Biological Assessment for the

Bangor Hydro-Electric Company Northeast Reliability Interconnect

November 2005

U.S. Department of Energy
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Permitting, Siting, and Analysis Division
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NOTATION

The following is a list of the acronyms, abbreviations, and units of measure used in this document.

GENERAL ACRONYMS AND ABBREVIATIONS

AC	alternating current
ATV	all-terrain vehicle
BA	biological assessment
BHE	Bangor Hydro-Electric Company
CEQ	Council on Environmental Quality
DPS	distinct population segment
DOE	U.S. Department of Energy
EFH	essential fish habitat
EIS	environmental impact statement
E.O.	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	*Federal Register*
M&N	Maritimes & Northeast Pipeline, L.L.C.
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
MEPCO	Maine Electric Power Company
NB Power	New Brunswick Power Corporation
NEPA	National Environmental Policy Act of 1969
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NRI	Northeast Reliability Interconnect
ROW	right-of-way
U.S.	United States
USC	*United States Code*
USFWS	U.S. Fish and Wildlife Service

UNITS OF MEASURE

ºC	degree(s) Celsius
cm	centimeter(s)
ºF	degree(s) Fahrenheit
ft	feet or foot
ha	hectare(s)
in.	inch(es)
km	kilometer(s)
kV	kilovolt(s)
m	meter(s)
mi	mile(s)

ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS

The following table lists the appropriate equivalents for English and metric units used in this document.

Multiply	By	To Obtain
English/Metric Equivalents		
acres (ac)	0.4047	hectares (ha)
degrees Fahrenheit (ºF) –32	0.5555	degrees Celsius (ºC)
inches (in.)	2.54	centimeters (cm)
feet (ft)	0.3048	meters (m)
miles (mi)	1.609	kilometers (km)
Metric/English Equivalents		
centimeters (cm)	0.394	inches (in.)
degrees Celsius (ºC) +17.78	1.800	degrees Fahrenheit (ºF)
hectares (ha)	2.47	acres (ac)
kilometers (km)	0.6214	miles (mi)
meters (m)	3.281	feet (ft)

BIOLOGICAL ASSESSMENT FOR THE BANGOR HYDRO-ELECTRIC COMPANY NORTHEAST RELIABILITY INTERCONNECT

SUMMARY

This biological assessment (BA) evaluates the potential impacts of an amendment to Presidential Permit PP-89 that would allow Bangor Hydro-Electric Company to construct, connect, operate, and maintain an 85-mi (137-km) long single-circuit, 345,000-volt (345-kV) alternating-current electric transmission line. The transmission line, known as the Northeast Reliability Interconnect (NRI), would originate at the Orrington Substation at Orrington, Maine, and extend eastward to the international crossing between the United States and Canada near Baileyville, Maine. At that location, it would connect with a line to be constructed, operated, and maintained by New Brunswick Power Corporation. The bald eagle (*Haliaeetus leucocephalus*) and the Atlantic salmon (*Salmo salar*), which are afforded protection under the Endangered Species Act of 1973, could potentially occur within or near the transmission line right-of-way. United States Department of Energy (DOE) staff have conducted a BA on the bald eagle and the Atlantic salmon and have determined that the construction, connection, operation, and maintenance of the NRI may affect, but is not likely to adversely affect, these species.[1]

1 INTRODUCTION

Executive Order (E.O.) 10485 (September 9, 1953), as amended by E.O. 12038 (February 7, 1978), requires that a Presidential permit be issued by the United States (U.S.) Department of Energy (DOE) before electric transmission facilities may be constructed, operated, maintained, or connected at the U.S. international border. Bangor Hydro-Electric Company (BHE) has applied to DOE to amend Presidential Permit PP-89, which authorizes BHE to construct, connect, operate, and maintain a single-circuit, 345,000-volt (345-kV) alternating-current (AC) electric transmission line across the U.S. international border in the vicinity of Baileyville, Maine.

The proposed transmission line, referred to as the Northeast Reliability Interconnect (NRI), would originate at the existing Orrington Substation, located in Orrington, Maine, and extend eastward to the international border between the United States and Canada, where it would connect with a transmission line to be constructed, operated, and maintained by New Brunswick Power Corporation (NB Power) (Figure 1.1). DOE has determined that an amendment to the Presidential permit would constitute a major Federal action that may have a significant impact on the environment within the meaning of the National Environmental Policy Act of 1969 (NEPA).

[1] DOE has transmitted the BA to the U.S. Fish and Wildlife Service for its review comments and concurrence on DOE's determination.

