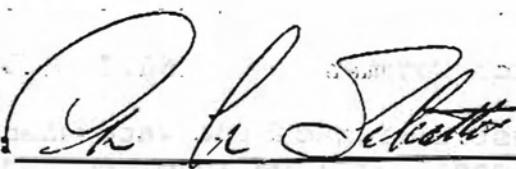


Henry McBride
Secretary/Treasurer

Date: 7/12/93

WATERSHED AGREEMENT

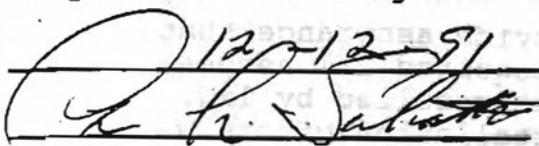
(b) Houlton Band of Maliseet Indians
P.O. Box 748, Bell Road
Houlton, ME 04730

By: 

Clair A. Sabattis
Title: Tribal Chief

Date: 07-12-93

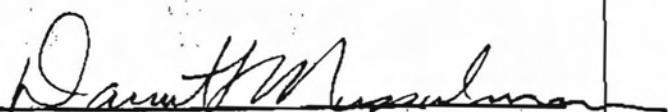
The signing of this WPP/EA was authorized by a resolution of the governing body of the Houlton Band of Maliseet Indians adopted at a meeting held on



Clair A. Sabattis
Tribal Chief

Date: _____

(c) Soil Conservation Service
United States Department of Agriculture
5 Godfrey Drive
Orono, ME 04473

Approved by: 
David L. Musselman
State Conservationist

Date: 7-12-93

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SUMMARY OF WATERSHED PROTECTION PLAN - ENVIRONMENTAL ASSESSMENT

Project Name: Main Branch Meduxnekeag River Watershed

County: Aroostook

State: Maine

Sponsors: Southern Aroostook Soil and Water Conservation District; Houlton Band of Maliseet Indians

Description of Recommended Plan: Installation of enduring and non-enduring practices for water quality improvement and watershed protection.

Resource Information:

Size of Watershed	185,000 acres
Land Use - Forestland	146,200 acres
- Active Cropland	23,900 acres
- Hay and Pastureland	3,900 acres
- Conservation Reserve Program	2,900 acres
- Grassland	100 acres
- Water and Urban Land	8,000 acres
Land Ownership - Private	90 percent
- State and Local	10 percent
Number of Farms - 393	Average Size - 80 acres
Prime and Important Farmlands -	105,000 acres
Threatened and Endangered Species - Bald Eagle	
Cultural Resources - Native American resources at least as old as 8,000 years have been identified.	
The Houlton Band of Maliseet Indians is a project Sponsor.	

Problem Identification: Degraded water quality and deterioration of the soil resource base.

Candidate Plans Considered:

1. No action.
2. Land treatment.
3. Land treatment; road ditch stabilization; waste management systems; and pest, nutrient, and pasture management.
4. Land treatment; road ditch stabilization; waste management systems; pest, nutrient, and pasture management; and nutrient and sediment control systems.
5. Land treatment; road ditch stabilization; waste management systems; pest, nutrient, and pasture management; nutrient and sediment control systems; and forest management.

Project Purposes: Water quality improvement and protection of the soil resource base.

Ditch Crop 46,000
18,

SUMMARY OF WATERSHED PROTECTION PLAN - ENVIRONMENTAL ASSESSMENT

Principal Project Measures:

- * Diversions, waterways, sediment basins, sub-surface drainage, and erosion control structures.
- * Road ditch stabilization.
- * Waste management systems.
- * Pest and nutrient management.
- * Pasture management.
- * Nutrient and sediment control systems.
- * Forest management.
- * Riparian vegetative buffer strips.

Project Costs:

Funds	PL-566 Funds	Other Funds			Total
Items	\$	%	\$	%	\$
Installation Cost	0	0	2,201,300	60	2,201,300
Technical Assist.	1,160,000	32	0	0	1,160,000
Project Administr.	121,000	3	13,500	0	134,500
Project Evaluation	150,000	4	0	0	150,000
Total Project	1,431,000	39	2,214,800	61	3,645,800

Project Benefits:

Evaluation Unit	Dollars	Percent
On-site	595,740	78
Off-site	169,500	22

Cropland Acres Benefitted - 16,730

Hay and Pastureland Acres Benefitted - 3,000

Forestland Acres Benefitted - 30,000

Impacts:

Land Use Changes:

Acres of cropland to permanent cover - 4,300

Natural Resources:	Existing	Improve/Gain	Lost
Wooded Floodplain	6,800 Ac	2,000 Ac	0 Ac
Wildlife Habitat	135,000 Ac	46,730 Ac	0 Ac
Wetlands	68,000 Ac	2,025 Ac	0 Ac
Fisheries	290 Mi	200 Mi	0 Mi
Prime Farmland	26,000 Ac	16,730 Ac	150 Ac

Cultural Resources 1/ Cultural resources include a known 10 acre site owned by the Houlton Band of Maliseet Indians.

Major Conclusions: The project is not anticipated to produce significant adverse impacts that would affect the quality of the human environment. A Finding of No Significant Impact (FONSI) has been prepared.

INTRODUCTION

This Watershed Protection Plan / Environmental Assessment (WPP/EA) summarizes an interagency plan to control agricultural non-point source (NPS) pollution and protect the soil resource base in the Main Branch Meduxnekeag River Watershed, an international watershed important to both the State of Maine and the Province of New Brunswick, Canada.

The WPP/EA summarizes the results of a study to reduce NPS water quality problems identified in Maine's NPS Pollution Assessment Report and NPS Pollution Management Plan, approved under Section 319 of the Clean Water Act of 1977 and called the '319 Report', by reducing nutrient, pesticide, and sediment loading into surface water and to eliminate potential hazardous threats to groundwater. Watershed problems also were identified in SCS's Aroostook County Cropland Management Study (USDA, SCS, 1988), and in several inventories conducted by the SASWCD (SASWCD, 1990a, b; 1987a, b). Interagency coordination will be used to implement a program to provide adequate technical, financial, and educational assistance to solve the problem. The WPP/EA may be supplemented as necessary as goals are modified and new technology is developed.

MAJOR STUDY PARTICIPANTS

Planning was a coordinated effort by several local, state, and Federal government agencies and other interested groups. Those providing basic data, monitoring or survey information, environmental evaluations, technical expertise, and other necessary input include the following:

- * Southern Aroostook Soil and Water Conservation District (SASWCD) (Sponsor),
- * Houlton Band of Maliseet Indians (Sponsor),
- * Agricultural Stabilization and Conservation Service (ASCS), United States Department of Agriculture (USDA),
- * Farmers Home Administration (FmHA), USDA,
- * Forest Service (USFS), USDA,
- * Soil Conservation Service (SCS), USDA,
- * Fish and Wildlife Service (USFWS), United States Department of Interior (USDI),
- * Maine Department of Agriculture, Food and Rural Resources (MDAFRR),
- * Maine Department of Conservation, Forest Service (MFS),
- * Maine Department of Environmental Protection (MDEP),
- * Maine Department of Inland Fisheries and Wildlife (MDIFW),
- * Maine Department of Transportation (MDOT),
- * Maine Soil and Water Conservation Commission (MSWCC),
- * Maine State Historic Preservation Commission (MSHPC),
- * University of Maine Cooperative Extension (UMCE), and
- * St. John - Aroostook Resource Conservation & Development Area (SJARCD).

PROJECT SETTING

The Main Branch Meduxnekeag River Watershed is located in southeastern Aroostook County, Maine approximately 120 miles northeast of Orono (see Location Map, Figure 1). The drainage area to the New Brunswick, Canada border is approximately 289 square miles. It includes Houlton, the Aroostook county seat, and all or parts of 15 neighboring towns -- Amity, Hodgdon, Linneus, Littleton, Ludlow, Monticello, New Limerick, Oakfield, Smyrna, Cary Plantation, Dudley Township, Forkstown Township, Hammond, TA R2 WELS (Township A Range 2, west of east line of state), and TC R2 WELS. The latter six townships are unorganized and under the jurisdiction of the Maine Land Use Regulation Commission (LURC). Nearly 8,000 acres are either urban land or water.

The river drains the southern part of the St. John River Basin subregion, hydrologic unit 01010005 of the U.S. Water Resources Council (USGS, 1974). Maine SCS has divided this area into four smaller watersheds, 030 through 060. The watershed includes waterbodies 152 and 153 of the MDEP and the U.S. Environmental Protection Agency (USEPA).

Many small lakes are located in the upstream parts of the watershed, above the agricultural land. They have no known significant water quality problems. The two largest lakes, Meduxnekeag Lake (1,020 acres; max. depth 49 ft.) and Nickerson Lake (230 acres; max. depth 107 ft.) are on the Main Branch (MDEP, 7/86). The watershed's 68,000 acres of wetlands are mapped by the USFWS, as part of the National Wetlands Inventory.

The South Branch (68.5 mi^2) joins the Main Branch in Houlton before crossing the Canada/U.S.A. boundary. Other major tributaries to the Main Branch include B Stream (45.5 mi^2) and Pearce Brook (8.0 mi^2). Many sections of the 290 miles of stream have important recreational and ecological values including fishing, canoeing, and spawning and nursery habitat for trout and salmon.

The Meduxnekeag River supports a wide range of wildlife, birds, and fish. A partial list of species found in or near the river includes: bear, beaver, brook trout, brown trout, coyote, many species of ducks, whitetail deer, red fox, hare, heron, marten, mink, moose, muskrat, otter, rabbit, and salmon.

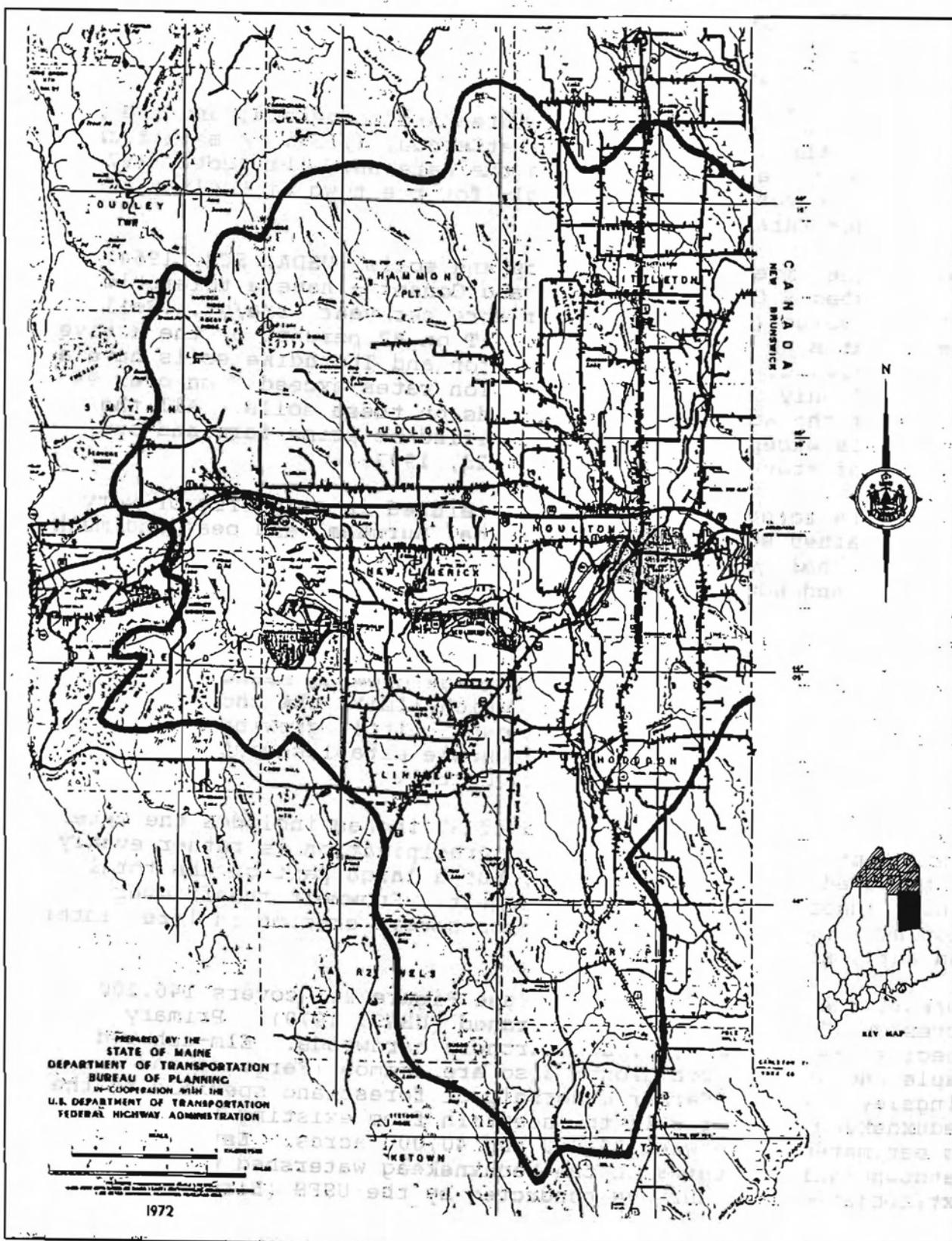
The watershed lies within Maine's Central Highlands physiographic region. Relief is moderate with hills and ridges rising 200 to 500 feet above the valley floors. Elevations vary from 250 feet National Geodetic Vertical Datum (NGVD) at the Canada/U.S.A. boundary to 1120 feet NGVD on Bull Ridge in the town of Hammond.

Bedrock (Osberg et al., 1985) is primarily weakly metamorphosed limestone and calcareous pelite and sandstone of Paleozoic age. Minor igneous intrusions also occur, and an abandoned granite quarry is located at the northeast corner of Meduxnekeag Lake. At least 16 manganeseiferous iron prospects, collectively known as

PROJECT SETTING

FIGURE 1 - LOCATION MAP

Main Branch Meduxnekeag River Watershed, Maine



PROJECT SETTING

the Southern Manganese District, lie within the watershed. Based on limited investigations done during the 1950's, at least 50 million short tons of manganeseiferous iron ore, averaging 7 to 8 percent manganese, were identified (Patterson, 5/93).

Surficial material (Thompson and Borns, 1985; Prescott, 1973, 1971) is primarily calcareous till derived from local bedrock. Some stratified drift and alluvium is found along the valleys. Commercial sand and gravel is mined intermittently at four locations within the watershed. Three are commercial and one is operated by the Town of Houlton (Patterson, 5/93). A significant sand and gravel aquifer traverses the watershed (Prescott, 1973, 1971). It serves as a water supply for the town of Houlton and many private rural residences.

Three of the five predominant cropland soils (USDA, SCS, 1964) in the watershed - Caribou, Colton, and Conant - have a tolerable soil loss value (T) of 3 tons per acre per year (t/a/y). Soil erosion rates on these soils exceed T on 82 percent of the active cropland fields. The shallow Mapleton and Thorndike soils have a T value of only 2 t/a/y. Soil erosion rates exceed T on over 99 percent of the active cropland fields on these soils. All the above soils except Colton are classified as prime farmland or farmland of statewide importance (SCS, 1993).

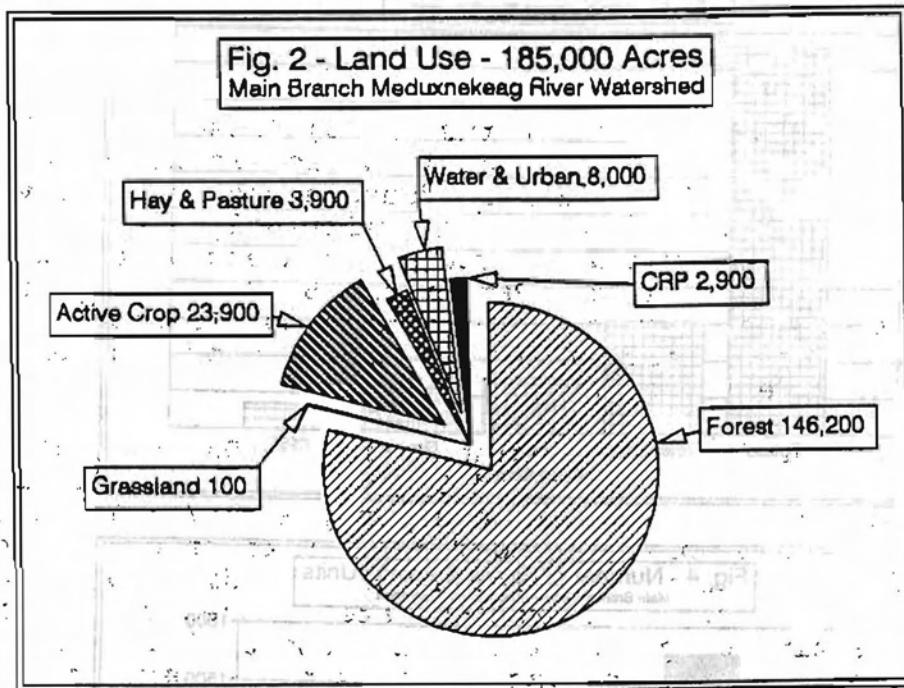
Much of the forested land in the watershed is on poorly or very poorly drained soils (such as Monarda, Burnham, and peat and muck soils) or shallow to bedrock, steep, or stony soils (such as Thorndike and Howland).

