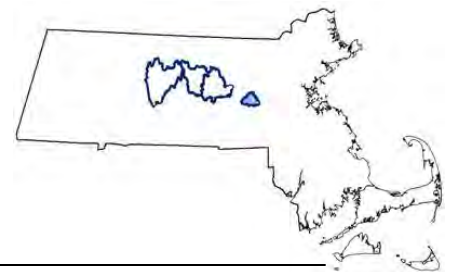




2008 Watershed Protection Plan Update

Volume IID

Sudbury and Foss Reservoirs Watershed



December 2008

Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection
Office of Watershed Management

2008 Watershed Protection Plan Update

Volume IID: Sudbury and Foss Reservoirs Watershed

Table of Contents

1	INTRODUCTION.....	1
1.1	EMERGENCY SOURCE WATER SUPPLY	1
1.2	REGULATION OF EMERGENCY SOURCE WATER SUPPLIES	3
1.2.1	<i>Drinking Water Regulations</i>	3
1.2.2	<i>Massachusetts Surface Water Quality Standards</i>	3
1.2.3	<i>Watershed Protection Regulations</i>	4
2	WATERSHED DESCRIPTION.....	5
2.1	HISTORY.....	5
2.2	BASIN LOCATION.....	6
2.2.1	<i>North Basin</i>	9
2.2.2	<i>South Basin</i>	10
2.3	EMERGENCY USE	10
2.4	NATURAL CHARACTERISTICS	12
2.4.1	<i>Topography</i>	12
2.4.2	<i>Geology</i>	12
2.4.3	<i>Vegetation</i>	12
2.5	LAND USE	15
2.6	HYDROLOGY	18
2.7	WATER QUALITY.....	19
3	SOURCES OF POLLUTION AND THEIR ASSESSMENT.....	21
3.1	WILDLIFE	22
3.2	PUBLIC ACCESS/RECREATION	22
3.2.1	<i>Water Contact Activities</i>	23
3.2.2	<i>Boating (Motorized and Non-motorized)</i>	23
3.2.3	<i>Fishing</i>	23
3.2.4	<i>Off-Road Driving</i>	23
3.2.5	<i>Horseback Riding</i>	23
3.2.6	<i>Dogs and Other Pets</i>	24
3.2.7	<i>Camping</i>	24
3.2.8	<i>Hunting and Trapping</i>	24
3.2.9	<i>Hiking, Nature Study, Bird Watching, Snowshoeing</i>	24
3.2.10	<i>Bicycle Riding</i>	24
3.2.11	<i>Cross-Country Skiing</i>	25
3.2.12	<i>Picnicking</i>	25
3.2.13	<i>Others</i>	25
3.3	TIMBER HARVESTING	26
3.4	WASTEWATER	26
3.5	ROADWAYS/RAILWAYS/ROWS.....	27
3.6	AGRICULTURE	27
3.7	CONSTRUCTION	27
3.8	COMMERCIAL, INDUSTRIAL, AND GOVERNMENTAL SITES.....	28
3.9	RESIDENTIAL SITES	28
3.10	SOLID WASTE FACILITIES.....	28
3.11	FUTURE GROWTH	29
3.12	CLIMATE CHANGE.....	29

4	PROGRAMS TO CONTROL POTENTIAL SOURCES OF POLLUTION	31
4.1	LAND ACQUISITION	31
4.2	LAND MANAGEMENT	34
4.3	WILDLIFE MANAGEMENT	34
4.4	PUBLIC ACCESS MANAGEMENT.....	35
	4.4.1 <i>Trespassing</i>	35
	4.4.2 <i>Encroachments</i>	35
4.5	WATERSHED SECURITY	38
4.6	INFRASTRUCTURE.....	38
4.7	WATERSHED PROTECTION ACT	38
4.8	TECHNICAL ASSISTANCE AND COMMUNITY OUTREACH	38
4.9	INTERPRETIVE SERVICES	38
4.10	WATER QUALITY MONITORING.....	39
4.11	ENVIRONMENTAL QUALITY ASSESSMENTS	39
4.12	EMERGENCY RESPONSE.....	39
5	IMPLEMENTATION SCHEDULE AND WORK PLAN	41
	REFERENCES	43

Tables

TABLE IID-1:	SUDBURY AND FOSS RESERVOIR INFORMATION	9
TABLE IID-2:	EMERGENCY USE SCENARIOS AND WATER QUALITY IMPACTS	11
TABLE IID-3:	ACREAGE OF MANAGED DWSP FOREST ON SUDBURY AND FOSS RESERVOIR WATERSHED BY TYPE ...	14
TABLE IID-4:	ACREAGE OF MANAGED DWSP FOREST ON SUDBURY AND FOSS RESERVOIRS WATERSHED BY SIZE CLASS	14
TABLE IID-5:	SUDBURY AND FOSS RESERVOIRS WATERSHED LAND COVER AND LAND USE	15
TABLE IID-6:	SUDBURY AND FOSS RESERVOIRS WATERSHED OPEN SPACE OWNERSHIP	15
TABLE IID-7:	SUDBURY AND FOSS RESERVOIRS WATERSHED POPULATION.....	15
TABLE IID-8:	SUDBURY AND FOSS RESERVOIRS WATERSHED SUB-BASINS.....	18
TABLE IID-9:	SUDBURY AND FOSS RESERVOIRS SAFE YIELD VOLUMES	19
TABLE IID-10:	WATER QUALITY CONTAMINANTS AND THEIR MOST LIKELY SOURCES IN THE WATERSHED SYSTEM	21
TABLE IID-11:	SUDBURY AND FOSS RESERVOIRS SOURCE THREAT ASSESSMENT.....	22
TABLE IID-12:	DCR WATERSHED PROTECTION GOALS, PROGRAMS, PLANS AND GUIDANCE DOCUMENTS FOR THE SUDBURY AND FOSS RESERVOIRS WATERSHED	32
TABLE IID-13:	SUMMARY OF PROGRAMS TO ADDRESS POTENTIAL SOURCES OF WATER POLLUTION.....	33
TABLE IID-14:	DCR/DWSP PUBLIC ACCESS POLICY SUMMARY IN THE SUDBURY AND FOSS RESERVOIRS WATERSHED	37
TABLE IID-15:	SUDBURY AND FOSS RESERVOIR WATERSHED 5 YEAR WORK PLAN 2009-2013	41

Figures

FIGURE IID-1:	DCR/MWRA WATER SUPPLY SYSTEM.....	2
FIGURE IID-2:	SUASCO BASIN AND THE SUDBURY RESERVOIR WATERSHED SYSTEM SUB-BASINS	7
FIGURE IID-3:	SUDBURY AND FOSS RESERVOIRS WATERSHED (SUDBURY RESERVOIR WATERSHED SYSTEM NORTH BASIN).....	8
FIGURE IID-4:	SUDBURY AND FOSS RESERVOIRS WATERSHED HYDROGRAPHY	13
FIGURE IID-5:	SUDBURY AND FOSS RESERVOIRS WATERSHED LAND USE	16
FIGURE IID-6:	SUDBURY AND FOSS RESERVOIRS WATERSHED PROTECTED OPEN SPACE	17
FIGURE IID-7:	PUBLIC ACCESS ZONES IN THE SUDBURY AND FOSS RESERVOIRS WATERSHED	36

1 Introduction

The Massachusetts Department of Conservation and Recreation, Division of Water Supply Protection, Office of Watershed Management (DWSP, or the Division) manages and protects the drinking water supply watersheds that provide water for distribution by the Massachusetts Water Resources Authority (MWRA) to approximately 2.2 million Massachusetts residents.

Watershed Protection Plans are an important tool used by the Division to implement programs that enable staff to carry out its mission to utilize and conserve water and other natural resources to protect, preserve and enhance the environment of the Commonwealth and to assure the availability of pure water for future generations. This report is part of a multi-volume set of plans that update the Watershed Protection Plans for the entire DCR/MWRA Watershed System. The previous volumes are:

- Volume I – The DCR Watershed System
- Volume IIA – Quabbin Reservoir Watershed
- Volume IIB – Ware River Watershed
- Volume IIC – Wachusett Reservoir Watershed.

1.1 *Emergency Source Water Supply*

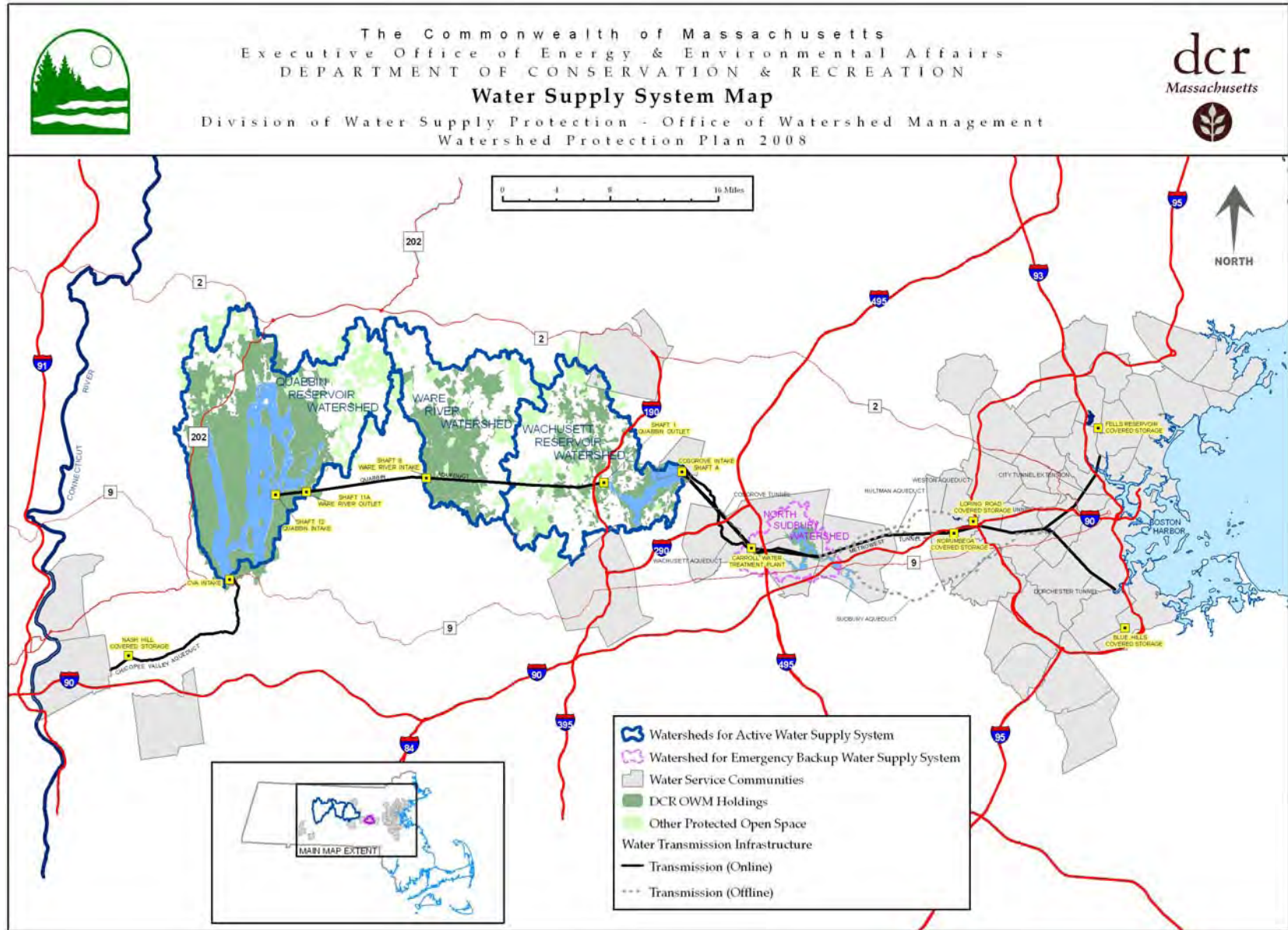
The Sudbury and Foss (Framingham #3) Reservoirs are the emergency source water supplies for the DCR/MWRA water system (see Figure IID-1). These reservoirs are therefore much less critical to the daily drinking water needs of greater Boston than the active sources – Wachusett Reservoir, Ware River, and Quabbin Reservoir. Extensive Watershed Protection Plans have been developed and updated for these three active water supply watersheds; the Sudbury and Foss do not require the same level of vigilant monitoring, inspection, and overall management. The Commonwealth's resources nevertheless need to be maintained and protected from degradation.

This Sudbury and Foss Reservoirs Watershed Protection Plan is based on the following goal:

Maintain the integrity of DCR lands and waters in the Sudbury and Foss Reservoir watersheds for water quality protection purposes in order to serve as an emergency source water supply.