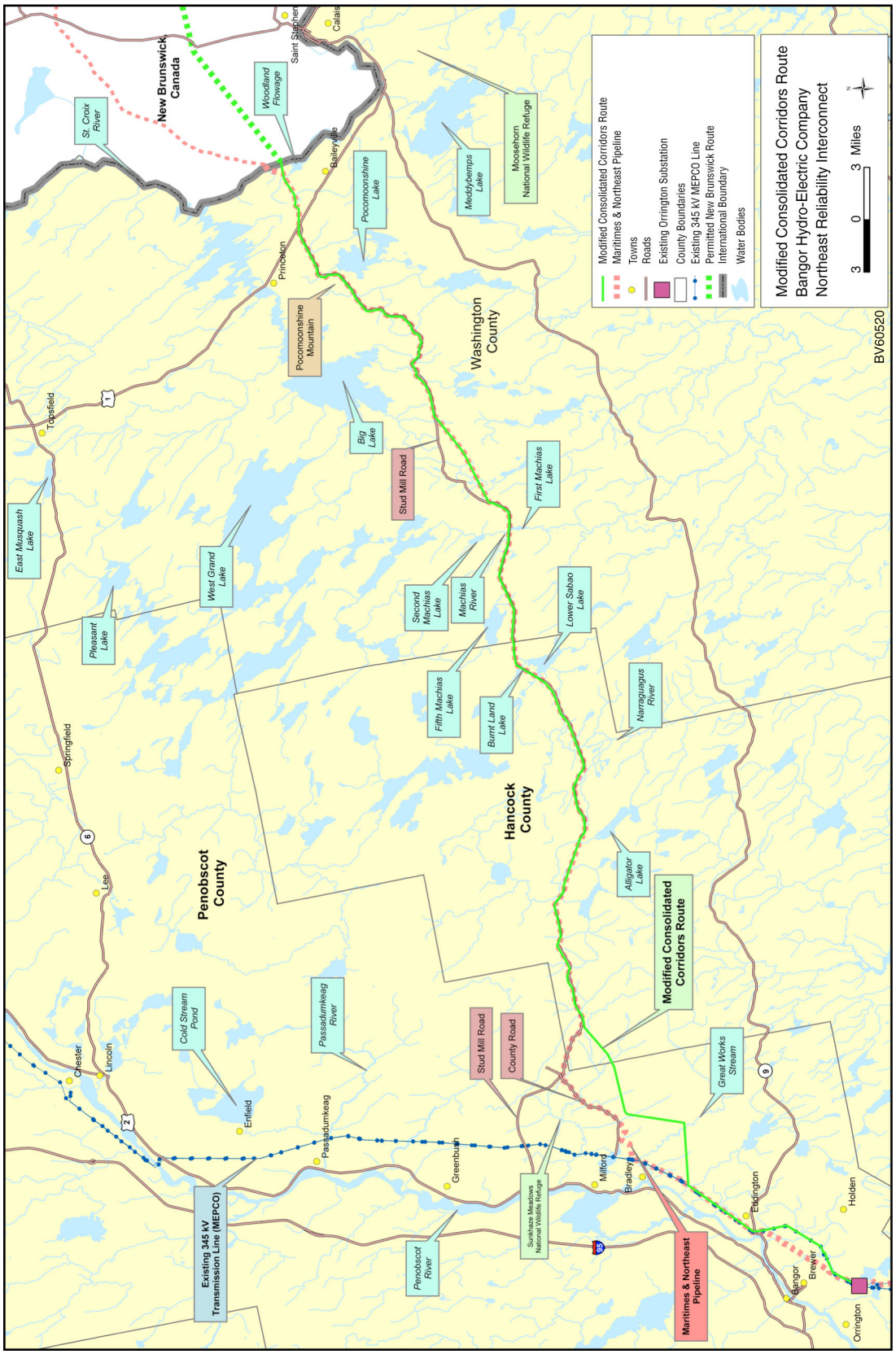

FIGURE 1.1 Modified Consolidated Corridors Proposed Route for the Bangor Hydro-Electric Company Northeast Reliability Interconnect (Source: Paquette 2005a)

In response to DOE's November 2, 2004, notice in the *Federal Register* (Volume 69, page 63514 [69 FR 63514]) requesting scoping comments on the preparation of an environmental impact statement (EIS) to discuss the impacts of BHE's proposed project, the U.S. Fish and Wildlife Service (USFWS) sent a letter dated December 1, 2004 (Bartlett 2004), that provided the USFWS's response pursuant to Section 7 of the Endangered Species Act (ESA), as amended (*United States Code*, Title 16, Sections 1531–1543 [16 USC §§ 1531–1543). In that letter, the USFWS identified two Federally listed species known to occur in the project area: the threatened bald eagle (*Haliaeetus leucocephalus*) and the endangered Atlantic salmon (*Salmo salar*).

This biological assessment (BA), prepared as required under Section 7 of the ESA, discusses the presence of, and assesses potential project-related impacts on, the bald eagle and the Gulf of Maine distinct population segment (DPS) of the Atlantic salmon in the vicinities of the proposed route for the NRI. Under the ESA, three types of effects determinations are possible:

- No effect — This determination means that the project would have no effects, positive or negative, on a species.

- May affect, but not likely to adversely affect — This determination means that all impacts would be beneficial, insignificant, or discountable. Such a determination would require concurrence from the USFWS.

- May affect, likely to adversely affect — This determination means that there would be at least one adverse effect of the proposed action on a species and that formal consultation, as defined in the ESA, would be required with the USFWS.

1.1 PROPOSED ACTION

The proposed Federal action is to determine whether it is in the public interest to grant an amendment to Presidential Permit PP-89 to BHE for the construction, connection, operation, and maintenance of the proposed NRI 345-kV transmission line. BHE's stated purposes for the NRI are to improve the reliability and stability of the bulk electric transmission system, increase the import/export transmission capacity between Maine and New Brunswick, and reduce costly line losses (BHE 2005). Details on the project purposes and description can be found in the EIS prepared for the proposed project (DOE 2005).

1.2 TRANSMISSION LINE DESCRIPTION

The proposed (preferred) route, referred to as the Modified Consolidated Corridors Route, is shown in Figure 1.1. From the Orrington Substation, the Modified Consolidated Corridors Route would parallel the existing 345-kV Maine Electric Power Company (MEPCO) transmission line to Blackman Stream in the Township of Bradley. The Modified Consolidated

Corridors Route would then proceed east-northeast, generally paralleling the Maritimes & Northeast Pipeline, L.L.C. (M&N) gas pipeline and Stud Mill Road to the international border near Baileyville, Maine. The total distance of the Modified Consolidated Corridors Route would be about 85 mi (137 km).

