November 9, 2004

Ms. Patricia A. Kurkul, Regional Administrator
NOAA Fisheries
Northeast Regional Office
One Blackburn Drive
Gloucester, MA 09130-2298

SUBJECT: REQUEST FOR CONCURRENCE - BIOLOGICAL ASSESSMENT FOR MILLSTONE POWER STATION, UNITS 2 AND 3 LICENSE RENEWAL

Dear Ms. Kurkul:

The U.S. Nuclear Regulatory Commission (NRC) has prepared the enclosed biological assessment (BA) to evaluate whether the proposed renewal of the Millstone Power Station, Units 2 and 3 (MPS) operating licenses for a period of an additional 20 years would have adverse effects on listed species. The proposed action (license renewal) is not a major construction activity. MPS is located on the north shore of Long Island Sound in Waterford, Connecticut, approximately 40 miles southeast of Hartford, Connecticut.

By letter dated March 17, 2004, to the National Oceanic and Atmospheric Administration (NOAA) - Fisheries, the NRC requested a list of Federally threatened or endangered aquatic species that may be in the vicinity of MPS and its associated transmission lines. In a letter dated September 21, 2004, NOAA Fisheries provided a list of Federally threatened or endangered species. Your office identified one threatened and three endangered species of sea turtles that may be seasonally found in the waters of Long Island. These include the loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), green turtles (*Chelonia mydas*), and leatherback turtles (*Dermochelys coriacea*). The letter also identified three other endangered species known to occur seasonally in Northeast waters, the North Atlantic right whales (*Eubalaena glacialis*), humpback whales (*Megaptera novaeangliae*), and fin whales (*Balaenoptera physalus*). The NRC has also included in its evaluation the endangered shortnose sturgeon (*Acipenser brevirostrum*); this species is known to occur in the Connecticut River, which flows into Long Island Sound approximately 10 miles east of the Millstone site.

In addition the staff also contacted U.S. Fish and Wildlife Service (FWS) by letter dated March 18, 2004, requesting a list of Federally threatened or endangered terrestrial species that may be in the vicinity of MPS. In a letter dated April 15, 2004, FWS identified the following terrestrial species: the endangered roseate tern (*Sterna dougallii dougallii*); the threatened piping plover (*Charadrius melodus*), puritan tiger beetle (*Cicindela puritana*), small whorled pogonia (*Isotria medeoloides*), and bald eagle (*Haliaeetus leucophalus*); and one candidate species, the New England cottontail (*Sylvilagus transitionalis*).

The staff has determined that license renewal for Millstone would have no effect on the puritan tiger beetle, shortnose sturgeon, loggerhead sea turtle, green sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, piping plover, right whale, finback whale, and humpback whale. License renewal may affect, but is not likely to adversely affect, the bald eagle, roseate tern, New England cottontail, and small whorled pogonia.

We are requesting your concurrence with our determination. In reaching our conclusion, the NRC staff relied on information provided by the licensee, on literature research and interviews with experts performed by NRC staff, and on information provided by FWS (i.e., including current listings of species provided by the FWS, Concord, New Hampshire, New England Field Office) and NOAA Fisheries (Northeast Regional Office).

If you have any questions regarding this BA or the staff's request, please contact Mr. Richard L. Emch, Jr., Senior Environmental Project Manager, at 301-415-1590 or via e-mail at rle@nrc.gov.

Sincerely,
/RA/
Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-336 and 50-423

Enclosures: As stated

cc w/encl.: See next page

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1. Ltr to: P. Moriarty w/Biological Assessment, Svc. List: **ML043170594**

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Millstone Power Station, Units 2 and 3

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Biological Assessment

Millstone Power Station
License Renewal Review

October 2004

Docket Numbers
50-336
50-423

U.S. Nuclear Regulatory Commission
Rockville, Maryland

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) issues operating licenses for domestic nuclear power plants in accordance with the provisions of the Atomic Energy Act of 1954, as amended, and NRC implementing regulations. The purpose and need for the proposed action (that is, renewal of an operating license) is to provide an option that allows electric power generation to continue beyond the term of the current nuclear power plant operating license, so future generating needs can be met if the operator and State regulatory agencies pursue that option.

Dominion Nuclear Connecticut, Inc. (Dominion) has prepared an environmental report in conjunction with its application for renewal of the Millstone Nuclear Plant, Units 2 and 3 (Millstone) operating licenses, as provided for by the following NRC regulations:

- Title 10, Energy, Code of Federal Regulations (CFR) Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," Section 54.23, Contents of application - environmental information (10 CFR 54.23).

- Title 10, Energy, CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," Section 51.53, Postconstruction environmental reports, Subsection 51.53(c), Operating license renewal stage [10 CFR 51.53(c)].

The NRC is reviewing an application submitted by Dominion (the applicant) for the renewal of the operating licenses for Millstone for a period of an additional 20 years. There will be no major construction, refurbishment, or replacement activities associated with this action. This biological assessment examines the potential effects of the continued operation of Millstone on 14 Federally listed species and one species proposed for candidate listing that could occur within the Millstone site, near the site, or along its associated transmission line rights-of-way (ROWs). This consultation is pursuant to Section 7(a)(2) of the Endangered Species Act.

In letters dated March 17 and 18, 2004, the NRC requested that the National Oceanographic and Atmospheric Administration (NOAA) - Fisheries (also known as the National Marine Fisheries Service or NMFS) and the U.S. Fish and Wildlife Service (FWS), respectively, provide lists of Federally listed endangered or threatened species and information on protected, proposed, and candidate species, as well as any designated critical habitat, that may be in the vicinity of Millstone and its associated transmission line ROWs (NRC 2004a, 2004b). The project area is defined as the Millstone site, its associated transmission line ROWs, and adjacent areas of Long Island Sound. In letters from the FWS (FWS 2004a) and the NMFS (NMFS 2004a), the NRC was provided a list of Federally protected species in the project area. A total of eight aquatic and six terrestrial species afforded protection under the Endangered Species Act of 1973 or candidates for such protection were identified that could potentially inhabit the project area.

2.0 Proposed Action

The proposed action is the renewal of the operating licenses for Millstone. The current operating license for Unit 2 expires on July 31, 2015, and for Unit 3 on November 25, 2025. Dominion has submitted an application to the NRC to renew these operating licenses for an additional 20 years of operation (i.e., until July 31, 2035, for Unit 2 and November 25, 2045, for Unit 3). The renewed licenses, if issued, will be effective from their date of issuance until 20 years after the expiration date of the current operating licenses.

Millstone is located on Millstone Point in Niantic Bay, between the Niantic and Thames Rivers on Long Island Sound, near Waterford in New London County, Connecticut (Figure 1). The nearest large cities are New Haven, approximately 64 km (40 mi) to the west, and Hartford, approximately 64 km (40 mi) to the northwest. The site is situated on the edge of Long Island Sound and Niantic Bay and is approximately 32 km (20 mi) west of Rhode Island. At one time, there were three operating nuclear power plants at the Millstone site. Construction on Unit 1 began in 1966, on Unit 2 in 1970, and on Unit 3 in 1974. Unit 1 was a boiling-water reactor that was permanently shut down in 1995. The facility is in long-term storage awaiting decontamination and dismantlement as part of station decommissioning. Unit 1 is not part of this license renewal application. Millstone Unit 2 is a two-loop, closed-cycle, pressurized-water nuclear reactor with a calculated electrical output of approximately 870 megawatts electric (MW[e]); while Millstone Unit 3 is a four-loop, closed-cycle, pressurized-water nuclear reactor with a calculated electrical output of approximately 1,154 MW(e) (Dominion 2004a).