DCR/DWSP is currently implementing two management plans to fulfill this mission, the *Land Management Plan for the Watersheds of the Sudbury Reservoirs: 2005-2014*, and the *2002 Sudbury Reservoir Watershed System Public Access Plan Update*. This plan updates the *Sudbury Reservoir and Framingham Reservoir #3 Watershed Protection Plan*, developed in 1997 with the assistance of Comprehensive Environmental Inc., by integrating the information from the two management plans with additional studies to derive a five year watershed protection strategy for the Sudbury and Foss Reservoirs.

Figure IID-1: DCR/MWRA Water Supply System



1.2 Regulation of Emergency Source Water Supplies

Volume I of the 2008 Watershed Protection Plan Update provides a summary of all environmental laws and regulations that impact the DCR/MWRA drinking water supply system (see Volume I, Table I-16). Two of these regulations administered by the Department of Environmental Protection, the Massachusetts Surface Water Quality Standards (314 CMR 4.00) and the Massachusetts Drinking Water Regulations (310 CMR 22.00), along with DCR/DWSP's own Watershed Protection Regulations (350 CMR 11.09), have the most significant impact on the protection and management of the Sudbury and Foss Reservoirs.

1.2.1 Drinking Water Regulations

The Massachusetts Drinking Water Regulations (310 CMR 22.00) were promulgated to promote the public health and general welfare by ensuring that public water systems in Massachusetts provide to the users thereof water that is safe, fit and pure to drink. Surface water drinking supplies in Massachusetts are regulated under 310 CMR 22.20B. However, the Sudbury and Foss Reservoirs, as an emergency source approved by DEP, are not subject to the vast array of requirements set forth in these regulations (see 310 CMR 22.20B(1)(b)). The use of this water for drinking water purposes is possible through the declaration of a water emergency, as defined by 301 CMR 22.02:

Emergency Source means any source of water used to supplement or temporarily replace a public water system's active or inactive source(s) when water of sufficient quality or quantity is not available. An emergency source may be placed on-line only after the Department's approval pursuant to a declaration of a state of water emergency under M.G.L. c. 21G, §§ 15 through 17 or as a requirement of a Department administrative order.

1.2.2 Massachusetts Surface Water Quality Standards

The Massachusetts Surface Water Quality Standards, 314 CMR 4.00, designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained and protected, prescribe the minimum water quality criteria required to sustain the designated uses, and contain regulations necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges. 314 CMR 4.06 designates the Sudbury Reservoir, Foss Reservoir, and the MWRA Open Channel (Wachusett Aqueduct) as Class A Public Water Supply, which also qualifies them as Outstanding Resource Waters (ORW).

The Class A/ORW designation impacts other environmental regulations. Title 5 (310 CMR 15.00), the rules regarding installation and setbacks for septic systems, includes Class A Public Water Supplies in their definition of a "Zone A". The minimum setback distance for septic tanks, holding tanks, pump chambers, treatment units and soil absorption systems, including reserve area, from Surface Water Supply Reservoirs and Impoundments is 400' and for Tributaries to Surface Water Supplies it is 200' (in 310 CMR 15.211).

The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The NPDES Stormwater Phase II rules requires a federal permit for any construction that disturbs an area greater than one acre. The DEP Stormwater Handbook states that “Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “storm water discharge” as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. The Sudbury and Foss Reservoirs are defined as a “critical area” for stormwater management purposes pursuant to 310 CMR 10.05(6)(k)(6). A setback is required for certain BMPs and discharges near ORWs to comply with this regulation’s requirement that such discharges be “setback from the receiving water or wetland and receive the highest and best practical method of treatment.” BMPs, such as infiltration basins, must meet the minimum setbacks for those structures located near critical areas.

1.2.3 Watershed Protection Regulations

DCR Division of Water Supply Protection’s regulations, 350 CMR 11.00, were promulgated in 1994 to integrate the components of the Watershed Protection Act (Ch. 36 of the Acts of 1992). The land use rules defined in the Watershed Protection Act are applicable only in the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds; they do not include the Sudbury and Foss Reservoirs watershed. These regulations do include, however, a section on General Rules and Regulations for the Protection of Watersheds and the Watershed System (350 CMR 11.09) which does encompass the Sudbury and Foss Reservoirs watershed. 350 CMR 11.09 delineates rules against polluting the water and restrictions on access to DCR property (see Section 4.4). DWSP staff work with local, State, and Environmental Police, the DCR Office of General Counsel, and if necessary the Attorney General, to enforce these regulations.

2 Watershed Description

2.1 History

During the nineteenth century, the Boston area obtained water mostly from Lake Cochituate in Natick, a reservoir completed in 1848 under the auspices of the Boston Water Board. Some communities were also served by the Mystic Lakes. By 1878, public health officials determined that these sources of supply would prove inadequate, so a system of seven reservoirs to supplement the Cochituate system was constructed by the Boston Water Board. These new reservoirs, created by holding back portions of the Sudbury River, were: Sudbury, Whitehall, Hopkinton, Ashland, Stearns, Brackett, and Foss (the last three referred to respectively as Framingham Reservoirs Nos. 1, 2, and 3).

Limited yield, urbanization of the watersheds, and unsatisfactory water quality led to an investigation for additional water supply of satisfactory quantity and quality. A study completed by the state health board in 1895 recommended the development of a reservoir along the South Branch of the Nashua River. The Metropolitan Water Board was created in 1895 to oversee the planning and development of the Wachusett Reservoir. The Wachusett Dam and Reservoir were completed in 1908, harnessing the Nashua River in central Massachusetts as the new source of drinking water for metropolitan Boston.

The Metropolitan Water Board, Sewer Board, and Parks Commission were combined by the Commonwealth as the Metropolitan District Commission in 1919. State officials realized during the 1920s that, once again, additional sources of water were needed to serve the growing needs of Eastern Massachusetts. The Quabbin Reservoir was created in the 1930s, using the Windsor Dam to impound the Swift River and flood an area formerly occupied by the four Western Massachusetts towns of Dana, Enfield, Greenwich, and Prescott. The Ware River had previously been identified as a source of water that could be used from October through June when flows in the river are sufficient for diversion and there was demonstrated need. Diversions of water from the Ware River are conveyed at Shaft 11A of the Quabbin tunnel aqueduct. Ware River water can flow to either Quabbin or Wachusett Reservoir; prior to Quabbin Reservoir construction, the Ware River was fed directly to the Wachusett Reservoir, however current practice is to send this water solely to Quabbin Reservoir in order to take advantage of the reservoir's capacity and retention time.

Since water started flowing from Quabbin Reservoir in 1948, no new sources of drinking water have been required to meet the water supply needs of metropolitan Boston. Through ongoing improvements of the distribution system and demand management by the MWRA and watershed management by DCR and its predecessors, the current prognosis is that the DCR/MWRA watershed system will provide adequate supply and delivery to the MWRA member communities well into the 21st century.

The creation of the Wachusett and Quabbin Reservoirs meant that increasingly substandard source waters from many of the reservoirs in the Sudbury System could be discontinued. Lake Cochituate, Whitehall, Hopkinton, and Ashland Reservoirs were transferred in 1947 to one of DCR's predecessor agencies for use as State Parks.

Evidence of serious toxic pollution to the Sudbury River surfaced in the late 1960s. In 1970, the Nyanza textile plant was cited as a source of mercury contamination and the site was designated as an EPA Superfund site in 1982. Wastes had contaminated the sediments in Stearns and Brackett Reservoirs (Framingham Reservoirs Nos. 1 and 2). Significant progress has been made on this clean-up, which is being administered by the US Environmental Protection Agency and the Massachusetts Department of Environmental Protection. A risk assessment is currently underway on segments of the Sudbury River. See Section 2.2.2 for additional information.

The entire Sudbury System was officially removed from active use and classified as an emergency water supply in 1976. Stearns and Brackett Reservoirs will not be used as part of the metropolitan Boston water supply, as the MWRA Board of Directors voted in 2007 to declare these lands surplus to MWRA waterworks system and needs and purposes. Section 2.2.2 has a more complete discussion on disposition of these lands.

The Sudbury and Foss Reservoirs remain the only emergency drinking water source supply for over two million residents of Eastern Massachusetts. There are three emergency conditions that would require the use of the Sudbury and Foss Reservoirs:

- Wachusett Reservoir is declared non-potable.
- There is an inability to convey water from the Wachusett Reservoir to the MWRA distribution system.
- A serious drought occurs.

Depending on the situation, the Sudbury Reservoir would be used either as a primary source of water supply, as a pass through of Wachusett Reservoir water, or as a supplemental source to the Quabbin and Wachusett Reservoirs. See Section 2.3 for a more detailed explanation of these scenarios.

2.2 Basin Location

The original Sudbury drinking water supply system watershed, a sub-basin within the Sudbury-Assabet-Concord (SuAsCo) drainage basin, consists of 47,841 acres, or 74.7 square miles, divided geographically into a North and South Basin (see Figure IID-2). The Sudbury and Foss Reservoirs watersheds, the current emergency water supply, consists solely of the North Basin (see Figure IID-3). The North Basin is the smaller of the two sub-basins, encompassing 17,782 acres (27.6 sq. mi.). Both the North and South Basins drain into Stearns Reservoir. Releases from Stearns Reservoir flow into the Sudbury River at the Winter Street Dam and continue east towards the Assabet and Concord Rivers. This watershed protection plan focuses solely on lands within the North Basin.

Figure IID-2: SuAsCo Basin and the Sudbury Reservoir Watershed System Sub-basins

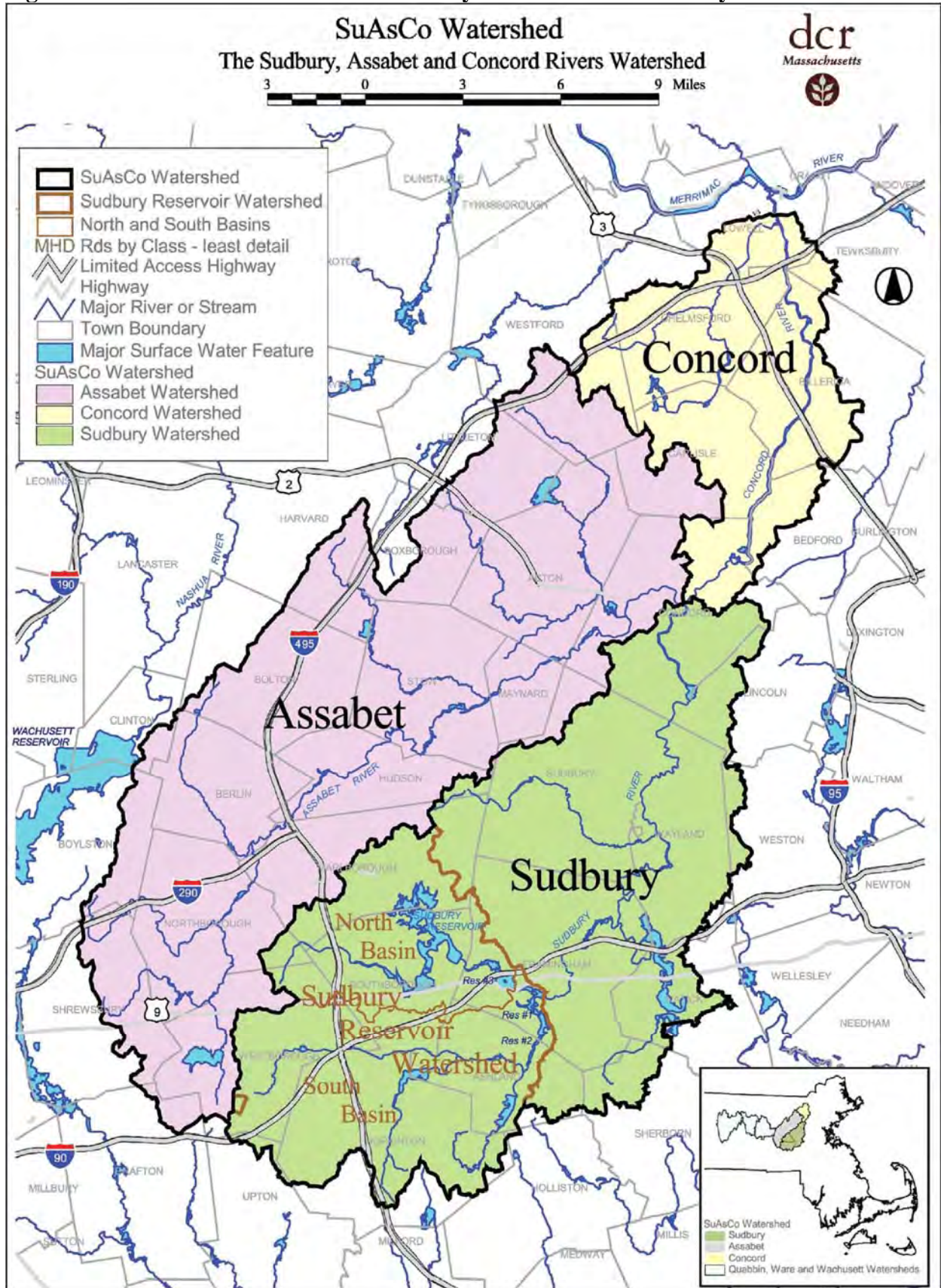


Figure IID-3: Sudbury and Foss Reservoirs Watershed (Sudbury Reservoir Watershed System North Basin)



2.2.1 North Basin

The North Basin area contains the Sudbury Reservoir and Foss Reservoir (Framingham No. 3). Four aqueducts, the Wachusett, Hultman and Weston Aqueducts and the MetroWest Tunnel, are also contained within the North Basin. The Wachusett Aqueduct delivers water to the Sudbury Reservoir directly from the Wachusett Reservoir. Water from the Wachusett Aqueduct flows directly into the Sudbury Reservoir through the Wachusett Open Channel (The Wachusett Open Channel, from the terminal chamber to Deerfoot Road, is under the jurisdiction of the MWRA). Water from Sudbury’s North Basin can be used for a DEP declared emergency if the water is treated to meet public health requirements, by either boiling or treating with chlorine and/or other approved water treatment techniques. The Sudbury System was last used as an emergency supply in 1981 during a temporary shutdown of City Tunnel for repair work; at that time the water received primary disinfection with chlorine gas in Framingham and then secondary disinfection with chlorine gas and anhydrous ammonia.