The NRI would have a single-circuit configuration and would consist of two overhead shield wires and three phases with two conductors per phase. The 491 tangent structures would be wood-pole H-frame structures, while the 117 angle and dead-end support structures would consist of 110 three-pole wood structures and 7 three-pole steel structures. Average span length would be 731 ft (223 m). Minimum sag clearance to vegetation would be 15.0 ft (4.6 m) (TRC 2005a).

The width of the right-of-way (ROW) for the NRI would be 170 ft (52 m) for a new ROW (18% of the route), 155 ft (47 m) where it would be co-located with the M&N gas pipeline and/or Stud Mill Road (68% of the route), 100 ft (30 m) where it would be co-located with an existing transmission line (6% of the route), and 125 ft (38 m) where it would be co-located with the M&N gas pipeline and an existing transmission line (8% of the route). Where the NRI would parallel, cross, or otherwise be located near the M&N gas pipeline, AC mitigation would be required for the pipeline. The mitigation techniques under consideration include the installation of a zinc ribbon buried about 18 in. (46 cm) deep that would overlay the pipeline and the use of coiled zinc ribbon ground mats at existing test stations along the pipeline. However, the zinc ribbon and the test station mats would not be required within stream crossings.

2 ENVIRONMENTAL SETTING

2.1 TERRESTRIAL RESOURCES

About 17.7 million acres (7.2 million ha), or 90%, of Maine is forest land. The forest land is a mixture of softwoods and hardwoods (LURC 1997). Maine is situated in an ecological transitional zone between the eastern boreal and the temperate deciduous forests. Spruce-fir is the most prevalent forest type, accounting for 42% of Maine's forest land. Most of Maine's forests are naturally regenerated stands that are managed extensively. Approximately 562,000 acres (227,000 ha) are harvested annually, with harvesting rotation intervals of 20 to 60 years (McWilliams et al. 2005). Within Hancock, Penobscot, and Washington Counties, nearly 4.5 million acres (1.8 million ha) are forested, and less than 400,000 acres (161,875 ha) are nonforest lands (McWilliams et al. 2005).

General vegetative cover types that occur in the project area include early successional and clear-cut areas, spruce-fir forests, white-pine/mixed-hardwood forests, forested wetlands, scrub-shrub wetlands, and emergent wetlands (TRC 2002). Early successional habitats found throughout the project area include fallow fields, hayfields, and other agricultural lands and existing ROWs (e.g., for transmission lines and gas pipelines). These areas are frequently disturbed by tilling, harvesting, and/or maintenance practices for vegetation.

The proposed route crosses primarily privately owned managed forests consisting of recent clear-cuts, young second- and third-growth stands, and older managed stands. Consequently, ongoing forestry practices have affected, and will continue to affect, the character of this landscape. The area within which the proposed route occurs consists of a mosaic of forest types dominated by spruce-fir, northern hardwoods, aspen-beech, and white-pine/red-pine.

At least a quarter of the land area in Maine (more than 5 million acres [2 million ha]) is wetlands (Maine State Planning Office 2001). Wetland types within the project area include palustrine emergent, open water, scrub-shrub, and forested. These wetlands include inland marshes, wet meadows, peatlands, shrub swamps, forested swamps (both deciduous and evergreen), forested floodplain wetlands, and vernal pools (MDEP 2005). Riverine wetlands are common within the channels of waterbodies. The NRI ROW would cross 188 wetlands for a total distance of about 7.7 mi (12.4 km). About 133 acres (54 ha) of the ROW would be wetlands, including 70 acres (28 ha) of forested wetlands.

The amount of individual land cover types within the ROW for the proposed route would be 1,411 acres (571 ha) of forests (including forested wetlands), 31 acres (13 ha) of agricultural lands, and 125 acres (51 ha) of other land cover (including urban or built-up lands, residential and industrial areas, and roads) (BHE 2005). Significant wildlife habitats that occur within the project area include habitats for Federally or State listed threatened and endangered species, deer wintering areas, and waterfowl and wading bird habitats. Early successional habitat (grasses and forbs) occur over the M&N gas pipeline ROW. The NRI would parallel the pipeline for 58 mi (93 km).

A large diversity of wildlife species occurs in the project area because of the variety of habitat types present. Included are at least 45 species of mammals, 150 species of birds, and 25 species of reptiles and amphibians. Nearly 200 species of birds have been reported on or near the Sunkhaze Meadows National Wildlife Refuge (USFWS 2000). Numerous game species are actively managed by the Maine Department of Inland Fisheries and Wildlife (MDIFW). These species include black bear (*Ursus americanus*), moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), various furbearing mammals, upland gamebirds, and waterfowl (MDIFW 2004). The NRI ROW would encompass about 133 acres (54 ha) of waterfowl and wading bird habitats (BHE 2005).