Long Island Sound is the source of water for the once-through turbine condenser cooling systems at Millstone. The system withdraws salt water from Long Island Sound though intakes, pumps the water through the condenser for cooling, and surface discharges heated water to Long Island Sound approximately 610 m (2000 ft) southeast of the withdrawal points (Dominion 2004a).

Intake structures for Units 2 and 3 are located on the eastern shore of Niantic Bay, which is fed by Long Island Sound (Figure 2). The structures consist of four reinforced-concrete bays for Unit 2 and six bays for Unit 3. When both Units 2 and 3 are operating at full power, the 10 pumps (one for each bay) pump a total of 92 m^3/s (1.46 million gpm) into 2-m (7-ft) diameter conveyance pipes. Cooling water then moves through the condensers. After passing through each unit's condensers, cooling water is discharged to the former granite quarry. The heated discharge water then flows through two cuts excavated from the bedrock at the eastern end of the quarry into Long Island Sound. Figure 2 shows the intake structures, quarry, and discharge points for the Millstone circulating water system.

The intake structures are designed to minimize the possibility of clogging or impingement of aquatic organisms. Before the intake water reaches the circulating water pumps, the water passes through trash racks consisting of 1-cm (3/8-in. thick) metal bars spaced horizontally on 5-cm (2-in.) centers. The water then flows through vertical traveling screens with 1-cm (3/8-in.) mesh that prevent debris and large organisms from entering the cooling system. A cutoff wall in front of the intake extends 2.7 m (9 ft) below the surface to prevent surface water debris and organisms from entering the intake. Individual trash and fish return troughs collect and sluice debris and fish from the screens. Unit 3 was originally constructed with a fish return trough;