Headwaters for the Sudbury’s North Basin lie in Crane’s Swamp, which is located in Northborough and Westborough. The Wachusett Aqueduct terminates at Shaft C, located in Crane’s Swamp, and flows eastward through the Wachusett Open Channel which is the main tributary of the Sudbury Reservoir. Water from the reservoir is released at the Sudbury Dam and flows into the Stony Brook open channel. The Stony Brook Channel fills Foss Reservoir and then drains into Stearns Reservoir, where it is released into the Sudbury River and flows northward.

MWRA’s John J. Carroll Water Treatment Plant is sited at Walnut Hill in Marlborough. This plant utilizes ozone as the primary disinfectant for the drinking water transmitted from Quabbin and Wachusett Reservoirs before it is distributed throughout metropolitan Boston via the Hultman aqueduct and the recently built MetroWest tunnel.

Table IID-1: Sudbury and Foss Reservoir Information

Attribute	Sudbury Reservoir	Foss Reservoir (Framingham #3)
Year Built	1896	1878
Volume Capacity	7.254 billion gallons	1.074 billion gallons
Surface Area	1,292 acres	250 acres
Watershed Area	22.4 mi ²	5.3 mi ²
Length of Dam	2000'	1,640'
Maximum Depth	65'	24'

Information from DCR/DWSP records and MassGIS

2.2.2 South Basin

The South Basin is located within six municipalities: Framingham, Ashland, Marlborough, Westborough, Southborough, and Hopkinton. Water flows through the South Basin in a westerly to northeast direction. The South Basin area contains the Sudbury Aqueduct and two reservoirs: Stearns (Framingham Reservoir No. 1) and Brackett (Framingham Reservoir No. 2). DCR lands also include a portion of the Sudbury River and Cedar Swamp. Headwaters for the Sudbury River originate from brooks in the towns of Upton and Westborough that empty into Cedar Swamp. Water from Cedar Swamp flows into the Sudbury River and drains into Brackett Reservoir. Water from Brackett Reservoir flows north and is released into Stearns Reservoir at the Brackett Reservoir Dam. The South Basin also includes the Ashland, Hopkinton and Whitehall Reservoirs, which are managed as State Parks by DCR.

The Sudbury South Basin has not been used for water supply since 1930. Impacts from the Nyanza Superfund Site and mercury contamination of the basin sediment have made Sudbury's South Basin unusable for public water supply. The Nyanza Superfund site in Ashland deposited large amounts of mercury into the Sudbury River. Brackett Reservoir received the largest deposition of this contaminant. The U.S. Environmental Protection Agency has been charged with the study and clean-up of this contamination. The Human Health Assessment documents no unacceptable risks from incidental contact with or ingestion of either surface water or sediments. There is, however, an "unacceptable risk" to human health from the ingestion of contaminated fish caught in the two reservoirs. The EPA is also preparing an Ecological Assessment and a Feasibility Study. The Feasibility Study will evaluate potential remedial alternatives as to their effectiveness, implementability, cost, and risk reduction. Completion of this process is estimated for 2009.

DCR, and its predecessor the MDC, have been attempting to transfer control of the remaining South Basin lands for twenty years. This approach was validated in the fall of 2007 with a vote by the MWRA Board of Directors declaring the South Basin lands surplus to their needs. Disposition is a complicated process that is coordinated by the MA Department of Capital Asset Management. Since the DCR property is protected under Article 97 of the State Constitution, transfer of ownership will require approval from two-thirds of the state legislature. While DCR is actively pursuing this course, the South Basin lands will continue to be managed as outlined in the *Sudbury Public Access Plan* and the *Sudbury Land Management Plan*. The South Basin, however, is excluded from the scope of this Watershed Protection Plan, as it is no longer considered part of the DCR/MWRA Drinking Water Supply System.

2.3 Emergency Use

There are three conditions under which the Sudbury Reservoir would be used as an emergency supply source for the Boston area:

1. Wachusett Reservoir is declared non-potable.
2. The inability to convey water from the Wachusett Reservoir to the MWRA system.
3. Serious Drought.

These emergency conditions can be categorized into three emergency use scenarios (Yeo, 1992; see Table IID-2). Under each of these scenarios, certain water quality impacts can be expected to occur. These relate to the quantity of water removed from the reservoir, the inflow into the reservoir from other sources, and the season and length of the emergency situation. Algae, taste, and odor impacts would be expected in any scenario, as well as increases in disinfection by-products associated with emergency chlorination of this water.

The combined resources of Sudbury and Foss Reservoirs could provide an estimated long-term safe yield of 18.0 MGD and could provide a rate of 200 MGD for a maximum of 30 days before virtual depletion of these sources. Water quality will be an issue should any of the emergency scenarios occur. In the event of a serious drought, low water levels in Sudbury may result in higher temperatures; greater algae blooms and taste and odor problems would be expected.

Table IID-2: Emergency Use Scenarios and Water Quality Impacts

Condition	Type of Use	General Water Quality Impacts
Primary Use of the Sudbury Reservoir	This would occur if the conveyance of water from the Wachusett Reservoir was impossible or there was a water quality problem in the Wachusett Reservoir which rendered the water unfit for potable use.	Because the capacity of Sudbury Reservoir is small compared to demand, this scenario is likely to result in drastic drawdown impacts and high turbidities from shoreline erosion of newly exposed shorelines. Quality is likely to require a boil water notice because of high bacterial counts and the fact that the high turbidity may protect bacteria and protozoans from disinfection. There may also be staining problems from high iron and manganese levels.
Pass Through Use of the Sudbury Reservoir	This would address events that would prevent direct transmission of water from Wachusett Reservoir to the MWRA distribution system.	Sudbury Reservoir water is likely to be highly diluted by much larger flows from Wachusett Reservoir, minimizing the impact of relatively poor quality Sudbury Reservoir water. This is the best quality scenario, and other than the initial startup quality problems, may not require a boil water notice once transfers are in place.
Supplemental Use of the Sudbury Reservoir	This would include using the Sudbury Reservoir to reduce demand on the Quabbin and Wachusett Reservoirs during a serious drought	Depending on the volume and duration of Sudbury water supplementing the primary water, different water quality issues would arise. For example, since lower water levels in Sudbury Reservoir may result in higher water temperatures due to use during a drought, greater nutrient availability and increased algae blooms, as well as taste and odor problems may be expected. There may also be staining problems from high iron and manganese levels. Turbidities may be high from shoreline erosion of newly exposed shorelines.

Source: Yeo, Jonathan L. The Future Role of the Sudbury Reservoirs and Watershed in the MDC/MWRA Water Supply System: A Review of Alternatives. MWRA, Boston, MA. 1992.

The potential for the Sudbury system to be utilized has decreased since the MWRA's MetroWest Tunnel and John J. Carroll Water Treatment Plant came into service. The MetroWest tunnel provides redundancy for the Hultman Aqueduct, minimizing the likelihood of transmission system failure. Wachusett Reservoir water flows to the Carroll Water Treatment Plant primarily via the Cosgrove Tunnel. The likelihood of aqueduct failure and vulnerability from Wachusett Reservoir contamination have been reduced because the upgraded Wachusett Aqueduct can also deliver water for treatment and distribution. If used, however, water would need to be treated at Wachusett Lower Gatehouse prior to entering the MetroWest tunnel or Hultman Aqueduct because the Wachusett Aqueduct elevation is below the Carroll Water Treatment Plant treatment tanks.

2.4 Natural Characteristics

2.4.1 Topography

The topography of DWSP land in the Sudbury watersheds varies from level to moderately sloped (see Figure IID-4). Steep slopes are few and limited in extent. Elevation ranges from 259 feet (elevation of full reservoir) to 464 feet at Pine Hill. The watershed contains numerous drumlins; Walnut Hill is a prime example. Upland slopes are generally covered with glacial till material while lowlands are typically filled with the stratified silt, sand and gravel that constitute glacial outwash. Extensive forested wetlands exist at the north end of the reservoir and in the watershed headwaters at Crane Swamp.

2.4.2 Geology

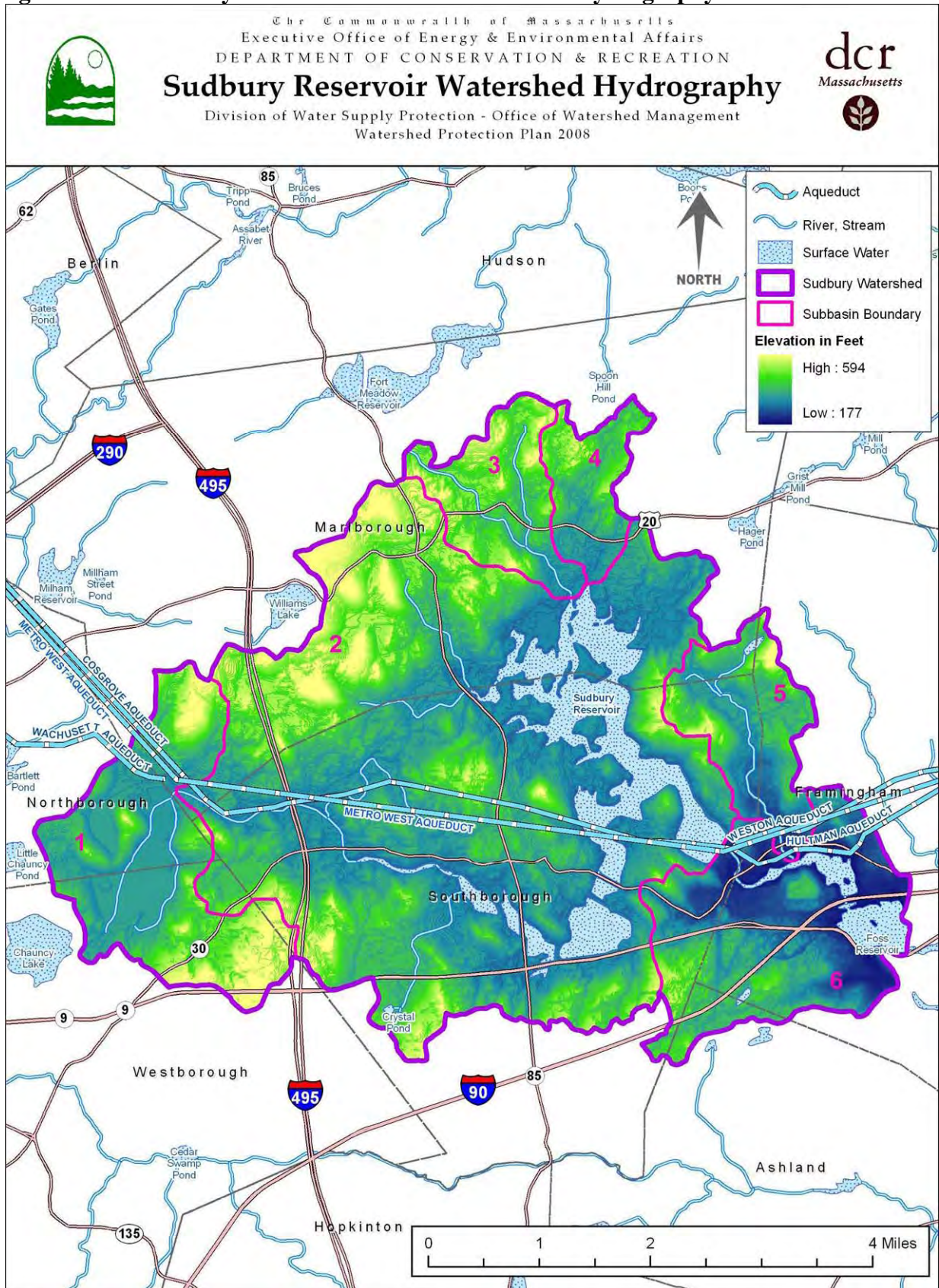
The principal aquifers in the Sudbury Reservoir watershed are composed of stratified sand and gravel, up to 140 ft thick, deposited in stream channels at the end of the glacial period. Many broad lowlands in the SuAsCo basin mark the sites of glacial lakes, such as Lake Sudbury, which extended from South Framingham to Weston and from Concord to Wellesley, and Lake Assabet, which was located mainly in Westborough, Southborough, and Northborough.