2.2 AQUATIC RESOURCES

The project area has extensive surface water resources. The NRI would have numerous stream and river crossings that would include portions of the Penobscot rivershed; the North Coastal rivershed, which includes the Union River, Narraguagus River, Machias River, and East Machias River subbasins; and the St. Croix rivershed. The proposed route would have a total of 117 stream and river crossings, which would include smaller intermittent and permanent streams (BHE 2005). The highest quality (Class AA[2]) streams and rivers that would be crossed by the proposed route are Baker Brook, Little Birch Stream, Birch Stream, unnamed tributary to Little Birch Stream, Titcomb Brook, unnamed tributary to Birch Stream, Sunkhaze Stream, unnamed tributary to Sunkhaze Stream, Wiley Brook, unnamed tributary to Indian Brook, Narraguagus River, and Machias River. The Narraguagus and Machias Rivers are also classified as Outstanding River Segments because of their unparalleled natural and recreational values that provide irreplaceable social and economic benefits.

Potential threats to water quality in the project area include all-terrain vehicle (ATV) use, roads (including logging, blueberry farm, state, and town roads), sand and salt facilities, peat and timber harvesting, faulty septic systems, phosphorous and other nutrients, pesticide drift and runoff, agricultural water withdrawal, beaver activity, acid precipitation, and landfill seepage and runoff. The potential environmental consequences of these threats can include sedimentation, loss of riparian vegetation, loss of aquatic habitat, alterations of water chemistry, increases in toxins, nutrient loading, loss of fish passage, and thermal stress (Arter 2003). Soil erosion is the primary source of pollution to surface waters in Maine (MDEP 2004).

More than 60 fish species have been reported from Maine. Both warmwater and coldwater species, including several migratory species, occur in the project area (Table 2.1).

[2] Class AA is the highest classification for rivers and streams and applies to waters that are outstanding natural resources and that should be preserved because of their ecological, social, scenic, or recreational importance. Class AA waters must be of a quality that is suitable for use as drinking water after disinfection; for use in fishing, agriculture, recreation in and on the water, and navigation; and for use as habitat for fish and other aquatic life. The habitat must be characterized as free flowing and natural.

TABLE 2.1 Representative Fish Species That Could Occur in the Project Area

Warmwater Species	Coldwater and Migratory Species
Chain pickerel (*Esox niger*)	American eel (*Anguilla rostrata*)[a]
Muskellunge (*Esox masquinongy*)	Alewife (*Alosa pseudoharengus*)[a]
Northern pike (*Esox lucius*)	American shad (*Alosa sapidissima*)[a]
Golden shiner (*Notemigonus crysoleucas*)	Blueback herring (*Alosa aestivalis*)[a]
Common shiner (*Luxilus cornutus*)	Brook trout (*Salvelinus fontinalis*)
Creek chub (*Semotilus atromaculatus*)	Brown trout (*Salmo trutta*)
Brown bullhead (*Ameiurus nebulosus*)	Lake trout (*Salvelinus namaycush*)
Banded killifish (*Fundulus diaphanus*)	Atlantic salmon (*Salmo salar*)[a]
Threespine stickleback (*Gasterosteus aculeatus*)	Landlocked salmon (*Salmo salar*)
Ninespine stickleback (*Pungitius pungitius*)	Lake whitefish (*Coregonus clupeaformis*)
White perch (*Morone americana*)	Round whitefish (*Prosopium cylindraceum*)
Largemouth bass (*Micropterus salmoides*)	Burbot (*Lota lota*)
Smallmouth bass (*Micropterus dolomieu*)	Blacknose dace (*Rhinichthys atratulus*)
Black crappie (*Pomoxis nigromaculatus*)	Longnose dace (*Rhinichthys cataractae*)
Redbreast sunfish (*Lepomis auritus*)	Longnose sucker (*Catostomus catostomus*)
Pumpkinseed (*Lepomis gibbosus*)	White sucker (*Catostomus commersoni*)
Yellow perch (*Perca flavescens*)	

[a] Migratory species.

Source: TRC (2002).

3 EVALUATION OF THREATENED AND ENDANGERED SPECIES

The USFWS (Bartlett 2004) identified the bald eagle and Atlantic salmon as occurring within the vicinity of the proposed NRI. The bald eagle is currently listed as threatened by the USFWS. The Atlantic salmon is jointly listed by the USFWS and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) as endangered.

3.1 BALD EAGLE (*Haliaeetus leucocephalus*)

The bald eagle was listed as Federally endangered on February 14, 1978 (USFWS 1978), and was reclassified as threatened effective August 11, 1995 (USFWS 1995). This raptor inhabits much of North America from the Arctic to the Gulf of Mexico. Populations of this once-common species declined beginning in the mid-1800s because of such factors as habitat loss and fragmentation, hunting, and (after World War II) contamination of prey with pesticides. As the bald eagle nears recovery in Maine, loss of undisturbed nesting sites is still one of the primary dangers to the State's eagle population. In recent years, polychlorinated biphenyls (PCBs), dioxin, and mercury also have affected bald eagles in Maine (USFWS 1999). Generally, nesting pairs in Maine have been steadily increasing since 1990, when 123 breeding pairs occurred in the State. In 2003, there were 309 breeding pairs in Maine (USFWS 2004). Currently, about 62% of the State's bald eagle population occurs within Hancock, Penobscot, and Washington Counties (MDIFW 2002).

Adequate numbers of young eagles must be produced to achieve a lasting recovery for this species. Therefore, the State designation of nest sites as "Essential Habitat" remains an important tool in achieving full recovery (MDIFW 2003). The applicant's proposed project requires an evaluation by the MDIFW to demonstrate that the project would not significantly alter Essential Habitat or violate protection guidelines adopted for the habitat. Evaluation criteria could include timing restrictions on the project (e.g., no construction near Essential Habitat during the critical nesting period). As is discussed below, the proposed route for the NRI would not be located within 0.25 mi (0.4 km) of known designated bald eagle nests.

