

Libby Brook Implementation Plan



Prepared by:

**Cumberland County Soil & Water Conservation District
Casco Bay Estuary Project
Friends of the Royal River
Maine Department of Environmental Protection**

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Acknowledgements

This project was funded by Casco Bay Estuary Project and the Maine Department of Environmental Protection and sponsored by the Cumberland County Soil and Water Conservation District.

Public involvement in the development of the Libby Brook Implementation Plan consisted of the Town of Gray, Friends of the Royal River, Gray Public Works Department, Maine Department of Transportation, private citizens and Gray-New Gloucester High School.

With the financial assistance of the Casco Bay Estuary Project, the Libby Brook Watershed Survey will be utilized to develop the Implementation Plan with recommendations to improve and mitigate the existing identified problems in the watershed.

A Watershed approach to interagency coordination and cooperation

The watershed approach strengthens teamwork between the public and private sectors at the federal, state and local levels to achieve the greatest environmental improvements with the resources available. It is through the cooperation and coordination of numerous local, state and federal groups and agencies that the actions outlined in this watershed plan will be implemented. They include:

Town of Gray
Gray New Gloucester High School
Friends of the Royal River
Cumberland County Soil & Water Conservation District
Maine Department of Environmental Protection
Maine Dept. of Transportation
Casco Bay Estuary Project
US EPA
Spring Meadows Golf & Country Club
Wilkinson Excavating

Introduction

The Libby Brook Watershed encompasses 23 square miles and drains a large portion of the Town of Gray and small piece of New Gloucester. Libby Brook tributaries include Mill, Hatchery, Cole and Eddy Brooks. Libby Brook flows into Collyer Brook, a major tributary of the Royal River (See Figure Page 7).

A watershed survey is designed to locate sources of existing erosion (polluted runoff) that could have a negative impact on water quality. Water pollution is caused, in part, by nonpoint source (NPS) pollution. Pollutants are picked up by rainwater and snow melt (stormwater runoff) and carried into the stream, river or lake. The identified sites from the 1998 Libby Brook Watershed Survey were groundtruthed to determine if erosion problems continue to exist. Of the 50 sites originally identified, 36 were rated to have high or medium impact to Libby Brook's water quality. These 36 sites are the core of this report along with recommendations for on-the-ground fixes that will enable the reduction of the amount of sediments that are currently impacting Libby Brook and its watershed.

Watershed

***A watershed includes all of the land that surrounds the river that drains to it through ditches, seeps and springs, tributaries, ground water flow or directly over the ground.
(Libby Brook Watershed is 23 square miles.)***

The Friends of the Royal River, in collaboration with the Casco Bay Estuary Project, the Cumberland County Soil & Water Conservation District, Department of Environmental Protection and the Sabbathday Lake Association have begun planning efforts to establish a regional Youth Conservation Corps. A Youth Conservation Corps is a group of area high school students hired each summer that are trained to perform runoff and erosion control work in the watershed. All the work performed is done by hand and includes installing vegetative buffers, water diverters, hand placing rip rap to stabilize culvert inlet and outlets, ditch cleaning, and redefining turnouts. The Friends of the Royal River and partners have applied for grant funding for the start up of the Youth Conservation Corps Program. If funded, the Youth Conservation Corps would be able to address many of the sites identified in the Libby Brook Watershed Survey.

The Libby Brook Implementation Plan is designed for landowners and municipalities in the watershed to enable them to work together to improve, restore and protect Libby Brook. This plan offers suggestions on ways to provide long and short term protection of the surface water.

Watershed Characteristics

Libby Brook is mostly located in the Town of Gray with a small portion in the Town of New Gloucester. Libby Brook flows into Collyer Brook, which is a major tributary of the Royal River. The Libby Brook Watershed encompasses 23 square miles and its tributaries include Mill Brook, Hatchery Brook and Cole Brook. The topography varies throughout the watershed from steep areas with large rocky streambeds, to flat areas where stream flow is slow and meandering.



Libby Brook has been identified by the Maine Department of Inland Fish and Wildlife as prime habitat for brown and brook trout (NEA, 1997). Natural cold water springs feed the stream along with many stretches of good forested buffers that provide shade, excellent shelter and food for trout.

Watershed development has increased dramatically in Cumberland County during the past decade. The Town of Gray is 42 square miles and has approximately 7,000 permanent residents. This is an increase of 20% from the 5,904 residents in 1990. Gray is located 15 miles north of Portland and is the junction of State Routes 100, 26, 115 and 202 and the Maine Turnpike, Exit 11. Included in the watershed are numerous commercial businesses, agricultural land, a Golf and Country Club, residential homes, schools and the Gray Animal Farm.

Fish & Wildlife

Libby Brook is prime habitat for brown and brook trout but also is habitat for perch, pickerel, smallmouth and largemouth bass. The Dry Mills Fish Hatchery is located within the watershed as well.

Many species of animals occupy the watershed including black bear, beaver, bobcat, eastern chipmunk, eastern cottontail, coyote, white tailed deer, gray fox, red fox, moose, otter, porcupine, raccoons, squirrel, skunk, woodchuck, wood ducks, black ducks, blue heron and woodcock to name some.