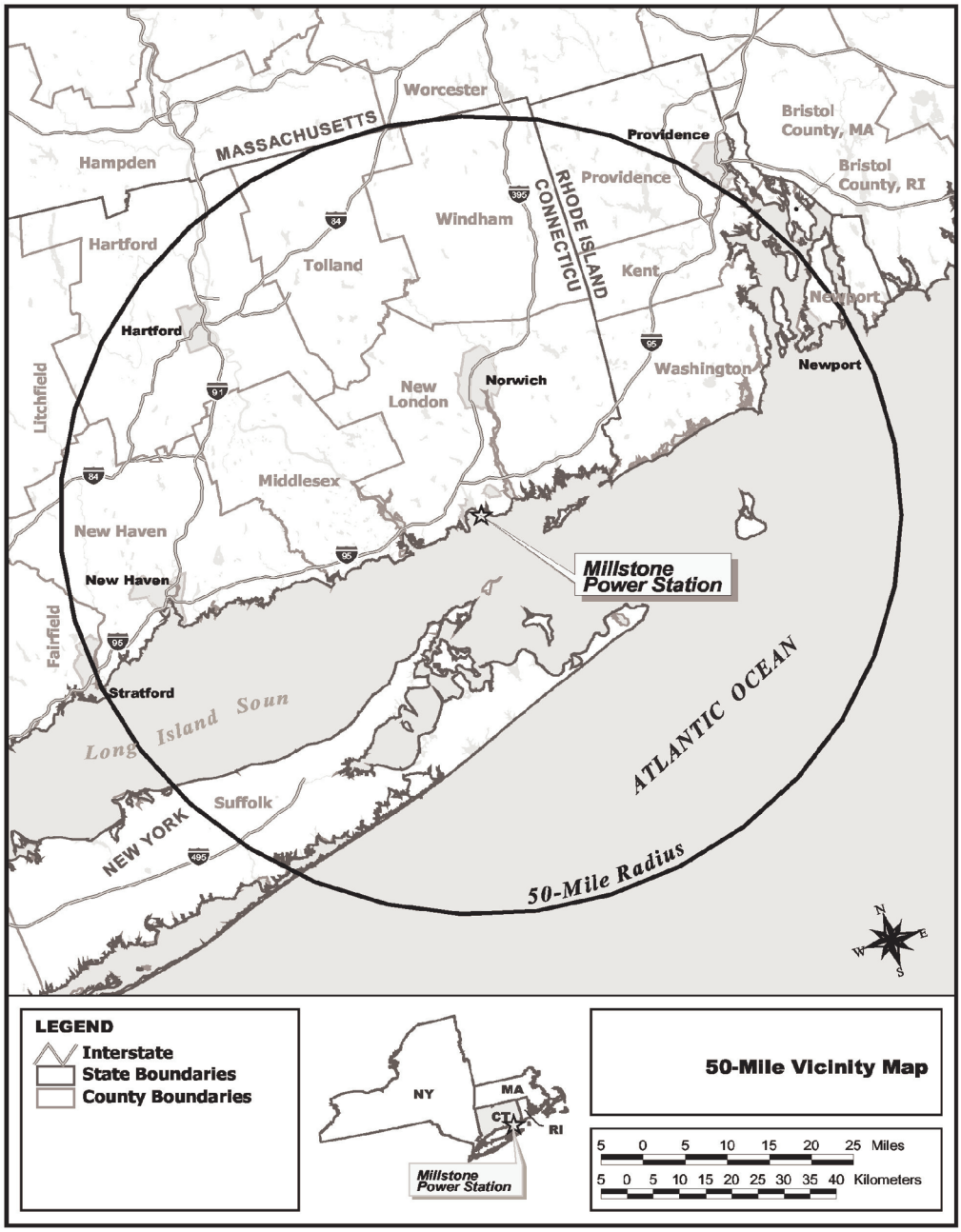

Figure 1. Location of Millstone, 80-km (50-mi) Region

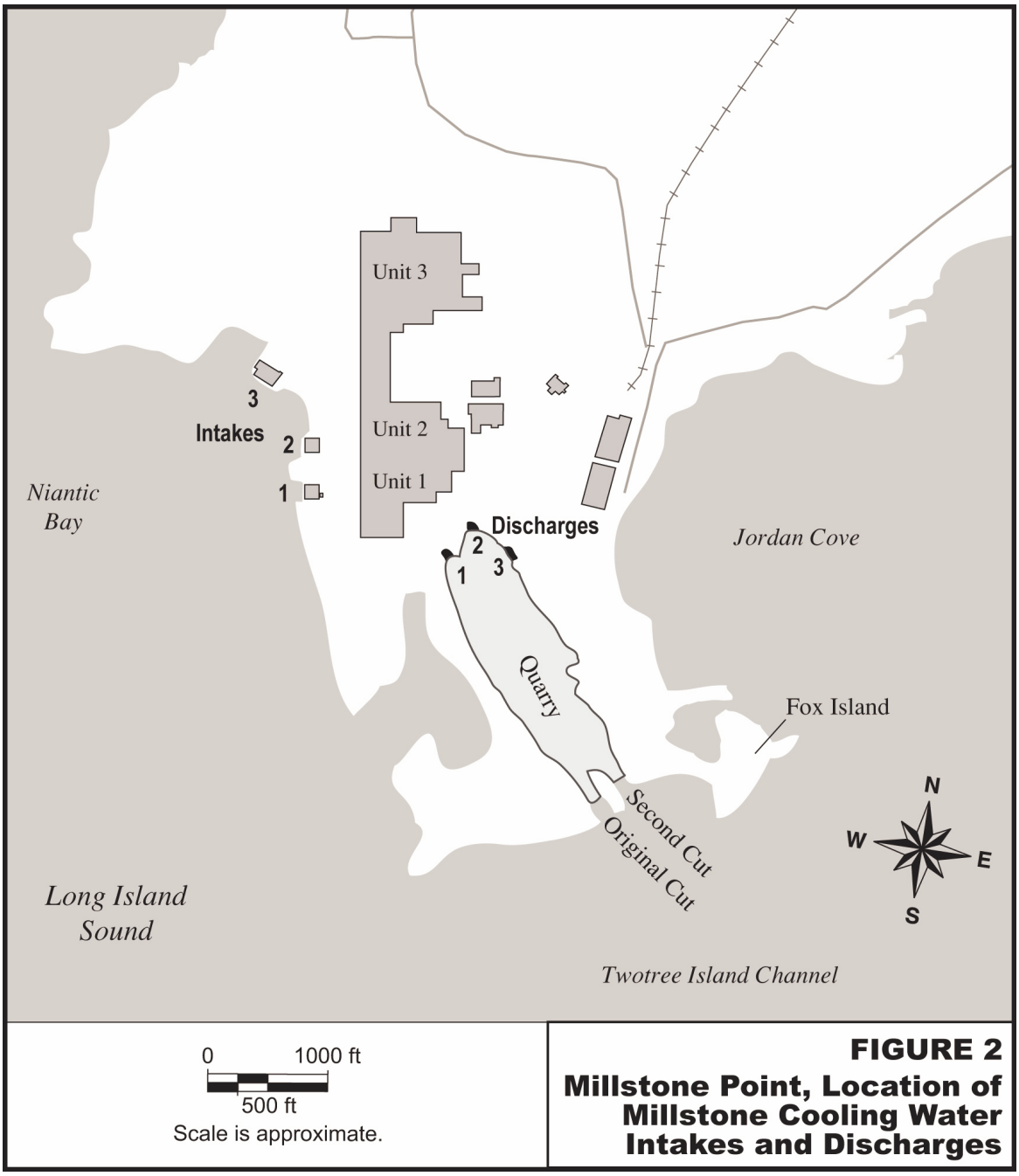

Figure 2. Millstone Point, Location of Millstone Cooling Water Intake and Discharges

a fish return trough was added to Unit 2 in 2000. Water velocity in front of the Unit 2 structure is estimated to be about 0.2 m/s (0.6 ft/s) (Dominion 2004a).

Biocides are added to the intake water to prevent biofouling. Sodium hypochlorite is injected on a periodic basis, and the system is designed to maintain a 0.2 parts per million (ppm) chlorine concentration (Dominion 2004a). Residual chlorine is monitored in the effluent water. Thermal backwashing is also performed to prevent mussels from fouling the intake structure pump bays.

3.0 Environmental Setting

3.1 Terrestrial Resources

The Millstone site is located in the Southern New England Coastal Plains and Hills of the Northeastern Coastal Zone ecoregion (U.S. Environmental Protection Agency [EPA] 2004a). Pre-settlement vegetation would have consisted primarily of winter deciduous hardwood forests with some salt marsh and beach habitat types. Out of approximately 212 ha (525 ac) that comprise the Millstone site, current land use includes approximately 89 ha (220 ac) of developed area, a 20-ha (50-ac) natural area, and a 12-ha (30-ac) ballpark licensed to the town of Waterford. Until 1960, the site was used as a granite quarry, which operated for 200 years (Dominion 2004a).

The current terrestrial environment includes old field habitats dominated by eastern red cedar (*Juniperus virginiana*), scarlet oak (*Quercus coccinea*), black cherry (*Prunus serotina*), and blackberry (*Rubus* spp.) (Dominion 2004a). Common invasive exotics in this habitat include multiflora rose (*Rosa multiflora*) and Japanese honeysuckle (*Lonicera japonica*). Winter deciduous hardwood forest dominated by various species of oak (*Quercus* spp.), pignut hickory (*Carya glabra*), black birch (*Betula lenta*), red maple (*Acer rubrum*), and American beech (*Fagus grandifolia*) is the most common undisturbed habitat type. Along the coast, beach and coastal marsh habitats are dominated by beach grass (*Ammopila breviligulata*), toadflax (*Linaria vulgaris*), evening primrose (*Oenothera biennis*), seaside goldenrod (*Solidago sempervirens*), salt meadow grass (*Spartina patens*), salt grass (*Distichlis spicata*), Bigelow's glasswort (*Salicornia bigelovii*), and smooth cordgrass (*Spartina alterniflora*). Ponds and wetlands in the eastern portion of the site are managed as a wildlife refuge.

Terrestrial habitats on the Millstone site support common wildlife species such as white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), cottontail rabbits (*Sylvilagus* spp.), red fox (*Vulpes vulpes*), woodchucks (*Marmota monax*), and wild turkey (*Meleagris gallopavo*). Coastal marshes and the wildlife refuge on the site contain habitat that supports waterfowl such as mallard ducks (*Anas platyrhynchos*), wood ducks (*Aix sponsa*), Canada geese (*Branta canadensis*), common mergansers (*Mergus merganser*), black ducks (*Anas rubripes*), herons, and egrets. Osprey (*Pandion haliaetus*) nest platforms have been maintained at Millstone for over 35 years and 173 fledglings have been produced over that time period (Dominion 2004a).

Four 345-KV transmission lines connect Millstone to the power grid (Table 1) (Dominion 2004a). The ROWs traverse New London, Middlesex, Hartford, Tolland, and the northeast corner of New Haven counties. The four lines share a common ROW for 14.5 km (9 mi) north to Hunts

Brook Junction (Figure 3). At Hunts Brook Junction two lines run north in the same ROW to the Card Street Substation where one line continues on to the Manchester Substation, one line runs east to the Montville Station and one line runs west to the Southington Substation. All Millstone lines share ROWs with lines from other sources and would be maintained if Millstone ceased operating. Transmission lines traverse abandoned fields, pasture, cultivated fields, forests, and wetlands as well as a number of conservation areas (Dominion 2004a). The Card Street/Manchester line crosses the Pease Brook Wildlife Management Area. The Southington line crosses the Nehantic State Forest, Cockaponset State Forest, and Hartman Park, a municipal park owned by the town of Lyme, Connecticut.