Bald eagles prefer habitat along coastlines, lakes, rivers, and other waterbodies that provide their primary food source — fish and waterfowl (NatureServe 2005). Todd et al. (1982) reported that the brown bullhead (*Ameiurus nebulosus*), white sucker (*Catostomus commersoni*), and chain pickerel (*Esox niger*) accounted for 84% of the fish and 64% of all food remains observed at bald eagle nests within interior Maine. Salmon and trout, while common throughout the State, were rarely used by eagles. Bald eagle nests are usually located within 0.5 mi (0.8 km) of water and in the tallest trees in a forest stand. Bald eagles also use perch and roost trees, which are also typically among the tallest trees in a forest stand. The perch trees are usually located within 165 ft (50 m) of water (Stalmaster 1987). Isolation from human disturbance may be an additional habitat need (DeGraaf and Rudis 1986). The hunting area or home range patrolled by a bald eagle varies from 1,700 to 10,000 acres (688 to 4,047 ha), while the nesting territory is about 640 to 1,280 acres (259 to 518 ha) (Baldeagleinfo.com 2001). In Oregon, productivity of bald eagle nesting was negatively correlated with proximity to clear-cuts and main logging roads

(Anthony and Isaacs 1989). Bald eagles are known in the area around the proposed NRI; however, there are no known nests whose 0.5-mi-diameter (0.8-km-diameter) buffer zone intersects the proposed ROW. Figures 3.1 through 3.3 show the locations of known nests closest to the ROW.

Two nests are located along the Penobscot River near South Brewer (Figure 3.1). The NRI would be located about 2,400 ft (732 m) from the edge of the buffer zone for the closer of the two nests and about 900 ft (274 m) from the Penobscot River. No other foraging areas (waterfowl and wading bird habitats) occur near the NRI in this area. Two more bald eagle nest sites are located at Alligator Lake (Figure 3.2). The NRI would be more than 3,200 ft (975 m) from the edge of the closest 0.5-mi (0.8-mi)-diameter buffer zone. Several waterfowl and wading bird habitats are located within about 1,600 ft (487 m) or less of the NRI in this area, but Alligator Lake, Rift Pond, and King Pond are the only large waterbodies in the area. All three waterbodies are located on the same side of the ROW; thus, bald eagles would not be expected to make frequent flights across the ROW in this area while foraging.

A bald eagle nest is also located on Pocomoonshine Lake, and another one is on Dog Brook, a tributary to Pocomoonshine Lake (Figure 3.3). The edge of the buffer zone for the Pocomoonshine nest is more than 2,000 ft (610 m) from the NRI, while the edge of the buffer zone for the Dog Brook nest is about 5,600 ft (1,707 m) from the NRI. The ROW would intersect several waterfowl and wading bird habitats in the area, but Pocomoonshine Lake is the only large body of water in the area that would provide a major foraging area.

The habitat requirements of bald eagles are met in many places along the proposed route in addition to the specific nest sites described above. Therefore, the applicant would perform aerial surveys after leaf fall, but before ROW clearing, in 2005, and again in the spring of 2006 and 2007 to identify any new bald eagle nests that might have become established within 0.25 mi (0.4 km) of the ROW (Paquette 2005c). The surveys would include a low altitude flight with at least one observer experienced in the identification of bald eagle nests. The 2005 survey would cover the proposed ROW width (Paquette 2005c). The 2006 and 2007 spring surveys, which would occur around the last week of April, would primarily cover the ROW plus an additional 0.25-mi (0.4-km) swath on each side of the NRI measured from the outside edges of the ROW (Raddant 2005). The spring surveys would occur during the mud season when construction work does not take place (Paquette 2005c).

The applicant would only conduct clearing operations following the 2005 survey if no eagle nests are found. If any new nests are identified, DOE would reinitiate consultation with the USFWS, and then BHE would consult with the MDIFW and USFWS to determine appropriate mitigation for potential impacts. Similarly, other construction activities would not occur until after the spring surveys and not before BHE has consulted with the MDIFW and USFWS regarding the survey results (Paquette 2005c). If any new nests are identified following the 2006 or 2007 spring surveys, DOE would reinitiate consultation with the USFWS, and then BHE would consult with the MDIFW and USFWS to determine appropriate mitigation for potential impacts.