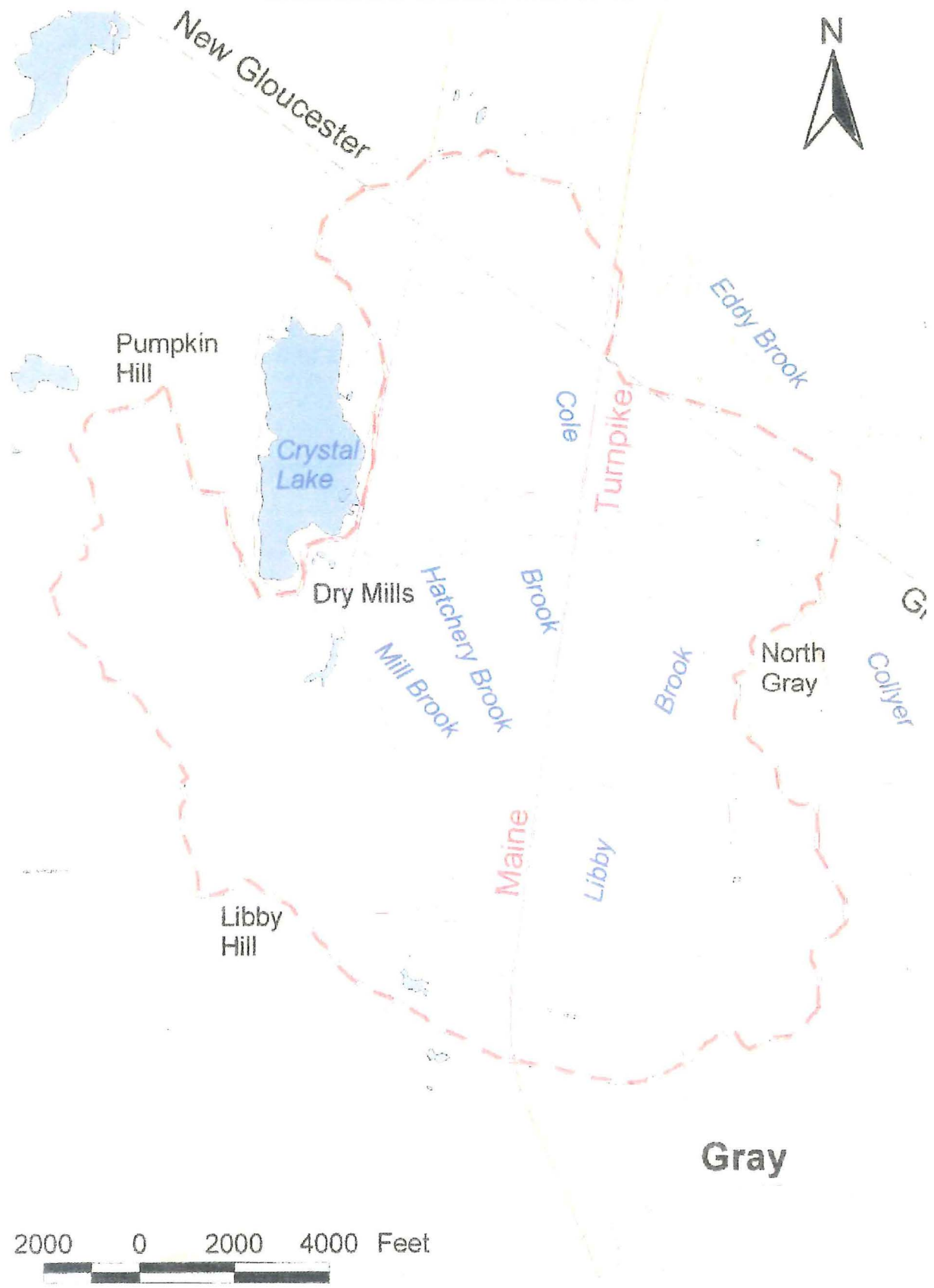
Soils in the Watershed

Soil Associations

- Windsor-Hinckley-Deerfield association: Deep, excessively drained to moderately well drained, nearly level to steep, coarse-textured soils.
- Suffield-Buxton-Hollis association: Deep, well drained to somewhat poorly drained, gently sloping to steep, medium textured soils and ridges of shallow, somewhat excessively drained, moderately coarse textured.
- Scantic-Buxton-Windsor association: Deep, poorly drained to moderately well drained, level to moderately sloping, medium-textured soils and deep, excessively drained, nearly level to steep, coarse textured soils.
- Paxton-Woodbridge-Hollis association: Deep well drained and moderately well drained, nearly level to strongly sloping, moderately coarse textured soils and shallow, somewhat excessively drained, moderately coarse textured soils.

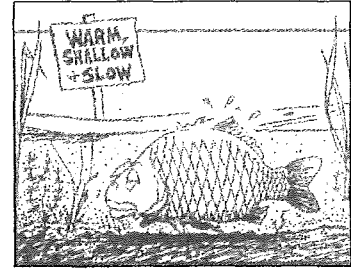
The predominant soil types include the Buxton, Suffield and Windsor series that tend to have high clay content with susceptibility of frost heaving. Runoff is rapid because of slow permeability in the clay layers and steep slopes.

Libby Brook Watershed

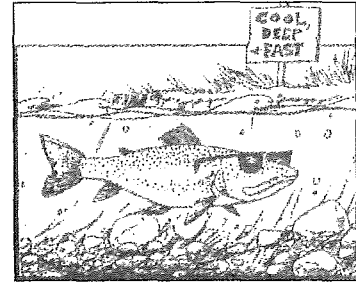


Impacts to Libby Brook

In a developed watershed winter snow melt and stormwater runoff do not infiltrate easily into the ground, but instead run into ditches and storm sewers. Soil and sediments washing from agricultural land, commercial businesses, residential neighborhoods and roads are being deposited into our streams and rivers and carrying pollutants with them.



Sediments are soil particles eroded from gravel road surfaces, construction sites, streambanks and cropland. When these particles reach streams, the sediments cause the water to become cloudy or turbid making it difficult for fish to see and feed properly.



Sediments can also damage fish gills and impair the feeding and breathing processes in aquatic insects that are so important to fish. Sediments also destroy a stream's natural "riffle" and "pool" pattern producing a slow-moving, muddy stream.

Friends of the Royal River conducted water quality sampling for Libby Brook from June through September in 1998 and 1999. They published their findings in a Water Quality Report in April of 2001. Analysis included dissolved oxygen, turbidity and *E.coli*.

The State of Maine established a classification system based on water quality standards and intended uses.

- **Class A:** suitable for drinking (after disinfection), swimming and fishing
- **Class B:** suitable for drinking (after treatment), swimming and fishing
- **Class C:** suitable for drinking (after treatment), swimming and fishing

Dissolved Oxygen Standards:

- **Class A & B:** not less than 7 parts per million (ppm) or 75% of saturation, whichever is higher
- **Class C:** not less than 5ppm or 60% of saturation, whichever is higher oxygen,

Annual mean oxygen concentrations fortunately exceeded Class B standards, and turbidity values were the lowest of all the sub-watersheds throughout the Royal River.

- *E.coli* bacteria levels exceeded the standard several times throughout the year. For a Class B stream, *E.coli* levels may not exceed the seasonal geometric mean of 64 colony forming units per 100 mL.

***E. coli* Standards**

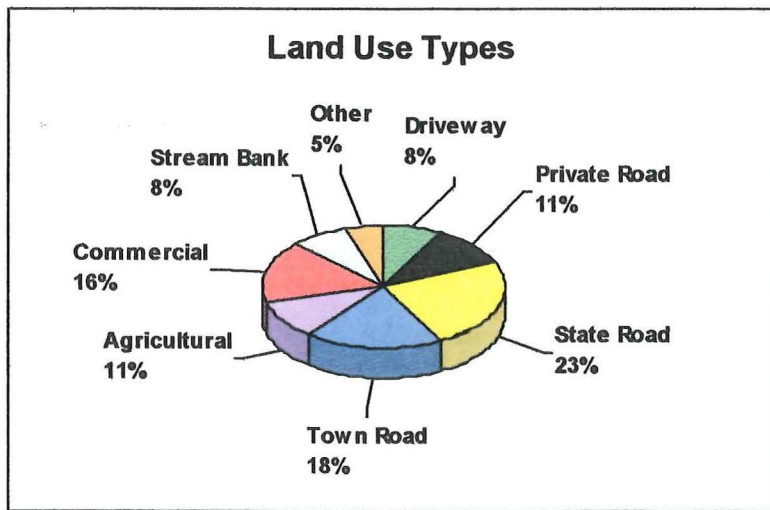
- **Class A:** as naturally occurs
- **Class B:** between May 15th & September 30th, may not exceed a seasonal geometric mean of 64 colony forming units (cfu) per 100 mL

Class C: between May 15th & September 30th, may not exceed a seasonal geometric mean of 142 cfu's per mL

Gray is a rapidly developing town with an approximate 20% increase in population in the last ten years. An increase in development in the watershed brings an increase in impervious surfaces (e.g., roads, parking lots, and buildings). Rainwater and pollutants (e.g. silt, sand, fertilizers, pesticides, animal wastes etc.) run more directly from these surfaces into streams and rivers as surface runoff than from undeveloped forest land. Now is the time to address these issues and seek to at least maintain the current water quality.