The climate is typical of Maine's northern climatic zone, with average daily temperatures ($^{\circ}$ F) ranging from the low teens in January to the upper 60's in July. The growing season is quite short, between 100 and 125 days, which limits the choices of crops or varieties that can be grown. Little growing season is left after the potato harvest to enable establishment of an effective cover crop for erosion control.

The average annual precipitation of 37 inches includes the water equivalent of 95 inches of snow. Precipitation is rather evenly distributed throughout the year, but a large part of the total annual runoff is from spring snowmelt. Snowmelt runoff over sloping, fallow ground often causes severe erosion in late winter and early spring.

Forest, the principal land use (see Figure 2), covers 146,200 acres or 79 percent of the watershed (USGS, 1979). Primary species are spruce, fir, and northern hardwoods. Elm-ash-red maple and aspen-birch groups also are common (Ferguson and Kingsley, 1972). Farmer ownership of forestland specific to the Meduxnekeag is difficult to ascertain from existing records, but is estimated at between 35,000 and 40,000 acres. Estimates of landownership patterns in the Meduxnekeag watershed were extrapolated from surveys conducted by the USFS (Birch, 1986).

PROJECT SETTING



The forest industry owns about half of the forestland in the watershed. An estimated 86,200 acres is in either individual or joint private ownership, with about 52,000 acres held in parcels between 50 and 500 acres.

The primary use of forest industry land is timber production. However, the land also is available for hunting, fishing, and other recreational pursuits. The primary reasons for private forestland ownership in the State of Maine include: esthetic enjoyment, forestland was incidental to ownership, land investments, recreational use (including hunting), farm or domestic use, timber production, and other (Birch, 1986; Maine Tomorrow, 1991).

The Maine Bureau of Public Lands manages 960 acres in Hammond, primarily for timber production, but the land also is made available for similar uses as industry lands.

This is the most intensively farmed watershed in southern Aroostook County (SASWCD 1990a, b). Some 393 farms of all sizes, with 2,443 separate fields, occupy 30,800 acres of agricultural land. Nearly 2,900 acres of Highly Erodible Land (HEL) have been put into grass cover for at least 10 years under USDA's Conservation Reserve Program (CRP).

About 20,000 acres of potatoes, most commonly in rotation with oats, are grown on 212 farms. Fifty-two livestock operations support 2,350 animal units (AU), mostly dairy or beef cattle. Figures 3 and 4 show the number of crop farms by crop grown and the number of livestock farms and AU's by type of animal.

PROJECT SETTING

Fig. 3 - Number of Crop Farms
Main Branch Medomakaw River Watershed

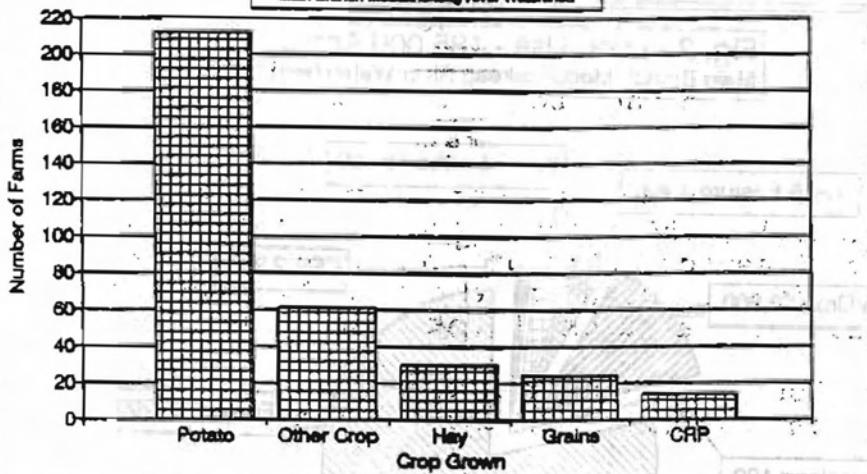
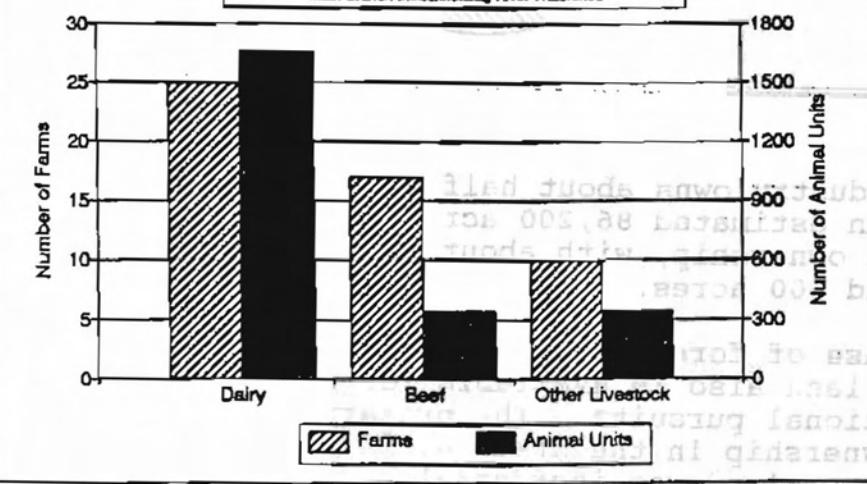


Fig. 4 - Number of Farms & Animal Units
Main Branch Medomakaw River Watershed



When income levels, sales, access to capital, farm size, education levels, management skills, cultural and language barriers, debt load, and family size are considered, an estimated one-third of the watershed's farmers are 'Limited Resource Farmers' (LRF). Individual assistance beyond the usual level provided by SCS will be needed to help this group.

Profiles of two significant categories of LRF's in the watershed follow:

- * LRF livestock farmers. Most are small beef operations of typically about 25 AU's, but some sheep and hogs are found. The majority of people in this group are part-time farmers with low-paying nonfarm jobs. Many are young and new to farming, so they have not developed good management skills. This is often borne out by their low hay and pasture yields. They have difficulty obtaining financing; and

PROJECT SETTING

- * LRF crop (potato) farmers. These farmers are generally older than the non-LRF crop farmers and have smaller acreages in potatoes (40 to 150 acres versus 150 to 500 acres). Their farm machinery is older, smaller, and less efficient.

The LRF's benefit most from low cost practices with quick returns. For example, the planned grazing systems included in the project for livestock LRF's are relatively inexpensive. Economic studies done in Maine have shown that they have positive economic benefits with a quick 'break-even' point.

Cropland LRF's should benefit from the land treatment and technical assistance included in the project.

PROBLEM AND OPPORTUNITY IDENTIFICATION

GENERAL

Several of the watershed's significant problems (SASWCD, 1990a, b; 1987a, b) occur on the farm or in the forest, or **on-site**, including:

- * Loss of productivity and deterioration of the soil resource base due to excessive cropland erosion (Hepler *et al.*, 1980);
- * Lack of adequate riparian buffer zones between cropland and drainageways;
- * Inefficient use of pastures, animal wastes, and pesticides;
- * Inefficient forest management, which leads to an unhealthy forest, low prices for harvested wood, and increased sediment and erosion (MFS, 1991); and
- * Erosion and sedimentation associated with farm roads and ditches.

These problems, which can be treated **on-site**, ultimately cause the most significant **off-site** problem in the watershed:

- * Water quality in the Main Branch Meduxnekeag River and its tributaries is significantly degraded by agricultural and, to a lesser extent, forestland NPS. Recreational use of the river, especially for fishing, has been severely impaired.

According to local residents and biologists the fishery has deteriorated over the years primarily because of NPS pollution, including sediment, nutrients, and pesticides (Basley, 1/91, 4/91). Problems from point sources of years ago - sewage and industrial waste - have been alleviated.

The **on-site** problems mentioned above and others, such as forest harvesting and urban runoff, have resulted in **off-site** problems such as elevated water temperatures, lower oxygen levels, excessive algal growth, loss of fishery habitat, loss of fish spawning and nursery areas, and changes in aquatic life and the food chain.

The overall negative effects of these problems have resulted in the reduction of fishing opportunities, prevented the river from reaching its potential fishery, decreased the visual appeal and esthetics of the river, created a severe underutilization of the area's recreational potential, and caused a loss of revenue from recreational activities.

PROBLEM AND OPPORTUNITY IDENTIFICATION

PROBLEMS

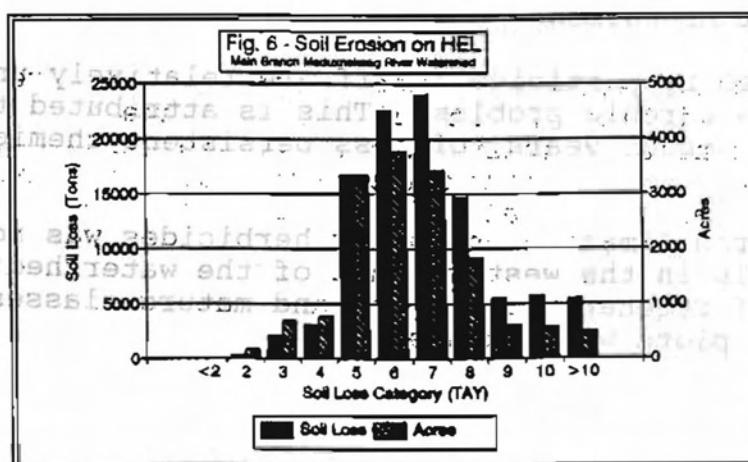
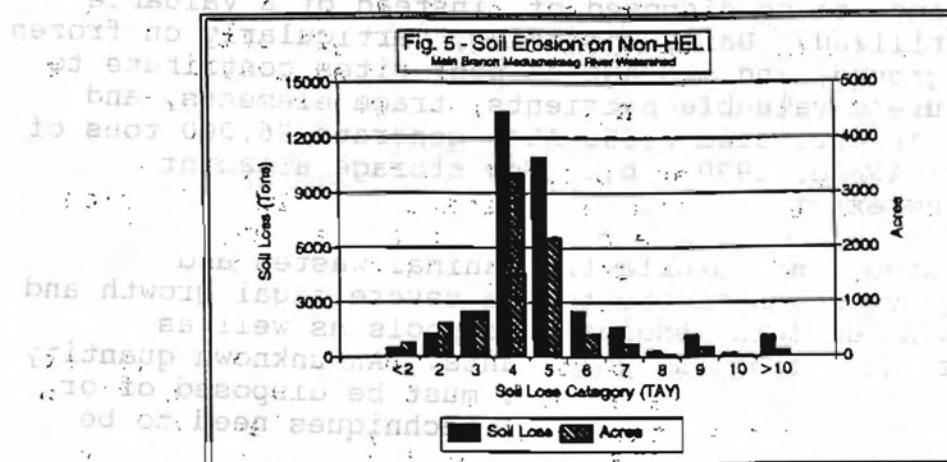
Land Treatment - Primarily Treatable On-site

Loss of Cropland Productivity and Deterioration of the Soil Resource Base

Although soil erosion on many fields has been reduced by the soil and water conservation practices applied over the years, problem areas still exist and work remains.

Soil erosion rates in the watershed exceed the tolerable limit (T) of 3 t/a/y on 82 percent of the active cropland on Caribou, Conant and Colton soils and on 99 percent of the active cropland on Mapleton and Thorndike soils ($T = 2$ t/a/y). Shallow, fragile soils, such as Thorndike, have only 5 to 10 inches of topsoil remaining over bedrock. This makes them difficult to farm and limits their long term usefulness for continued production.

Nearly 18,000 acres of HEL, subject to excessive erosion, remain in either cropland, hay and pasture, or grassland. Soil erosion on Non-HEL and HEL is summarized in Figures 5 and 6.



PROBLEM AND OPPORTUNITY IDENTIFICATION

Lack of Riparian Buffer Zones

Two recent inventories found few fields with an adequate vegetative buffer separating them from a drainageway (SASWCD, 1990a, b). The proximity of farms, pastures, and feedlots to the river and its tributaries results in a very high delivery ratio of NPS pollutants. Fine sediments, attached and soluble chemicals, and nutrients often flow directly into watercourses.

Inefficient Pasture Management

Inefficient use of pastures results in increased expenditures for purchase of bedding, hay, and grain; and in increased labor for handling of rations, bedding, and manure (Burns, 1988).

Although not quantified, inventories found that some streambank erosion in the watershed is associated with uncontrolled livestock access to the streams. This uncontrolled access also deteriorates streamside habitat for wildlife and creates sediment and nutrient sources detrimental to aquatic resources.

Inefficient Nutrient and Animal Waste Management

Animal manure is not used as efficiently as it could be on most livestock farms (Burns, 1988). Some thinking still prevails that manure is a nuisance to be disposed of, instead of a valuable resource to be utilized. Daily spreading, particularly on frozen or snow covered ground, and storage on poor sites contribute to the waste of manure's valuable nutrients, trace elements, and organic matter. An estimated 2,350 AU's generate 36,000 tons of manure per year (SASWCD, 1990a, b). Few storage areas or stacking sites now exist.

Phosphorus, nitrates, and ammonia from animal wastes and commercial fertilizers contribute to the severe algal growth and odor problems in deadwaters, eddies, and pools as well as contributing noxious biological pollutants. An unknown quantity of 'waste' potatoes generated each year must be disposed of or used. Integrated crop management (ICM) techniques need to be initiated on most farm operations.

Inefficient Pest Management

Fish kills caused by pesticide runoff are relatively unknown and not considered a chronic problem. This is attributed to the more careful use, in recent years, of less persistent chemicals by farmers.

Forest damage from Simazine and other herbicides was noted in Oakfield township in the western part of the watershed. From 6 to 69 percent of regeneration, pole, and mature classes of birch trees in sample plots were damaged.

PROBLEM AND OPPORTUNITY IDENTIFICATION

There is a need for education and implementation of integrated pest management (IPM) programs to ensure that pesticides are used only when needed, rather than routinely or habitually (Burns, 1991).

Forest Health

Spruce budworm is a recurrent pest in the boreal forest (USFS and MDC, 1981). The 1992 Maine Forest Health Protection Survey indicates minor infestation in the southeastern part of the Meduxnekeag watershed and heavy infestations in other parts of Aroostook and Piscataquis Counties. The spruce budworm is affecting mainly white spruce and red spruce. It may attack any size tree but damage is usually restricted to mature and over-mature trees. BT, a biologically derived chemical, is commonly used for treatment.

Yellow-headed spruce sawfly infestations were recorded in eastern Aroostook County in 1992. This pest attacks plantations, and solitary and ornamental trees between 3 and 12 feet tall (MFS, 1992b).

White pine plantations are susceptible to white pine blister rust. The white pine weevil affects understory and pole sized trees. Lindane and Dimilin are often used to control the weevil (MFS, 1992b).

The 1992 Northeastern Area Forest Health Report indicates that the gypsy moth, a European pest, is expanding its range toward the watershed.

Some field reconnaissance is being conducted now to verify reports of black ash stress and mortality in Northern Maine, especially along riparian corridors. This situation will be monitored as it could affect recommendations for forest riparian corridor management and may directly affect the economy of the Houlton Band of Maliseet Indians (HBMI).

Forest Harvests

A small woodland owners survey (Maine Tomorrow, 1991) indicated that of those respondents not harvesting their land about 29 percent indicated it was because they had insufficient knowledge of what trees to sell or how to sell. Thirty-two percent of this group said they would harvest if they had a plan done by a professional forester.

The SJARCD developed a plan to provide county residents with more access to professional forestry assistance. A top priority of the project was to work with small, family farm owners to evaluate their forests and design practices to enable them to gain benefits from their woodlands. In the process, a consulting forestry practice would be established and continue after the project was terminated.

PROBLEM AND OPPORTUNITY IDENTIFICATION

The final report of this project indicated that a need for assistance exists among small landowners. They require extensive pre-education and follow-up contacts before they feel comfortable in implementing their recommended plan. This increases the cost of providing this service to landowners and makes it an unattractive market for consultants since recouping their cost requires charges that exceed the ability or willingness of small landowners to pay.

Erosion and Sedimentation Associated with Roads and Ditches

Practices such as farming up and down slope on potato land are contributing to the deposition of sediment in road ditches and the clogging of culverts. Municipalities spend an average \$1,600 per mile annually to remove this sediment. In the winter clogged culverts cause runoff to flow over the roads and form icy conditions, creating extreme safety hazards on the area's highways (Burns, 8/91, 7/91). About 5 miles of farm roads and road ditches have been identified as both sources and pathways that deliver sediment and other pollutants to the river (SASWCD, 1990b, 1987a).

Water Quality - Primarily Off-site Effects

Groundwater

Prescott (1971) first surveyed and tested individual wells for USGS in the 1960's. Measurable quantities of bacteria, nitrates, and pesticides have been documented in some private rural groundwater supplies in the past and may indicate potentially more serious problems (Neil et al., 1989; EPA, 1990).

The town of Houlton recently has developed high yield water supply wells in a large sand and gravel aquifer traversing the watershed. Because some active cropland overlies this aquifer, the groundwater contamination potential remains moderate to high.

Rivers and Streams

This river has been known for providing fishing opportunity for brook trout, brown trout, and occasional salmon. The Maine State Planning Office's River Study lists the Meduxnekeag River as having natural and recreational values of statewide significance; however, these values currently are impaired.