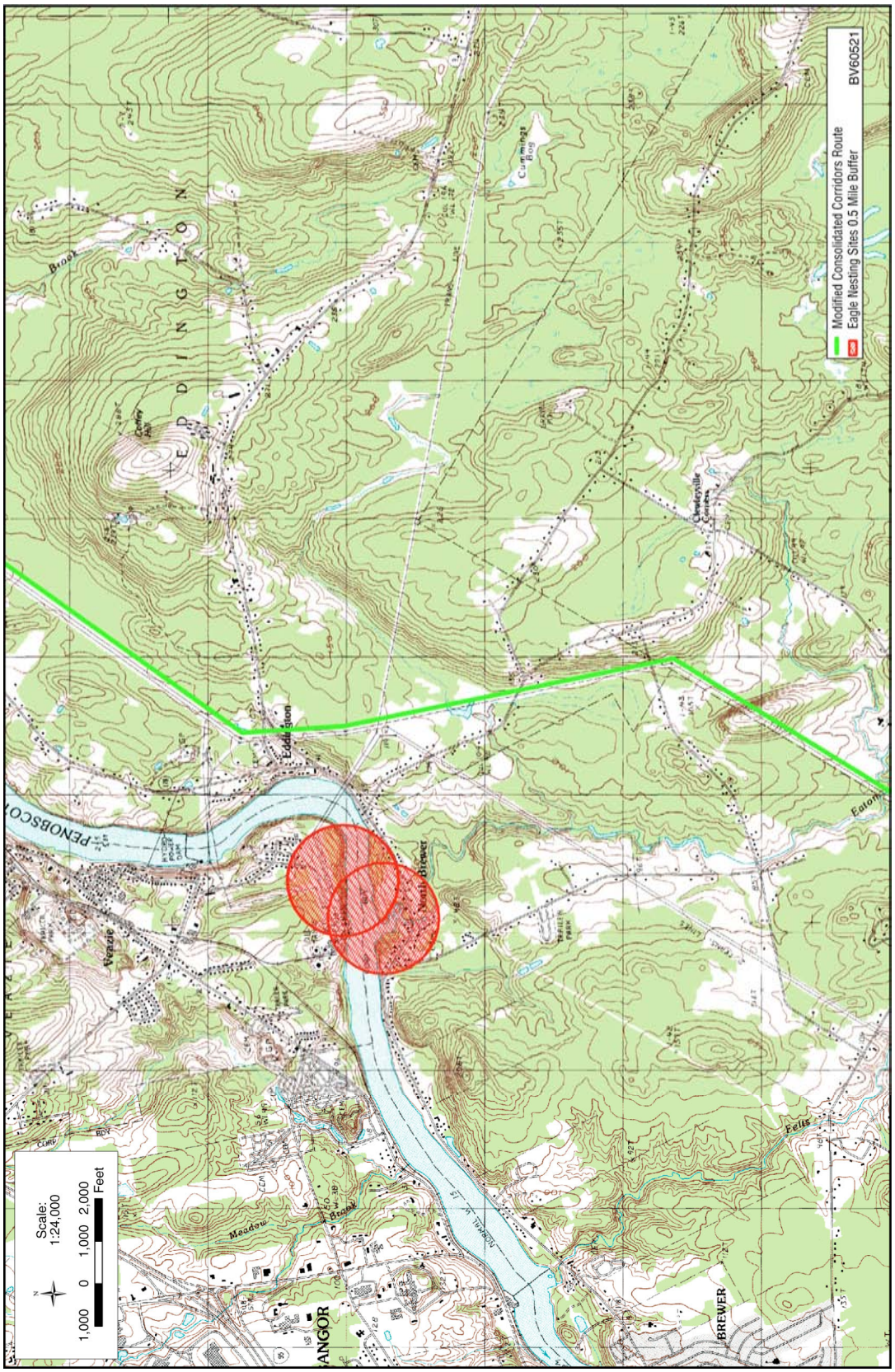

FIGURE 3.1 Bald Eagle Nest Sites along the Penobscot River near the Modified Consolidated Corridors Route for the Bangor Hydro-Electric Company Northeast Reliability Interconnect (Source: Paquette 2005b)