Watershed Survey Key Findings:

- Most of the problems were found on state, town and private roads.
- Most of all the problems can be fixed with little expense or technical expertise.
- Approximately **40%** of all the problems may be causing significant impact to Libby Brook.



Land uses in the watershed are comprised of a golf and country club, car wash, restaurants, gas stations, convenience stores, Gray New Gloucester Middle School and High School as well as residential properties and agricultural land.

Types of Polluted Runoff in the Watershed



Private Roads

Problem: Entrance to this road is paved but lack of drainage ditching has eroded shoulders, ditch capability has been exceeded and pavement has begun to crumble.

Solution: Install/redefine ditches on both sides of 600' stretch of entrance to private gravel road and construct turnouts.

Stream Crossings

Problem: Moderate shoulder erosion, gabion baskets being undermined with direct flow to Mill Brook.

Solution: Build up road, install ditching, turnouts and replace undersized culvert.



Gravel Pit Road

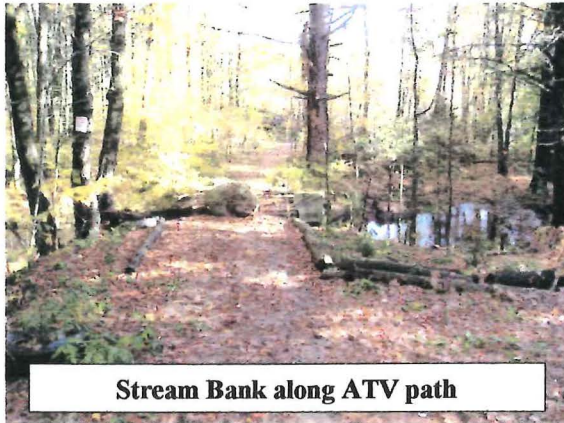
Problem: Moderate to severe surface erosion on gravel pit road with direct flow to Libby Brook tributary.

Solution: Establish erosion controls and enhance vegetated buffer.

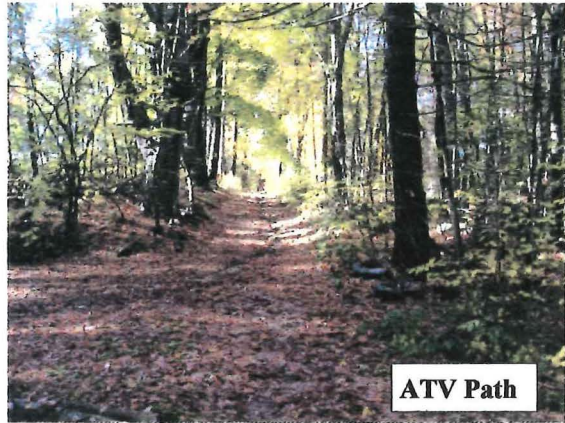
ATV Paths/Degraded stream banks

Problem: (Right) Moderate to severe surface erosion with direct runoff to Mill Brook and (Left) unstable stream banks and bare soil.

Solution: (Right) Install several rubber razor blades to divert runoff into existing vegetated buffers. (Left) Install vegetative buffer strip along stream bank, seed and mulch bare soil areas.



Stream Bank along ATV path



ATV Path

Unstable turnaround/Town Roads

Problem: Unstable turnaround with moderate surface erosion, unstable culvert inlet & outlet; hydroseed washing into Libby Brook. Lack of ditching and winter sand is making its way to brook.

Solution: Armor culvert inlet and outlet, construct earthen berm around edge of turnaround, seed and mulch, remove winter sand. Install ditching, turnouts and remove winter sand.



Implementation Plan

This plan has been developed to serve as a guiding document for individual homeowners, businesses, private road associations and municipalities. This plan includes suggestions on solving identified problems and provides for long term protection.

General Recommendations

Solving problems associated with soil erosion and stormwater runoff should occur at many levels (individual, organization, business, government, school) and in different time frames (short term, intermediate, long-term) in order to be effective. Everyone including students, landowners, business owners, and government officials, has a part in maintaining a healthy watershed.

Individuals can correct small, uncomplicated, chronic sources of polluted runoff with little guidance and expense. Other, more complex, existing and future sources will require a higher degree of technical expertise, long term planning, and possibly fundraising.

More data could be collected to help determine the health of the brook including riparian vegetation widths, macroinvertebrate analysis, and systematic and consistent water quality monitoring. The riparian zone, also known as the streamside zone, is the land next to the river or stream that floods occasionally. The riparian zone is important to water quality because the vegetation filters soil and nutrients that erode from surrounding uplands. It is also important to wildlife habitat, and bank protection. A macroinvertebrate analysis is the collection, processing and analysis of aquatic organisms that will help determine the health of the biological community in the stream. In addition, a Stream Habitat Walk will provide useful information about in-stream and near stream habitat conditions. While this would not provide a comprehensive biological analysis, it would be a manageable place to start.



Solutions include reducing polluted runoff from existing erosion sites, implementing conservation and maintenance practices, providing technical assistance and education, and long-term watershed planning.

Plan Specifics

Goal 1: Reduce the amount of sediment laden stormwater runoff from existing erosion sources throughout the watershed.

- Implement conservation practices on existing erosion sites.
- Provide technical assistance to landowners to teach individuals how to install conservation practices that are inexpensive and can be done by hand.
- Provide technical assistance and training to municipal public works crews on proper installation of conservation practices.
- Encourage establishment of Royal River Youth Conservation Corps to address existing erosion sources in the watershed.

Goal 2: Build local leadership to promote public stewardship of the watershed.

- Establish a mechanism for long term watershed protection.
- Establish and encourage a Stream Team or stream adoption program in the local high school/middle school.

Goal 3: Educate landowners on healthy watershed practices and the importance of fish and wildlife habitat.

- Promote understanding about issues facing water resources.
- Conduct education and outreach to inform residents about the value of riparian habitat, in-stream habitat and high value plant and animal habitats.