The SuAsCo basin is underlain by a variety of crystalline rocks. Wells drilled in bedrock for domestic water supplies are commonly 100 to 300 ft deep and yield 2 to 10 gal/min, although yields up to 225 gal/min have been reported. Fine-grained lake deposits generally yield less than 100 gal/min to wells, but, if interspersed with coarser deposits, can yield 100 to 300 gal/min.

2.4.3 Vegetation

The forest on DCR property in the Sudbury watershed originates primarily from plantations established from 1907 to 1947. The majority of the approximately 1.75 million seedlings planted during this period were planted from 1913 to 1921. The balance of the Sudbury forest is the result of farm abandonment following the takings of the land prior to reservoir construction. The majority of the managed Sudbury forest is therefore 75+ years old.

Figure IID-4: Sudbury and Foss Reservoirs Watershed Hydrography



The simplest Sudbury stands are even-aged conifer plantations of a single species. Complex stands are multi-aged, with a stratified mixture of both shade-tolerant and shade-intolerant species. Stand boundaries which were created and maintained by past land-use practices will fade with the passage of time, and stand definition will become less important. However, boundaries between forest types will remain evident where there are significant differences in site characteristics, and these type changes will dictate some differences in management (for instance opening sizes and choices of species where underplanting is required).

Acres of forest types currently under management (see Tables IID-3 and IID-4) were obtained from DCR/DWSP forest type maps that were created from 1989 to 1994. The most recent version of these type maps has been updated and digitized for use in GIS analysis and mapping. DWSP plans to continually update typing to account for changes. Note that this typing only includes actively managed forest in the North Basin.

Table IID-3: Acreage of Managed DWSP Forest on Sudbury and Foss Reservoir Watershed by Type

Type	Acres	Percent
White pine	327	24
Red maple/Mixed hardwoods	313	23
White pine-oak/hardwoods	299	22
Oak	249	19
Mixed pine/Mixed pine-oak/Hemlock	59	5
Red pine	55	4
Spruce	31	2
Others	13	1
TOTAL	1,347	100

Source: DCR, 2005.

Table IID-4: Acreage of Managed DWSP Forest on Sudbury and Foss Reservoirs Watershed by Size Class

Size Class	Acres	Percent
Less than 20 feet tall	100	7
20 to 40 feet	112	8
40 to 60 feet	77	6
60 to 80 feet	768	57
More than 80 feet	290	22
TOTAL	1,347	100

Source: DCR, 2005.

There have been 30 silvicultural operations completed on DWSP property in the watershed from 1984 through 2003. Salvage operations account for eight of these operations and occurred on 49 acres. These operations were performed to cleanup damaged trees following Hurricanes Gloria and Bob and dead and dying trees resulting from gypsy moth defoliation and subsequent diseases. The remaining 22 silvicultural operations occurred on 556 acres and included thinnings, removal of diseased and declining plantation overstory trees, and regeneration cuts of varying size to encourage tree regeneration and forest diversity.

2.5 Land Use

The Sudbury North Basin is situated in a well developed suburban/urban area. The major growth in this region, particularly in Marlborough and Framingham, has already occurred. The bisection of Foss Reservoir by the Massachusetts Turnpike and the construction of the Framingham Technology Park at its edge established land uses that have a significant impact on a drinking water supply. Precipitation run-off from over a quarter of the City of Marlborough drains into Sudbury Reservoir. The Town of Southborough, which has maintained a rural character much longer than many of its neighbors, faces significant growth pressure as it is well situated near the intersection of Rt. 495, Rt. 9, and the Massachusetts Turnpike (see Figure IID-5). DCR/DWSP lands play a significant role of preserving Open Space in this landscape (see Figure IID-6).

Table IID-5: Sudbury and Foss Reservoirs Watershed Land Cover and Land Use

Forest		Wetland		Agriculture		Residential		Commercial/ Industrial/ Governmental		Open Water*		Other	
Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
6,669	40.8%	221	1.3%	998	6.2%	4,983	30.5%	1,987	12.2%	35	0.2%	1,457	8.8%

*Open Water excludes Sudbury and Foss Reservoirs. Sudbury and Foss Reservoirs encompass 1,432 acres by MassGIS calculations, representing 12.4% of the total watershed area of 17,782 acres. Information derived from MassGIS 1999 data

Table IID-6: Sudbury and Foss Reservoirs Watershed Open Space Ownership

Total Watershed Area*	DCR/DWSP Protected		Other Protected		Total Protected	
	Area	%	Area	%	Area	%
16,350	2,381	14.6%	1,715	10.5%	4,096	25.1%

*Not including Sudbury and Foss Reservoirs. Total Watershed Area including reservoirs is 17,782 acres. Information derived from DCR and MassGIS data

Table IID-7: Sudbury and Foss Reservoirs Watershed Population

Town	2000 Population	2010 Est. Population	2020 Est. Population	2030 Est. Population	% Est. Increase
Framingham	66,913	69,061	70,743	72,008	8%
Marlborough	36,256	37,930	39,263	40,308	11%
Northborough	14,013	14,793	15,418	15,916	14%
Southborough	9,071	10,285	10,647	10,933	21%
Westborough	17,997	19,382	20,089	20,646	15%

Source: www.mapc.org/data_gis/data_center/2006_Projections/MAPCProjections013106.xls

Figure IID-5: Sudbury and Foss Reservoirs Watershed Land Use

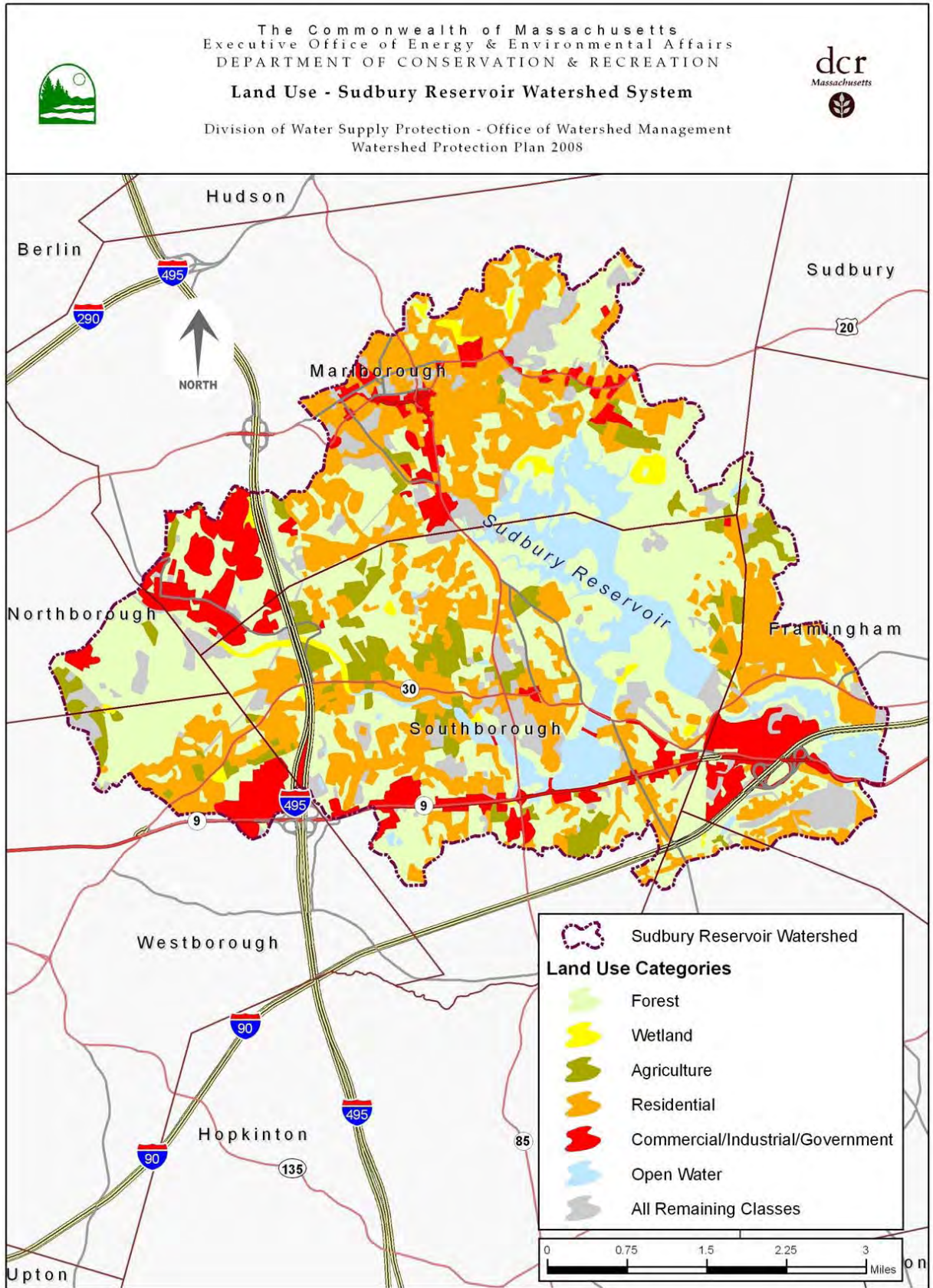
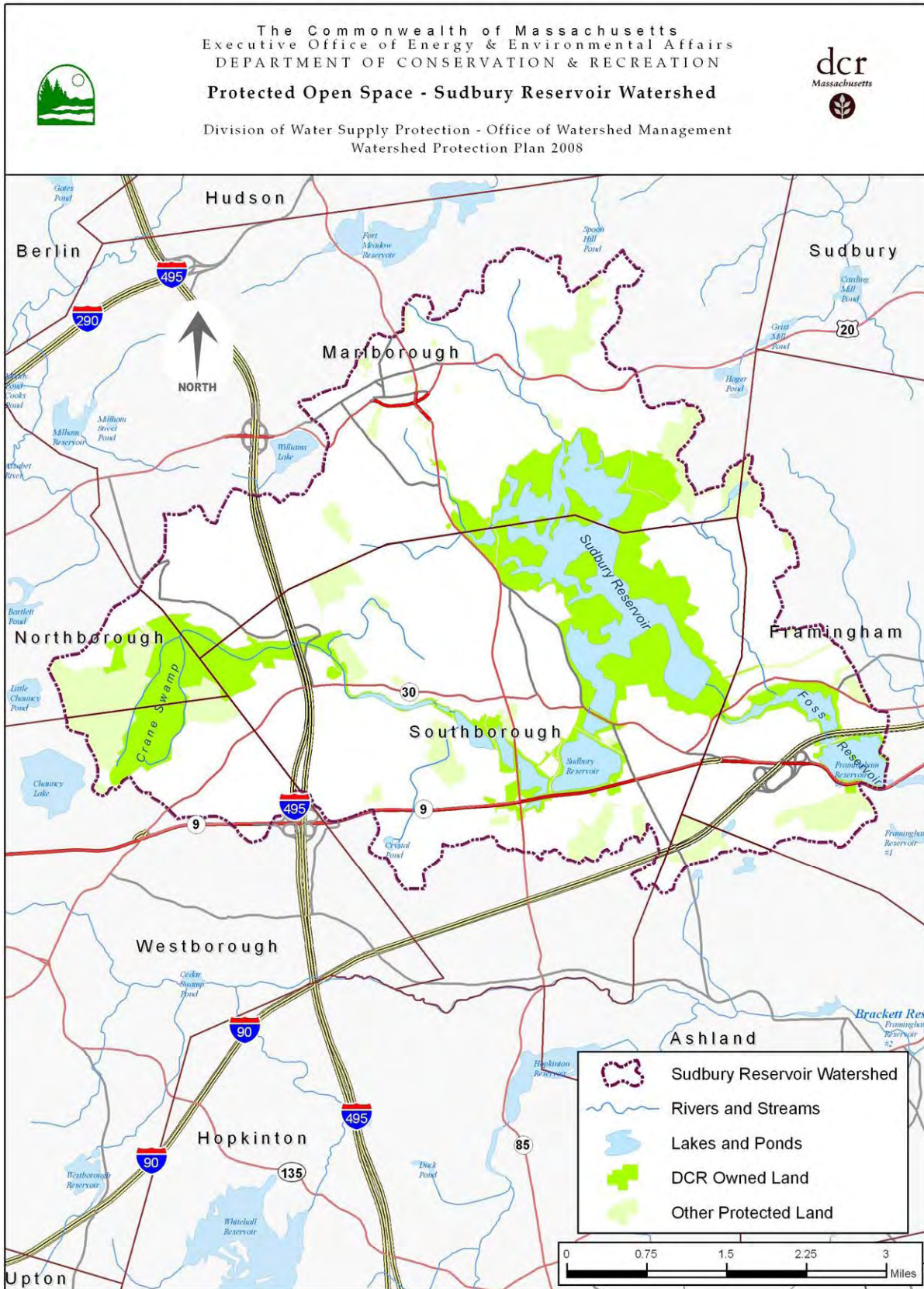


Figure IID-6: Sudbury and Foss Reservoirs Watershed Protected Open Space



2.6 Hydrology

The Sudbury Reservoir watershed system is part of the Sudbury-Assabet-Concord (SuAsCo) Watershed (see Figure IID-2). The North Sudbury Basin covers 17,806 acres. The major hydrologic inputs to the Sudbury and Foss reservoirs are the natural watershed drainage and the flow from the Wachusett Aqueduct and Open Channel (see Figure IID-4). The minimum regulatory release from the reservoirs to the Sudbury River is 1.5 MGD (Ch. 177, Acts of 1872).