Table 1. Millstone Transmission Line Corridors.

		Length		Width		Max Area[a]	
Substation	**kV**	**km**	**(mi)**	**m**	**(ft)**	**ha**	**(ac)**
Hunts Brook Junction	345	14	(9)	152	(500)	220	(545)
Montville	345	6	(4)	99	(325)	64	(158)
Card Street	345	32	(20)	91	(300)	294	(727)
Manchester	345	61	(38)	91	(300)	559	(1382)
Southington	345	71	(44)	76	(250)	539	(1333)

[(a)] Max area calculations use maximum right-of-way width estimates (Dominion 2004a).

Connecticut Light and Power (CL&P), a subsidiary of Northeast Utilities conducts maintenance activities on these transmission lines and ROWs. These activities include, but are not restricted to, maintenance of vegetation in each ROW, replacement of poles or towers, installation of lightning arresters and counterpoise, and upgrading of existing equipment.

CL&P manages vegetation within the ROWs with an approach it calls “two-zone maintenance” (NU 2004). The area directly beneath the transmission lines and extending out 4.5 m (15 ft) on either direction is called the “wire zone.” Most vegetation in the wire zone is kept short except for the occasional clusters of eastern red cedar that are maintained for nesting habitat. The area from the edge of the wire zone to the outside edge of the ROWs is called the “side zone.” The side zone acts as a transition between the towers and conductors of the wire zone and the forest. The side zone is maintained as a multi-layered habitat with low growing trees and shrubs.

Vegetation is managed through a combination of mowing, trimming, and herbicide treatments. All personnel applying herbicides are required to possess a valid applicator’s license (NU 2004). Wetlands and other water bodies are protected from herbicides by a 3-m (10-ft) vegetative border (NU 2004). Mowing is conducted only between the months of November and April to minimize impacts to wet soils, nesting birds, and wildlife forage. The Connecticut Department of Environmental Protection (CTDEP) reviews all ROW management plans to assure protection

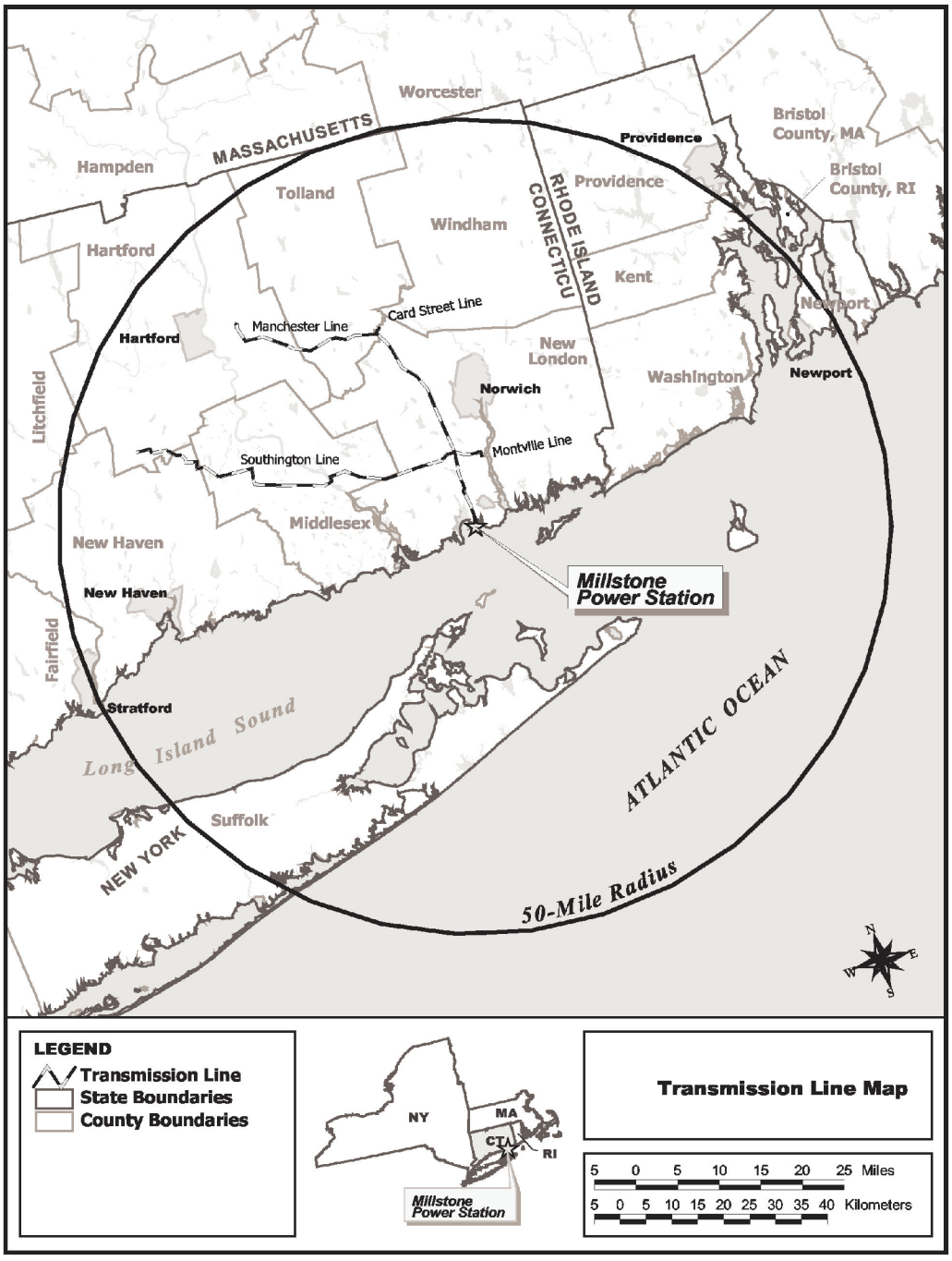

Figure 3. Millstone Site and Associated Transmission Lines

of threatened and endangered species. CL&P personnel work closely with maintenance crews to ensure that treatments are implemented properly.

CL&P encourages collaboration with conservation groups to use the ROWs for wildlife habitat improvement. It has also developed a list of plant species and wildlife habitat types that it attempts to promote through its vegetation management actions. Contractors are required to identify and target non-native, invasive plant species (NU 2004).

3.2 Aquatic Resources

Aquatic resources in the vicinity of Millstone are primarily associated with marine and estuarine environments that are part of Long Island Sound. Millstone is bordered on the west by Niantic Bay, to the east by Jordan Cove, and to the south by the Twotree Island Channel (Dominion 2004b). The plant is located approximately 1.6 km (1 mi) southeast of the mouth of the Niantic River, and approximately 5.5 km (3.5 mi) west of the Thames River. Cooling water intakes are located in Niantic Bay on the western shoreline of Millstone Point and are situated approximately 4.6 to 7.6 m (15 to 25 ft) below mean sea level. Once-through cooling water is discharged into an abandoned granite quarry located in approximately the center of Millstone Point. Water then flows from the quarry over a weir into Long Island Sound near the Twotree Island Channel (Figure 2). Rated flows for Millstone Units 2 and 3 are 36 and 59 $m^3 s^{-1}$ (1275 and 2097 $ft^3 s^{-1}$) respectively.