Action Plan

Objective #1: Reduce the amount of sediment laden stormwater runoff from existing erosion sources throughout the watershed.			
Action	Schedule	Management	Cost Estimates
Strategy #1: Implement conservation practices on existing erosion sites			
1. Work with the Town of Gray Public Works Department to encourage maintenance practices and divert runoff from roads into stable ditches and vegetated areas.	2004	Town of Gray Public Works and CCSWCD	\$2,000
2. Develop and implement project with local high school to educate students on installing conservation practices.	2004	Gray New Gloucester High School and CCSWCD	\$1,200
3. Assist agricultural landowners with alternative livestock watering facilities and assist them with fencing livestock out of water resources.	2004	Ag Landowners and CCSWCD & NRCS	\$10,000
4. Plant vegetative buffers and seed and mulch bare soil areas.	2004	Landowners & CCSWCD	\$3,500
5. Armor and stabilize culvert inlet and outlets.	2004	Town of Gray Public Works and CCSWCD	\$1,200
6. Support the Friends of the Royal River along with other Royal River Watershed partners in their efforts to establish a Youth Conservation Corps (YCC). The YCC would be able to address many of the existing sites identified in the watershed survey.	2004	Friends of the Royal River and CCSWCD	\$5,000/year
Strategy #2: Provide technical assistance to landowners and municipalities to teach individuals how to install conservation practices			
1. Implement a landowner technical assistance program to teach them how to install low cost conservation practices that can be done by hand.	2004 & ongoing	CCSWCD & DEP	\$900/year
2. Develop and assist private road associations and encourage new and improved road maintenance procedures.	2004 & ongoing	CCSWCD	\$1000/year
3. Implement a technical assistance program for town public works crews.	2004	CCSWCD	\$1,000

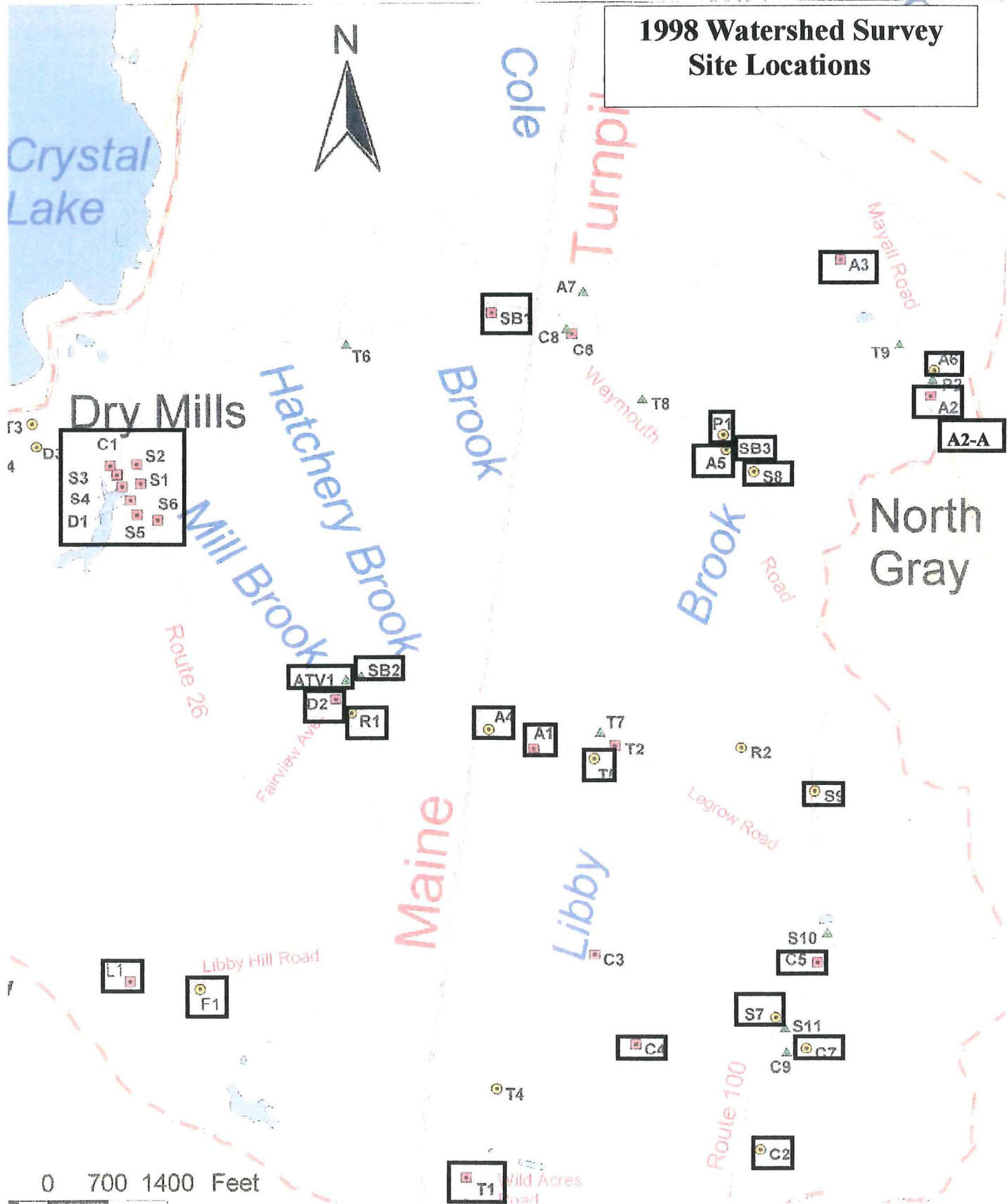
Goal 2: Build local leadership to promote stewardship of the watershed.

Action	Schedule	Management	Cost Estimates
Strategy #1: Establish a mechanism for long term watershed protection			
1. Encourage and assist the Town of Gray with implementing a surface water protection ordinance for stream, rivers and lakes.	2004	Town of Gray & CCSWCD and neighboring towns	\$4,000
2. Support the Friends of the Royal River efforts to conduct outreach and education to local landowners and municipal officials through the state's NEMO (NPS Education for Municipal Officials) Program.	2004 & ongoing	FORR & NEMO Program, Town of Gray	\$1250/year
Strategy #2: Establish and encourage a Stream Team/Stream Adoption Program at Gray New Gloucester High School.			
1. Assist Advanced Science class at Gray New Gloucester High School in developing a Stream Team that focuses on protecting, monitoring and restoring Libby Brook.	2004 & ongoing	DEP Stream Team & High School & FORR	\$2,000
2. Provide current and up to date information on streams, plant and animal habitat.	2004 & ongoing	DEP Stream Team & FORR	\$500/year
3. Assist class with choosing sites for monitoring, equipment and tracking procedures for monitoring data.	2004	DEP Stream Team & CCSWCD	\$1,500
4. Conduct a DEP Stream Team Program Stream Habitat Walk.	2004	DEP Stream Team & CCSWCD & Gray New Gloucester High School	\$3,000
Goal 3: Educate landowners about healthy watershed practices and the importance of fish and wildlife habitat.			
Strategy #1: Promote understanding of issues facing water resources			
1. Collaborate with High School students to write weekly column for local newspaper on topics such as water quality, wildlife facts, watersheds, habitats, class environmental projects and land use practices and how they affect stream ecosystems.	2004 & ongoing	CCSWCD & Gray New Gloucester High School	\$800/year
2. Promote and encourage phosphorus free fertilizers by developing a one page fact sheet to be distributed with local newspaper.	2004	Gray New Gloucester High School & CCSWCD & DEP	\$500
3. Support Friends of the Royal River effort to educate and involve local watershed landowners by developing, updating and maintaining their website with information about the Libby Brook Watershed.	2004 & ongoing	Friends of Royal River & CCSWCD	\$500/year