The naturally cold water, high pH (7 to 8) for the area, and physical characteristics of the streams provide the basis of a potentially outstanding fishery. It also acts to keep phosphorus available once in the water environment.

Land clearing practices for agriculture and urban development in the Houlton area have contributed to increased average summer water temperatures and lower oxygen levels, although lower oxygen levels were caused primarily by industrial discharges and organic

PROBLEM AND OPPORTUNITY IDENTIFICATION

wastes from sewage. The MDEP has reported that attempts to monitor the biochemical oxygen demand (BOD) in sewage treatment plant effluent to evaluate its effect on the river have been difficult because the effects are masked by the high NPS loads in the stream during periods of runoff.

The river below Houlton was so severely impacted by domestic and industrial pollution in the late 1950's and 1960's that it was unsuitable salmonid habitat. The streams apparently have recovered some of their potential fisheries after successful efforts to reduce point sources of pollution, but considerable work remains to be done. In the 1990's the river is under protective regulations designed to improve the catch rate and promote a quality angling experience (Basley, 1/91).

NPS pollution is now considered the limiting factor affecting biological conditions in the river and its tributaries. Water quality problems are significant and obvious with impacts on over 200 miles of rivers and streams that are degraded from contaminated runoff and sediment originating on cropland, and to a lesser extent, from forestland.

Comprehensive pre-project monitoring or water quality modeling by SCS was not necessary to document the existence of the overall problem and its cause (SCS, 1/90; Terrell and Perfetti, 1989). Scientific literature associates nutrient- and sediment-rich water in streams with excessive algal growth, low oxygen levels, and clogged substrate (Hickman, 1985).

Water quality and other environmental changes are obvious below the subdrainages where agricultural land and rural road networks are concentrated. It is repeated or chronic loading that has resulted in the long term degradation of the river and stream substrate as aquatic habitat.

Streams turn muddy with suspended sediment during runoff events in all seasons of the year, even during winter thaws. Runoff from spring snowmelt and rain, and fall rain, when over 20,000 acres of cropland is bare, delivers the heaviest sediment loads to the streams. Heavy summer rains, even when there is some ground cover, commonly add sediment loads to streams and may threaten aquatic life with pesticide runoff.

Each year over 9 miles of the Main Branch, from Houlton to Canada, become choked with thick mats of slippery, filamentous green algae during the warm summer months, reducing sport fishing opportunity (Basley, 1/91). This condition was first documented by biologists in the 1960's and 1970's as part of fishing survey reports. The gravelly, cobble substrate of most streams becomes coated and clogged with algae, silt, aquatic growth, or other organic matter both early and late in the growing season. During low water this material is often observed as an encrustation on the rocks. High flows will sometimes scour these surfaces, especially in upstream areas where the gradient increases.

PROBLEM AND OPPORTUNITY IDENTIFICATION

The conditions within the substrate have been observed to be far below the optimum for suitable spawning and nursery habitat because of sediment and organic matter. While these conditions can never be documented by measuring the quality of water, the substrate and conditions within the potential spawning habitat are visibly degraded. Lowered oxygen saturation levels and reduced inter-gravel flow of water affect the survivability of eggs and health of young fish. In addition, the entire food chain is disrupted, adversely affecting the carrying capacity of the stream ecosystem (Chevalier and Carson, 1985).

After June of each year algal growth and low flows preclude the use of lures or streamer flies, essentially eliminating fishing opportunities. Effects on fisheries from the above problems are well documented in literature.

Project justification should be based on priority watersheds, as identified in the state '319 Report'. Measurement of progress and accomplishments should relate to treatment measures installed and improvements in the fisheries (and appearance) of the river as the ecosystem recovers. Improvements should be observable in the last half of the 10 year installation period.

Lakes and Ponds

Drews (Meduxnekeag) Lake in Linnæus covers 1,020 acres and is both a cold water and warm water fishery. The 1991 305(b) Report indicated it is a non-attainment, impaired lake because of organic enrichment and a depletion of dissolved oxygen levels in late summer. Although the listed cause is 'unknown', two sources are suspect. Peat and muck soils surrounding the lake may contribute high inflows of natural organic materials, and land use has intensified in the upper watershed and adjacent to the lake. Landowners are improving many seasonal camps to year-round residences, widening and paving road systems to accommodate increased traffic, and often removing natural lakeside vegetation to provide a more 'residential' environment. These activities have the potential to increase nitrogen, phosphorus, and sediment contributions to the lake and the Meduxnekeag River system.

The Drews Lake Landowner's Association has expressed interest in improving lake water quality. Information on land treatment measures through urban forestry, run-off control, etc. would provide them and other associations with some tools for protecting their quality of life.

Cochrane Lake in New Limerick is an 86-acre lake that supports cold water and warm water fish. One algal bloom has been recorded for the lake. It is listed as a non-attainment lake in the 1992 Maine 305(b) report because of organic enrichment and oxygen depletion in late summer.

PROBLEM AND OPPORTUNITY IDENTIFICATION

Cochrane Lake is one of many small lakes that drain into the main stem of the Meduxnekeag River. Adjacent peat and muck soils provide a natural source of organic materials. Tributary streams also have a high potential for impacts because their watersheds contain cropland, road-stream crossings, residential development, and logging.

Other nearby waterbodies, including Bradley Lake, Glancy Lake, and Green Pond, were not tested for water quality for the 1992 report.

Irrigation

The nutrient assimilation capacity of the river during the critical warm summer months is decreased to some unknown degree by irrigation withdrawals. The reduced flows, which occur at the warmest and driest time of the year, accentuate the growth of algae, and increase the production of organic matter. This can result in altered benthic organism populations and reduced oxygen levels during critical periods.

While the number of farmers currently irrigating is relatively small, the demand for irrigation water is expected to grow because some have expressed an interest in irrigating potatoes and broccoli. MDIFW expects that further reduction of streamflow would be detrimental to the remaining fishery.

OPPORTUNITIES

Streams and headwaters without agricultural activities show little impairment, except for turbidity associated with some forest harvest operations. However, the potential for problems due to land use and forest management changes in the upper watershed is present and will be addressed by accelerated information and education activities. One such change, though not project related, is a sanitary landfill planned by the Southern Aroostook Regional Waste Authority. The 100 acre site is near the headwaters of 'B' Stream on land now owned by Bowater Incorporated.

The HBMI, a Federally-recognized Indian Tribe and a project Sponsor, has acquired about 900 acres of land north of Houlton near the river. The purpose is to create a new HBMI community with its own unique aspirations and identity. Part of the HBMI Master Plan (Maine Tomorrow, 1990) is to practice wise natural resources planning and examine the land's characteristics before undertaking any development activities.

Two overriding principles will be adhered to:

- * Develop a community center where all Maliseets can gather and share common bonds and heritage, including their cultural resources; and

PROBLEM AND OPPORTUNITY IDENTIFICATION

- * Strive to develop and manage its land so development is confined to a particular parcel or parcels that are surrounded by agricultural land and woodland. In this way, the Meduxnekeag River would be a link between parcels and an important recreation corridor.

Their participation in this project affords a unique opportunity for progress toward the achievement of the overall goals of the HBMI Master Plan.

Overall, the project will have a positive impact on the community. It will provide opportunities for economic development, job creation, and improved quality of life. The project will also help to protect natural resources and promote sustainable development. The proposed development will be carefully planned to ensure that it is compatible with the surrounding environment and does not negatively impact the local ecosystem. The project will also help to support local businesses and create jobs for the community. Overall, the project has the potential to bring significant benefits to the community while respecting the natural environment.

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INVENTORY AND FORECASTING

SCOPING OF CONCERNS

The inventory and forecasting phases of this study identified a broad range of socioeconomic and environmental factors that were of primary concern in the watershed. During the initial stages of planning, data was gathered on the status of these resource areas and future conditions without the project were estimated.

Table A lists those factors considered in the scoping process and their perceived significance to project formulation and decision making. Factors with high and medium significance were studied to a detail commensurate with their overall importance and were used to assess conditions, formulate and compare alternatives, and to present impacts of the selected plan.

TABLE A - SOCIOECONOMIC AND ENVIRONMENTAL FACTORS IMPORTANT TO DECISION MAKING

Main Branch Meduxnekeag River Watershed, Maine

SOCIOECONOMIC AND ENVIRONMENTAL FACTORS	SIGNIFICANCE TO DECISION MAKING
Agricultural Economics	High
Agricultural Operations	High
Cultural Resources	High
Erosion and Sedimentation	High
Fishery Resources	High
Forest Resources	High
Recreation	High
Social Resources	High
Visual Resources	High
Water Quality	High
Groundwater	Medium
Insect Vectors	Medium
Land Use	Medium
Prime Farmland	Medium
Water Quantity	Medium
Air and Noise	Low
Floodwater and Drainage	Low
Mineral Resources	Low
Threatened and Endangered Species	Low
Transportation	Low
Wetlands	Low
Wildlife Resources	Low

INVENTORY AND FORECASTING

RECENT INVENTORIES

The Maine Inventory of Non-Cropland Erosion (MINCE) conducted in southern Aroostook County has identified about 5 miles of farm roads and road ditches as both sources and pathways that deliver sediment and other pollutants to the river (SASWCD, 1990b, 1987a).

The Meduxnekeag River is listed in the Maine State Planning Office's Maine Rivers Study as having natural and recreational resource values with statewide significance. It has unique / significant resource values in the following areas: critical / ecological (rare vascular plants), anadromous fishery, and inland fishery. It is not cited under section 1A of the State Subdivision Law or under subsection 480P of the Natural Resources Protection Act as an 'Outstanding River Segment'.

The watershed is also a high priority of the MDEP, Maine's state water quality management agency and is identified in Maine's '319 Report'. State and local officials consider it adversely impacted by agricultural NPS pollution. The river and its tributaries carry large loads of suspended solids and nutrients, and some pesticides and bacteria during periods of heavy runoff.

The inventories of agricultural land conducted by the SASWCD and SCS indicated there were some 2,500 agricultural fields that usually drain directly into intermittent or perennial streams, with no riparian buffer zone (SASWCD, 1990a, b).

A comprehensive sampling and testing program coordinated by state agencies has determined that the groundwater pollution problem is not significant and has decreased since the banning of the pesticide Temik several years ago (Neil et al., 1989).

The SASWCD has prepared a 'Study of Non-Point Agricultural Pollution (SNAP)' which identifies the location, extent, and kinds of agricultural activities causing excessive soil erosion and water quality concerns from sediment, animal manure, and agricultural chemicals (SASWCD, 1987b).

Conservative estimates of the average existing and potential fishery have been tabulated by MDIFW and SCS biologists for all 290 miles of stream in the watershed (Basley, 4/91). Some streams will have higher or lower use. The summary table appears in the Effects of Recommended Plan section of this report.

The USFS and MFS will begin their fourth comprehensive forest inventory next year. This information will be evaluated as it becomes available and program emphasis can be adjusted as necessary.

Maine has required landowners to report timber harvest activity since 1991. Information from the towns of Amity, Cary Plantation, Hammond, Linneus, Littleton, Ludlow, Monticello,

INVENTORY AND FORECASTING

New Limerick, Oakfield, Smyrna, and TA R2 WELS indicate that about 13,600 acres of land was planned for harvest in the 2 year period of 1991 and 1992. This includes 75 sales ranging in size from small sales to clear gardening space or rights-of-way to a 3,000 acre harvest for commercial purposes (MFS, 1992b).

The last USFS landowner survey indicated that 72 percent of the forestland in Maine was owned by parties expecting to conduct some type of harvest on their forestland within the last 10 years (Birch, 1986). This forecast appears to have been accurate. A recent small woodland owners survey (Maine Tomorrow, 1991) indicated that 79.2 percent of private landowners that responded to their survey had harvested wood from some of their woodland within the last 10 years.

Most owners who harvest their forestland do so because it is mature, they need money, they can get a good price, they are clearing land, doing timber salvage or cultural work, or planning for their own or company use. People who do not harvest timber, reason it is too poor quality, their lands have low volumes, they own insufficient area, have immature timber, or there is no market, the price is too low, or they oppose cutting on philosophical grounds (Birch, 1986; Maine Tomorrow, 1991).

EXISTING RESOURCES AND FORECASTED CONDITIONS

Agricultural Operations and Economics

Agriculture is a way of life in the Main Branch Meduxnekeag River Watershed, and it is expected to remain. About 40 percent of the active cropland in the SASWCD is located here. Over 54 percent of the 393 farms are potato farms and 13 percent raise some sort of livestock, predominantly dairy and beef cattle. Based on recent trends, beef production is expected to increase significantly in the next several years. The CRP includes about 16 percent of the HEL in the watershed. This percentage will vary over time, depending on USDA programs.

As a group, crop farmers apply more pesticides and commercial fertilizers than is necessary, thereby reducing profits. This practice is expected to decrease because of economic good sense and increased regulation and education. Lack of appropriate conservation practices and management compounds the problem, but the percentage of farms adopting more modern practices is expected to increase.

Animal waste as a replacement for commercial fertilizer is not utilized to its fullest extent. Cull potatoes have been given away as feed for beef cattle, a symbiotic relationship beneficial to both groups of producers.

INVENTORY AND FORECASTING

Many farms also contain woodlots. The MFS's Stewardship Incentive Program (SIP) is administered through county offices of the USDA, ASCS. SIP provides cost sharing for the preparation and implementation of measures to improve timber, wildlife, water quality, and recreation values on small, private woodlots. The condition of woodlots in the area is expected to improve through participation in the program.

Cultural Resources

This part of North America has been occupied by Native American peoples for thousands of years. Evidence of prehistoric activities at least as old as 8,000 years exists in fields along the river (Cranmer and Spiess, 1993). The Meduxnekeag River has long been a major resource of the HBMI and their ancestors.

The HBMI owns many parcels of watershed land, including cropland and forestland, and is a project Sponsor. Several hundred acres of prime farmland are included in their holdings.

The HBMI is deeply interested in preserving their cultural heritage. Even without the watershed project, it is anticipated that any known or newly discovered cultural resource that is located on their property will be investigated and, as appropriate, preserved in some manner for future generations.

Erosion and Sedimentation

About two-thirds of the total active cropland is HEL, with an average annual erosion rate of 6.4 t/a/y. The other third has a rate of 4.3 t/a/y. Without the project, these rates still are expected to decrease because of recent 'Farm Bills' which mandate that a conservation plan to protect highly erodible cropland be implemented, or government benefits will be lost. Even if the sheet erosion rate decreased to far below T, there would still be a need for sediment basins and NSCS because it is the 'first flush' of runoff that carries significant levels of NPS pollutants to waterbodies. Also, ephemeral and gully erosion, which can contribute large volumes of sediment to watercourses, is not included in the above figures.

Models to assess the delivery of sediments from typical field conditions during the non-growing season have not yet been developed and calibrated for the northern potato culture.

Road and road ditch erosion is expected to decrease overall, since the Maine Department of Transportation is encouraging installation and maintenance in accordance with their manual 'Best Management Practices for Erosion & Sediment Control' (MDOT, 1992).

Local road erosion is difficult to quantify, due to the lack of baseline data and the difficulty of distinguishing between natural and anthropogenic sources.

INVENTORY AND FORECASTING

Transportation systems are a necessary part of forest harvest situations and often are retained to provide access for recreational or other purposes once harvest is completed. They are recognized as a potential source of sediment and nutrient pollution when not properly designed and located (MFS, 1991).

Best management practices (BMP) will vary with the harvest location. Two critical situations include the design and location of roads in steep topography, and the drainage associated with year-round access into wetlands. Many of the forested wetlands in the watershed act as source areas for discharge into the stream system. Temporary roads associated with winter logging do not require modification of the hydrology, however, drainage may accompany roads designed for year-round access. This has the potential to increase organic loads to the aquatic system and decrease baseflow if the drainage area is large.

The most economical means of assessing the cumulative potential for NPS pollution from these sources is by evaluating current air photos. Recent photography was not available for this report, however, air photo coverage is planned for the project period and will be evaluated when it becomes available.

Forest Resources

State and Federal forest management agencies continually monitor natural conditions that can affect water resources. Extensive areas of tree mortality brought on by insects, disease, or climatic factors can result in increases in water temperature, loss of streambank stability, loss of fisheries and wildlife habitat, and increased short-term fire hazards. The need for rapid salvage can affect the economic stability of an area, while chemical and biological treatments may affect water resources. Technical forestry assistance can help anticipate and minimize economic and environmental losses from these factors.

Transportation, harvesting, and chemical spraying are forestry management practices with potential to affect the basin's water quality (MFS, 1991). Forestry-related activities can contribute to NPS pollution when BMP's are not applied to the land.

Training in BMP use is important for foresters, loggers, and landowners. The ability to design and properly locate BMP's on the land is a skill gained by experience. Landowners with infrequent harvests or stand improvement projects may find it difficult to acquire these skills. The availability of professional help and instruction in forestland improvement, timber sale layout and design, and continuing education on the proper use and handling of chemicals is important and should increase the probability of proper BMP use.

INVENTORY AND FORECASTING

The amount of forestland harvested in the watershed is an indirect measure of the potential for effects to water resources. Large changes in harvest activities and markets over the project period are not anticipated. Markets for pulpwood, cordwood, sawtimber, boltwood, and veneer products are available to forest landowners in the Meduxnekeag. Recent establishment of a waferboard industry has expanded local markets for hardwood.