Long Island Sound is a large water body, with a surface area of 3420 km^2 (1320 mi^2), and 965 km (600 mi) of coastline. The drainage area associated with the water body is approximately 27,070 km^2 (16,820 mi^2). The average depth of the sound is 19 m (63 ft); and the approximate volume is 68 trillion L (18 trillion gallons). Millstone Point lies on the western shore of Long Island Sound, near the mouth of the sound. This area of Long Island Sound experiences a salinity of approximately 23 parts per thousand due to the influence of three major rivers: the Thames, the Housatonic, and the Connecticut Rivers. Ambient water temperature near the Millstone cooling water intakes can range from 1EC to 22EC (34EF to 72EF) over the course of a year. Linear regression performed on daily and annual seawater temperatures near Millstone over a 25-year period revealed a significant long-term increase in water temperature of 1.55EC (2.8EF) based on daily means and 1.01EC (1.8EF) based on annual means (Keser et al. 2003).

Millstone Point is situated approximately 5.6 km (3.5 mi) west of the Thames River, in an area that experiences strong tidal currents that influence the nearshore ecosystem, which include rocky coastlines and boulder and gravel substrate beaches that support a variety of fish, invertebrate, and marine plant life . The average tidal flow through Twotree Island Channel is approximately 3400 $m^3 s^{-1}$ (1.2×10^6 $ft^3 s^{-1}$) with a maximum flow of about 8500 $m^3 s^{-1}$ (3.0×10^6 $ft^3 s^{-1}$). This translates into current velocities of about 1.8 to 3.30 km hr^{-1} (1 to 1.8 knots), with slightly lower velocities near the plant. Weak currents predominate in both the Niantic River and Jordan Cove. Tidal fluctuation in this area is not severe, with mean and maximum ranges of 0.8 and 1.0 m (2.6 to 3.3 ft), respectively (Dominion 2004b).

EPA Region 1 has identified Long Island Sound as “an estuary of national significance” and listed six problem areas of concern associated with water quality (EPA 2004b):

1. Low dissolved oxygen (hypoxia)
2. Toxic contamination
3. Pathogen contamination
4. Floatable debris
5. Habitat degradation and loss, and living resource health associated with Items 1-4
6. Land use and development resulting in habitat loss and degradation of water quality

These problem areas have resulted in a variety of long-term, integrated studies of Long Island Sound by both state and Federal agencies.

- **Chemical Contaminants Near Millstone**

Specific chemical data associated with sediment, water, or biota near the Millstone study area were not available for review, but in general, surficial sediment associated with the eastern portion of Long Island Sound exhibits lower levels of common contaminants (heavy metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides) than the western portion. United States Geological Survey (USGS) data (Mecray et al. 2004) showed regional patterns of high metals concentrations in the western sound, with relatively low concentrations associated with the eastern sound in the vicinity of Millstone. Draft data (Battelle 1999) associated with surficial samples from the Thames River indicated most metals were below NOAA effects-range-median (Long et al. 1998), and organic constituents were at or near detection limits with the exception of the PAH, perylene, which was detected at concentrations ranging from approximately 20 to 1200 Fg/kg dry weight. It is suspected the source of this compound is biogenic rather than anthropogenic.

A citizens’ group conducted limited chemical and radiological monitoring of bottom sediments in the vicinity of Millstone and reported possible elevated levels of hydrazine and uranium in the bottom sediments of Jordon Cove (CTDEP 2002). The chemical compound 1,1-dimethylhydrazine (UMDH) was reported as detected in two sediment samples at low levels. It was postulated that the UMDH might be due to hydrazine used at Millstone for corrosion control. CTDEP reviewed available information and concluded that the detections likely were false positives because of questionable quality of the analytical procedures, and it was unlikely that hydrazine could accumulate in bottom sediments because it degrades rapidly into water and nitrogen. In addition, the particular chemical form of hydrazine used at Millstone is different than UMDH. There are also industrial facilities in the area that commonly use hydrazine. CTDEP also concluded that the types and levels of uranium measured in sediments near Millstone reflected naturally occurring background levels (CTDEP 2002). Neither concern was judged by CTDEP to be sufficiently credible to warrant further investigation.

- **Important Fish and Shellfish Communities Near Millstone**

A variety of commercially, recreationally, or environmentally important fish and shellfish live or spend a portion of their life cycle in the vicinity of Millstone, and also commonly occur in Long

Island Sound (Table 2). Many of these species live in the waters near Millstone, travel through the area during their seasonal migrations in and out of Long Island Sound, or pass close to the plant as they enter rivers adjacent to Millstone during their spawning seasons. Because of their proximity to Millstone, they may be susceptible to entrainment, impingement, or to lethal or sublethal effects associated with plant operations. In order to assess relative species abundance near Millstone operations, a variety of collection and enumeration methods have been employed, including sampling cooling water discharge using plankton nets to determine ichthyoplankton (fish eggs and larvae) abundance, shore-zone seines to capture small fish, and bottom trawls to capture larger, demersal fish (Dominion 2004b). In general, assessments of fish and shellfish have included sampling stations in direct proximity to the plant (e.g., within a radius of approximately 3 km [2 mi]). Sampling stations have included a station located near the Unit 2 and 3 cooling water discharge, stations in the Niantic River and Bay, and stations in Jordan Cove. Far-field reference sites were not included in the fish and shellfish monitoring programs, nor were sampling grids located at varying distances from the area of interest to identify environmental gradient effects. Plume dynamic studies and assessments of intertidal ecosystems, however did use far-field reference or control sites.

Table 2. Important Fish and Shellfish Species.

Common Name	Scientific Name
winter flounder	*Pseudopleuronectes americanus*
lobster	*Homarus americanus*
American sandlance	*Ammodytes americanus*
anchovy	*Anchoa* spp.
silversides	*Menidia* spp.
grubby	*Myoxocephalus aenaeus*
cunner	*Tautogolabrus adspersus*
tautog	*Tautoga onitis*

Eelgrass Community

Eelgrass (*Zostera marina*) is one of the dominant seagrasses in coastal regions of the northern hemisphere, and common in eastern Long Island Sound near the Millstone facility. This seagrass is important because of its significant influence on the nearshore environment. Eelgrass beds provide habitat and cover for many larval and juvenile forms of fish and invertebrates, support significant primary and secondary production, and serve as a food source for numerous waterfowl or planktonic grazers (Kesar et al., 2003). Eelgrass beds in the vicinity of Millstone have been monitored for many years to evaluate population dynamics and document change over time. Sampling locations included areas associated with thermal plume discharge (Jordan Cove, White Point), and reference locations associated with the Niantic River (Dominion 2004b). Studies near Millstone and in Long Island Sound have shown considerable variation in the extent of eelgrass beds at all locations, probably due to water body temperature

fluctuations, eutrophication, sedimentation, turbidity, the presence of nuisance organisms (mussels and green algae blooms) and possible changes associated with nearshore hydrodynamics. Studies conducted at Millstone have suggested that eelgrass abundance and distribution at Jordan Cove and White Point has been affected by the thermal plume discharge, but have observed relative stable biomass and distribution over the past 16 years at other locations adjacent to the facility (Dominion 2004b). Studies have also noted dramatic changes in eelgrass populations in the Niantic River, resulting in multiple relocations of reference sites over the past 20 years due to die-off that is attributable to poor water quality and potential biological disturbances (Dominion 2004b).