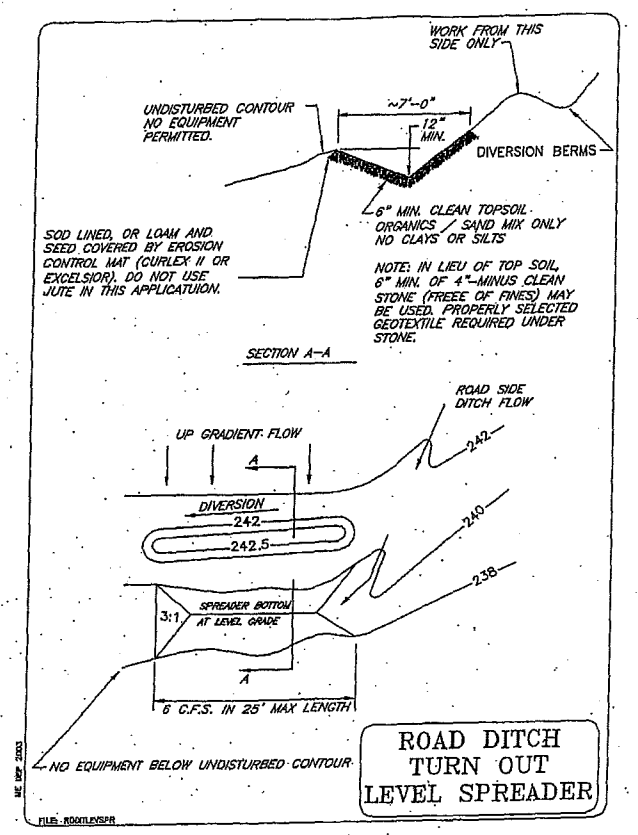
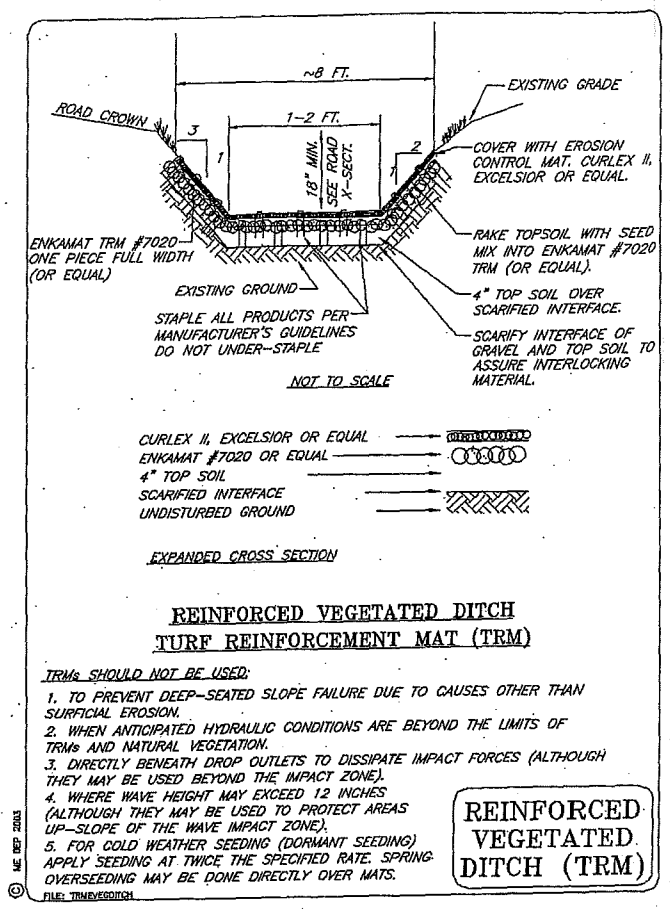
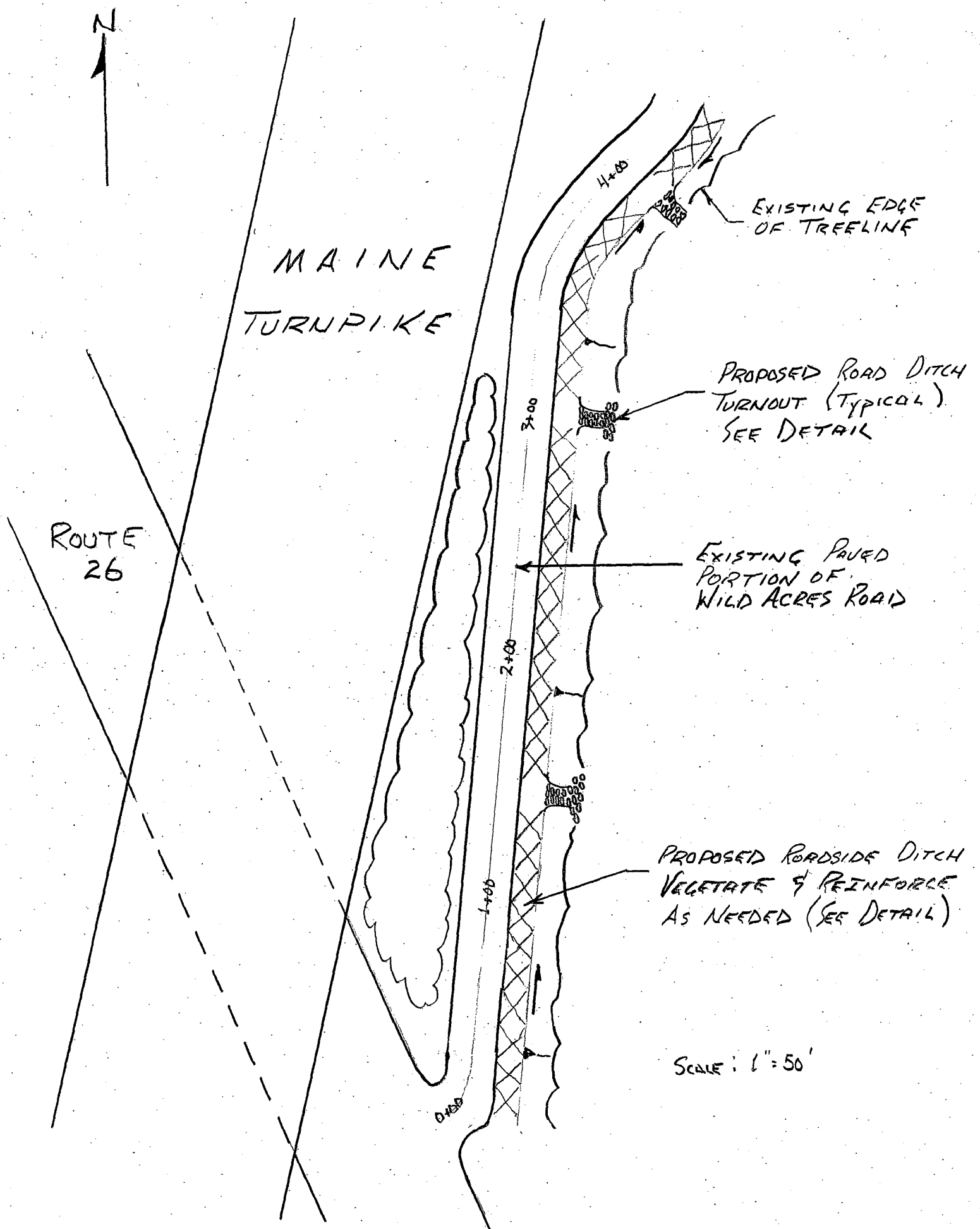
Strategy #2: Conduct education and outreach to inform residents about the value of riparian, in-stream habitat and high value of plant and animal habitat.