Forest landowners are placing increased emphasis on non-market values for their woodlands but this does not mean they oppose forest harvest activities. Wildlife, esthetic, and water quality objectives are often accomplished through management.

Research indicates that environmental damage from harvest is minimized with professional forestry assistance. Also, residual stands are superior in growth and composition. Economic benefits to landowners vary with the size, value and complexity of silvicultural treatment required (Budelsky *et al.*, 1989; Henley *et al.*, 1988).

Records from the Maine Department of Conservation (MDC) indicate licensed foresters were used on the industry harvests recorded in the project area and rarely used in harvests by private landowners. Statewide in 1991, only 40 percent of harvests occurring on ownerships with less than 1,000 acres used forestry assistance. This increased to 60 percent and 94 percent for ownerships of 1,001 to 5,000 acres and 5,000+ acres, respectively.

A separate survey indicated that small woodland owners indicated they are willing to pay \$7.55 per hour for forestry assistance (Maine Tomorrow, 1991). Consulting foresters charge more like \$25 per hour.

Social Resources

The Houlton area has experienced a decline in population in the recent past. According to the 1990 Census there are 6,613 people in Houlton, down from 8,113 in 1970. This is a decline of 1,500 people, or 18.5 percent in 20 years. Many farms have gone out of business. For example, there are about half as many dairy farms within the SASWCD today as 10 years ago. In the same period the number of potato farms declined about 31 percent.

Unemployment levels have been high for some time. Although not severely depressed, the area has not thrived recently. The estimated one-third of the area's farmers who are LRF's are likely to be either older potato farmers who are struggling to 'make ends meet' using old machinery on small acreages, or younger part-time farmers trying to supplement low off-farm incomes with proceeds from livestock.

Without the project, these trends are expected to continue.

INVENTORY AND FORECASTING

Fishery, Recreational, and Visual Resources, and Water Quality

By far the majority of discussion in the Problems section of this report documents the continuing decline in these resources. Without this project, or assistance from some other program, the trend will continue and might well accelerate.

Groundwater

There is documentation of private, rural, individual water supplies that have tested positive for nutrients or pesticides associated with agriculture (Neil et al., 1989; ERA, 1990). Groundwater supplies are not believed to be at risk in most of this area, although caution and common sense are still advised in the use of nutrients and pesticides, particularly near significant sand and gravel aquifers (Neil et al., 1989).

Insect Vectors

Threats from forest insect pests were identified in the Problems - Forest Health section. Spruce budworm is a major recurrent threat. Spruce budworm infestations occur when large blocks of mature and over-mature timber is available for habitat. These conditions existed across northern Maine, Quebec, and New Brunswick in the 1920's and again in the 1960's. Twenty-five percent of the standing timber of the project area became heavily infested with spruce budworm during the 1960's. Subsequent suppression and salvage activity continued in this area through the 70's and mid-80's leaving large percentages of the area in similar age classes (USFS and MDC, 1981).

Modification of age class distribution across the landscape can mitigate the potential for heavy infestations and their indirect effects on water resources. In addition, many of the stands affected by spruce budworm are approaching an age where management objectives should be defined and improvements made or future social and economic benefits will be foregone as well.

Land Use

Land use acreage has been described previously. The trend is to gradual increases in urban and suburban land at the expense of forest and agricultural land. This project could result in some marginal land remaining in agricultural production over the near term.

Prime Farmland

Four of the five predominant cropland soils are either prime farmland or farmland of statewide importance. Colton is the exception. Practically all project measures will help to arrest the decline in productivity of these soils.

INVENTORY AND FORECASTING

Water Quantity

An increase in demand for irrigation water for potatoes and broccoli may result in additional withdrawals from both surface and groundwaters. Both sources are directly related, since it is groundwater which provides base flow to streams during dry periods. There are no large reservoirs that could provide low-flow augmentation during high demand periods. Without alternative sources of irrigation water, such as pumped storage reservoirs, for farmers who now use the stream and cause reduction of summer flows, increased temperatures and decreased assimilation capacity will continue to impact the river.

The U.S. Army Corps of Engineers (COE) recently has received funding for a 10-year duration irrigation demonstration project in Aroostook County. The results of the study, particularly as they relate to irrigation water sources, are eagerly anticipated.

Alternative sources of water would reduce the adverse impacts of temperature increases, reduced assimilation capacity, and reduced flushing on the river and tributaries during summer base flow, and would protect both the farmers' production and crop quality.

Increasing cropland irrigation is not a purpose of this project.

With the recent increase in irrigation use in the state, there is concern about the long-term sustainability of the water resources. Irrigation is a relatively new activity in Maine, and its impact on the environment is not fully understood. The potential effects of irrigation on water quality, fish and wildlife, and land use are being studied by various agencies and organizations. The results of these studies will help guide future decisions regarding irrigation development in Maine. It is important to remember that irrigation is a tool for agriculture, and should be used responsibly to ensure the long-term health of our water resources and the environment.

Some of the key issues facing irrigation users in Maine include:

- Ensuring sufficient water supplies for irrigation, especially during dry periods.
- Protecting water quality by minimizing nutrient runoff and preventing soil erosion.
- Minimizing environmental impacts, such as habitat loss and degradation.
- Managing irrigation systems efficiently to reduce waste and conserve water.

FORMULATION OF ALTERNATIVES

GENERAL

This project will address the on-site problems related to sediment, nutrient, and chemical pollution from agricultural, residential, and forestland areas. Each problem must be treated at the source to achieve off-site water quality benefits in the watershed's surface and groundwaters, in addition to significant on-site economic and environmental benefits.

Nearly 400 farms and 500 forest landowners need intensive, but voluntary, soil and water conservation plans developed and implemented. This effort requires an objective planning evaluation to enable treatment of the most significant sources of pollution on a farm-by-farm and woodlot basis. The size of an operation does not necessarily correlate with its pollution potential.

SCS uses the 'Total Resource Management' approach to watershed problem-solving. The installation of BMP's as part of 'Resource Management Systems' (RMS) will, by design, improve soil, water, animal, plant, and air resources.

FORMULATION PROCESS

SCS water resource planning activities are to conform to the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)", (USWRC, 1983). The P&G assures the use of proper and consistent planning procedures by all Federal agencies. Among the items included in the P&G are a six-step planning process, and economic and environmental evaluation procedures. SCS used P&G objectives and planning guidelines during formulation of alternatives for this plan.

Under the P&G, systematic formulation of plans assures the evaluation of all reasonable measures. Measures having limited economic or physical feasibility require less detailed development than those with more implementation potential.

Planners formulate alternatives from the most viable measures. They then evaluate them in terms of their problem-solving potential and their beneficial and adverse effects on the four National Environmental Policy Act (NEPA) accounts of National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). Alternatives also are evaluated against four P&G criteria: completeness, effectiveness, efficiency, and acceptability.

'Water resource plans' include structural or nonstructural measures, and also may include land treatment measures. One P&G requirement, unless an exception is granted, is that any 'water resource plan' recommending Federal action is to be the alternative with the greatest net economic benefit consistent

FORMULATION OF ALTERNATIVES

with protecting the Nation's environment. This alternative is called the National Economic Development (NED) Plan.

'Watershed protection plans' that include only land treatment measures, such as this project, also are planned in accordance with P&G procedures. However, selection or identification of the NED Plan is not required for watershed protection plans (USDA - SCS, October 1992).

Land Treatment Measures

Conservation practices that reduce erosion and sedimentation during the fall, winter, and spring will be installed on about 16,730 acres of active cropland. They also will reduce the delivery of pollutants in selected, critical drainages. Practices that already have been proven effective include diversions, waterways, sediment basins, sub-surface drainage, and erosion control structures.

Benefits accruing from these practices include:

- * Improved water quality in the watershed, when combined with other planned measures;
- * Reduced maintenance of rural roads and ditches;
- * Reduced productivity losses due to cumulative, long-term effects of cropland erosion; and
- * Increased yields due to better soil management.

Road Ditch Stabilization

Stabilization will include cleanout, reshaping, regrading, and vegetating of about 5 miles of eroding road ditches in accordance with MDOT BMP's (MDOT, 1992). Plastic or natural fiber matting will provide temporary protection until permanent vegetation becomes established. Problem areas are not contiguous, but are scattered throughout the watershed.

Benefits from these road ditch improvements will include reductions in the amounts of sediment and other NPS pollutants delivered to the receiving waters. Elimination of over-road flows caused by clogged ditches and culverts will result in less hazardous highways during intense storm events and during winter (Burns, 8/91, 7/91).

Waste Management Systems

These systems will vary from simple manure stacking pads to complex manure storage structures or holding ponds, depending on the type and size of farm enterprise involved and the physical characteristics of sites. They allow for storage of agricultural waste during cold weather and until conditions are suitable for

FORMULATION OF ALTERNATIVES

proper field spreading when plants need it. Related runoff control practices are part of the systems.

Benefits include a significant reduction in the delivery of nutrients to receiving waters and savings on commercial fertilizer costs through better manure utilization and management (Burns, 1988). About 25 farms will require systems.

Planned Grazing Systems (Voisin)

These systems involve adoption of the Voisin rational (short duration) grazing system on farms. Animals are rotated among many small, high quality pastures. Areas are not allowed to be overgrazed and have time to return to full growth before grazing resumes. An estimated 50 farms require such systems.

Benefits accrue primarily on-site, and include such items as reduced hay and grain rations, reduced bedding expenses, and reduced labor and manure handling (Burns, 1993, 3/88; Burns and Jones, 9/87).

Nutrient and Sediment Control Systems (NSCS)

These specially designed systems incorporate a combination of practices that may include sediment basins, grass filter areas, wetlands, and deep ponds. They are used in critical drainage areas where it is not practical to eliminate or significantly reduce sediment and nutrients in runoff by management techniques or other means.

Concentrated agricultural runoff is intercepted and treated using physical, biological, and chemical processes. Detailed monitoring of inflow and outflow conducted at demonstration NSCS in other areas of Aroostook County has proved them extremely effective in reducing NPS pollution, even during runoff events in fall, late winter, and early spring.

These systems may have a high initial cost and do not always seem to 'pay' directly to farmers, as does nutrient management. However, when amortized over 25 years, the annual cost per acre protected is affordable. The benefits to society and receiving waters are significant and include reductions in attached and soluble nutrients, sediment, pesticides, bacteria, and organic matter concentrations. Sometimes they are the only choice if water quality related objectives are to be realized. About 50 NSCS are needed.

Riparian Forest Buffers

Forests and forested wetland ecosystems can intercept suspended and dissolved nutrients and sediment, and store, transform, or filter pollutants from runoff before it enter surface waters (Richardson, 1989). Riparian forests can be managed to maximize the ability of these systems to remove NPS pollutants from

FORMULATION OF ALTERNATIVES

forestry, agricultural, and urban sources. Riparian forests have removed 80 to 90 percent of nitrate, 50 percent of phosphorus, and 99 percent of sediments generated from adjacent agricultural fields (Lowrance *et al.*, 1984, 1985).

The Meduxnekeag watershed has roughly 6,800 acres of forested floodplain. The acreage in the headwaters historically has been maintained in forest cover. Riparian land in the interior of the basin is more likely to have been modified by land drainage, pasturing, and tillage. Many riparian areas that were once cultivated have been allowed to regrow into shrub and low value woodlands. Targeting about 2,000 acres of streamside forest in the interior of the basin for restoration, maintenance, and enhancement will result in substantial water quality benefits. The highest priority areas will be crop fields with high sediment delivery rates as identified in the SASWCD watershed inventory (SASWCD, 1990a, b). Buffers will be sized according to USFS specifications (Welsch, 1991). A 100 foot wide buffer occupies about 12 acres of land per mile of shoreline.

Pionke and Lowrance (1991) have recommended that uneven-aged silvicultural systems should be employed in forest buffers to maximize water quality benefits. Trees should be harvested periodically to sustain growth and diversity and remove nutrients captured in tree stems and branches. Multiple objectives, locations, width placement, fencing, and species can be addressed during buffer design (Welsch, 1991).

Technical Assistance, Information and Education

In addition to the measures listed above, technical assistance will be provided for pest management and nutrient management on all farms requesting assistance.

Continued efforts will be made to educate agricultural producers and the public on how their activities impact water quality. Demonstrations of new methods of agronomic and livestock production will be conducted to show how they can minimize the potential for water quality problems.

Foresters can help private landowners establish and manage forest riparian buffers, stabilize highly erodible lands, improve forest health conditions, and prevent pollution from timber harvest activities throughout the project area. This will involve reconnaissance and development of forest management recommendations for 500 landowners on 30,000 acres of land over a 10 year period. Highest priority will be given to landowners with holdings that will benefit water quality and guard soil productivity. The cost of serving these clients will be reduced by coordinating farm and forestland planning activities. On-going outreach and farm planning activities of the SASWCD will serve to identify and refer clients to foresters for technical assistance.

FORMULATION OF ALTERNATIVES

Forestry also provides a means of reducing land use impacts to water resources. A forestry information and education assistance program could inform private non-industrial landowners of the means of achieving water quality improvements through forestry. A large component of this program will be directed to education regarding the existing programs such as the Forestry Incentive Program (FIP), the Stewardship Incentive Program (SIP), the Tree Growth Tax Law, Forest Legacy, and other programs that may provide economic incentives to aid landowners in meeting water quality and other forest resource objectives.

An equally important responsibility will be providing up-to-date information on local zoning ordinances, wetlands and endangered species rules, and mandatory compliance with the State Forest Practices Act, the Natural Resources Protection Act, and the Shoreland Protection Act.

EVALUATION OF ALTERNATIVES

Alternative 1 - 'No Project'

Demand for agricultural and forestry technical assistance currently exceeds supply on farmland and private non-industrial forestlands in the Houlton area. Ongoing USDA programs will not be accelerated, but will continue to address the watershed's problems. No concerted effort will be made to contact non-traditional users of these services who could demonstrate the most water quality benefits from practices. Information and education activities will continue as in the past.

Affected resources will decline in quality with no project. Demand will be met on a first-come, first-served basis. Incentive programs will be underutilized due to lack of technical assistance. Economic and environmental benefits will not be realized.

Alternative 2

This alternative consists of conservation practices such as diversions, waterways, sediment basins, sub-surface drainage, and erosion control structures. Experience in similar watersheds indicates this would eliminate only about 10 percent of the water quality problems from agricultural lands.

The cost of this alternative, including technical assistance and project administration, is estimated at \$1,020,000, of which \$300,000 is for PL-566 technical assistance. The average annual cost, including \$14,300 for operation and maintenance is estimated at \$111,905.

FORMULATION OF ALTERNATIVES

Average annual benefits, which include \$11,460 for elimination of 10 percent of the water quality problems and \$167,300 for reduction of lost productivity due to the long term effect of cropland erosion, are estimated at \$178,760.

Alternative 3

This alternative consists of the conservation practices described in Alternative 2, plus 25 waste storage structures, 50 planned grazing systems (Voisin), and stabilization of 25,000 feet of road ditches.

The cost of this alternative, including technical assistance and project administration, is estimated at \$2,046,300, of which \$650,000 is for PL-566 technical assistance. The average annual cost, including \$20,300 for operation and maintenance, is estimated at \$216,110.

Average annual benefits, which include \$178,760 from Alternative 2, \$22,920 for eliminating 20 percent of the agricultural water quality problems, \$61,200 for better utilization of animal wastes, \$195,000 for better pasture utilization, and \$54,900 for lower road ditch and culvert cleanout costs, are estimated at \$501,320.

Alternative 4

This alternative consists of all the conservation practices and management measures in Alternative 3, plus the installation of 50 NSCS.

The cost of this alternative, including technical assistance and project administration, is estimated at \$2,751,300, of which \$800,000 is for PL-566 technical assistance. The average annual cost, including \$23,840 for operation and maintenance is estimated at \$287,110.

Average annual benefits, which include those of Alternative 3 and an additional \$91,680 in off-site water quality benefits, are estimated at \$593,000.

Alternative 5

Although not required to be identified as such, this alternative maximizes net economic benefits and is the **National Economic Development (NED) Plan** (USWRC, 1983). It also provides the most protection to the watershed's resources and is the **Environmental Quality (EQ) Plan**.

In addition to all the conservation practices and management measures in Alternative 4, this alternative targets non-industrial forest landowners with technical assistance in developing and implementing forest management activities on their land.

FORMULATION OF ALTERNATIVES

It focuses information and education activities within the watershed and seeks ways to make it economically feasible for small landowners to install conservation practices. This will involve development of forestry recommendations on 30,000 acres of land, including 2,000 acres located in riparian areas.

Estimated additional costs include \$36,000 per year for forestry technical assistance and \$50,000 per year for implementing forest management recommendations.

The total cost of this alternative, including \$1,160,000 for PL-566 technical assistance, \$134,500 for project administration, and \$150,000 for project evaluation, is estimated at \$3,645,800. The average annual cost, including \$29,450 for operation and maintenance, is estimated at \$378,315.

Average annual benefits, including all those of Alternative 4 plus \$172,240 attributable to forestry practices, are estimated at \$765,240.

COMPARISON OF ALTERNATIVE PLANS

A comparison of alternative plans is displayed in Table B.

PROJECT INTERACTION

In July 1990 the USFS approved \$5,000 for a 3-year demonstration project to install half-acre Norway spruce riparian buffer strips between cropland and drainageways at two locations along the river. Funding is being sought for the installation of sediment catchments, shallow wells, and lysimeters. These measures will be monitored for 3 years to assess the filtering capacity of the plantations. Four more demonstration buffers were installed in the summer of 1992. Similar measures are planned as part of this PL-566 watershed project.