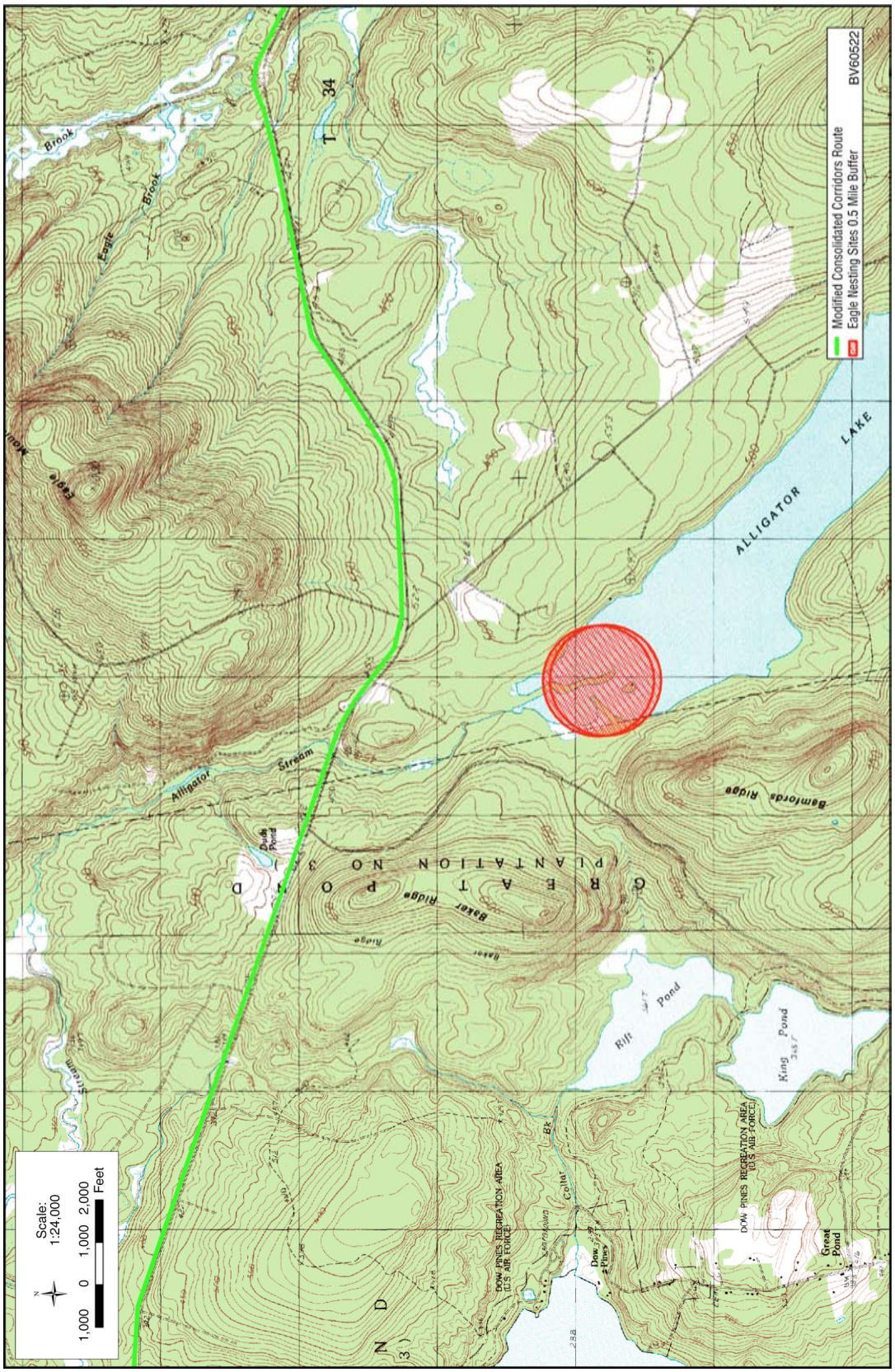

FIGURE 3.2 Bald Eagle Nest Sites at Alligator Lake near the Modified Consolidated Corridors Route for the Bangor Hydro-Electric Company Northeast Reliability Interconnect (Source: Paquette 2005b)

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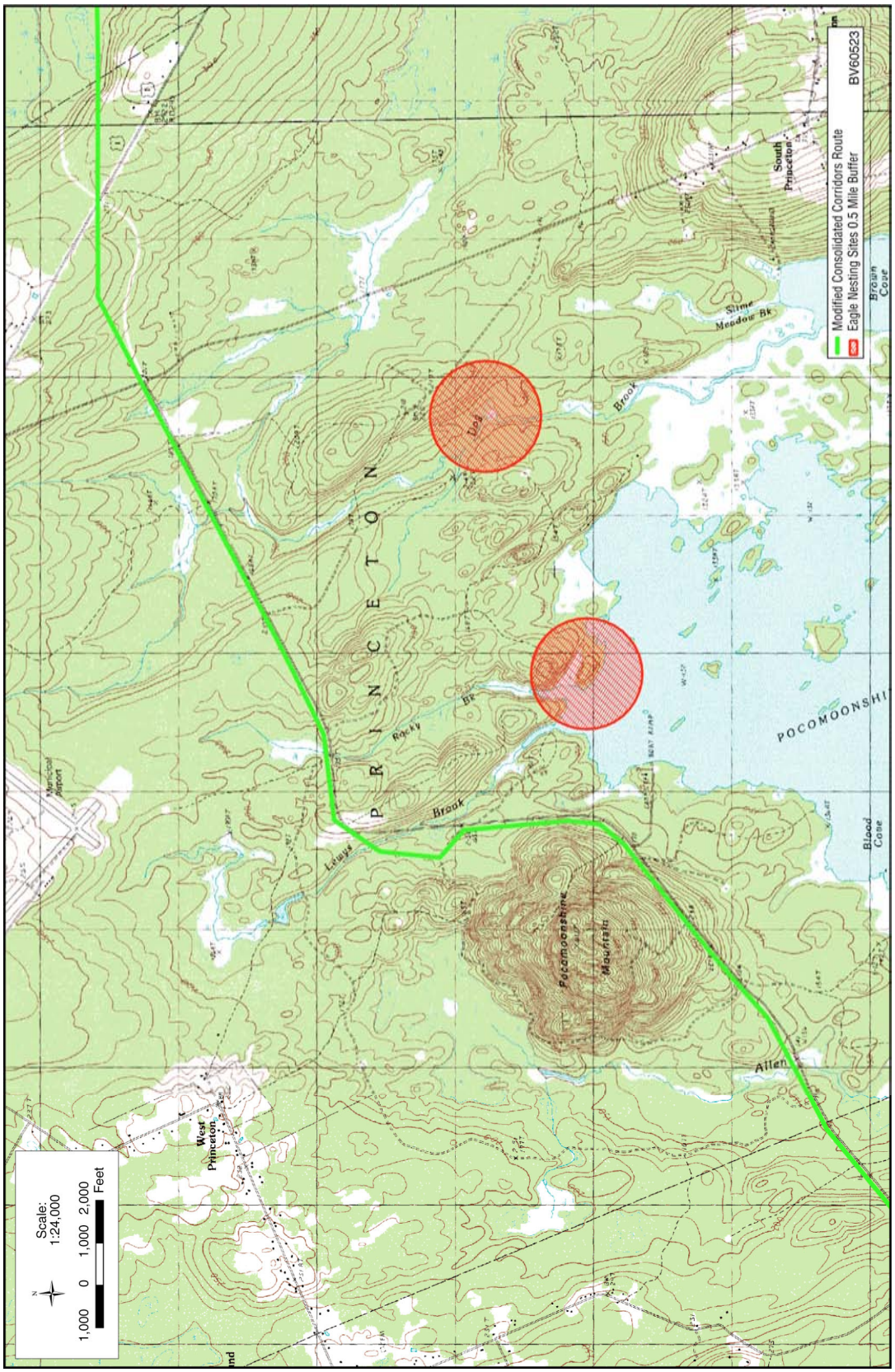