There are six major subbasins in the North Sudbury Watershed (see Table IID-8 and Figure IID-4). The Sudbury Reservoir subbasin encompasses the drainage from the City of Marlborough, the most urbanized section of the watershed.

The Sudbury Reservoir subbasin also includes the Marlborough Filter Beds. This landscape of swales located at the north west corner of the Sudbury Reservoir was designed to intercept wastewater from the city of Marlborough at a time prior to treatment through a sewer system. There has been renewed interest in this feature in order to address stormwater run-off.

Table IID-8: Sudbury and Foss Reservoirs Watershed Sub-basins

Sub-basin	Name	Area	% of Watershed
1.	Crane Swamp	2,192	12%
2.	Sudbury Reservoir	10,625	60%
3.	Mowry	943	5%
4.	Broad Meadow	608	3%
5.	Angelica	1,070	6%
6.	Foss Reservoir (Capen/Hessell/Willow/Brewer)	2,368	13%
	Total	17,806	

Source: MassGIS. See Figure IID-4.

Prior to the 1980 decision to limit Sudbury and Foss Reservoirs water to emergency use, water flow was continuously monitored at Stearns Reservoir. MWRA presently manages reservoir and flood control operations for these reservoirs, with daily monitoring of elevations, inflows and outflows, and routine gate changing to keep both reservoirs within safe operating bands. MWRA provides daily operational data to the National Oceanic and Atmospheric Administration's River Forecast Center for their forecast model that aids in monitoring flood conditions on the Sudbury River. The USGS gage at Saxonville, approximately 4.5 miles downstream from the dam at Stearns Reservoir, is closely monitored during flooding season and conditions in order to make reservoir operational decisions that will limit downstream flooding.

A study done in 1976 by C. E. Maguire, Inc. for the Metropolitan District Commission to help determine the potential use of the Upper Sudbury River Watershed for drinking water purposes derived a three-tiered safe yield volume for the Sudbury and Foss Reservoirs (see Table IID-9). The information from this study was utilized by the MWRA and MDC to make the

determination that it was cost prohibitive to utilize the Upper Sudbury as part of the active water supply and it is best maintained as an emergency water supply.

Table IID-9: Sudbury and Foss Reservoirs Safe Yield Volumes

Statistical Year	Period of Availability	Volume
Average	November-May	12,800 MG
Wet	August-June	38,700 MG
Dry	January-April	4,350 MG

Source: C. E. Maguire, Inc., 1979

Urbanized land, such as in Marlborough and Framingham, have a higher runoff rate compared to undeveloped forests and wetlands due to larger areas of impervious surfaces. Although these areas contribute a higher water yield than the undeveloped lands, it is of a lesser quality due to pollutants picked up in the surface runoff. Additionally, high yields can lead to stream erosion problems and reduce the base flow, which is desired in the drier periods. This emphasizes the importance of the protected lands in the watershed since they will not be developed and will remain as pervious areas even when development occurs around them. It was assessed that at build out conditions, based on current zoning, the watershed will be 26% impervious.

The data from the 1976 Maguire study was used by the MWRA to derive the yield figures determined for the emergency scenarios described in Section 2.3. These figures take into account the short-term use of the Sudbury and Foss Reservoirs in conditions that would range from one to six months. A total withdrawal of 7,200-8,000 MG was determined to be the yield for these two reservoirs, fulfilling a short-term need of 210 MGD for the greater Boston area.

2.7 Water Quality

Camp Dresser & McKee (CDM) conducted baseline studies in 1999 on the water quality in the MWRA's emergency distribution reservoirs (Chestnut Hill, Fells, Norumbega, Spot Pond, and Weston) and DCR/MWRA emergency source reservoirs (Sudbury and Foss), presenting their final reports to MWRA in 2002. Fecal coliform and phosphorus loading were two of the major concerns raised by CDM regarding the water quality in these emergency reservoirs. CDM identified several sources of phosphorus loadings to the reservoirs, including: watershed, atmospheric, sediments, birds, and supplemental water. The contribution of bacteria and phosphorus loadings is different for each reservoir. Using historical data and results from samples they collected and analyzed in 1999 and 2000, CDM made phosphorus loading predictions in terms of eutrophic status on the water quality of these emergency reservoirs based on two hydrological models, Vallenweider and BATHTUB. CDM presented several eutrophication management alternatives to MWRA: 1) No Action, 2) Alum Treatment, 3) Artificial Circulation, 4) Waterfowl Control, and 5) Addition of Supplemental Water.

CDM recommended an extensive sampling program using boats. A more limited shoreline sampling plan was implemented by MWRA due to time and budget priorities. Samples have been collected five times each year from March to November (every other month) in water columns in the reservoirs. MWRA summarized monitoring results for water samples collected in

the period from 2002 to the end of 2005, comparing the results of the individual emergency reservoirs with baseline data measured by CDM and reservoir management benchmarks recommended by CDM.

The report states that the Chlorophyll *a* and total phosphorus results for most of the emergency reservoirs have water quality indicative of oligotrophic or mesotrophic water bodies required by regulation (MA DEP Class B water body). As a result, minimum treatment for these reservoirs would be necessary to be used as drinking water supplies in case of emergency. The Sudbury Reservoir's pH results – from 6.2 to 9.2 – did not, however, meet the Class B water body criterion range of 6.5 to 8.3. The fecal coliform results in some of the samples from Sudbury also exceeded the limit defined by Class B water body requirements. The cause of the high bacteria levels was not determined during the study period, although bird droppings are one potential explanation.

DWSP aquatic biologists currently survey the Sudbury Reservoir annually for aquatic invasive species. The highly invasive water chestnut was recently discovered, prompting MWRA to incorporate Sudbury Reservoir into its reservoir invasive plants control program. Water chestnut in Sudbury Reservoir are now removed every year, with a goal of reducing seed drop and, therefore, long-term viability.

3 Sources of Pollution and Their Assessment

A watershed protection program for a surface water supply must establish a comprehensive method to identify potential sources of pollution in the reservoir drainage. There are thousands of specific compounds that can pollute drinking water. DWSP has aggregated these compounds into five categories with common properties in order to develop a practical methodology to assess the potential threat of these compounds: Pathogens, Nutrients, Turbidity, Hazardous Materials, and Pesticides. The contaminant categories are based on conventional definitions and have been adapted to include functional planning aspects in the context of assessing sources and developing protection programs. In order to systematically evaluate contaminant sources in the entire watershed system, 12 categories have been defined by DWSP for use in the Watershed Protection Plan process. Table IID-10 represents the contaminants these sources can potentially introduce into the watershed system.

Volume I, Section 4 has a more thorough description of these pollutants and general definitions of the potential source categories. This Section presents information regarding these potential sources of pollutants specific to the Sudbury and Foss Reservoirs watershed.

Table IID-10: Water Quality Contaminants and Their Most Likely Sources in the Watershed System

<i>Source</i>	<i>Contaminant</i>				
	Pathogens	Nutrients	Turbidity	Hazardous Materials	Pesticides
Wildlife	•	•			
Public Access/Recreation	•	•	•		
Timber Harvesting			•	•	
Wastewater	•	•		•	
Roadways/Railways/ROWs				•	•
Agriculture	•	•	•		•
Construction Sites			•	•	
Commercial, Industrial, and Governmental Sites				•	
Residential Sites	•	•			•
Solid Waste Facilities				•	
Future Growth	•	•	•	•	•
Climate Change	•	•	•		

As an emergency water supply, the Sudbury and Foss Reservoirs do not receive the same priorities as the active source supply Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds. Table IID-11 assesses these sources of pollution in both a watershed specific and system-wide perspective. This assessment is reflected in the Work Plans developed annually to guide the Division's staff resources.

Table IID-11: Sudbury and Foss Reservoirs Source Threat Assessment

Source	Sudbury and Foss Reservoirs Watershed	DCR Watershed System
Wildlife	Medium	Low
Public Access/Recreation	High	Medium
Timber Harvesting	Medium	Low
Wastewater	Low	Lower
Roadways/Railways/ROWs	High	Medium
Agriculture	Low	Lowest
Construction	Low	Lower
Commercial/Industrial/ Governmental Sites	Low	Lower
Residential Sites	Low	Lower
Solid Waste Facilities	Low	Lowest
Future Growth	Low	Lowest
Climate Change	Low	Lowest

3.1 Wildlife

As a mostly urban/suburban watershed, the wildlife issues present in the Sudbury system are not as varied as those in the Quabbin Reservoir, Ware River, or Wachusett Reservoir watersheds. As a reserve water supply, there is less need to manage for impacts from wildlife. In fact, DWSP holdings represent some of the largest blocks of contiguous, protected wildlife habitat in the area, contributing significant value for protecting biodiversity in this region.

The most serious threat to water quality that is actively managed by DWSP is the resident Canada goose population on the Sudbury Reservoir. A Canada goose population control program was initiated in 2006 on the Sudbury Reservoir. Each spring during April and May, the reservoir is visited routinely, and all islands are surveyed to located nesting geese. When a goose nest is found, all eggs within the nest are oiled to prevent hatching. During the summer, typically 1-2 complete shoreline surveys are conducted on the main reservoir to document adults and any young that may have hatched.

3.2 Public Access/Recreation

The Sudbury Reservoir Watershed System Public Access Plan was last revised in 2002. The purpose of the Plan is to guide and control public access, incorporating the most current information available, so as to minimize the impacts from recreational activities on the reserve drinking water supply lands managed DCR. The Access Plan details the Division’s management rationale and explains which programs and activities are used to limit and control access to these lands and waters. Public access, in the Division’s management context, includes: the physical ability to enter and use land for recreational activities; the legal restrictions or prohibitions related to access or specific land or water-based recreational activities; sign placement; mapping;

user education; intergovernmental coordination; public safety; and protection of public and private property rights.

All of the following assessment of public access and recreation uses, except for those under the “other” category, are derived from the 2002 *Sudbury Reservoir Watershed System Public Access Plan*.

3.2.1 Water Contact Activities

Direct water contact activities, such as swimming and wading, pose an established threat to the water supply and to public safety. These activities are prohibited by regulation. In addition, limited DCR land ownership, resource limitations and proper public safety considerations make water contact activities inappropriate for these areas. Illegal swimming occurs chronically at certain spots around the two reservoirs, in particular the train trestle crossing the Foss Reservoir.

3.2.2 Boating (Motorized and Non-motorized)

All boating activities, both motorized and non-motorized, are prohibited by current regulations, except in areas specifically designated by the Commissioner at Quabbin Reservoir. Although boating does not require water contact, this contact nevertheless frequently occurs with these activities. Boating poses less of a threat to the water supply than swimming, but is still considered an unnecessary threat to a water supply. Boating currently occurs mostly from adolescents in small craft or encroaching abutters (see Section 3.2.13).

3.2.3 Fishing

Shoreline fishing is currently allowed along most of the Sudbury Reservoir shoreline, with a fishing season that runs from the first Saturday in April until November 30th each year. Shoreline fishing, without water contact, in certain areas, and for a limited period of time, does not pose a significant threat to the water supply or other natural resources.

3.2.4 Off-Road Driving

This recreational activity has been prohibited by regulation on all DCR/DWSP lands in the watershed system since 1989. This prohibition is based on significant documentation of the erosion impacts associated with ORV and ATV use, and observations of these effects on non-DWSP lands on the Ware River watershed. Given the limited DCR ownership in the Sudbury watersheds, control of potentially damaging uses on that land is critical.

3.2.5 Horseback Riding

Horseback riding is prohibited by regulation on all DCR watershed lands, except in designated areas within the Ware River watershed. Horseback riding is extremely limited due to the threat of fecal coliform contamination and the potential of other pathogens associated with domestic animal manures, as well as the increased potential for erosion of access roads.

The relatively small amount of DCR/DWSP property in the Sudbury System does not allow for trails to be located in an appropriate manner to adequately protect water quality. The additional road maintenance required to mitigate erosion impacts from horseback riding would further compromise the limited resources available to the Division for watershed protection.