The MDIFW provided fishery surveys and projected future use.

RISK AND UNCERTAINTY

Risk and uncertainty are characteristic of most aspects of water resources planning and implementation. Possible sources of risk and uncertainty could include estimates of the effects of treatment within a given period, landowner participation in the program, and costs and benefits of the project measures. The possibility exists that planning estimates could vary from post-project figures.

TABLE B¹ - SUMMARY AND COMPARISON OF CANDIDATE PLANS

Main Branch Meduxnekeag River Watershed, Maine

<u>Effects</u>	<u>Alternative 1 (No Project)</u>	<u>Alternative 2</u>	<u>Alternative 3</u>	<u>Alternative 4</u>	<u>Alternative 5 (Recommended, NED, EQ)</u>
Measures	None	Land treatment	Land treatment Pest, nutrient, and pasture management	Land treatment Pest, nutrient, and pasture management	Land treatment Pest, nutrient, and pasture management
			Waste management systems	Waste management systems	Waste management systems
			Road ditch stabilization	Road ditch stabilization	Road ditch stabilization
				Nutrient and sediment control systems	Nutrient- and sediment control systems
					Forest management
Project Investment	\$0	\$1,020,000	\$2,046,300	\$2,751,300	\$3,645,800
NED ACCOUNT					
Adverse					
Ave. Annual Beneficial,		\$111,905	\$216,110	\$287,110	\$378,315
Ave. Annual Net Beneficial		\$178,760	\$501,320	\$593,000	\$765,240
		\$66,855	\$285,210	\$305,890	\$386,925

TABLE B - SUMMARY AND COMPARISON OF CANDIDATE PLANS (Cont'd)

Main Branch Meduxnekeag River Watershed, Maine					
Effects	Alternative 1 (No Project)	Alternative 2	Alternative 3	Alternative 4	Alternative 5 (Recommended, NED, EQ)
EQ ACCOUNT					
Beneficial	No effects	Reduction of erosion and sedimentation on cropland to tolerable levels	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
Harmful		No effect on road and ditch erosion and sedimentation	Reduction of erosion and sedimentation of roads and ditches	Same as Alternative 3	Same as Alternative 3
Neutral		Est. 10 percent improvement in fishery	Additional 10 percent improvement in fishery	Fishery at full potential	Same as Alternative 4
Wetlands		Very slight decrease in nutrient and sediment delivery	Slight decrease	Significant reductions in phosphorus, nitrogen, and sediment from cropland	Slight additional decrease from forestland
Forests		No effect on forest health	No effect	No effect	Improved forest health and wildlife habitat

TABLE B - SUMMARY AND COMPARISON OF CANDIDATE PLANS (Cont'd)

Main Branch Meduxnekeag River Watershed, Maine

<u>Effects</u>	<u>Alternative 1 (No Project)</u>	<u>Alternative 2</u>	<u>Alternative 3</u>	<u>Alternative 4</u>	<u>Alternative 5 (Recommended, NED, EQ)</u>
Adverse	Excessive cropland erosion and sediment delivery Excessive road and ditch erosion and sedimentation Fishery impaired by nutrients, sediment, low oxygen levels, elevated temperatures, and algae Excessive delivery of phosphorus, nitrogen, and sediment from cropland and forestland Unhealthy forest needing management				
Budgetary					
Ecological					
Economic					
Political					
Regulatory					

TABLE B - SUMMARY AND COMPARISON OF CANDIDATE PLANS (Cont'd)

TABLE B - SUMMARY AND COMPARISON OF CANDIDATE PLANS (Cont'd)

Main Branch Meduxnekeag River Watershed, Maine

<u>Effects</u>	<u>Alternative 1 (No Project)</u>	<u>Alternative 2</u>	<u>Alternative 3</u>	<u>Alternative 4</u>	<u>Alternative 5 (Recommended, NED, EQ)</u>
OSE ACCOUNT					
Beneficial	No effects	Slight improvement in esthetics	Significant improvement in esthetics	Great improvement in esthetics	Same as Alternative 4
Harmful		Modest help in preserving agriculture's infrastructure	Significant help in preserving agriculture's infrastructure	Same as Alternative 3	Great help in preserving agriculture's infrastructure
Neutral		Slight help in stabilizing area's declining population	Significant help in stabilizing area's declining population	Same as Alternative 3	Great help in stabilizing area's declining population
WATER USE					
Beneficial		Improve LRF's economics	Same as Alternative 3		Significant improvement
Harmful		Increase in healthy outdoor recreation	Significant increase in healthy outdoor recreation		Great increase in healthy outdoor recreation
Neutral		Improve road safety	Same as Alternative 3		Same as Alternative 3
WATER POLLUTION		Decrease chance of drinking water pollution	Same as Alternative 3		Same as Alternative 3
ELECTRICITY					
Beneficial					
Harmful					
Neutral					

TABLE B - SUMMARY AND COMPARISON OF CANDIDATE PLANS (Cont'd)

Main Branch Meduxnekeag River Watershed, Maine

<u>Effects</u>	<u>Alternative 1 (No Project)</u>	<u>Alternative 2</u>	<u>Alternative 3</u>	<u>Alternative 4</u>	<u>Alternative 5 (Recommended, NED, EQ)</u>
Adverse	Poor visual esthetics Loss of agricultural infrastructure Declining population Poor LRF economics Declining outdoor recreational opportunities Hazardous roads and ditches Impaired water quality				
Benefit					
Costs					
Effects					

TABLE B - SUMMARY AND COMPARISON OF CANDIDATE PLANS (Cont'd)

TABLE B - SUMMARY AND COMPARISON OF CANDIDATE PLANS (Cont'd)

Main Branch Meduxnekeag River Watershed, Maine

<u>Effects</u>	<u>Alternative 1 (No Project)</u>	<u>Alternative 2</u>	<u>Alternative 3</u>	<u>Alternative 4</u>	<u>Alternative 5 (Recommended, NED, EQ)</u>
RED ACCOUNT					
Positive Effect Average Annual Region	\$178,760	\$0	\$501,320	\$593,000	\$765,240
Rest of Nation	\$0	\$0	\$0	\$0	\$0
Negative Effect Average Annual Region	\$80,615	\$147,885	\$187,595	\$241,380	\$241,380
Rest of Nation	\$31,290	\$68,225	\$99,520	\$136,935	\$136,935

NOTES:

Interest Rates - All alternatives evaluated at 8 1/4 percent interest.

Period of Analysis - All plans evaluated over 25 years.

Price Levels - 1993 price levels.

FORMULATION OF ALTERNATIVES

Benefits are based on interviews with knowledgeable persons, experience in nearby watersheds, and studies conducted for Maine's conservation operations program (Burns, 1993, 1991, 8/91, 7/91, 1988, 3/88; Burns and Jones, 9/87). Costs are based on experience with similar projects and on annual conservation practice cost surveys conducted by the SASWCD for all USDA agencies.

Care was taken in obtaining the information, judging its validity, analyzing it, and then making the best estimates possible. The results are believed to be accurate and valid for project planning that, of course, is always based on estimates.

Based on public participation efforts during planning, and experience with similar operational projects, the participation rate is expected to be 80 to 100 percent. A 75 percent participation rate would assure project success.

RATIONALE FOR PLAN SELECTION

The Recommended Plan will achieve an acceptable level of water quality improvement and protection of the soil resource base, and will increase the recreational use of the watershed. It has the added advantage of meeting the national objective of maximizing net economic benefits and is the NED Plan.

Alternative		Net Benefit - Estimated			Net Benefit - Maximum	
Benefit	Cost	Net Benefit	Net Benefit	Net Benefit	Net Benefit	Net Benefit
Water Quality Improvement	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
Soil Resource Protection	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
Recreational Use	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
Total	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000

RECOMMENDED PLAN

PURPOSE AND SUMMARY

The Recommended Plan (Alternative 5) includes runoff control practices; waste management systems; technical assistance for pest management, nutrient management, and forest management; planned grazing systems (Voisin); road ditch improvements; and NSCS, all to improve the water quality and protect the soil resource base within the watershed.

PLAN ELEMENTS

The accelerated program recommended will supplement the ongoing conservation program and will be initiated by project action. A landuser's participation in the program is strictly voluntary. SCS must concur on what practices will be installed. Those installed with cost share money from the ASCS Agricultural Conservation Program (ACP) must comply with the SCS Field Office Technical Guide (SCS, 1993).

Runoff control practices to be planned on 16,730 acres of cropland will include the following:

Diversions	25,000 feet
Grassed Waterways	50 acres
Sediment Basins	250 each
Sub-surface Drainage	100,000 feet
Erosion Control Structures	150 each

Resource management systems (RMS), which consist of a combination of BMP's, will be applied. In addition to the conservation practices listed above for runoff control, the RMS may also include:

Nutrient Management
Pest Management (IPM)
Pasture and Hayland Management
Forest Management
Nutrient and Sediment Control Systems
Waste Storage Structure
Planned Grazing System (Voisin)
Critical Area Planning
Filter Strips (Riparian Buffer Strips)
Livestock Exclusion (Fencing)

Water quality problems can still exist though erosion might be brought to tolerable limits from a maintenance of production standpoint. An estimated 50 NSCS will be needed to trap suspended phosphorous laden sediment particles and other nutrients. These will average from 1.5 to 3.5 acres in size and will control drainage areas up to about 250 acres. The estimated average cost is \$7,500 per site including land rights.

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In addition, it is estimated that 25 waste storage structures at \$10,000 each and 50 planned grazing systems (Voisin) at \$2,000 each will be required.

Approximately 25,000 feet of road/ditches will need stabilizing, at a price of \$5.00 per foot.

Buffer strips and livestock exclusion will be incorporated as required to improve water quality. Each conservation plan will identify areas needing treatment. Treatment will include planting trees and shrubs along drainageways and streams, excluding livestock from intermittent and perennial streams (with all associated practices, including fencing), establishment of necessary buffer or riparian zones (Welsch, 1991), and creating or restoring small wetlands in cooperation with the USFWS, etc. These measures will reduce sediment and nutrient contributions to waterbodies in the watershed.

This alternative also targets non-industrial forest landowners with technical assistance in developing and implementing forest management activities on their land. It focuses information and education activities within the watershed and seeks ways to make it economically feasible for small landowners to install conservation practices.

This will involve development of forestry recommendations on 30,000 acres of land including 2,000 acres located in riparian areas adjacent to agricultural operations. Implementation costs are estimated at \$50,000 per year.

Technical assistance, including surveys, conservation planning, and application, to be provided by USDA will vary by year, but range from 2 to 4 staff years per year. Financial assistance for recommended measures will be borne by a mix of ASCS ACP and Water Quality Incentive Program (WQIP) funds, State of Maine funds, and other local (non-PL-566) funds. Assistance is provided only when it contributes to identified project objectives and does not result in adverse impacts to significant concerns.

Cultural resource assessments will be an integral part of conservation planning and application. SCS will follow the procedures established in the General Manual, Chapter 420, Part 401 to complete the identification and evaluation of any cultural resources that are discovered. Protection of existing cultural resources will involve close cooperation of the Maliseets, the Bureau of Indian Affairs (BIA), SCS, and the MSHPC. SCS will take appropriate action to avoid adverse effects to any significant resources, including the known sites.

The ongoing conservation program consists of technical assistance to landowners under the SCS's Conservation Operations Program and financial assistance under ASCS's ACP.

Services cost is \$2,000 per site including land survey.

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PERMITS AND COMPLIANCE

Installation of some of the planned measures may require permits from Federal, state, or local government agencies. The responsibility for the procurement of all permits rests with the project Sponsors or individual landowners, not with the Federal government.

Most of the measures proposed for installation will not require a Department of the Army '404' permit because they are exempt by reason that they are either 'minor drainage' or 'upland soil and water conservation practices,' as defined in 33 CFR 323.4. However, should any work involve wetlands, stream diversion, or road construction, it will require a '404' permit or a determination of categorical exclusion for the proposed action, as well as a State of Maine Water Quality Certification. Examples are the NSCS, which involve disturbance of up to about 3 acres of land and may be sited near streams or wetlands, and any wetland restoration projects of the USFWS or USFS.

MDEP personnel will evaluate each site within incorporated towns and determine the need for permits on an individual basis. Some measures within the six unorganized townships may require permits from LURC. LURC zoning maps and Land Use Districts and Standards will be consulted to determine when permits may be required.

Several state regulations apply to forestry activities, including:

- The 1989 Forest Practices Act (MFS, 1992a) requires landowners who plan to harvest forestland notify the State. Special restrictions apply to clearcutting practices.
- The State Shoreland Zoning Act has provisions of concern regarding forest management activities.

Both state and Federal forestry incentive and cost share programs have provisions that must be adhered to in order to receive benefits. Local towns may have ordinances or other provisions related to harvesting.

SCS will consult with the State Historic Preservation Officer (SHPO) and, as appropriate, with the Advisory Council on Historic Preservation (AChP) before the installation of any practice that will require ground disturbance and thus may have an adverse effect on cultural resources.

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COSTS

The total estimated cost of implementing the recommended plan is \$3,645,800, of which \$2,214,800 will be borne by other sources and \$1,431,000 will be borne by PL-566 funds. Table 1 displays a further breakdown of estimated costs.

INSTALLATION AND FINANCING

Implementation of needed soil and water conservation practices will depend on the availability of cost sharing funds from ASCS or other sources. This will especially apply to practices that only provide off-site benefits, without direct financial gain to the farmers.

Existing program limits based on percentages and ACP limits per farmer will be factors that limit the success of achieving the objectives. All cost shared programs approved by the Maine Agricultural Stabilization and Conservation Committee will be included in this effort.

Water quality measures will be installed voluntarily by land users who will enter into Long-Term Agreements with the SASWCD and ASCS. Individual plans will be prepared for all voluntarily participating land users whose activities impact project goals. Plans will be developed in accordance with the SCS National Conservation Planning Manual. The planned installation sequence is shown in Table C.

SCS field personnel have received cultural resources awareness training. If potentially significant cultural resources are discovered during construction, the SHPO, and the Departmental Consulting Archeologist of the Department of Interior, or the ACHP, will be notified. Measures will be taken to protect or recover significant information from the resources discovered.

The Sponsors have analyzed their financial needs and have arranged that funds will be available when needed for the installation, operation, and maintenance of the planned measures. Installation costs will be shared as shown in Figure 7. The Sponsors and landowners will pay approximately 61 percent of the total project cost, now estimated at \$3,645,800.

Assistance to be furnished by SCS for carrying out the project is contingent upon the appropriation of funds for this purpose.

RECOMMENDED PLAN

TABLE C - PLANNED INSTALLATION SEQUENCE

Main Branch Meduxnekeag River Watershed, Maine

Year	Items	PL-566 Funds (\$)	Other Funds (\$)	Total Funds (\$)
First	Financial Assistance	139,000	300,500	300,500
	Technical Assistance	139,000	0	139,000
	Project Administration	16,800	2,000	18,800
	Project Evaluation	4,500	0	4,500
	Subtotal	160,300	302,500	462,800
Second	Financial Assistance	173,500	575,700	575,700
	Technical Assistance	173,500	0	173,500
	Project Administration	20,200	2,000	22,200
	Project Evaluation	7,500	0	7,500
	Subtotal	201,200	577,700	778,900
Third	Financial Assistance	170,500	408,450	408,450
	Technical Assistance	170,500	0	170,500
	Project Administration	20,200	2,000	22,200
	Project Evaluation	10,500	0	10,500
	Subtotal	201,200	410,450	611,650
Fourth	Financial Assistance	137,500	300,500	300,500
	Technical Assistance	137,500	0	137,500
	Project Administration	20,200	2,000	22,200
	Project Evaluation	13,500	0	13,500
	Subtotal	171,200	302,500	473,700
Fifth	Financial Assistance	137,000	160,800	160,800
	Technical Assistance	137,000	0	137,000
	Project Administration	16,800	1,400	18,200
	Project Evaluation	16,500	0	16,500
	Subtotal	170,300	162,200	332,500
Sixth	Financial Assistance	129,000	150,250	150,250
	Technical Assistance	129,000	0	129,000
	Project Administration	10,000	1,000	11,000
	Project Evaluation	19,500	0	19,500
	Subtotal	158,500	151,250	309,750
Seventh	Financial Assistance	111,500	101,700	101,700
	Technical Assistance	111,500	0	111,500
	Project Administration	6,600	1,000	7,600
	Project Evaluation	19,500	0	19,500
	Subtotal	137,600	102,700	240,300

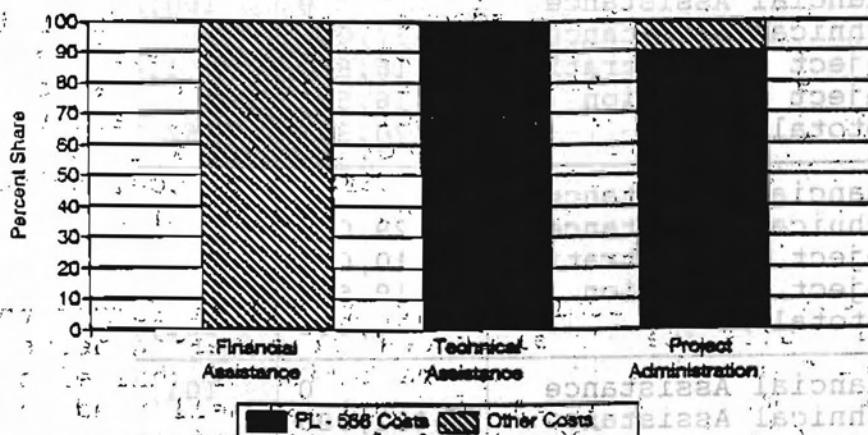
RECOMMENDED PLAN

TABLE C - PLANNED INSTALLATION SEQUENCE (Cont'd)

Main Branch Meduxnekeag River Watershed, Maine

Year	Items	PL-566 Funds (\$)	Other Funds (\$)	Total Funds (\$)
Eighth	Financial Assistance	0	85,800	85,800
	Technical Assistance	54,000	0	54,000
	Project Administration	3,400	700	4,100
	Project Evaluation	19,500	0	19,500
	Subtotal	76,900	86,500	163,400
Ninth	Financial Assistance	0	58,800	58,800
	Technical Assistance	54,000	0	54,000
	Project Administration	3,400	700	4,100
	Project Evaluation	19,500	0	19,500
	Subtotal	76,900	59,500	136,400
Tenth	Financial Assistance	0	58,800	58,800
	Technical Assistance	54,000	0	54,000
	Project Administration	3,400	700	4,100
	Project Evaluation	19,500	0	19,500
	Subtotal	76,900	59,500	136,400
TOTALS		1,431,000	2,214,800	3,645,800

**Fig. 7 - Cost Sharing Percent 1/
Main Branch Meduxnekeag River Watershed**



1/ ASCS ACP and WQIP funds, combined with funds from MDEP, Sponsors, and other local sources, will provide for 100 percent of the project's financial assistance costs.