Rocky Intertidal Communities

A rich and varied rocky intertidal habitat exists in the region surrounding Millstone, and includes marine alga, polychaeteous annelids, crustaceans, and molluscs. All of these organisms are important contributors to the structure and function of nearshore ecosystems. Environmental studies conducted by Dominion have included sites at Fox Island, Millstone Point, White Point, and a reference location near Giant's Neck (Figure 2). Cooling water discharge stations have included a location close to the quarry cuts and one location approximately 200 m (660 ft) southeast of the quarry cut. Millstone monitoring programs have been in effect since 1979 and are intended to provide 1) an environmental baseline of abundance of important species, and 2) a means to detect change in community structure and function near the Millstone facility.

Algal studies have been conducted since 1979, and have identified over 140 species that occur or have occurred in the area during the study duration. Dominion scientists have data on organisms that represent the more common marine flora or fauna, including barnacles, the algae *Fucus* spp., the red alga *Chondrus* spp., and the marine mussel *Mytilus edulis*. Community analyses using clustering techniques suggest that plant impacts are generally limited to approximately 150 m (490 ft) of shoreline on the east side of the discharge to Long Island Sound (Dominion 2004b). Detectable changes at the community level have been observed in the study area, as have ecosystem-level changes (e.g. water temperature fluctuations, nutrient concentrations, light intensity). Of particular note is the presence of the red alga *Antithamnion pectinatum*, an exotic species native to the Pacific Ocean that was not previously reported in the Atlantic.

Benthic Infauna

Benthic infaunal communities near Millstone are consistent with soft-bottom, nearshore environments associated with New England. These communities typically contain a diverse assemblage of species that collectively contribute to the stability of the nearshore food web. Subtidal communities in the vicinity of Millstone and at a reference site located near Giants Neck have been sampled and studied since 1980. During the 2003 sampling, marine polychaetes were the most abundant taxa, followed by oligochaetes, arthropods, and molluscs (Dominion 2004b). The following infaunal taxa were selected as representative of sites affected by Millstone: oligochaetes, the polychaetes *Aricidea catherinae*, *Mediomastus ambiseta*, *Tharyx* spp., *Polycirrus eximius*, *Protodorvillea gaspeensis*, *Parapionosyllis longicirrata,* and the bivalve mollusc *Nuculana annulata* (Dominion 2004b). Monitoring studies have been helpful in detecting changes in benthic infauna community structure and linking the observed changes to

both natural and anthropogenic disturbances. Millstone activities relating to cooling water discharge and required maintenance dredging have produced observable effects to the structure of benthic communities in the immediate vicinity of the plant. This was clearly evident by the response of the benthic community during extended shutdowns during 1996-1998.

4.0 Assessment of Federally Listed Species

Several Federally listed species are known to occur in the vicinity of the Millstone site or associated transmission line ROWs. No FWS-designated critical habitat is found within the site or associated ROWs.

4.1 Aquatic Species

Eight Federally listed marine species could occur in Long Island Sound in the vicinity of Millstone. These include three species of whales and four species of turtle (NMFS 2004a, FWS 2004b) (Table 3). The staff has also evaluated the potential impacts of continued Millstone operation on the shortnose sturgeon (*Acipenser brevirostrum*). The shortnose sturgeon is a Federally listed endangered species that is found in the Connecticut River, which flows into Long Island Sound approximately 10 miles east of the Millstone site.

Table 3. Aquatic Endangered and Threatened Aquatic Species

Scientific Name	Common Name	Federal Status[a]
	FISH	
Acipenser brevirostrum	shortnose sturgeon	Endangered
	TURTLES	
Caretta caretta	loggerhead	Endangered
Chelonia mydas	green turtle	Threatened
Dermochelys coriacea	leatherback turtle	Endangered
Lepidochelys kempii	Kemp's Ridley	Endangered
	WHALES	
Balaena glacialis	right whale	Endangered
Balaenoptera physalus	finback whale	Endangered
Megaptera novaengliae	humpback whale	Endangered

(a) FWS 2004b, NMFS 2004a.

Shortnose Sturgeon (*Acipenser brevirostrum*)

The shortnose sturgeon is Federally listed as endangered in the entire range (FWS 2004b). Two populations of shortnose sturgeon are present in the Connecticut River. One of these is landlocked in the upper part of the river between the Holyoke dam and Turners Falls dam in Massachusetts, and the other population is located in the lower Connecticut River from the Holyoke Dam to Long Island Sound. An estimated 1200 to 1500 shortnose sturgeon are found in freshwater and estuarine portions of the Connecticut River and are presumed to occasionally

range into adjacent areas of Long Island Sound (FWS 2001). No shortnose sturgeon have been impinged or captured in more than 30 years of sampling at Millstone (Dominion 2004a). The primary threats to this species are dam building, water pollution, and dredging (NatureServe 2004).

Although this species has not been recorded for the area and it is highly unlikely that individuals could even occasionally be present. The intake structures at Dominion have been fitted with fish sluiceways that return fish and other organisms that become impinged during cooling water intake. It is unknown how impingement and returns affect mortality of shortnose sturgeon but it is expected that the mortality rate would be low. The species has a bottom orientation, it is a strong swimmer and its robustness would likely minimize the potential for impingement.

The staff reviewed the design, operation, and location of the intake and discharge structures at Millstone and the impingement and entrainment data collected during plant operation. The staff also visited the site and reviewed the life history information about the shortnose sturgeon. On the basis of this information, the staff has determined that the continued operation of Millstone over the 20-year renewal period will have no effect on the shortnose sturgeon.

Loggerhead (*Caretta caretta)*

The loggerhead sea turtle is Federally listed as threatened throughout its range (FWS 2004b). There are currently no critical habitats designated for this species, although the NMFS is currently working on a status review based on a 2002 petition to reclassify the Northern and Florida Panhandle subpopulations with endangered status and to designate critical habitat for both subpopulations (NMFS 2004b). The range for the Atlantic population of loggerheads extends from Newfoundland to Argentina, with primary nesting areas located in Florida, Georgia, and the Carolinas.

The NMFS (2004b) has noted that loggerheads can become impinged on intake structures of coastal power plants and estimates the mortality rate for impingement is 2 percent (NMFS 2004b). The applicant has not reported any incidences of impingement of loggerheads or incidental takes during trawling studies in over 30 years of sampling operations.

The staff reviewed the design, operation, and location of the intake and discharge structures at Millstone and the impingement and entrainment data collected during plant operation. On the basis of this information, and that previously provided for the aquatic resources in the vicinity of the plant, the staff has determined that continued operation of Millstone over the 20-year renewal period will have no effect on the loggerhead sea turtle.