Action	Schedule	Management	Cost Estimates
1. Encourage Town to incorporate Beginning with Habitat Program into Comprehensive Plan and participate in a presentation offered by the Program.	2004	Beginning with Habitat & Town of Gray	\$2,500
2. Support Friends of the Royal River efforts to obtain conservation easements within the watershed.	2004 & ongoing	Friends of the Royal River & DEP	\$1,000/year
3. Conduct macroinvertebrate sampling and analysis and gather data on fisheries and vegetation widths.	2004	DEP Stream Team, IF & W and NRCS aerial photography	\$1,800

1998 Watershed Survey Site Locations



2003 Groundtruthed Sites



Cumberland County Soil and Water Conservation District	Project: LIBBY BROOK WILD ACRES ROAD #1	Drawn by: CB Date: 12-17-03
Scale: AS SHOWN	Sheet Title: PRELIMINARY DESIGN	Sheet No. 1 of 1

Site ID	Land Use	Location	Type of Problem	Length or Area	Recommendations	Technical/ Funding Level to Install	Priority	Comments	Problem/Issue Solved
D1	Driveway	Rt 26, south of Mill Brook crossing (Gray Fire Dept)	Moderate surface erosion, poor shaping, and bare soil on parking area, and direct flow to Mill Brook	30' X 50'	Reshape bare soil area and vegetate, add berm and slope runoff to west (to stand of bamboo). Modify snow management (don't plow toward brook).	*	High	problem still exists and agree with recommendations and priority status	
D2	Driveway	27 Fairview Ave	Moderate surface erosion, manmade waterbar that is directing runoff into headwaters of unnamed stream, direct flow to unnamed stream with a natural spring and direct connection to Mill Brook	100' X 10'	Broad based dip placed before stream to disperse runoff to buffer, or level lip spreader placed close to head of spring for same purpose	*	High	gully full length of pathway (ATV trail??) to unnamed stream. Turnouts, waterbars, possible level lip spreader	
D3	Driveway	First driveway on left, heading W on North Raymond Rd from Rt 26	Moderate surface erosion, unstable culvert inlet/outlet, poor shaping, direct flow to Mill Brook	150' X 9'	New surface material, reshape, and add waterbar. Culvert is smaller than culverts placed upstream (larger culvert size should be considered).	**	Medium	driveway paved, no evidence of erosion or runoff	X
D4	Driveway	Further W from site D3	Unstable culvert inlet/outlet (will have problems if left as is), direct flow to Mill Brook	20' X 12'	Rip rap culvert inlet/outlet, seed and mulch	*	Low		
P1	Private Road	Near NW corner of Weymouth Rd and Libby Brook crossing	Unstable culvert inlet/outlet and direct flow into wetland tributary of Libby Brook	(10' X 5') X 2	Reshape culvert inlet and outlet and rip rap	*	Medium	problem still exists, agree with recommendations stated and priority status.	
P2	Private Road	Mayall Rd	Moderate ditch erosion, unstable culvert inlet/outlet, clogged culvert inlet and direct flow to Libby Brook	(5' X 15')x2	Clear culvert inlet, and rip rap culvert inlet/outlet.	*	Low		
S1	State Road	SE corner of Rt 26, Mill Brook crossing	Moderate surface erosion, poor shaping, direct flow to Mill Brook	Not Available	Build up road, reshape shoulder, reditch, and construct sediment trap with level lip spreader that directs flow to a vegetated buffer	***	High	problem still exists, agree with recommendations stated and priority status.	
S2	State Road	NE corner of Rt 26, Mill Brook crossing	Moderate surface erosion, poor shaping, direct flow to Mill Brook	Not Available	Construct a plunge pool or sediment trap to dissipate flow before it enters Mill Brook	***	High	problem still exists, agree with recommendations stated and priority status.	

S3	State Road	NW corner of Rt 26, Mill Brook Crossing	Moderate surface erosion, direct flow to Mill Brook	20' X 20'	Maintenance - remove winter sand, vegetate, plunge pool.	**	High	problem still exists, agree with recommendations stated and priority status.	
S4	State Road	SW corner of Rt 26, Mill Brook crossing	Moderate surface erosion, direct flow to Mill Brook	50' X 5'	Ditch turnout	*	High	problem still exists, agree with recommendations stated and priority status.	
S5	State Road	Rt 26, south of Mill Brook crossing (Gray Fire Dept)	Moderate shoulder erosion and direct flow to Mill Brook	50' of ditch	Reshape road shoulder, seed, and mulch.	*	High	problem still exists, agree with recommendations stated and priority status.	
S6	State Road	East side of Rt 26	Moderate shoulder erosion, winter sand build up, direct flow to Mill Brook	600' of ditch	Reditch, turnout by St. Gregory Church information sign	*	High	problem still exists, establish turnouts with plunge pool above Franks Garage	
S7	State Road	Route 100, 300' N of Cole Farms	Moderate shoulder erosion, stream bank erosion, direct flow to tributary	60' X 10'	Turnout on shoulders before stream, stabilize stream bank - vegetate and rip rap, and remove silt fence from stream channel	**	Medium	no existing problems seen	X
S8	State Road	NE side of Weymouth Rd	Severe shoulder erosion, severe ditch erosion and direct flow to manmade ditch	1,100' X 10'	Reditch where filled with sediment, reshape ditch, rip rap ditch bottom along steeper slopes, seed and mulch, and possible sediment trap near junction with existing diversion ditch	**	Medium	No problems seen, ditch has been established and is vegetated nicely.	X
S9	State Road	Culvert under Route 100, at junction of Route 100 and Legrow Rd	Severe shoulder erosion, unstable culvert inlet/outlet, direct flow to tributary of Libby Brook	(40' X 15')x2	Vegetate road shoulder and rip rap culvert inlet/outlet.	*	Medium	Has been corrected but needs a bit of revegetation of banking by stop sign.	
S10	State Road	Route 100 at Foster Hill Rd Pond	Unstable culvert inlet/outlet and direct flow to duck pond	10' X 10'	Rip rap around culvert	*	Low		
S11	State Road	Route 100, ditch between N parking lot and Route 100	Moderate shoulder erosion, severe ditch erosion, direct flow to storm drain along Lewiston Road	300' X 15'	Reditch, vegetate, and erosion controls around storm drain	*	Low		
T1	Private Road	Entrance to Wild Acres Rd - first 600'	Winter sand build up, ditch capability exceeded, direct flow to the headwaters of Libby Brook	600' X 3'	Reditch both sides of road, remove winter sand, and insert new cross culvert to feed ditch runoff to natural detention pond on NW side of road	***	High	problems still exist, agree with recommendations as stated possible turnout at top of hill with plunge pool	