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OPERATION, MAINTENANCE, AND REPLACEMENT

Specific operation and maintenance (O&M) agreements will be made before signing a project agreement. These agreements will be based on the SCS National O&M Manual (SCS, 1982). An O&M plan will be prepared for each water quality measure.

Land users will be responsible for maintaining installed practices on their farms and woodlands. The Sponsors will encourage land users to properly operate and maintain practices to be carried out by a land user. A plan will provide for maintaining vegetative cover, clearing brush and weeds, making repairs, and recommended procedures for the management of hayland and cropland.

Contracts with landowners will specify that all measures will be maintained for at least 2 years after installation of the last measure in the plan. Representatives of the Sponsors and SCS will periodically review the status of water quality measures in the watershed.

Average annual O&M costs are estimated to be \$29,450.

INTERAGENCY COORDINATION AND COOPERATION

The goal is to solve the agricultural and forestry NPS water quality problems of the Main Branch Meduxnekeag River Watershed identified in Maine's '319 Report' by reducing nutrient, pesticide, and sediment loading into surface water and groundwater.

Interagency coordination and cooperation will be used to implement a program to provide adequate technical, financial, and educational assistance to solve the problem. Objectives of most participating agencies complement one another, as they should in an integrated, coordinated, interdisciplinary approach to solving NPS water quality problems. Close coordination will be needed between the SASWCD, ASCS, UMCE, SCS, USFS, and local private industry, including both suppliers and 'conservation' construction contractors.

A Watershed Management Coordination Team will be formed to cooperate and address technical issues and research needs that may arise during planning and implementation of this effort. Additional programs and sources of funds may well need to be developed and applied to reach watershed objectives.

A multi-agency group including SCS, MDEP, and MDIFW will develop a strategy for evaluating the project's effects on water quality in the river and its tributaries. The time and expense of 'detailed monitoring and testing' for a multitude of specific water chemistry parameters should not be needed. The most important evaluation variables are biological (nutrients), not

RECOMMENDED PLAN

chemical, because aquatic life reflects the results of changing water quality and the effectiveness of conservation efforts. Improvements in esthetic value from cleaner water and less algae in the streams will be evaluated.

Funds to conduct evaluations during and after implementation have not been committed, but will be sought during the early stages of implementation. Cooperative fishery related censuses and sampling will be employed to assess water quality changes reflected in fisheries. Stream improvements resulting from reducing livestock access and restoring riparian areas will be included.

Annual reviews of water quality and biological changes will be made and compared to the applied water quality related conservation practices. Streams respond in a few years if loads of problem-causing pollutants are significantly reduced at the right time of year. This differs from lakes that take longer to respond and where water column monitoring can be more meaningful. Results should be measurable or observable in 3 to 5 years after 50 to 70 percent of conservation practices that can directly affect water quality have been installed.

Southern Aroostook Soil and Water Conservation District

The SASWCD will continue to provide overall local direction to conservation initiatives within the district and, in particular, the watershed. They will participate on the Watershed Management Coordination Team to prioritize activities to achieve existing goals and objectives.

Houlton Band of Maliseet Indians

The HBMI will encourage the management of natural resources under their control in a manner consistent with project goals. The HBMI already has applied for grant money to purchase water quality monitoring equipment. They will participate in the cooperative project evaluation program if funds become available.

Agricultural Stabilization and Conservation Service, USDA

ASCS will allocate its regular ACP funds, Forestry Incentive Program (FIP) funds, and Water Quality Incentive Program (WQIP) funds in coordination with conservation needs identified by the Watershed Management Coordination Team.

Farmers Home Administration, USDA

FmHA will work with cooperating agencies and landowners to determine and maintain eligibility for USDA agricultural programs. FmHA also provides forestry purpose loans to farmers who own woodlands, and are unable to obtain credit at a reasonable rate elsewhere.

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Forest Service, USDA

Technical assistance in restoring riparian (streamside) forests, wetlands, and other natural buffers along drainageways to improve water quality is an important challenge to be addressed by the USFS. Several USFS programs are available to complement watershed planning efforts, including the following:

- * Economic Well-being Through Forestry Program,
- * Forestry Legacy Program,
- * Forest Stewardship Program,
- * Natural Resource Conservation Education Program, and
- * Stewardship Incentive Program.

Soil Conservation Service, USDA

SCS provides technical assistance to plan and apply conservation practices that are needed to show measurable results in 3 to 5 years. The ACP watershed activities will require a significant amount of water quality planning and engineering expertise.

Fish and Wildlife Service, USDI

The USFWS is actively cooperating with the SASWCD, HBMI, and other local landowners in wetland restoration projects and development of conservation easements for selected properties. There is no cost to the landowner for wetland restoration work. In addition, the USFWS intends to cooperate with other agencies to restore self-sustaining populations of Atlantic salmon to the river by the year 2021 (Patterson, 5/93).

Maine Department of Agriculture, Food and Rural Resources

MDAFAFR, through its four bureaus and the MSWCC, provides financial and technical assistance on significant agricultural issues, such as livestock initiatives, agricultural viability programs, and information and education.

Maine Soil and Water Conservation Commission

The MSWCC approved the initial project application. They continue to provide technical assistance for various projects at the Soil and Water Conservation District (SWCD) level.

Maine Department of Conservation, Maine Forest Service

The MFS provides technical assistance for forestry management and fire and insect protection on private lands under several programs, including the Stewardship Incentive Program. Consulting professional foresters, trained to manage forestland, must be licensed by the State of Maine. A list of those licensed is available from MFS.

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Maine Department of Conservation, Maine Geological Survey

MGS will continue to provide data from groundwater monitoring wells in the area. Field work is under way on studies of the hydrogeology and water quality of significant sand and gravel aquifers in the watershed.

Maine Department of Environmental Protection

MDEP is the designated state water quality management agency in Maine, and has provided valuable monitoring of the performance of NSCS in another watershed. They will continue to provide information support and, when possible, special studies through the '319' program.

Maine Department of Inland Fisheries & Wildlife

MDIFW will provide analysis of data and assist in surveys of fisheries and habitat response to changing water quality and quantity conditions, as well as monitor angler catches and trends by annual creel censuses.

St. John Aroostook Resource Conservation and Development Area

The Main Branch Meduxnekeag River watershed falls within the SJARCD area. The SJARCD's three-year Plan of Work and Activity Schedule identifies four priority concerns for accelerating rural development in the area:

- * Enhance agriculture and forestry opportunities,
- * Enhance community facilities and service opportunities,
- * Enhance business and industry opportunities, and
- * Enhance scenic and fish and wildlife resource opportunities.

Planned efforts to create agricultural diversity include a livestock initiative and workshops on planned grazing systems, forage production, etc.

Several water quality initiatives are underway. RC&D has assisted in the development of lake water quality management plans. It also has developed an effective information and education program aimed at watershed residents and shoreland camp owners. This program included the development and distribution of camp owner brochures addressing care and maintenance of septic systems, camp roads and lots, and recreational areas. The SJARCD has raised funds for the installation of demonstration and pilot projects for water quality.

Planned efforts to create agricultural diversity include a livestock initiative and workshops on planned grazing systems, forage production, etc.

RECOMMENDED PLAN

The three-year plan contains items significant to the Meduxnekeag, including identifying new and emerging water quality initiatives and opportunities, and assisting local, state, and Federal programs in solving individual non-point pollution problems. The RC&D plan also addresses forest, cropland, road ditch, development, construction, and streambank erosion control.

RC&D and the HBMI have signed a cooperative agreement to provide training, now underway, in soil and water conservation to a Native American.

The SJARCD's 28 years of experience in making things happen in Aroostook County will be invaluable to this project.

University of Maine Cooperative Extension

A three-way Memorandum of Understanding (MOU) with UMCE, ASCS, and SCS is being developed for the work needed in this and other watersheds. UMCE has developed a series of complementary objectives and actions within the framework of the MOU. UMCE has a major role in information and education program development and delivery.

INFORMATION AND EDUCATION

An extensive information and education effort will be a critical part of this project. 'Voluntary' programs with goals of water quality improvement and resource protection need an intensive, multi-agency educational program. Cooperating agencies will design and carry out a program for youth (schools and 4-H programs), the public, homeowners, 'backyard' farmers, and town officials such as code enforcement officers, in addition to business owners and full-time farmers.

Many land users do not fully comprehend the intensive planning and implementation needed for significant environmental improvement. An important factor often overlooked is the cumulative impact of many small farms on water quality. Information and education-induced change in farm and business operations may be the least costly and most environmentally effective of all.

Fact sheets, stream inventories, public service announcements, and ground and surface water awareness materials will be developed, produced, and used throughout the watershed and be expanded for use as models in other areas of the state and region. Video tapes, pamphlets, news articles, workshops, tours, and 'kitchen meetings' will be used to educate and demonstrate to agricultural producers and the public how their activities and businesses impact water quality and the environment, and how agricultural practices can be refined to meet water quality goals while maintaining farm profitability.

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Watershed farms will be prioritized for intensive nutrient, pest, and pasture and hayland management education and implementation programs. New agronomic and livestock production methods, farm diversification, and proper by-product use will be emphasized.

ICM programs will be demonstrated and provided to agricultural producers. ICM includes both IPM and nutrient management (whole farm nutrient budgets).

Innovative nutrient management techniques such as petiole tissue nutrient sampling and new phosphorus indices will be demonstrated. They help to reduce farm nutrient and pesticide inputs while maintaining farm profitability (Anderson, 1990; Ellsmore, 7/90; Kersbergen). Whole farm nutrient budgets will be developed for a majority of the farms in the watershed. Pest management will be developed, refined, and implemented.

Planned grazing systems (Voisin) will be implemented to minimize impacts in the watershed and maximize forage production. Watering facilities will be developed and refined for site specific areas.

Agronomic and economic data from these local model farms will be collected under a MOU between SCS and UMCE. Data will be used to help convince other crop and livestock producers that they can both minimize impact on the environment and maximize profit.

Local soil conservation districts will be involved in the implementation of the recommended plan. A local steering committee will be developed to oversee the implementation of the recommendations. The steering committee will be composed of the local SCS office, local conservation districts, and local agricultural organizations. The steering committee will be responsible for developing a work plan, identifying resources, and monitoring progress. The steering committee will be composed of local farmers, ranchers, and other interested parties. The work plan will include a timeline for implementation, specific goals and objectives, and a budget. The steering committee will be responsible for ensuring that the recommendations are implemented in a timely and effective manner.

The work plan will include a timeline for implementation, specific goals and objectives, and a budget. The steering committee will be responsible for ensuring that the recommendations are implemented in a timely and effective manner. The work plan will include a timeline for implementation, specific goals and objectives, and a budget. The steering committee will be responsible for ensuring that the recommendations are implemented in a timely and effective manner. The work plan will include a timeline for implementation, specific goals and objectives, and a budget. The steering committee will be responsible for ensuring that the recommendations are implemented in a timely and effective manner.

TABLE 1 - ESTIMATED INSTALLATION COST

Main Branch Meduxnekeag River Watershed, Maine 17

			Estimated Cost (Dollars) 2/		
Installation Cost Item	Unit	Number	PL-566 Funds	Other Funds	Total Cost
On-site					
Diversions	Ft.	25,000	0	42,500	42,500
Waterways	Ft.	100,000	0	260,000	260,000
Sediment Basins	Ea.	250	0	100,000	100,000
Sub-surface					
Drainage	Ft.	100,000	0	250,000	250,000
Erosion Control Structures	Ea.	150	0	37,500	37,500
Waste Storage Structures	No.	25	0	250,000	250,000
Planned Grazing Systems	No.	50	0	261,300	261,300
Forestry Practices	Ac.	28,000	0	450,000	450,000
Subtotal			0	1,651,300	1,651,300
Off-site					
Nutrient and Sediment Control Sys.	No.	50	0	375,000	375,000
Riparian Buffers	Ac.	2,000	0	50,000	50,000
Road Ditch Stabilization	Ft.	25,000	0	125,000	125,000
Subtotal			0	550,000	550,000
Technical Assistance Project			1,160,000	0	1,160,000
Administration Project			121,000	13,500	134,500
Evaluation			150,000	0	150,000
TOTAL PROJECT			1,431,000	2,214,800	3,645,800

1/ All land is nonfederal land.

2/ Price Base 1992

March 1993

TABLE 4 - ESTIMATED AVERAGE ANNUAL NED COSTS

Main Branch Meduxnekeag River Watershed, Maine

(Dollars) 1/

Project Outlays			
Evaluation Unit	Amortization of Installation Cost	Operation Maintenance and Replacement Cost	Total
On-site	251,180	23,350	274,530
Off-site	97,685	6,100	103,785
GRAND TOTAL	348,865	29,450	378,315

1/ Price Base 1992, amortized over 25 years at a discount rate of 8-1/4 percent.

**TABLE 5A - ESTIMATED AVERAGE ANNUAL WATERSHED PROTECTION
DAMAGE REDUCTION BENEFITS**

Main Branch Meduxnekeag River Watershed, Maine

(Dollars) 1/

Item	Damage Reduction Benefit Average Annual	
	Agriculture Related	Non-agricultural
On-site Maintaining Productivity	595,740	0
Subtotal	595,740	0
Off-site/Public Road and Ditch Sediment Damages	0	54,900
Water-based Recreation	0	114,600
Subtotal	0	169,500
GRAND TOTAL	595,740	169,500

1/ Price Base 1992, amortized over 25 years at a discount rate
of 8-1/4 percent.

March 1993

TABLE 6 - COMPARISON OF NED BENEFITS AND COSTS

Main Branch Meduxnekeag River Watershed, Maine

(Dollars) 1/

Evaluation Unit	Ag Related 2/	Non-ag Related 2/	Recreation 2/	Average Annual Benefits 2/	Average Annual Costs 3/	Benefit : Cost Ratio
On-site	595,740	0	0	595,740	274,539	2.2:1.0
Off-site / Public	0	54,900	114,600	169,500	103,785	1.6:1.0
GRAND TOTAL	595,740	54,900	114,600	765,240	378,315	2.0:1.0

1/ Price Base 1992, amortized over 25 years at a discount rate of 8-1/4 percent.

2/ From Table 5A.

3/ From Table 4.

March 1993

EFFECTS OF RECOMMENDED PLAN

GENERAL

Increased and accelerated technical assistance to landowners and operators in installing conservation practices and implementing better farm and forest management will result in two broad categories of project effects and benefits:

- * On-site benefits to landowners and municipalities, and
- * Off-site benefits to society at large because of improved surface and groundwater quality.

Implementing the planned measures "would substantially improve water quality and habitat for salmon, trout, and other native fish populations and wildlife." (Patterson, 5/93).

The project will make the area a better place to live by improving health and safety, esthetics, and the economy. Properly constructed road ditches will improve traffic safety, last longer, need less maintenance, and save tax dollars (Burns, 8/91, 7/91). Erosion control should increase farm incomes. Water quality improvements will make water-contact recreation safer and more enjoyable, and mean more money spent by fishermen and other recreationists. Improved incomes for agriculture and recreation will benefit the entire area. The 'multiplier effect' will generate additional economic activity from these increased incomes.

On-site

Implementing soil and water conservation plans that reduce the loss of nutrients and fine soil particles will maintain and improve the soil resource base and associated productivity. Reductions in crop yields will be significantly decreased, and farm efficiency and profits will increase.

The use of nutrient management, planned grazing systems, and pest management, all of which stress the efficient use of animal wastes, chemical fertilizers, pastures, and pesticides will reduce farm operating costs and improve farm efficiency (Anderson, 1990; Burns, 1993, 1991, 1988, 3/88; Burns and Jones, 9/87; Cashman, 1992; Ellsmore, 7/90; Kersbergen). Their use also will decrease the concentrations of nutrients and pesticides in the area's surface and groundwaters.