Green Turtle (*Chelonia mydas*)

The green sea turtle is Federally listed as endangered in the breeding colony populations in Florida and on the Pacific coast of Mexico and threatened for all other areas (FWS 2004b). The western Atlantic population of green turtles ranges from Massachusetts south to the U.S. Virgin Islands and Puerto Rico, with important feeding grounds in Florida, and primary nesting sites on the east coast of Florida, the U.S. Virgin Islands and Puerto Rico (NMFS 2004c).

NMFS (2004c) has noted that green sea turtles can become impinged on intake structures of coastal power plants and estimates the impingement mortality for green sea turtles at 7 percent (NMFS 2004c). The applicant has not reported any incidences of impingement of green turtles or incidental takes during trawling studies in over 30 years of sampling operations.

The staff reviewed the design, operation, and location of the intake and discharge structures at Millstone and the impingement and entrainment data collected during plant operation. On the basis of this information, and that previously provided for the aquatic resources in the vicinity of the plant, the staff has determined that continued operation of Millstone over the 20-year renewal period will have no effect on the green turtle.

Leatherback Turtle (*Dermochelys coriacea*)

The leatherback sea turtle is Federally listed as endangered throughout its range (FWS 2004b). The western Atlantic population of leatherback sea turtles ranges from Nova Scotia to Puerto Rico and the U.S. Virgin Islands. During the summer, leatherbacks are typically found along the east coast of the U.S. from the Gulf of Maine to central Florida. Critical habitat designated in the area around the U.S. Virgin Islands, with nesting sites located from Georgia to the U.S. Virgin Islands (NMFS 2004d).

The primary threats to the survival of leatherback sea turtles include habitat destruction, incidental catch in commercial fisheries, and harvest of eggs and meat (NMFS 2004d). Impingement of leatherback sea turtles is not listed by NMFS as one of the human impacts on this species (NMFS 2004d). The applicant has not reported any incidences of impingement of leatherback turtles or incidental takes during trawling studies in over 30 years of sampling operations.

The staff reviewed the design, operation, and location of the intake and discharge structures at Millstone and the impingement and entrainment data collected during plant operation. On the basis of this information, and that previously provided for the aquatic resources in the vicinity of the plant, the staff has determined that continued operation of Millstone over the 20-year renewal period will have no effect on the leatherback turtle.

Kemp's Ridley (*Lepidochelys kempii*)

The Kemp's ridley sea turtle is Federally listed as endangered throughout its range (FWS 2004b). This species is found primarily in coastal areas of the Gulf of Mexico and the northwestern Atlantic, with a major nesting beach on the northeastern coast of Mexico (NMFS 2004e).

Habitat degradation, pollution, and ingestion of floating debris are among the most significant threats to Kemp's ridley sea turtles (NMFS 2004e). Impingement of Kemp's ridley was not listed in NMFS (2004e) as one of the human impacts on this species. The applicant did not report any incidences of impingement of Kemp's ridley or incidental takes during trawling studies in over 30 years of sampling operations.

The staff reviewed the design, operation, and location of the intake and discharge structures at Millstone and the impingement and entrainment data collected during plant operation. On the basis of this information, and that previously provided for the aquatic resources in the vicinity of the plant, the NRC concludes that continued operation of Millstone over the 20-year renewal period will have no effect on the Kemp's ridley.

Right Whale (*Eubalaena glacialis*)

The right whale is Federally listed as endangered throughout its range (FWS 2004b). With a population estimated at 291 individuals in 1998, the North Atlantic right whale is considered to be one of the most critically endangered populations of large whales in the world (NMFS 2002). This population ranges from wintering and calving grounds in the coastal waters of the southeastern United States to summer feeding and nursery grounds in New England waters and northward (NMFS 2002). In 1994, the NMFS designated three critical habitats for the North Atlantic right whale: Cape Cod Bay/Massachusetts Bay, Great South Channel, and the Southeastern USA. At the present time, injuries and mortality caused by ship strikes are the primary source of human impacts to right whales, with some additional impacts from fishery entanglements. Right whales have been sighted near Long Island Sound (NMFS 2004a), but are not known to move into the shallow waters immediately offshore of the Millstone site (Dominion 2004b).

On the basis of this information, and that previously provided for the aquatic resources in the vicinity of the plant, the staff has determined that continued operation of Millstone over the 20-year renewal period will have no effect on the right whale.

Finback Whale (*Balaenoptera physalus*)

The finback (fin) whale is Federally listed as endangered throughout its range (FWS 2004b). The current minimum population estimate from a 1999 survey for the western North Atlantic fin whale was 2362 (NMFS 2002). Fin whales are found principally in waters from North Carolina north to Nova Scotia. New England waters provide an important feeding ground for this species. There are no critical habitats designated for the fin whale, although a recovery plan has been drafted. At the present time, injuries and mortality caused by ship strikes are the primary source of human impacts to fin whales. It is possible that fin whales could enter Long Island Sound, but they are not known to move into the shallow waters immediately offshore of the Millstone site (Dominion 2004b).

On the basis of this information, and that previously provided for the aquatic resources in the vicinity of the plant, the staff has determined that continued operation of Millstone over the 20-year renewal period will have no effect on the fin whale.

Humpback Whale (*Megaptera novaengliae*)

The humpback whale is Federally listed as endangered throughout its range (FWS 2004b). The overall abundance for the North Atlantic humpback whale population was estimated in 1992/1993 at 11,570 individuals (NMFS 2002). North Atlantic humpback whales are found during the spring, summer, and fall over a range covering the eastern coast of the United

States. New England waters are an important feeding ground for this species. A recovery plan for humpback whales has been developed and implemented. Injuries and mortality from fishery entanglements and ship strikes are the primary human impacts on humpback whales. Disturbance from whale watching traffic is also of concern, particularly in coastal New England waters. It is possible that humpback whales could enter Long Island Sound, but they are not known to move into the shallow waters immediately offshore of the Millstone site (Dominion 2004b).

On the basis of this information, and that previously provided for the aquatic resources in the vicinity of the plant, the staff has determined that continued operation of Millstone over the 20-year renewal period will have no effect on the humpback whale.

4.2 Terrestrial Species

A total of five Federally listed and one potential candidate terrestrial species was identified (FWS 2004a) as having the potential to occur in New London county or counties traversed by transmission line ROWs (Middlesex, Hartford, Tolland, and the northeast corner of New Haven) (Table 4).

Table 4. Terrestrial Endangered and Threatened Species

Scientific Name	Common Name	Federal Status[a]
	INSECTS	
Cicindela puritana	Puritan tiger beetle	Threatened
	BIRDS	
Charadrius melodus	piping plover	Threatened
Haliaeetus leucocephalus	bald eagle	Endangered
Sterna dougallii dougallii	roseate tern	Endangered
	MAMMALS	
Sylvilagus transitionalis	New England cottontail	Proposed for Candidacy
	PLANTS	
Isotria medeoloides	small whorled pogonia	Threatened

(a) FWS 2004a, 2004b.