T4	Private Road	Dead end of Wild Acres Rd	Moderate surface erosion, moderate shoulder erosion, unstable culvert inlet/outlet and direct flow to Libby Brook	150' X 15'	Reshape ditch and road, rip rap & vegetate shoulders, establish buffer to stream, and add turnout before stream crossing	**	Medium	Problem does still exists and agree with stated recommendations	
T2	Town Road	North side of Legrow Rd	Severe ditch erosion, bank erosion, ditch capacity exceeded, winter sand buildup, unstable culvert inlet/outlet and clogged culvert	289' X 7'	Rip rap culvert, reshape ditch, remove winter sand, clean culvert and seed and mulch ditch.	**	High	Problem no longer exists	X
T3	Town Road	North Raymond Rd, 150' W of Rt 26	Moderate shoulder erosion, ditch capability exceeded (no ditch), direct flow to stream leading into Mill Brook	300' of ditch: 200' from W, 100' from E	Plunge pool, reditch, maintenance	**	Medium	Problem no longer exists	X
T5	Town Road	Turnaround at Legrow Rd, Libby Brook Crossing	Moderate surface erosion, bare soil, unstable culvert inlet/outlet, direct flow to Libby Brook	40' X 30'	Rip rap around culvert, seed and mulch bare soil and remove winter sand	*	Medium	culvert stabilized, vegetated berm has been established at edge of turn around	X
T6	Town Road	Weymouth Road, Hatchery Brook crossing	Moderate surface erosion, unstable culvert inlet/outlet, and direct flow to Hatchery Brook via ditch	5'	Rip rap	*	Low		
T7	Town Road	Dirt Rd off Legrow, along E side of Libby Brook	Moderate shoulder erosion, poor shaping, unstable culvert inlet/outlet and clogged culvert	20' X 5'	Rip rap culvert, reshape shoulder, seed and mulch and clear culvert.	*	Low		
T8	Town Road	Along N side of Weymouth Rd, just E of 94 Weymouth Rd	No ditching, moderate shoulder erosion	5' X 100'	Either excavate a ditch and vegetate, or use coarser shoulder material	*	Low		
T9	Town Road	Mayall Rd, between mailboxes 377 & 373	Severe ditch erosion and clogged culvert.	750' X 10' - primarily W side of rd	Clear culvert, reditch, rip rap and seed and mulch.	*	Low		
A1	Agriculture	End of Legrow Rd ext, just inside pasture	Stream bank erosion, bare soil and direct flow to Mill Brook	10' X 7' N side; 15' X 7' S side	Establish riparian buffer and vegetate.	*	High	Problem no longer exists	X
A2	Agriculture	Mayall Rd	Bare soil with moderate surface erosion, deposited stream sediment, unstable stream access (cows), and direct flow to Libby Brook.	180' of stream bank	Establish buffer, vegetate, and limit livestock access to Libby Brook	**	High	buffer established	X

A2-A	Agriculture	East side of Mayall Road	Cattle access to brook for drinking water, bare soil, stream bank erosion	20'x10'	establish buffer, vegetate, limit livestock to brook		High	new site identified	
A3	Agriculture	Large area west of Mayall Rd	Bare fields and severe surface erosion (gullies along southern perimeter of cropland), direct flow to Libby Brook	1,000' X 1,500'	Reestablish riparian buffer, possible interceptor trench, rip rap downspout, and level lip spreader at toe to deal with steep slope.	***	High	Bare fields are now grown for hay and have winter cover on them. Will check on in the spring.	
A4	Agriculture	Mill Brook off Legrow Rd	Lack of riparian buffer, stream bank erosion and severe surface erosion adjacent to stream.	16' X 14'	Establish buffer, vegetate and limit livestock access	*	Medium	Problem no longer exists	X
A5	Agriculture	Southeast corner of Weymouth Rd, Libby Brook crossing	Bare soil with moderate surface erosion, unstable stream access (cows) and direct flow to Libby Brook.	40' X 30'	Establish buffer, vegetate, and limit livestock access to Libby Brook	*	Medium	problems still exist, agree with recommendations as stated	
A6	Agriculture	Just east of Mayall Rd	Severe surface erosion, bare fields, clogged culvert, and direct flow to tributary of Libby Brook	45' X 90'	Widen ditch, vegetate, and clear culvert	*	Medium	field vegetated and culvert cleaned	X
A7	Agriculture	North of Weymouth Rd, just East of Turnpike	Moderate ditch erosion, bare soil, poor ditch shaping, and direct flow to a pond	500' X 5' to 25'	Reshape ditch, vegetate, and rip rap and/or install stone check dams as necessary	***	Low		
C1	Commercial	Parking Lot at the corner of Rt 26 and North Raymond Rd	Moderate surface erosion, stockpiled soil (some winter road sand), direct flow to Mill Brook	100' X 20'	New surface material, vegetate, stormwater controls to deal with hydrocarbon runoff from parking lot, adapt new snow management for least impact	***	High	Parking area paved, no erosion evident	X
C2	Commercial	Rt 100 LP Gas Station	Moderate surface erosion, bare soil parking lot, and suspected hydrocarbons flowing into a storm drain with unknown destination	0.75 acre	New surface material and storm drain protection	***	Medium	Parking area paved, no erosion evident	X
C3	Commercial	Cole Farms golf course, NW corner	Moderate surface erosion, bare soil, direct flow to stream, stockpiled soil, unstable construction site, and severe siltation in stream recognized as a direct result of construction	+/- 5 acres	Erosion controls, better planning of construction process to reduce impacts to stream	*	High		