Installation of NSCS will allow farmers to use economically viable rotations and management without environmental damage and avoid stressful and costly regulatory action.

Wetlands and ponds created by the installation of NSCS, or restored by the USFWS, will provide many cost effective benefits. They will improve both wetland and upland fish and wildlife habitat, and help purify water by trapping sediment, nutrients, and numerous other pollutants derived from agricultural lands.

EFFECTS OF RECOMMENDED PLAN

(Patterson, 5/93). Increased use of winter cover crops and reduction of fall tillage activities will improve upland habitat. Tree and shrub plantings along drainage ways and streams will restore riparian habitat.

Nearly 400 farms and 500 forest landowners will be eligible for accelerated technical and financial assistance with the planning and installation of conservation and water quality measures. The plans would involve about 30,800 acres of agricultural land and 30,000 acres of forestland. This assistance and the availability of expanded educational and informational efforts should provide significant additional benefits to all landowners, in particular the approximately one-third of all farmers who are LRF's.

Off-site

Implementing plan recommendations would significantly improve water quality for fish and wildlife resources (Patterson, 5/93). The expected benefits include protection and restoration of some of the finest rivers and streams in northern New England and western New Brunswick. Everyone (residents and non-residents, Mainers and nearby New Brunswick citizens) ultimately will benefit from efforts to improve and protect the watershed's soil, water, forest, and fisheries and wildlife resources.

Sediment and erosion control and road ditch stabilization measures on rural and farm roads will reduce contributions of sediments, nutrients, and pesticides to the stream system (Burns, 8/91, 7/91).

Farmers and forestland owners will be provided accelerated technical assistance to protect water quality. Most of the needed practices also will protect soil productivity and conserve nutrients, making landowner operations more efficient and profitable, which will benefit northern Maine's depressed economy.

The use of pest management and nutrient management will reduce existing problems and the threat of pollution to the aquifer and other groundwater, resulting in a lesser risk to health of local residents and downstream Canadians. Groundwater sources such as the sand and gravel aquifer containing the Town of Houlton's wells will be provided additional protection from nutrients, bacteria, and pesticides. Priority will be given to areas with an intermediate or high soil leaching potential that are, or are suspected of, contributing to groundwater problems.

The historical recreational uses of the river - hunting, fishing, canoeing, boating, photography, and nature study - will increase greatly as a result of its improved water quality. By decreasing contributions of sediment, pesticides, and nutrients the project will improve the water quality of the Main Branch Meduxnekeag River and its tributaries before they flow into neighboring New Brunswick. Offering examples of rare plant life, bird and animal

EFFECTS OF RECOMMENDED PLAN

life, and pleasant views and vistas, local importance of the river as a resource to be protected and enjoyed will increase.

Fishing regulations for part of the river were changed in 1990 because fewer fish were available for anglers. The daily bag limit was reduced to two fish and the size limit was increased. Improved water quality will provide noticeably better spawning conditions for both trout and salmon. Numbers of fish should increase, angler success should improve, and the stricter fishing regulations should be able to be relaxed in the future. (Basley, 1/91).

Sport fisheries of the Meduxnekeag River will be improved and protected from further deterioration of water and habitat quality and quantity. Improved fishing and recreation opportunities will be available to people in both Maine and adjacent Canada. The anticipated significant increase in angler use and fish catch is discussed below in the Specific Impacts section.

Natural and local sources of baitfish may be available from the deepwater ponds of NSCS in the watershed. This will reduce the demand for fish from outside the watershed, thus minimizing the associated hazards of 'imported' fish.

SPECIFIC IMPACTS

On-site

Sediment and Erosion Control

The average rate of sheet and rill erosion on cropland to be treated will be reduced from 5.7 t/a/y to 2 t/a/y. Long term benefits from sediment and erosion control are based on a per acre value derived from the incremental analysis of a similar watershed elsewhere in Aroostook County. At \$10 per acre and 16,730 acres benefitted, total benefits are an estimated \$167,300 annually. Preserving the soil maintains plant support, moisture holding capacity, etc.

Nutrient and Animal Waste Management

More efficient use of manure will result in reduced purchases of commercial fertilizers and lime.

SCS conducted extensive studies comparing the costs and benefits of nutrient management before and after implementation of a waste management system on Aroostook County dairy and livestock farms (Burns, 1988; Cashman, 1992). This information was used to estimate benefits from reduced purchases of commercial fertilizer with the project as farmers utilized manure more efficiently with systems in place. Based on previous experience, benefits were discounted for a 3-year 'adjustment' period and for the fact that not all commercial fertilizer purchases will be replaced.

EFFECTS OF RECOMMENDED PLAN

There also could be benefits to these farmers from decreased lime expenses as manure does not have the acidity of commercial fertilizer. Manure also builds up organic matter leading to possible improved yields and quality, particularly if the organic matter is now low - a common condition in Aroostook County. Manure is also a good source of trace elements. With annual benefits of \$2,700 per farm for 25 farms averaging 45 milkers each, benefits in this category are conservatively estimated at \$61,200 annually.

Pasture and Hayland Management

These benefits are estimated from the adoption of planned grazing systems (Voisin) on farms. This system has been intensively studied by SCS and almost always found to be economically beneficial (Burns, 1993, 3/88; Burns and Jones, 9/87).

Improved pasture management benefits were based on studies done in Maine and New York. They were adjusted for the fact that there are some smaller animal enterprises (primarily beef) in this watershed. Because the animals are outside more and on higher quality pastures, benefits include such items as reduced hay and grain rations, reduced bedding expenses, and reduced labor and manure handling.

Adopting intensive grazing on 30 farms averaging 45 animals each and on 20 farms averaging 20 animals each is estimated to lower costs an average of \$140 per animal annually. This gives an average annual benefit of \$195,000 after associated costs are deducted.

Forestry Technical Assistance Benefits

Forestry technical assistance provided to private non-industrial landowners will increase the use of BMP's and decrease on-site impacts to the land and streambanks (MFS, 1991). It will result in improved forest health and fisheries and wildlife habitat.

Forester-assisted timber sales result in higher payments to landowners than unassisted sales. Several studies have been conducted on a programmatic basis in other areas of the country:

- * Cubbage et al. (1985) evaluated Georgia's Rural Forestry Assistance Program and found that assisted landowners received significantly more money, as much as \$48 per thousand board feet or 87 percent more, depending on the analytical approach taken. They calculated a benefit / cost ratio of 61:1 for private efficiency at a 5 percent real discount rate and the social efficiency benefit / cost ratio was 24:1; a forearm of the same analysis for the state of Maine with a similar return to assisted landowners was 100 percent more efficient, especially at lower benefit rates. The social discount rate for the state of Maine was 5 percent, while the social discount rate for the state of Georgia was 10 percent.

EFFECTS OF RECOMMENDED PLAN

- * Jackson (1985) investigated the effects of Montana's Private Forestry Assistance Program and concluded that landowners received an extra \$12.85 per thousand board feet, with an average product price of \$220.12 per thousand board feet;
- * Straka et al. (1986) examined the benefits and costs of Mississippi's Service Forestry Project. Using a social efficiency approach to measuring benefits of the incremental assistance provided by additional service foresters. At a 7 percent real discount rate, the benefit / cost ratio was 8.2:1. This was assumed to be a conservative measure of the benefits of service forestry assistance since it did not include nonmarket benefits and local economy multiplier effects; and
- * Minnesota's Private Forestry Assistance Program results indicated on-site benefits to landowners but did not develop benefit / cost ratios (Henley et al., 1988).

Assessment of incremental economic benefits from increased forestry assistance often is difficult. A conservative estimate of \$60 per acre for increased value of timber sales on 30,000 acres provides an average annual benefit of \$172,240.

Forestry Information and Education

Forestry information and education that leads to planning and implementation yield the benefits explained above. An additional benefit to landowners not included in the economic analysis is the economic benefit gained by those unaware of the planning, implementation, and tax incentives available to forest landowners, including those below:

- * The Maine State Income Tax law now provides credits of up to \$200 to help pay for forest management planning. The credit offsets some expenses incurred in preparing a plan; and
- * Maine's Tree Growth Tax program offers property tax savings to landowners who manage their woodlots for forest products. A forest management plan must be prepared for tracts greater than 10 acres. There are penalties if the land ceases to be used for forestry.

Off-site and on-site services will provide significant economic benefits.

Recreation (Fishing) Installation of 50 NSCS will have a significant effect on the recreational fishery of the river. Realistic estimates of the watershed's average existing and potential fishery have been tabulated (see Table D), and concurred in by MDIFW biologists assigned to this region (Basley, 4/91). Now 98 percent of the use is by Maine residents. Future use with the project was anticipated to increase by about 60 percent and be made up of 85

EFFECTS OF RECOMMENDED PLAN

percent residents and 15 percent non-residents. Resident use will increase from 13,230 fishing days to 18,275. Non-resident use will increase from 270 to 3,225.

The contingent valuation method (i.e., 'willingness to pay') was used to value this improved and increased fishing. A study done at the University of Maine provided an annual value of \$503 for resident and \$392 for non-resident anglers (MAES, 1990).

TABLE D - EXISTING AND POTENTIAL ANGLER USE (FISHING DAYS)

Main Branch Meduxnekeag River Watershed, Maine

Subwatershed	Stream Miles	Existing Use	Potential Use	Gain In Use
B Stream	55.5	1,965	2,930	965
South Branch	66.7	3,260	4,750	1,490
Main Branch	167.5	8,275	13,820	5,545
Total	289.7	13,500	21,500	8,000

Considering such factors as habitat recovery, time required for word to spread about the improved fishing, etc., MDIFW estimated that benefits from improved and increased fishing will increase gradually over 10 years to half of their full level, and then increase over the next 5 years to the full level. Benefits, estimated at \$114,600 annually, were discounted for accrual lag.

Decreased Road Ditch and Culvert Cleanout Expense

Meduxnekeag is a large watershed with 23,900 acres of active cropland. In many places practices such as farming up and down slope on potato land are contributing to the deposition of sediment in road ditches and the clogging of culverts (Burns, 8/91, 7/91). Municipalities spend an average \$1,600 per mile annually to remove this sediment.

Treating 70 percent of the cropland (16,730 acres) at an anticipated 75 percent effectiveness rate results in estimated average annual benefits of \$54,900.

Forestry

Forestland management will contribute to the goals of NPS pollution control in the watershed by preserving high quality water resources in forested watersheds, maximizing the ability of riparian forests to improve water quality in mixed land use situations, and contributing toward the economic health of the individual landowner and the overall project area.

EFFECTS OF RECOMMENDED PLAN

Costs associated with these recommendations include information and education assistance for the following:

- * Increasing the use and understanding of BMP's in forest harvesting, transportation, and chemical application;
- * Establishing, maintaining, and improving riparian forest buffers; and
- * Managing forestlands for multiple resource benefits and developing forestry components in a whole farm planning approach for farm operators.

Riparian Buffer Strips

Reductions of 80 to 90 percent of nitrate, 50 percent of phosphorus, and 99 percent of sediment may be possible adjacent to agricultural fields. Buffers are useful in timber harvest operations because they filter sediment from logging roads, skid trails, and site preparation activities before it reaches streams. Buffers in urban and suburban developments also can filter sediments and nutrients. These strips provide fish and wildlife habitat and improve esthetics. They contribute to the recreational benefits evaluated above under 'Fishing'.

Restored riparian zones would provide many natural resource benefits. Livestock fencing would allow vegetation to develop as buffers between fields and the streams, thereby reducing erosion from livestock access and providing nesting habitat for migrant bird species, many of which are experiencing population declines (Patterson, 5/93).

ENVIRONMENTAL EVALUATION

Individuals involved with the development of this WPP/EA to date, including the List of Preparers on page 74 and the technical specialists of cooperating agencies that have supplied basic inventory and monitoring data, have not identified any significant adverse environmental impacts associated with the recommended plan. Rather, they believe the overall effect on the environment of installing the BMP's described in the plan will be positive.

Based on the available data and professional opinions, the SCS State Conservationist, the Responsible Federal Official (RFO), has determined that the preparation of an Environmental Impact Statement (EIS) is not necessary. A Finding of No Significant Impact (FONSI) has been prepared and notice of this finding published in the Federal Register on April 8, 1993.

EFFECTS OF RECOMMENDED PLAN

Some short-term construction-related water pollution may occur as a result of project measure installation, primarily by increased erosion on temporarily disturbed areas. The effects of construction activities will be minimized with temporary sediment traps, prompt establishment of vegetation, mulching, silt fences, and similar erosion and sediment control measures. BMP's contained in the Maine Erosion and Sediment Control Handbook for Construction (MDEP and CCSWCD, 1991) will be utilized.

Project installation will require the irreversible commitment of only the funds, energy, labor and materials used and will preclude their use elsewhere. Project measures will not preclude land use changes driven by economics or national security. Mineral resources such as manganese, granite, and sand and gravel could be mined or extracted in the future, if doing so becomes necessary or more profitable than agriculture.

Table E displays effects of the recommended plan on resources of principal national recognition.

TABLE E, EFFECTS OF THE RECOMMENDED PLAN
ON RESOURCES OF PRINCIPAL NATIONAL RECOGNITION

Main Branch Meduxnekeag River Watershed, Maine

Types of Resources	Principal Sources of National Recognition	Measurement of Effects
Air quality	Clean Air Act, as amended [42 U.S.C. 1857h-7 et seq.]	No effect.
Areas of particular concern within the coastal zone.	Coastal Zone Management Act of 1972, as amended [16 U.S.C. 1451 et seq.]	Not present.
Endangered and threatened species critical habitat	Endangered Species Act of 1973, as amended [16 U.S.C. 1531 et seq.]	Improvement in bald eagle habitat (improved fishery)
Fish and wildlife habitat	Fish and Wildlife Coordination Act [16 U.S.C. 661 et seq.]	Fish habitat improved in over 200 miles of stream. Slight improvement in wildlife habitat.

EFFECTS OF RECOMMENDED PLAN

**TABLE E, EFFECTS OF THE RECOMMENDED PLAN
ON RESOURCES OF PRINCIPAL NATIONAL RECOGNITION (Cont'd)**

Main Branch Meduxnekeag River Watershed, Maine

Types of Resources	Principal Sources of National Recognition	Measurement of Effects
Floodplains	Executive Order 11988; Floodplain Management [42 CFR 26951]	Improvement in 2,000 acres of riparian habitat. No losses.
Historic and cultural properties	National Historic Preservation Act of 1966, as amended [16 U.S.C. 470a <i>et seq.</i>]	Cultural resources are known; more are likely. Procedures will be followed. SHPO will become involved.
Prime and unique farmland	CEQ Memorandum of August 11, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA; Farmland Protection Policy Act of 1981 [7 U.S.C. 4201 <i>et seq.</i>]	Minor loss to NSCS and other measures.
water quality	Clean Water Act of 1977 [33 U.S.C. 1251 <i>et seq.</i>]	Significant improvement in entire watershed.
Wetlands	Executive Order 11990, Protection of Wetlands [42 CFR 26961]; Clean Water Act of 1977 [33 U.S.C. 1251 <i>et seq.</i>]; Food Security Act of 1985 [16 U.S.C. 3801 <i>et seq.</i>]	Addition of about 25 acres of wetland habitat in NSCS ponds.
Wild and scenic rivers	Wild and Scenic Rivers Act, as amended [16 U.S.C. 1271 <i>et seq.</i>]	None present.

EFFECTS OF RECOMMENDED PLAN

RELATIONSHIP TO OTHER LAND AND WATER PLANS, POLICIES, AND CONTROLS

The St. John River, which the Meduxnekeag River joins in Canada, is an international waterway. In 1972 the Canadian Government sponsored the Inland Water Pollution Project through the North Atlantic Treaty Organization's Committee on the Challenges of Modern Society (NATO / CCMS). The United States and Canada agreed to use the St. John River Basin as a case study for international cooperation in developing planning methodology, public participation, and international standards and implementation programs for improving water quality. By implementing this proposed Main Branch Meduxnekeag River WPP/EA, the United States will remain consistent with an established international goal of achieving high water quality.

The watershed has been prioritized in Maine's '319' NPS Pollution Assessment Report and Management Plan. Other cooperating agencies including UMCE, ASCS, USFS, and the SJARCD all have designated the Meduxnekeag River Watershed as a priority for NPS control.

The river and its tributaries have been recognized by MDEP, MDIFW, the Maine Atlantic Sea Run Salmon Commission (MASRSC), local hunters and anglers, and related businesses as seriously impacted by pollution. The USFWS identified the river as one of eight 'target' rivers for Atlantic salmon restoration. The USFWS intends to cooperate with other agencies to restore self-sustaining populations of Atlantic salmon to the river by the year 2021 (Patterson, 5/93).

In 1990 the SCS, ASCS, and UMCE submitted a 'USDA Agricultural Nonpoint Source Hydrologic Unit Area (HUA) Proposal' for the Meduxnekeag River Watershed. The applicants, SASWCD, and numerous state agencies coordinated in developing an intensive and effective program for correcting a series of situations that contribute to the area's agricultural NPS problems. Unfortunately, that proposal was not approved or funded, and has not been resubmitted.