Puritan Tiger Beetle (*Cicindela puritana*)

The Puritan tiger beetle is Federally listed as threatened. This species is known from two disjunct populations, one along Chesapeake Bay in Maryland and one along the Connecticut River, in northern Connecticut (CTDEP 2004). Although this species is reported to occur in Middlesex County (FWS 2004b), CTDEP distribution maps clearly show the Connecticut population to be centered primarily along the Connecticut River in Hartford County (CTDEP 2004). The Millstone ROW for the Manchester transmission line does not cross the Connecticut River in Hartford County. The Puritan tiger beetle is restricted to sandy habitats typically found along river banks. Habitat has been depleted through riverbank stabilization and

flood control practices. There is no known habitat for this species near the Millstone site or within associated transmission line ROWs.

The staff has determined that continued operation of Millstone over the 20-year license renewal term will have no effect on the Puritan tiger beetle.

Piping Plover (*Charadrius melodus*)

The piping plover is Federally listed as threatened. This species is a shorebird that is found nesting in sandy beach habitats along seacoasts (CTDEP 2004). Piping plovers nest from North Carolina north to Nova Scotia. Nesting generally occurs from March through July. Historically, these birds were killed for consumption and the feathers used for adornment. Current threats include development and beach stabilization.

CTDEP range maps (CTDEP 2004) show piping plover habitat extending no further east than the east side of the mouth of the Connecticut River. There have been no reported sitings of piping plovers at the site. It is not likely that the necessary beach habitat for nesting is present in the vicinity of the site.

For these reasons, the staff has determined that continued operation of Millstone over the 20-year license renewal term will have no effect on the piping plover.

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle is Federally listed as threatened. This species is a large raptor that is found along the coastline and around lakes and rivers. Eagles generally nest in tall trees or on cliff faces near water and away from human disturbance. Eagle populations have declined in the Connecticut due to loss of habitat, human disturbance, and pesticide contamination. There are reported to be up to 100 eagles wintering along major rivers and reservoirs in Connecticut (CTDEP 2004). There are no known nesting pairs near the Millstone site or along transmission corridors. However, individuals have been seen foraging in the area.

Although no bald eagles are known to nest at the Millstone site, Dominion does maintain a raptor reporting program and will follow CTDEP recommendations should bald eagles nest on the Millstone site. For these reasons, the staff has determined that continued operation of Millstone over the 20-year license renewal term may affect, but is not likely to adversely affect, the bald eagle.

Roseate Tern (*Sterna dougallii dougallii*)

The roseate tern is Federally listed as endangered. This species is a seabird that is found almost exclusively on saltwater coastlines. Roseate terns nest in colonies on coastal beaches and offshore islands. Historically, tern populations in Connecticut have been impacted by unrestricted market hunting and more recently by the expansion of predatory great black-backed and herring gull populations throughout their range in the state (CTDEP 2004).

Fox Island (Figure 2) is a small promontory extending off the Millstone site and into Long Island Sound. This site is used by multiple species of seabirds and it is known to be used by roseate terns during the fall migration period. Roseate terns are not known to nest in the vicinity of the Millstone site (Dominion 2004a). Fox Island is managed as a tern sanctuary in the fall and access is strictly controlled. For these reasons, the staff has determined that continued operation of Millstone over the 20-year license renewal term may affect, but is not likely to adversely affect, the roseate tern.

New England Cottontail Rabbit (*Sylvilagus transitionalis*)

The FWS is in the process of determining if the New England cottontail rabbit will be proposed for listing as a candidate species. Populations in Connecticut were considered abundant through the mid 1930s, but competition from introduced Eastern cottontails (*Sylvilagus floridanus*) and loss of agriculture-related habitat has led to a decline is numbers (CTDEP 2004). This species is found in brushy habitats associated with fencelines and edges of fields and forests. Transmission line corridors are not considered high quality habitat due to the abundance of perching raptors and other predators that use the corridors. However, the species may use corridors for dispersal from one site to another. Surveys of eastern and New England cottontail rabbits have found New England cottontail rabbits near the Millstone site and in areas crossed by transmission lines (Goodie et al. 2004). Considering the population trends of this species it is likely to be listed before or during the period of license renewal.

Vegetation management techniques used on the Millstone site and associated transmission line corridors maintain the early successional habitat types that the New England cottontail requires. The CTDEP reviews all ROW management plans to assure protection of threatened and endangered species. CL&P personnel work closely with maintenance crews to ensure that treatments are implemented properly. The staff has determined that with implementation of current management procedures and safeguards, continued operation of Millstone over the 20-year license renewal term may affect, but is not likely to adversely affect, the New England cottontail.

Small Whorled Pogonia (*Isotria medeoloides*)

The small whorled pogonia is Federally listed as threatened. This species occurs in isolated populations throughout the eastern United States. In Connecticut it is reported to occur in New London, Middlesex, Tolland, Hartford, and New Haven counties. New England populations of this orchid are found almost exclusively on acidic, well drained, fragipan (a subsurface impermiable layer) soils (NatureServe 2004). Common plant associates include red maple, eastern hemlock (*Tsuga canadensis*), paper birch (*Betula papyrifera*), northern red oak (*Quercus rubra*), eastern white pine (*Pinus strobus*), and American beech (*Fagus grandifolia*). Isotria populations are found in second growth and mature forests. The major threats to this species are habitat destruction through development and forestry.

Habitat for the small whorled pogonia may exist at the Millstone site or along associated transmission line ROWs. The Millstone site is covered by glacial soils (Dominion 2004a) which can have subsurface fragipan layers. Some of the common plant associates are found on the site (red maple, American beech). This plant has been recorded in the towns of Lyme and

Glastonbury, Connecticut but is not known to currently occur at these sites (NRC 1984). ROW maintenance activities should not greatly impact the small whorled pogonia as long as soil disturbance is minimized. Mowing of some portions of the transmission line ROWs is only conducted between the months of November and April to minimize impacts to wet soils (NU 2004).

The CTDEP reviews all ROW management plans to assure protection of threatened and endangered species. CL&P personnel work closely with maintenance crews to ensure that treatments are implemented properly. The staff has determined that with implementation of current management procedures and safeguards, continued operation of Millstone over the 20-year license renewal term may affect, but is not likely to adversely affect, the small whorled pogonia.

5.0 Conclusions

The staff identified six terrestrial and eight aquatic species listed as threatened, endangered, or proposed for candidate under the Endangered Species Act that have a reasonable potential to occur in the vicinity of Millstone, along associated transmission line ROWs, or in adjacent areas of Long Island Sound. The Millstone site and the transmission line ROWs may cross or contain suitable habitat for some of these species. Given this possibility, Northeast Utilities has designed and implemented maintenance procedures for its transmission line rights-of-way that protect listed species and their habitats.

The staff has determined that license renewal for Millstone would have no effect on the Puritan tiger beetle, shortnose sturgeon, loggerhead, green turtle, leatherback turtle, Kemp's ridley, piping plover, right whale, finback whale, and the humpback whale. License renewal may affect, but is not likely to adversely affect, the bald eagle, the roseate tern, the New England cottontail, and the small whorled pogonia.

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