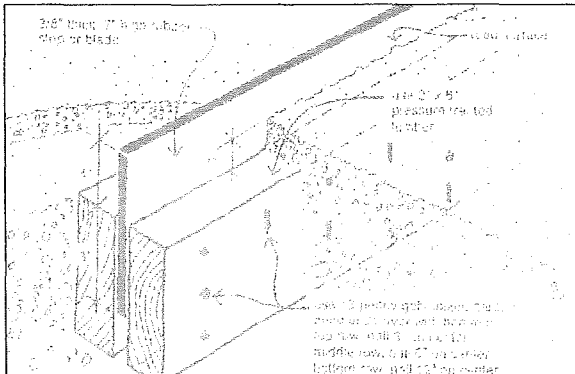
C4	Commercial	Cole Farms Golf Course, 1/2 mile from Route 100	Severe surface erosion, stream bank erosion, and direct flow to Libby Brook. (Note: The water through the golf course is clear for 1st 100', then water is severely impacted by excavated areas.) Detention/Sed Pond filled to capacity.	1000' X 10'	Maintenance, vegetate, and erosion controls. Remediation is necessary during construction of golf course! Note: This site will be fixed as golf course is developed	*	High	Construction of Golf Course is complete. Recommend enhanced buffer along stream channel.	
C5	Commercial	Route 100	Moderate surface erosion, bare soil, unstable construction site, rill erosion and silty water flowing into tributary	300' X 80'	Erosion controls, vegetate, seed and mulch and grade out rills	*	High	Problem no longer exists	X
C6	Commercial	Weymouth Rd	Severe surface erosion at edge of gravel pit, bare soil, direct flow to tributary of Libby Brook	110' X 15' W side; 80' X 15' E side	Establish erosion controls and vegetated buffer	**	Medium	problems still exist, agree with recommendations as stated	
C7	Commercial	Cole Farms Restaurant, near maintenance shed uphill from N parking lot	Stockpiled soil (winter road sand) on steep bank, direct flow to stream	28' X 20'	Erosion controls or, more preferably, remove sand and adapt new snow management for least impact	*	Low	Bare soil at rear of parking area- new excavation	
C8	Commercial	Weymouth Rd	Moderate ditch erosion along access road to gravel pit, with winter sand buildup	112' X 5'	Reditch and vegetate	*	Low		
C9	Commercial	Cole Farms Restaurant, excavated area around trash compacter	Severe surface erosion, bare soil, direct flow to storm drain along Lewiston Road	45' X 25'	Reduce angle of back slope, seed and mulch	*	Low		
R1	Residential	27 Fairview Ave	Severe surface erosion, bare soil, unstable construction site - house in place, landscaping not established	30,000 sq. ft.	Reshape, seed and mulch, clean up burn pile and stabilize foundation drain	**	Medium	Problem no longer exists	X
R2	Residential	Legrow Rd	Lack of buffer, shoreline erosion on man made pond, direct flow to tributary	100' of shoreline	Establish buffer and vegetate	*	Medium	Problem no longer exists	X
SB1	Stream Bank	Cole Brook, just downstream of Weymouth Rd	Severe stream bank erosion apparently caused by culvert discharge into stream bank.	35' X 23'	Reshape bank and rip rap	**	High	appears to have stabilized itself somewhat but bank needs to be toed in	

SB2	Stream bank	Mill Brook crossing behind 27 Fairview Ave	Unstable stream access, bare soil	(5' X10') x 4	Seed and mulch both sides of brook on each side of crossing (4 areas) and limit access	*	Low		
SB3	Stream bank	NE corner of Weymouth Rd and Libby Brook crossing	Unstable stream access, bare soil, and direct flow to Libby Brook	20' of shoreline	Rip rap	**	Low		
ATV1	ATV path	Mill Brook crossing behind 27 Fairview Ave	Moderate surface erosion, direct flow to Mill Brook	120' X 8'	Install waterbar on path leading down toward brook - need to divert runoff to buffered area	*	Low		
L1	Log Road	Libby Hill, uphill from school	Severe surface erosion, poor shaping, bare soil, no ditching	500' X 12'	Reshape, turnout, waterbar/diversion, broad based ditch, and seed and mulch	***	High	No problems exists, log road has been reshaped, ditched and erosion control mulch added to banking on left for 500 to 700' along with turnouts	X
F1	Foot Path	Libby Hill Rd, path to baseball field	Brook crossing needs to be established, currently logs on ground for walking	5' X 5'	Build up path leading to brook, install waterbar, create bridge	**	Medium to low	Bridge has been constructed, but recommend water bar just before bridge on pathway	

Appendix D

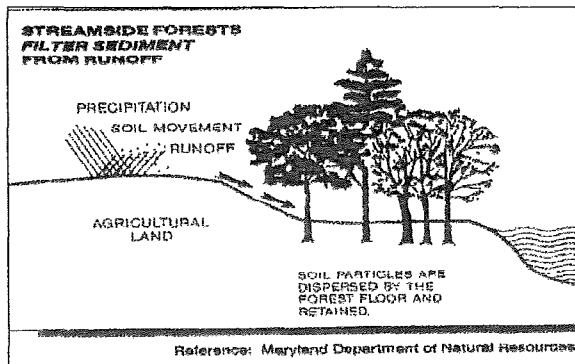
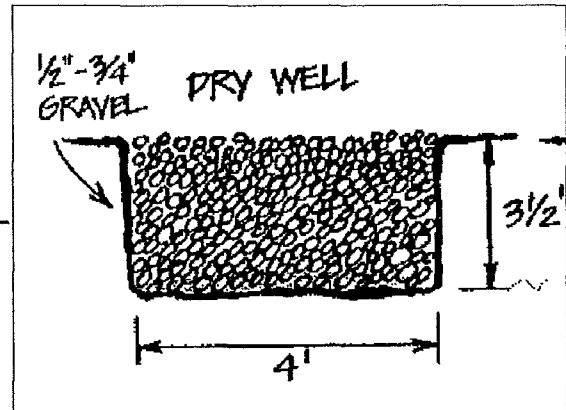
Installation of simple conservation practices will have a positive impact and along with regular maintenance practices, will reduce polluted runoff.

- Bare soil can easily be corrected with seed and hay or mulch.
- Waterbars and rubber razor blades can be used to divert water into vegetated buffers
- Stone lined infiltration trenches or French drains can be easily installed to allow water to soak into the ground while reducing sheet flow erosion or roof drip line erosion.
- Vegetated buffers can be installed fairly inexpensively and can be done in phases if vegetating a large area. Vegetation acts as a natural infiltration system allowing water to soak through to the roots.



Rubber Razor Blade or
Water diverter

Roof runoff control—dry
well for gutter downspout



Riparian /vegetation buffer
can be enhanced

Where Do I Get More Information?

Contacts

Cumberland County Soil and Water Conservation District

201 Main Street, Suite 6
Westbrook, Maine 04092
(207) 856-2777

Offers assistance with watershed planning and survey work, environmental education, engineering support, seminars and training sessions, technical assistance and education on the use of conservation practices.

Maine Department of Environmental Protection

312 Canco Road, Portland, ME 04103
Toll Free (888) 769-1036 or (207) 822-6300

17 State House Station, Augusta, ME 04333
Toll Free (800) 452-1942 or (207) 287-7688

Provides permit applications and assistance, numerous reference materials, technical assistance, environmental education, project funding opportunities, and stewardship activities for lakes.

United States Environmental Protection Agency
www.epa.gov/owow/nps

Publications

Androscoggin Valley SWCD and Lake and Watershed Resources Management Associates. 1998. *The Buffer Handbook: A Guide to Creating Vegetated Buffers for Lakefront Properties.* 20 pgs. plus inserts.

Kennebec County SWCD and Maine DEP. June, 2000. *Camp Road Maintenance Manual: A Guide for Landowners.* 54 pgs.

Maine DEP. 1999. *Maine Shoreland Zoning—A Handbook for Shoreland Owners.* DEPLW 1999-2. 34 pgs.

University of Maine Cooperative Extension. *Gardening to Conserve Maine's Native Landscape: Plants to Use and to Avoid.* Bulletin #2500. June, 1999. Folded leaflet.

**DEP Maine Stream Team website
www.state.me.us/dep/blwq**

DEP NPS Pollution Page—www.state.me.us/dep/blwq/doceducation/nps/index.htm

Gulf of Maine Aquarium. *Streams.* Folded leaflet.

Remember, the long term health of the watershed depends on you!