A Water Quality Incentive Program for part of the Main Branch Meduxnekeag River watershed was approved by ASCS for 1993. The project provides \$68,000 for establishment of management practices similar to those recommended in this WPP/EA. Applications for additional funds for other parts of the watershed may be made in the future.

Currently, no other concentrated efforts to improve water quality concerns associated with NPS pollution are being conducted besides the ongoing, voluntary SASWCD activities of technical assistance, information and education, and ACP cost share programs. Intensive, targeted efforts that direct these activities at specific NPS problems still are needed, as is

EFFECTS OF RECOMMENDED PLAN

involvement of most of the agricultural producers in the watershed.

The contributions of nutrients and sediment as pollutants from the town of Houlton (the only 'urban' area) have been, or are being, addressed. Industrial discharges have been eliminated and sewage discharges reduced significantly. Additional steps taken include initiation of a snow disposal system and improvement of road maintenance programs.

The improved Houlton sewage treatment plant is effective in reducing BOD by over 98 percent, and most sanitary/storm sewer combinations are being systematically eliminated. The HBMI housing project will be served by a sewer extension along Foxcroft Road. This will allow residences along that road to be connected to the system also.

This plan will adhere to SCS wetland policy, which is to aid in protecting, maintaining, and restoring wetlands to ensure continued realization of their beneficial values.

The HBMI Tribal Government goal for the river is "water quality suitable for swimming, fishing, boating and other recreational activities in, on, and along the Meduxnekeag River throughout the summer." The goals are attainable by maintaining natural flow levels, eliminating sediment loads and algal growth, reestablishing an Atlantic salmon fishery, and improving the trout fishery.

An HBMI water quality monitoring program is being developed to obtain baseline data, track quality changes, and test wells on tribal lands for pesticides. Preliminary plans are to test the river weekly for 10 parameters (dissolved oxygen, E. coli, pH, total alkalinity, temperature, total phosphorus, total dissolved phosphorus, conductivity, turbidity, and total suspended solids). Limited testing for locally applied pesticides will be conducted during runoff events that closely follow pesticide applications. Heavy metal and biological monitoring will begin during the second year of the program.

CONSULTATION AND PUBLIC PARTICIPATION

GENERAL

Coordination and public involvement remain essential parts of the overall planning process. Citizens groups, local units of government, state agencies, and farm groups as well as USDA cooperating agencies currently are involved in this water quality improvement effort. As members of the Watershed Management Coordination Team, the SASWCD, Agricultural Stabilization and Conservation Committee, and the Aroostook County Cooperative Extension Executive Committee will cooperate to direct local efforts. The Sponsors will provide the leadership for involving local agencies and the public.

The SCS worked closely with the Sponsors to ensure that all interested parties were encouraged to provide inputs to WPP/EA development and had ample opportunity to do so. A Chronology of Events section which describes several such opportunities follows. SCS will continue to coordinate investigations with state and Federal agencies and groups outside the local area.

The SASWCD is fundamentally important in the success of all water quality efforts, and its cooperators are key in the voluntary application of the many regular and innovative soil and water conservation practices. SCS's experience with other projects in the agricultural area of Aroostook County indicates that locally developed solutions, such as those proposed here, will be welcomed and implemented by local farmers.

Public meetings will continue to be held at appropriate times to keep all interested people informed and to provide a means for expressing public views, ideas, and sentiments. Timely news releases and public notices also will provide a means for disseminating information to the public. Outside viewpoints always will be considered in decisionmaking.

The SCS uses an interdisciplinary team approach to planning to ensure that all aspects of the project receive attention. Close coordination was maintained with the team counterparts of the Northeast National Technical Center (NNTC) in Chester, PA, as well as with state and other Federal agencies.

Technical aspects of the project will be coordinated by the local Food and Agriculture Council (FAC).

CONSULTATION AND PUBLIC PARTICIPATION

CHRONOLOGY OF EVENTS

- September 16, 1987 Initial request from SASWCD for evaluation of watershed by SCS Interdisciplinary Team (IDT).
- November 9-10, 1987 IDT field evaluation conducted.
- May 29, 1990 Interagency planning meeting.
- June 7, 1990 Draft application for Federal assistance prepared by SASWCD.
- June 26, 1990 Application submitted to MSWCC.
- July 19, 1990 State Planning Office completed intergovernmental review of application.
- August 14, 1990 SCS notified that MDAERR - MSWCC endorsed application.
- November 2, 1990 SASWCD notified of MSWCC approval of application.
- November 13-15, 1990 SASWCD, SCS-NNTC, and USFS IDT field review of watershed.
- February 20, 1991 SCS Chief notified of receipt of valid application for Federal assistance.
- March 25, 1991 Maine State Historic Preservation Commission notified of potential project and requested to provide review.
- March 28, 1991 Draft Preauthorization Planning Report and Plan of Work (PAPR/POW) submitted to NNTC for initial review.
- April 8, 1991 Conditional on later review of sites undergoing ground disturbance, SHPO responds that project will have no effect on protected resources.
- May 20, 1991 NNTC submitted review comments to Maine SCS.
- November 19, 1991 First formal meeting regarding HBMI sponsorship of project. SCS, SASWCD, USFWS, MDIFW, and HBMI attended.
- December 2, 1991 Cultural resources field review by the Maine Historic Preservation Commission archeologist.

CONSULTATION AND PUBLIC PARTICIPATION

- December 12, 1991 HBMI endorses project sponsorship.
- January 6, 1992 BIA fully supports HBMI involvement in the watershed project.
- June 3, 1992 Second Draft PAP/POW submitted to NNTC for technical concurrence.
- August 3, 1992 NNTC submitted review comments to Maine SCS.
- August 25, 1992 Third Draft PAP/POW submitted to NNTC for technical concurrence.
- September 1-3, 1992 USFS, SCS, SASWCD field review.
- September 29, 1992 NNTC grants technical concurrence.
- October 15, 1992 SCS, SASWCD, and New Brunswick Department of Agriculture field review.
- November 23, 1992 Planning authorization requested from SCS National Headquarters.
- December 10, 1992 Authorized for SCS planning assistance.
- March 23, 1993 Draft WPP/EA prepared and undergoing technical review.
- March 31, 1993 Draft WPP/EA distributed for Interagency Review.
- April 5, 1993 SCS and SASWCD meet with Houlton Planning Board and Southern Aroostook Growth Council to review Draft WPP/EA.
- April 8, 1993 Interagency Review period began with publication of Notice of FONSI in the Federal Register.
- May 19, 1993 SCS, SASWCD review Draft WPP/EA with HBMI Tribal Council.
- May 23, 1993 Interagency Review period ended.

REVIEWS

SCS state staff and NNTC specialists having responsibility for agronomy, biology, economics, engineering, forestry, geology, soils, and water quality reviewed early versions of the PAPR/POW. The NNTC granted technical concurrence in the PAPR/POW in September 1992. The Draft WPP/EA began interagency review on April 8, 1993.

CONSULTATION AND PUBLIC PARTICIPATION

AGENCIES FROM WHICH WRITTEN COMMENTS WERE RECEIVED AND REQUESTED

SCS received letters or comments from the following agencies and individuals during the interagency review period. SCS has prepared a written response to each respondent that provided comments on the WPP/EA.

USDI, Office of the Secretary, Office of Environmental Review.

Geological Survey.

USDOD, U.S. Army Corps of Engineers, New England Division.

United States Senate.

Senator George J. Mitchell.

Senator William S. Cohen.

Maine Atlantic Sea Run Salmon Commission.

Maine Department of Conservation, Maine Land Use Regulation Commission.

Maine Department of Inland Fisheries and Wildlife.

Maine Department of Transportation, Office of Environmental Services.

Maine State Planning Office (Governor's State Clearinghouse).

St. John - Aroostook RC&D Council.

In addition to the respondents above, SCS distributed the WPP/EA to, and requested comments from, those agencies and organizations listed below.

Advisory Council on Historic Preservation, Executive Secretary.

USDA, Director, Office of Advocacy and Enterprise.

Agricultural Research Service (ARS).

Agricultural Stabilization and Conservation Service.

Cooperative Extension Service (University of Maine Cooperative Extension).

Farmers Home Administration.

USDC, National Oceanic and Atmospheric Administration, Ecology and Conservation Office.

USDHUD, Regional Environmental Officer.

CONSULTATION AND PUBLIC PARTICIPATION

CONSULTATION AND PUBLIC PARTICIPATION

USDI, Bureau of Indian Affairs.

AGENCIES FROM WHICH WRITTEN COMMENTS WERE RECEIVED AND RECDERED

Fish and Wildlife Service, Division of Ecological Services.

SCS received letters of comments from the following agencies and

National Park Service.

Divisions/branches/units that responded to each letter or memo

USDOT, U.S. Coast Guard, Coordinator, Water Resources.

USEPA, Region 1 Administrator.

Office of Federal Activities.

United States House of Representatives.

Congresswoman Olympia J. Snowe.

Maine Department of Agriculture, Food and Rural Resources.

Maine Soil and Water Conservation Commission.

Maine Department of Environmental Protection.

Maine Historic Preservation Commission.

Maine Land and Water Resources Council.

New Brunswick Department of Agriculture.

Town of Amity.

(Town of) Cary Plantation.

Town of Hammond.

Town of Hodgdon.

Town of Houlton.

Town of Linneus.

Town of Littleton.

Town of Ludlow.

Town of Monticello.

Town of New Limerick.

Town of Oakfield.

Town of Smyrna.

Houlton Water Company.

CONSULTATION AND PUBLIC PARTICIPATION

Maine Blanche Meduxnekead River Watershed Maine
Audubon Society.

National Audubon Society. KEY

National Wildlife Federation, Legislative Representative (Name) (Title)

Natural Resources Council of Maine. (Position) (Address)

Natural Resources Defense Council, Inc. (Address)

Northern Maine Regional Planning Commission. (Address)

Potato Industry Long Range Planning Commission. (Address)

Sierra Club, National and local chapter. (Address)

Trout Unlimited. (Address)

Water Quality Protection Project, Maine Bay

Planning Board, Bath (Referred), SCS, Agriculture Department

S-A. Fisheries Study, Agricultural Economic

Cooperative Extension, UES, Waterways Management

Education Committee, UES, Soil Science

W-E, Natural Resources Management

D-B, Office of Planning, SCS, Water Resources Planning Coordination

Geological Survey, SCS, Water Resources

S-A, Geology

S-A, Fisheries Study, Geology

Bureau of Commerce, Jr., SCS, District Conservation, 15 Years

Soil Conservation, 3 Years

Soil Conservation Technical Assistance 3 Years

S-D, Agricultural Research Services Economics (ARE)

1 Acre dredge study, ARE

Road A., Dubois, SCS, District Conservation, 1 Acre

Soil Conservation, 3 Years

A-S, Forest Management Technology

S-B, BIA and Soil Sciences

W-E, Geology

LIST OF PREPARERS

CONSULTATION AND PUBLIC PARTICIPATION

TABLE F - LIST OF PREPARERS**Main Branch Meduxnekeag River Watershed, Maine**

KEY
(Name), (Agency), (Present Position), (Years in Position)
(Previous Positions), (Years in Position)
(Education)
(Certifications, Licenses, or Registrations)
NO. PREPARERS
Joseph C. Bertolaccini (Retired), SCS, Water Resources Program Coordinator, 8 Years Hydraulic Engineer, 12 Years Construction Engineer, 5 Years Planning Engineer, 6 Years B.S. Civil Engineering M.S. Civil Engineering Registered Professional Engineer, Maine and Massachusetts
Phillip J. Burns (Retired), SCS, Agricultural Economist, 27 Years B.A. Literature and History 2 yrs. graduate study, Agricultural Economics
Constance Carpenter, USFS, Watershed Specialist, State & Private Forestry, 1 year Hydrologist, 5 years Erosion Control Planner (SWCD), 1 1/2 years B.S. Soil Science M.S. Natural Resources Management
D. Bruce Champeon, SCS, Water Resources Program Coordinator, 1 Year Geologist, 25 years B.A. Geology 2 yrs. graduate study, Geology
Donald A. Collins, Jr., SCS, District Conservationist, 12 Years Soil Conservationist 2 years Soil Conservation Technician 2 years B.S. Agricultural Resource Economics (ARE) 1 year graduate study, ARE
Roland A. Dupuis, SCS, District Conservationist, 1 year Soil Conservationist, 3 Years A.S. Forest Management Technology B.S. Plant and Soil Sciences M.S. Forestry

LIST OF PREPARERS

TABLE F - LIST OF PREPARERS (Cont'd)

Main Branch Meduxnekeag River Watershed, Maine

(Name), (Agency), (Present Position), (Years in Position) ^{5a} (Previous Positions), (Years in Position) ^{5a} (Education) (Certifications, Licenses, or Registrations) ^{5d}	KEY
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PREPARERS
Christopher R. Jones, SCS, Conservation Agronomist, 9 Years District Conservationist, 4 Years Soil Conservationist, 3 Years B.S. Plant and Soil Science Certified Professional Agronomist Master Certified Pesticide Applicator, Commercial

Robert W. Wengrynek, SCS, Biologist, 17 Years

Soil Conservationist, 2 Years
Soil Conservation Technician, 14 Years
B.S. Wildlife Management
B.S. Forestry
Certified Wildlife Biologist
Registered Professional Forester

GLOSSARY OF ABBREVIATIONS USED

'319' - Section 319 of the Clean Water Act of 1977.
ACHP - Advisory Council on Historic Preservation.
ACP - Agricultural Conservation Program of ASCS.
ARS - Agricultural Research Service of USDA.
ASCS - Agricultural Stabilization and Conservation Service of USDA.
AU - Animal Unit - equivalent to 1,000 pounds of animals.
B.A. - Bachelor of Arts.
B.S. - Bachelor of Science.
BIA - Bureau of Indian Affairs of USDA.
BMP - Best Management Practice.
BOD - Biochemical Oxygen Demand.
CCSWCD - Cumberland County Soil and Water Conservation District.
CEQ - Council on Environmental Quality.
CFR - Code of Federal Regulations.
COE - U.S. Army Corps of Engineers.
CRP - Conservation Reserve Program.
EA - Environmental Assessment.
EIS - Environmental Impact Statement.
EQ - Environmental Quality.
FmHA - Farmers Home Administration of USDA.
FONSI - Finding of No Significant Impact.
HBMI - Houlton Band of Maliseet Indians.
HEL - Highly Erodible Land.
HUA - Hydrologic Unit Area.
ICM - Integrated Crop Management.
IPM - Integrated Pest Management.
LRF - Limited Resource Farmer.
LTA - Long-Term Agreement.
LURC - Maine Land Use Regulation Commission.
MAES - Maine Agricultural Experiment Station.
MDAFAFR - Maine Department of Agriculture, Food and Rural Resources.
MDC - Maine Department of Conservation.
MDEP - Maine Department of Environmental Protection.
MDIFW - Maine Department of Inland Fisheries and Wildlife.
MDOT - Maine Department of Transportation.
MFS - Maine Forest Service of MDC.
MINCE - Maine Inventory of Non-Cropland Erosion.
MOU - Memorandum of Understanding.
M.S. - Master of Science.
MSHPC - Maine State Historic Preservation Commission.
MASRSC - Maine Atlantic Sea Run Salmon Commission.
MSWCC - Maine Soil and Water Conservation Commission.
NATO / CCMS - North Atlantic Treaty Organization / Committee on the Challenges of Modern Society.
NED - National Economic Development.
NNTC - Northeast National Technical Center of SCS.
NPS - Non-Point Source Pollution.
NSCS - Nutrient and Sediment Control System.
O&M - Operation and Maintenance.
PAPR - Preauthorization Planning Report.
P&G - Principles and Guidelines of the USWRC.

GLOSSARY OF ABBREVIATIONS USED

- PL-566 - Public Law 83-566, **Watershed Protection and Flood Prevention Act.**
- POW - Plan of Work.
- RC&D - Resource Conservation and Development Program of USDA.
- RMS - Resource Management System.
- SASWCD - Southern Aroostook Soil and Water Conservation District.
- SCS - Soil Conservation Service of USDA.
- SHPO - State Historic Preservation Officer.
- SJARCD - St. John - Aroostook Resource Conservation and Development Area.
- SNAP - Study of Non-point Agricultural Pollution.
- SWCD - Soil and Water Conservation District.
- T - Tolerable soil loss limit.
- t/a/y - tons per acre per year.
- U.S.C. - United States Code.
- UMCE - University of Maine Cooperative Extension.
- USDA - United States Department of Agriculture.
- USDC - United States Department of Commerce.
- USHUD - United States Department of Housing and Urban Development.
- USDI - United States Department of the Interior.
- USDOD - United States Department of Defense.
- USDOT - United States Department of Transportation.
- USEPA - United States Environmental Protection Agency.
- USFS - United States Forest Service of USDA.
- USFWS - United States Fish and Wildlife Service of USDI.
- USWRC - United States Water Resources Council.
- WELS - West of East Line of State of Maine.
- WPP/EA - Watershed Protection Plan / Environmental Assessment.

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Definitions of a WIS ... Watershed

- a ridge of land that separates 2 different river systems
- river basin ...
- the entire area (geographical) drained by a river and its tributaries ...
- an area characterized by all runoff being conveyed to the same outlet ...
- the total land area that contributes runoff to a body of water ...
- A region of land within which water flows into a specified body, such as a river, lake, sea, drain basin or catchment basin in



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