3.2.6 Dogs and Other Pets

Bringing any animal onto DCR watershed lands is prohibited by regulation except where horses and dogs are authorized access at limited areas of the Ware River watershed and in the hunting zone of the Wachusett Reservoir watershed during upland game bird hunting season (350 CMR 11.00). Dogs and other domestic animals can carry *Giardia* and *Cryptosporidium*; these parasites can spread to wildlife populations and ultimately into the water supply.

3.2.7 Camping

Camping is prohibited by regulation. Camping tends to generate larger amounts of trash than hiking and walking. In addition, camping creates fire hazards and human sanitation problems. There are serious water quality concerns associated with deposition of human fecal matter close to tributaries and reservoirs.

Given the lack of sanitary facilities and the significant needs of resource allocation for administration, maintenance, and enforcement, the DCR considers camping inappropriate and it will continue to remain an unauthorized activity in the Sudbury Reservoir watershed.

3.2.8 Hunting and Trapping

DCR regulations prohibit hunting and trapping except at times and in areas designated by DCR. Hunting and trapping are not currently allowed on DCR lands in the Sudbury Reservoir watershed. Illegal poaching does occur on several areas of the watershed, such as Sudbury Reservoir and Crane Swamp.

3.2.9 Hiking, Nature Study, Bird Watching, Snowshoeing

Hiking, walking, nature study, bird watching, and snowshoeing are currently allowed in designated areas surrounding Crane's Swamp and the Sudbury Reservoir. Hiking has relatively minor impact to water quality, unless dogs are brought onto DWSP property (see Section 3.2.6). Walking on the surface of the Reservoirs when frozen is strictly forbidden.

3.2.10 Bicycle Riding

Regulations restrict bicycle riding to designated areas of DCR/DWSP property. The intensive use of trails for biking, if not properly constructed or maintained on a regular basis, can cause severe erosion. Excessive soil erosion has been documented on DCR's metropolitan Boston Reservations where mountain bicycle use occurs. Heavy bicycle usage can also be incompatible with walking and nature observation. Additional policing is needed to monitor both permitted bicycling and illegal off-trail riding, and to prevent erosion. Due to limited resources for

management of public access, recreational use, and user conflicts, DCR does not allow bicycle use on DCR/DWSP lands in the Sudbury System.

3.2.11 Cross-Country Skiing

Limited skiing presently occurs on the Sudbury Reservoir watershed. This activity is currently allowed along the existing DCR fire road located between Parmenter Road and the intersection of Nichols and Clemons Streets in Marlborough. Skiing is allowed in all areas that are open for hiking. Skiing is prohibited over the reservoir's frozen surface.

3.2.12 Picnicking

DCR regulations do not prohibit picnicking on Sudbury Reservoir watershed lands. Since picnicking is an ambiguous term, it should be noted that DCR's regulations prohibit the use of fire, any cooking activity, and alcoholic beverages on all watershed lands under the care and control of the DCR. All trash from picnic activity is the sole responsibility of the individual(s) involved and cannot be left on DCR property.

3.2.13 Others

3.2.13.1 Trespassing

Trespassing in the Sudbury watershed has been an ongoing concern for DCR. DWSP lands are some of the last remaining areas of open space in the region and are relatively spread-out. Illegal activities include ATV use, camping, fires, hunting, fishing in non-designated areas, boating, swimming, and refuse dumping.

Watershed Rangers based at Wachusett Reservoir are responsible for patrolling the area. DCR has a cooperative relationship with the State Police, Environmental Police, and local police to help with securing these resources and enforcing state laws. Starting in 2007, DWSP was able to increase the Wachusett/Sudbury Watershed Ranger staff by two people, allowing for a regular patrol of the Sudbury watershed.

3.2.13.2 Encroachments

Encroachment by abutters onto the Commonwealth's properties is a significant problem in the Sudbury watershed. This is due in part to limited ownership, unclear boundaries, and a lack of monitoring and enforcement. Some of these encroachments are minor (e.g., mowing onto commonwealth property), while others are quite significant (e.g., re-grading, landscaping, or placing structures directly adjacent to, and in some cases in, the Reservoirs). In the North Basin, the most significant encroachments are around Foss Reservoir.

DCR has initiated an inventory of all DWSP lands in the Sudbury System, identifying the types and severity of encroachments, and then working with the property owners to eliminate these encroachments. These efforts will also result in improved boundary marking of DWSP property.

3.3 Timber Harvesting

Timber harvesting on DWSP lands is a carefully monitored and regulated activity that is designed to enhance the ability of the watershed to protect water quality. The primary objective of DWSP's forest management is to create and maintain a complex forest structure, which forms a protective forest cover and a biological filter on the watershed land. This watershed protection forest is designed to be vigorous, diverse in species and age, actively accumulating biomass, conserving ecological and economic values, actively regenerating, and most importantly maintaining a predictable flow of high quality water from the land. See the *2005-2014 Land Management Plans for the Watersheds of the Sudbury Reservoirs* for details on this program.

Forest management on DWSP properties on the watersheds of the Sudbury reservoirs is conducted to improve the protection of the drinking water supply. The process of removing trees can impact the forest and soils essential to water quality if not carefully designed, implemented, and monitored. Among the areas of greatest concern is the placement of forwarder and skid roads and log landings, where logging work is concentrated. Proper location of these in relation to streams, rivers, reservoirs, ponds, vernal pools, and bordering vegetated wetlands is important so that soils do not move from these areas into water or wetland resources. Beyond this principal concern, Conservation Management Practices (CMPs) are designed to diminish the negative impact of silvicultural operations on the residual vegetation, to minimize soil compaction during these operations, and to keep potential pollutants out of the water resource.

The *2005-2014 Land Management Plans for the Watersheds of the Sudbury Reservoirs* details the process used by DWSP to review, approve, and monitor timber harvesting on DCR property. Timber Harvesting CMPs are designed to protect water supplies, which are the standard for DWSP's forest management. It should be noted that DWSP meets or exceeds the requirements of both the Forest Cutting Practices Act and the Wetlands Protection Act (MGL Chapters 132 and 131). Whenever these regulations are revised, DWSP management practices will meet or exceed the revised standards.

There is relatively little timber harvesting activity in the Sudbury watershed, especially compared to the amount performed in the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds. An average of one operation occurs annually on DWSP property, with a targeted coverage of approximately 40 acres. DCR Foresters receive all Forest Cutting Plans for activity on private property in the Watershed System; the limited private timber harvesting in the Sudbury and Foss Reservoirs watershed means few are ever submitted for DWSP review.

3.4 Wastewater

The town of Framingham is serviced by the MWRA sewer system. The city of Marlborough and the town of Westborough have their own municipally operated sewer service, while the town of Northborough is partially sewered using Marlborough's facilities. There are portions of Westborough and Northborough, however, that still utilize septic systems. The Town of Southborough relies solely on septic systems.

The presence of sewer systems minimizes the impact of wastewater on the reservoirs' water quality. DWSP depends on local implementation and DEP oversight of the strict Title 5

regulations, set in place in 1995, to prevent new septic tanks from posing a threat to groundwater quality and to gradually replace or upgrade older substandard tanks.

3.5 Roadways/Railways/ROWs

There are over 265 miles of roads throughout the Sudbury and Foss basin. Two of Massachusetts's major thoroughfares bisect the Sudbury and Foss Reservoirs watershed: the Massachusetts Turnpike, running east/west, and Interstate 495, running north/south. There are also four heavily traveled state numbered routes that pre-date the modern highways: Rt. 9, Rt. 20, and Rt. 30 running east/west, and Rt. 85, running north/south. Approximately 9 miles of rail line operated by CSX runs in a east/west direction across the watershed. The rail line and the Turnpike both travel across the southerly section of the Foss Reservoir. Rt. 9 runs along the southern border of the two reservoirs, and Rt. 85 crosses the Sudbury Reservoir at its western arm near its connection with the Open Channel. DCR depends on the local public works departments, Mass Highway, the Mass Turnpike Authority, and CSX to safely operate their respective road or rail line.

The most significant risk from this myriad of transportation corridors is an accidental spill of hazardous materials. DWSP utilizes an Emergency Spill Management Plan and protocol developed in association with MWRA and local responders. These procedures were utilized successfully in 2004 to contain a spill of diesel fuel from a school bus holding yard that drained directly to Foss Reservoir.

3.6 Agriculture

According to the 1999 MassGIS Land Use coverage, 998 acres, or 5.6% of the watershed, is classified as either cropland or pasture. While the region is very developed, there are significant remnants of the rural past remaining in the area, particularly in the Town of Southborough. The Metrowest area, especially the sections bordering Rt. 495, are under considerable development pressures. Updates to the Land Use data based on 2005 data will certainly demonstrate a reduction in this category, as a cursory examination of orthophotographs shows houses built on lands currently classified as agriculture. This transition to developed lands will continue without efforts initiated by the communities or other land protection interests.

There is minimal water impact from these crop and pasture lands to water quality in the Sudbury and Foss Reservoirs. Greater risks emerge from the ongoing residential and commercial development in the watershed.

3.7 Construction

Construction poses a pollution threat from site erosion into resource areas. Authority to prevent such erosion in the Sudbury and Foss Reservoirs can be found in a number of regulations, including the Wetlands Protection Act (310 CMR 10.00), the Massachusetts water quality standards (310 CMR 4.0), and DWSP regulations (350 CMR 11.09).

The Massachusetts Environmental Policy Act regulations (MEPA; 301 CMR 11.00) requires that construction projects above a certain size follow a process so that state agencies can study the environmental consequences of their actions, ensure that all feasible measures are presented to avoid, minimize, and mitigate damage to the environment, study alternatives to the proposed project, and develop enforceable mitigation commitments, which will become conditions for the project if and when it is permitted.

DWSP reviews MEPA filings in the watershed and comments when deemed necessary. DWSP is primarily dependent on local municipalities and DEP for implementation and enforcement of most environmental regulations in the watershed. DWSP staff investigate any significant impacts to the reservoirs and can utilize DCR's water quality regulations, 350 CMR 11.09, to mitigate or, if necessary, pursue enforcement procedures against a project that could degrade the quality of the Sudbury and/or Foss Reservoirs or interfere with their use as a source of water supply.

3.8 Commercial, Industrial, and Governmental Sites

There are several nodes of Commercial and Industrial activities in the Sudbury and Foss Reservoirs watershed, mostly clustered around the major transportation arteries of the Mass Turnpike, I-495, and Rt. 9. While many of these sites are in the western edge of the watershed, the Framingham Technology Park is situated adjacent to Foss Reservoir. Commercial activity also spreads along the length of Rt. 9 as it borders the two reservoirs, and there is a strip of commercial sites along Rt. 85 to the northwest of Sudbury Reservoir.

These sites represent significant existing and potential sources of pollutants. DWSP relies on the buffering capacity of its land to mitigate against the most serious impacts of this activity. As described in previous sections, DWSP also depends on local implementation, and DEP oversight, of state regulations to provide protection to the reserve water supply.

3.9 Residential Sites

Almost one third of the watershed is in residential development, with over 140,000 residents in the five towns encompassing this watershed. Similar to the approach for Commercial/Industrial/Governmental sites, DWSP relies on the buffering capacity of its land to mitigate against the most serious impacts of this activity. As described in previous sections, DWSP also depends on local implementation and DEP oversight of state regulations to provide protection to the reserve water supply.

3.10 Solid Waste Facilities

Solid waste facilities do not pose a threat to the Sudbury Reservoir. According to MassGIS and DEP, there are three closed or inactive solid waste facilities in the Sudbury basin. One is in Framingham, situated between Rt. 9 and the MA Turnpike. The other two are in Southborough, one on land owned by the town, the other south of Rt. 9. DWSP will continue to review DEP monitoring of the landfills under the state's Solid Waste Regulations.

3.11 Future Growth

The Metrowest region will continue to be a focal point for growth in the greater Boston region, as its location and transportation services provide access to employment, services, and other amenities. The Metropolitan Area Planning Commission (MAPC) estimates that population will increase by 10% over the next 25 years. Commercial and Industrial redevelopment and growth is also expected in this watershed that already contains major activities.

As a home-rule state, each community establishes its own land use zoning. Each municipality in the watershed is actively involved in planning for the future, as well as regional entities such as MAPC and state interests ranging from EOEEA, MAHD, and MWRA. DWSP supports all of these efforts that promote planning strategies in order to help protect the natural resources, including water resources, required for healthy, sustainable communities.

Land acquisition is one of the most successful approaches for protecting water quality. However, given the Sudbury and Foss Reservoirs' emergency status, DCR has no plans to add to the existing 4,000 acres in DWSP ownership. These current holdings remain a critical buffer to the impacts of future growth in the watershed.

3.12 Climate Change

The range of impacts predicted from Climate Change are discussed in Volume I. The effect of this potential array of changes, in particular increased volume and intensity of precipitation events, could impact the water quality and quantity in the Sudbury and Foss Reservoirs. The most important source of protection for this reserve water supply is the protected lands owned by DWSP.

4 Programs to Control Potential Sources of Pollution

The Sudbury and Foss Reservoirs, as the reserve source water supply in the DCR/MWRA watershed system, do not require the same level of protection as the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds. The Sudbury watershed, however, benefits from DWSP's efforts in the active supply watersheds. Resources from the Wachusett Reservoir are shared, when appropriate, within the Sudbury watershed. Policy initiatives and scientific studies are similarly adapted to the limited needs of a reserve water supply.

DWSP's watershed protection strategy for the DCR/MWRA water supply system is organized into four goals:

1. Protect land through ownership or agreement.
2. Manage DCR-owned properties to protect and enhance water quality.
3. Work with watershed communities to foster watershed protection principles on land in private ownership.
4. Monitor to identify potential or existing water quality problems

This Section describes the programs utilized in the Sudbury Reservoir and Foss Reservoir watershed to meet these goals. Table IID-12 presents these goals and the corresponding programs with the relevant plans and guidance documents for the Sudbury and Foss Reservoirs Watershed. Table IID-13 summarizes the specific actions for each program described in this Section, which are then organized in Section 5 into a five year Implementation Schedule and Work Plan. Please note that the first goal above, "Protect land through ownership or agreement," is not presented in these tables as there is no active program to acquire new lands in this watershed.

4.1 Land Acquisition

The funds available to DCR for water supply protection land acquisition are primarily targeted to the Wachusett Reservoir watershed, with some money also available for the Quabbin Reservoir watershed. As a reserve water supply, there is no active Land Acquisition program in the Sudbury and Foss Reservoirs watershed.

The 4,000 acres currently owned by DCR, however, are a crucial buffer to water quality degradation in the reservoirs. It is imperative that DCR limit the disposition of DWSP land for municipal or private use, through adherence to the DWSP and EOEEA Land Disposition Policies.

Table IID-12: DCR Watershed Protection Goals, Programs, Plans and Guidance Documents for the Sudbury and Foss Reservoirs Watershed

Goal	DCR Watershed Protection Program	Applicable Plans, Reports or Guidance Documents
Manage DCR-owned properties to protect and enhance water quality, and provide stewardship of natural resources.	Land Management	<i>Land Management Plan for the Watersheds of the Sudbury Reservoirs: 2005-2014; DCR/MWRA MOU.</i>
	Wildlife Management	<i>Land Management Plan for the Watersheds of the Sudbury Reservoirs: 2005-2014.</i>
	Public Access Management	<i>Sudbury Reservoir Watershed System Public Access Plan Update - 2002; 350 CMR 11.09(2); DCR/MWRA MOU</i>
	Watershed Security	<i>Watershed Ranger Patrol schedule; Land Management Plan for the Watersheds of the Sudbury Reservoirs: 2005-2014; DCR/MWRA MOU.</i>
	Infrastructure	<i>Land Management Plan for the Watersheds of the Sudbury Reservoirs: 2005-2014; Dam Inspection Reports; DCR/MWRA MOU</i>
Work with watershed communities to foster watershed protection principles on land in private ownership.	Interpretive Services	
Monitor to identify potential or existing water quality problems.	Water Quality Monitoring	DCR/MWRA MOU
	Emergency Response	<i>Wachusett and Sudbury Watersheds Emergency Spill Response/Prevention Plan; DCR/MWRA MOU; Emergency Action Plans for dams.</i>

Table IID-13: Summary of Programs to Address Potential Sources of Water Pollution

Goal	Program	Sudbury Reservoir and Foss Reservoir Watershed Description
Manage DCR- owned properties to protect and enhance water quality.	Land Management	<ul style="list-style-type: none"> • Implement the 2004-2013 <i>Sudbury Land Management Plan</i>. <ul style="list-style-type: none"> ▪ Provide a vigorous forest cover, diverse in species composition and tree sizes and ages, across the vast majority of DWSP lands. ▪ Comply with or exceed all environmental regulations governing forest management activities in Massachusetts. ▪ Prevent degradation of cultural sites and resources.
	Wildlife Management	<ul style="list-style-type: none"> • Implement the 2004-2013 <i>Sudbury Land Management Plan</i>. <ul style="list-style-type: none"> ▪ Continue Goose population control program on Sudbury Reservoir. ▪ Mitigate adverse impacts of wildlife on infrastructure and other watershed resources. ▪ Protect uncommon, rare, and otherwise significant wildlife species and habitats wherever they exist on DWSP lands.
	Public Access Management	<ul style="list-style-type: none"> • Continue to implement the 2002 <i>Sudbury Public Access Plan</i>. • Update <i>Sudbury Public Access Plan</i> in 2010. • Enforce DWSP regulations found at 350 CMR 11.09(2)
	Watershed Security	<ul style="list-style-type: none"> • Maintain regular Watershed Ranger patrols. • Maintain communication with State Police, Environmental Police, local police, and MWRA.
	Infrastructure	<ul style="list-style-type: none"> • Perform monthly inspections of Sudbury and Foss Reservoirs dams. • Work cooperatively with MWRA to identify both minor and major infrastructure maintenance and repair needs.
Work with watershed communities to foster watershed protection principles on land in private ownership.	Interpretive Services	<ul style="list-style-type: none"> • Utilize Watershed Rangers to educate visitors on DWSP property. • Provide educational material on DCR/MWRA watershed system and general drinking water issues, upon request, to watershed communities.
Monitor to identify potential or existing water quality problems.	Water Quality Monitoring	<ul style="list-style-type: none"> • Develop and implement a reservoir sampling protocol to supplement MWRA Open Reservoirs sampling program. • Assess need for tributary sampling. • Survey the Sudbury Reservoir for aquatic invasive species. Work with MWRA, as necessary, to control invasive species.
	Environmental Quality Assessment	<ul style="list-style-type: none"> • Utilize Watershed Ranger Patrols, water quality monitoring, communication with municipalities and other public agencies. • Support enforcement of all local, state, and federal environmental regulations.
	Emergency Response	<ul style="list-style-type: none"> • Implement Emergency Response protocol in association with MWRA. • Coordinate preparation with local responders.

4.2 Land Management

The *2004-2013 Sudbury Land Management Plan* lays out a comprehensive approach towards land management in the Sudbury watershed. Continued implementation of the Land Management Plan provides the best possible protection to the reservoirs from its surrounding forested tracts. The objectives of the Land Management Plan include:

- Provide a vigorous forest cover, diverse in species composition and tree sizes and ages, across the vast majority of DWSP lands.
- Maintain forest cover that balances active growth and nutrient assimilation, dense filtration, temperature regulation, and active reproduction.
- Retain this forest cover by encouraging and maintaining adequate forest regeneration across DWSP lands.
- Enhance and maintain the ability of the watershed forest to both resist and recover from disturbance.
- Prevent erosion of sediments and nutrients from the watershed forest, and provide for active assimilation of available nutrients.
- Limit the effects of human-caused air pollution by providing cover that filters and/or buffers pollutants. Develop a low-maintenance watershed forest, which provides long-term water quality protection with minimal intervention.
- Conduct any forest management activity such that the resulting benefits outweigh any potential negative impacts.
- Comply with or exceed all environmental regulations governing forest management activities in Massachusetts.
- Salvage dead and downed material in areas where this salvage will reduce the threats of fire or nutrient transport, and limit the need for salvage, through deliberate management practices aimed at reducing the likelihood of damage.
- Work to identify and eliminate invasive species from DWSP properties.
- Identify significant cultural resources on watershed lands.
- Prevent degradation of cultural sites and resources.

4.3 Wildlife Management

The *2004-2013 Sudbury Land Management Plan* includes extensive discussions on wildlife management in the watershed. The Canada goose population is the primary target of DWSP's wildlife management activities in the Sudbury watershed. A population control program initiated in 2007 has curbed the growth of the resident population.

The wildlife based objectives of the *2004-2013 Sudbury Land Management Plan* include:

- Mitigate adverse impacts of wildlife on infrastructure and other watershed resources.
- Protect uncommon, rare, and otherwise significant wildlife species and habitats wherever they exist on DWSP lands.
- Assess and mitigate impacts of watershed management activities on wildlife through a process of notification, site visits, review of records and literature, and recommendations to appropriate staff.

- Work to identify all uncommon or rare species present on DWSP lands, and provide habitat conditions and levels of protection recommended for perpetuating these species.
- Where feasible and applicable, and on limited acreage, maintain early successional forested and non-forested habitats on DWSP lands.
- Work to identify and eliminate invasive species from DWSP properties.
- Maintain forest reserves on a portion of DWSP's holdings.
- Implement Goose control program on Sudbury Reservoir.

4.4 Public Access Management

DWSP policies regarding public access in the Sudbury system are detailed in the *2002 Sudbury Reservoir Watershed System Public Access Plan*. A key component to the plan is the designation of resource management districts and corresponding public access rules (see Figure IID-7 and Table IID-14). Many activities are not allowed in the Sudbury and Foss Reservoirs watershed due to the limited resources available to protect both the public and DCR property. There are ongoing enforcement issues surrounding illegal uses and encroachments.

4.4.1 Trespassing

There are a range of transient trespassing issues, such as ATV and snowmobile use, swimming, access to prohibited areas, and dumping. These concerns are not unique to the Sudbury watershed, as they are problematic to any land management agency. The following are DWSP strategies for controlling trespassing:

- Patrol regularly, made possible by the Watershed Ranger staffing increase in the Wachusett/Sudbury Section.
- Communicate and coordinate with local police, State Police, and the Environmental Police.
- Enforce Watershed Protection regulations found at 350 CMR 11.09(2).
- Maintain gates and barway.
- Update boundary signs.

4.4.2 Encroachments

As described in Section 3.2.13, there are also permanent encroachments onto DWSP property. These encroachments vary from mowing onto DCR property to establishing camps to erecting permanent structures. DWSP strategies for controlling encroachments include:

- Complete inventory of all DWSP lands in the Sudbury System, identifying the types and severity of encroachments.
- Work with the property owners to eliminate these encroachments.
- Improve boundary marking of DWSP property.

Figure IID-7: Public Access Zones in the Sudbury and Foss Reservoirs Watershed

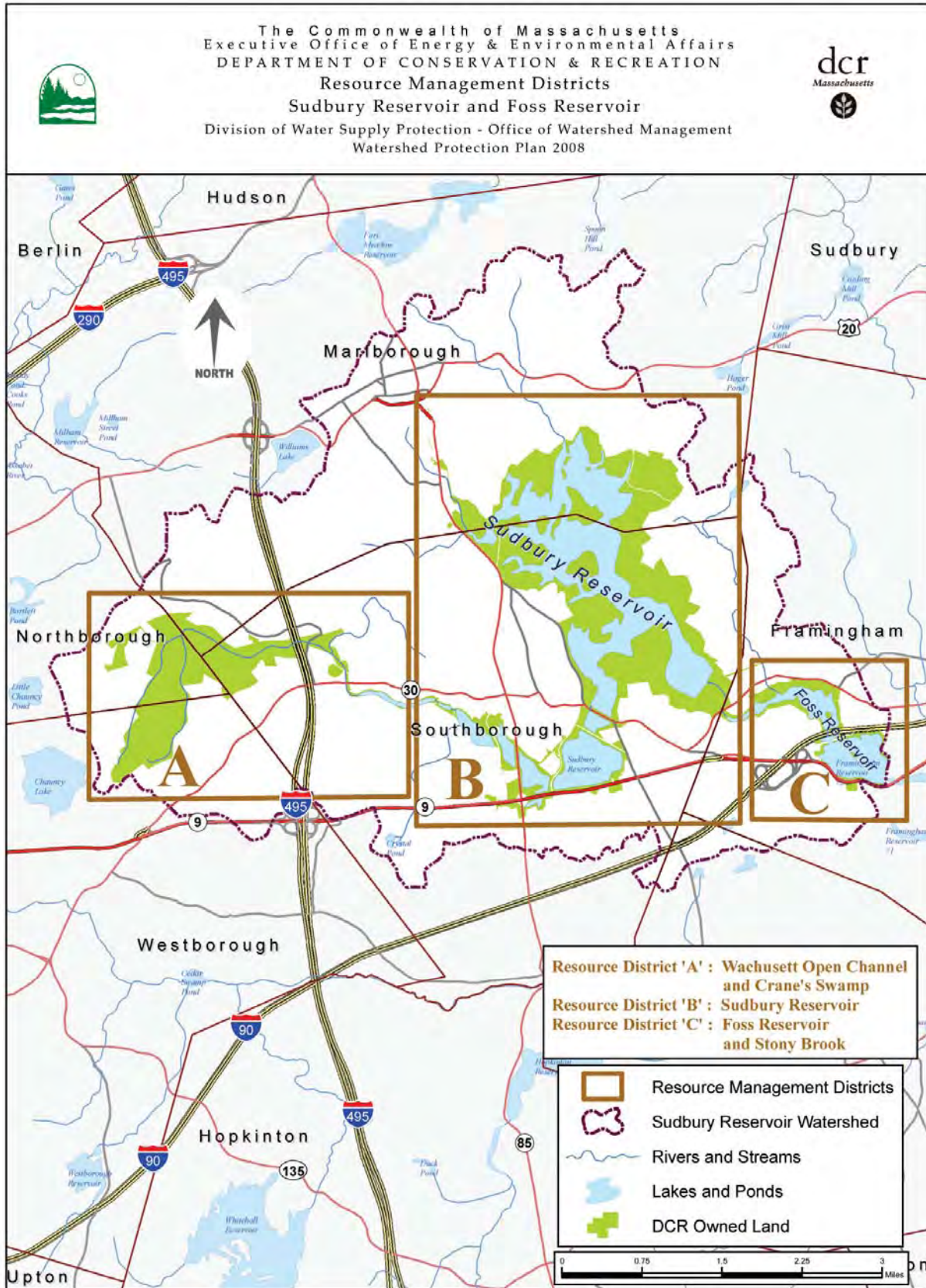


Table IID-14: DCR/DWSP Public Access Policy Summary in the Sudbury and Foss Reservoirs Watershed

ACTIVITY	Wachusett Open Channel/Crane's Swamp (Area A)	Sudbury Reservoir (Area B)	Reservoir No. 3/Stony Brook (Area C)
VEHICLE ACCESS			
Off-Road Driving (ORVs, ATVs)	⊘	⊘	⊘
Snowmobiling	⊘	⊘	⊘
Bicycling	⊘	⊘	⊘
FOOT ACCESS			
Hiking	✓	✓	⊘
Dog Walking	⊘	⊘	⊘
Cross-Country Skiing	✓	✓	⊘
Shoreline Fishing	✓	✓	⊘
Horseback Riding	⊘	⊘	⊘
Hunting	⊘	⊘	⊘
WATER ACCESS			
Boating - non – motorized	⊘	⊘	⊘
Boating – motorized (including “jet-skis”)	⊘	⊘	⊘
Swimming	⊘	⊘	⊘
Ice Skating/Ice Fishing	⊘	⊘	⊘
OTHER ACTIVITIES			
Camping	⊘	⊘	⊘
Picnicking	✓	✓	⊘
Fires & Cooking	⊘	⊘	⊘
Collecting/Metal Detecting	⊘	⊘	⊘

✓ – Public access is allowed in designated areas only ⊘ – Activity prohibited

Public access is allowed in designated areas only. Any activity which injures or defaces the property of the Commonwealth is strictly prohibited. All alcoholic beverages are prohibited. Night access is prohibited on DCR land in the Sudbury Reservoir watershed. See 350 CMR 11.09(2) for complete list of regulations. For additional information, contact the Wachusett/Sudbury Watershed Ranger Station at (978) 365-3800 or go to www.state.ma.us/dcr/watersupply/watershed/pacc.htm. In an emergency, contact the Watershed Rangers or the Massachusetts State Police at (508) 829-8410.

4.5 Watershed Security

The MWRA has completed both an Emergency Action Plan and a Vulnerability Assessment for the Sudbury and Foss Reservoirs. The Emergency Action Plan details the procedures to follow in several scenarios. The Vulnerability Assessment was required by the federal 2002 Public Health and Bioterrorism Preparedness and Response Act. DCR and MWRA are implementing the recommendations of this assessment; due to the sensitive nature of this matter, however, specific details can not be included in this report. Watershed Rangers regularly patrol the area; local, State, and Environmental Police are also responsible for watching the watershed.

4.6 Infrastructure

The main infrastructure elements in the Sudbury and Foss Reservoirs watersheds are the reservoirs' respective dams, spillways, gatehouses, and associated dikes. There are also emergency pipelines that connect Foss Reservoir Gatehouse to Stearns Reservoir Gatehouse and the Sudbury Aqueduct. DWSP and MWRA work cooperatively to ensure that the biannual dam safety inspections required under 302 CMR 10.00 are completed and results reported to the DCR Office of Dam Safety. DWSP's Civil Engineers performs routine monthly inspections, while MWRA provides capital maintenance and improvements in response to any deficiencies discovered by inspections.

4.7 Watershed Protection Act

The Watershed Protection Act (St. 1992, c.36) is not applicable to the Sudbury and Foss Reservoirs watershed. DWSP regulations found at 350 CMR 11.09, however, do encompass these resource areas.

4.8 Technical Assistance and Community Outreach

The suburban communities that comprise the Sudbury watershed, unlike many of the rural towns that are within the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds, are municipalities with professional staff. DWSP relies on this knowledge base to support local environmental regulatory implementation. DCR maintains communication, as needed, with key boards.

4.9 Interpretive Services

Watershed Rangers, besides patrolling DWSP property, are also able to educate visitors on DCR rules and regulations, the DCR/MWRA water supply system, and DWSP efforts to manage the watershed. The publications and education material developed and distributed by DWSP's Interpretive Service staff at the Quabbin Visitor's Center and Stillwater Farm can also be shared with the Sudbury Reservoir watershed communities.

4.10 Water Quality Monitoring

The Sudbury and Foss Reservoirs, as reserve source water supplies, are not subject to the same level of scrutiny as the Quabbin and Wachusett Reservoirs, the active drinking water sources in the DCR/MWRA water supply system. MWRA has a program of water quality monitoring for all of its reserve water supplies, both source (Sudbury and Foss) and distribution (Chestnut Hill, Fells, Norumbega, Spot Pond, and Weston) reservoirs. DWSP aquatic biologists annually survey the Sudbury Reservoirs for aquatic invasive species. DWSP also monitors tributaries on an as needed basis; responses are made if deemed necessary, for issues such as algal blooms or large outbreaks of invasive water species.

DWSP recognizes that additional monitoring is needed to adequately determine reservoir conditions. DWSP will design and implement a sampling program to better understand the water quality parameters of the Sudbury and Foss Reservoirs. At the same time, DWSP will assess the needs for further tributary sampling. DWSP currently works with MWRA to control invasive water chestnut under an MWRA contract; further cooperative ventures will be pursued as necessary.

4.11 Environmental Quality Assessments

DCR and MWRA have concluded that an intensive Environmental Quality Assessment program similar to those in the Wachusett Reservoir watershed is not necessary for the reserve water supply. Previously delineated efforts, such as Watershed Ranger patrols and an increased water quality monitoring program, provide initial information on the status of the watershed. Additional assessments of the watershed can be obtained from maintaining communication with local, state, and federal regulatory and planning authorities, as well as DWSP's review, as needed, of MEPA filings. DCR will support enforcement of all local, state, and federal environmental regulations regarding wastewater management, stormwater management, agriculture, and hazardous materials and waste.

4.12 Emergency Response

The level of threat from an accident depends on the type and volume of the product released, the location of the incident, and weather conditions. While not the same high priority as the Quabbin and Wachusett Reservoirs, DWSP and MWRA must still be prepared for accidents near the Sudbury and Foss Reservoirs. Updated protocols for the Sudbury watershed are integrated into the 2008 *Wachusett and Sudbury Watersheds Emergency Spill Response/Prevention Plan*. A critical component to any Emergency Response is communication, cooperation, and coordination with the local first responders as well as DEP's Bureau of Waste Site Cleanup Response and Remediation Division.

5 Implementation Schedule and Work Plan

The action items described in this Plan are combined with the ongoing tasks from recent Annual Work Plans into a Five Year Work Plan presented in Table IID-15. This Work Plan will guide DWSP watershed management activities in the Sudbury and Foss Reservoirs watershed from 2009 to 2013.

Table IID-15: Sudbury and Foss Reservoir Watershed 5 Year Work Plan 2009-2013

Key to Work Units in the Wachusett/Sudbury Section:

CE = Civil Engineers; EQ = Environmental Quality; F = Forestry; IS = Interpretive Services; NR = Natural Resources; P= Planning (Boston); RD = Regional Director, Assistant Regional Director; WR = Watershed Rangers.

Task Description	Lead Section	Additional Staff	Product(s)
Land Management			
Implement one timber harvesting operation, on average, per year, with a targeted coverage of approximately 40 acres.	F		<ul style="list-style-type: none"> ▪ Forest regeneration without negative water quality impacts
Comply with or exceed all environmental regulations governing forest management activities in Massachusetts. Promote CMPs as described in Land Management Plan and as further developed by Forestry staff.	F		<ul style="list-style-type: none"> ▪ Forest regeneration without negative water quality impacts
Improve boundary marking of DWSP property.	F	CE	<ul style="list-style-type: none"> ▪ Boundary markings
Wildlife Management			
Continue Goose population control program on Sudbury Reservoir.	NR		<ul style="list-style-type: none"> ▪ Annual report of activities
Mitigate adverse impacts of wildlife on infrastructure and other watershed resources.	NR		<ul style="list-style-type: none"> ▪ Mitigation projects (as needed)
Protect uncommon, rare, and otherwise significant wildlife species and habitats wherever they exist on DWSP lands.	NR		<ul style="list-style-type: none"> ▪ Submit rare species sightings to Natural Heritage program ▪ Maintain accurate databases
Public Access Management			
Continue to implement the 2002 <i>Sudbury Public Access Plan</i> .	WR		<ul style="list-style-type: none"> ▪ Quarterly reports
Update <i>Sudbury Public Access Plan</i> in 2010.	RD	P, WR	<ul style="list-style-type: none"> ▪ Public Access Plan
Enforce DWSP regulations found at 350 CMR 11.09(2)	WR		<ul style="list-style-type: none"> ▪ Quarterly reports
Identify and eliminate encroachments.	CE	F	<ul style="list-style-type: none"> ▪ Encroachment rectification(s)

Task Description	Lead Section	Additional Staff	Product(s)
Watershed Security			
Maintain regular Watershed Ranger patrols.	WR		▪ Quarterly reports
Maintain communication with State Police, Environmental Police, local police, and MWRA.	WR	RD	▪ Quarterly reports
Infrastructure			
Perform monthly inspections of Sudbury and Foss Reservoir dams.	CE		▪ Monthly dam report
Work cooperatively with MWRA to identify both minor and major infrastructure maintenance and repair needs.	CE	RD	▪ Monthly report ▪ Communication as needed
Interpretive Services			
Utilize Watershed Rangers to educate visitors on DWSP property.	WR		▪ Maps and brochures
Provide educational material on DCR/MWRA watershed system and general drinking water issues, upon request, to watershed communities.	WR	IS	▪ Maps ▪ Brochures, ▪ Educational programs
Water Quality Monitoring			
Develop and implement a reservoir sampling protocol.	EQ		▪ Sampling protocol
Assess need for tributary sampling.	EQ		▪ Assessment report
Survey annually the Sudbury Reservoir for aquatic invasive species. Work with MWRA to control invasive water chestnut and pursue further cooperative ventures as necessary.	EQ		▪ Annual survey
Environmental Quality Assessments			
Utilize Watershed Ranger Patrols, water quality monitoring, communication with municipalities and other public agencies to assess status of watershed.	WR	EQ	▪ Quarterly reports
Support enforcement of all local, state, and federal environmental regulations.	EQ	RD, P	▪ Ongoing communication with agencies
M. Emergency Response			
Implement Emergency Response protocol in association with MWRA.	EQ	CE, RD	▪ Ongoing communication
Coordinate emergency preparation with local responders.	EQ	CE, RD	▪ Ongoing communication

References

CE Maguire. *A Study of the Upper Sudbury River Watershed for the Metropolitan District Commission*, Waltham, MA 1975.

CE Maguire. *A Study of the Upper Sudbury River Watershed for the Metropolitan District Commission Amendment*, Waltham, MA 1979.

Department of Conservation and Recreation, Division of Water Supply Protection. *Land Management Plan for the Watersheds of the Sudbury Reservoirs: 2005-2014*. Boston, MA. 2005.

Department of Conservation and Recreation, Division of Water Supply Protection. *Wachusett and Sudbury Watersheds Emergency Spill Response/Prevention Plan*. West Boylston, MA. 2008.

Lao, Young and Steven F. Rhode. *An Evaluation of Water Quality of MWRA Emergency Distribution Reservoirs from 2002 to 2005*. Winthrop, MA. 2006.

Metropolitan District Commission, Division of Watershed Management. *Sudbury Reservoir Watershed System Public Access Plan Update*. Boston, MA. 2002.

Metropolitan District Commission, Massachusetts Water Resources Authority, and Comprehensive Environmental, Inc. *Watershed Protection Plan Sudbury Reservoir and Framingham Reservoir #3*. Boston, MA. 1997.

U.S. Environmental Protection Agency and Avatar Environmental. *Human Health Risk Assessment Synthesis, Nyanza Superfund Site, Operable Unit IV, Sudbury River Mercury Contamination (Draft)*. Boston, MA. 2006.

Wallace, Floyd Associates. *Water Supply Study and Environmental Impact Report—2020; Task 9: Upper Sudbury Watershed*. Boston, MA. 1986.

Yeo, Jonathan L. *The Future Role of the Sudbury Reservoirs and Watershed in the MDC/MWRA Water Supply System: A Review of Alternatives*. MWRA, Boston, MA. 1992.