FIGURE 3.3 Bald Eagle Nest Sites along Pocomoonshine Lake and Dog Brook near the Modified Consolidated Corridors Route for the Bangor Hydro-Electric Company Northeast Reliability Interconnect (Source: Paquette 2005b)

The ROW would likely be within bald eagle foraging areas, particularly where the ROW would cross larger waterbodies such as the Great Works Stream and the Narraguagus, Machias, and St. Croix Rivers. The applicant does not have reports of bald eagle mortality associated with the existing MEPCO 345-kV transmission line that crosses the Penobscot River at two locations. The Penobscot River provides nesting and foraging areas for a number of bald eagles. In the past, large numbers of alewives (*Alosa pseudoharengus*) in the St. Croix River attracted many bald eagles to that river for foraging. Currently, only a small number of alewives are allowed to pass upstream of the dam in Woodland, making the river in the vicinity of the proposed NRI crossing less valuable for foraging eagles (Bartlett 2004).

The potential impacts of transmission lines on bald eagles include (1) disturbance of important habitat, such as nest sites, during construction and maintenance, and (2) mortality from collisions with the conductors or shield wires. Collision with utility lines is generally a random, infrequent, and an inconsequential factor for raptor populations (Olendorff and Lehman 1986). However, loss of individuals of a rare species could be of significant concern.

Most bald eagles use old forests for nesting and other activities (Stalmaster 1987). The proposed route primarily crosses commercial timberlands that are cut on a 20- to 60-year cycle (McWilliams et al. 2005). Transmission line construction activities could disturb bald eagles, but such impacts are expected to be negligible (localized and temporary). Grubb and King (1991) assessed the effects of human disturbance on breeding bald eagles and reported the following median distances that evoked response from human disturbance: 980 ft (299 m) resulted in an "awareness" or alert response, 490 ft (149 m) resulted in a short-distance flight, and 330 ft (101 m) caused departure from the immediate area of human activity. Grubb and King (1991) suggested that vehicles should be excluded within at least 1,500 ft (457 m) and restricted within 2,800 ft (853 m) of breeding eagles. Since the nearest known bald eagle nests are more than 2,900 ft (884 m) from the proposed route, no construction-related disturbance effects are expected. Several activities shown to affect eagle behavior (hunting, fishing, and ATV use) are typical activities that occur in the project area. Development of the NRI would increase access within the project area for these recreational activities, although access is already well-established throughout the project area because of existing logging roads and skidder trails, established ATV trails, and other ROWs. The NRI would not increase access to areas where eagles are known to nest or forage.

The construction and maintenance procedures for the NRI are designed to minimize environmental impacts, and BHE would review ROW maintenance activities with regard to potential resource issues (TRC 2005b). Access and activity restrictions would be determined on the basis of knowledge of eagles in the area. Mechanical and hand clearing, coupled with selective herbicide use, would be used during construction of the NRI, while hand cutting and selective herbicides would be used during ROW maintenance. Herbicide application would be carefully controlled, and personnel who applied the herbicides would be trained and licensed and would follow manufacturers' guidelines, U.S. Environmental Protection Agency (EPA) guidelines, and State regulations.

Bald eagles would not be electrocuted by the NRI because the distances between the conductors and between the conductors and shield wires would be greater than the wingspan of

the bald eagle. However, the presence of the transmission line would present a potential collision hazard to bald eagles. Raptors are generally able to avoid obstacles because of their (1) keen eyesight; (2) ability to soar or use relatively slow, flapping flight; (3) good maneuverability while in flight; (4) conditioning to the presence of obstacles; (5) and tendency not to fly in groups. However, when preoccupied or distracted (e.g., when defending territory or pursuing prey), the potential for line strikes increases. Bad weather can also limit the visibility of wires to raptors (Olendorff and Lehman 1986).

Shield wires are often implicated in bird losses along high-voltage transmission lines because birds will fly over the more visible conductor bundles but collide with the less visible shield wires (Thompson 1978). Faanes (1987) reported that 102 of 109 bird deaths from transmission line collisions were due to the overhead shield wires rather than the conductors.

Mitigation measures for the proposed project are largely based on the applicant's erosion and sedimentation control plan (TRC 2005a) and post-construction vegetation maintenance plan (TRC 2005b). The mitigation measures mentioned in these plans would be highly effective in minimizing the potential for adverse environmental effects associated with the construction, connection, operation, and maintenance of the NRI and associated ROW. Few mitigation measures directly related to the bald eagle (other than the aerial surveys previously discussed to detect potential new nests) would be necessary because construction, connection, operation, and maintenance of the NRI would not occur close to Essential Habitat for the bald eagle. Nevertheless, the following list summarizes the types of mitigation measures that the applicant would employ to minimize potential impacts on the bald eagle:

- All personnel who would be working on the ROW or be present at a construction site at any time during construction would be given some form of environmental training before being allowed access to the construction site, and they would receive refresher training each month throughout the construction period.

- During the project planning phase, all sensitive natural areas that required priority treatment would be identified, and the method of avoiding or crossing these areas to minimize impacts would be identified and incorporated into the construction-issued project plans and permitting documents, if necessary.

- Construction operations would be continually monitored and inspected to ensure they complied with the erosion and sedimentation plan as well as other permit regulations and requirements. The combined efforts of the contractors, BHE environmental inspectors and representatives, and independent third-party inspectors would be required.

One specific mitigation measure that the applicant would perform that would directly minimize the potential impacts on bald eagles would be to place colored marker balls on the shield wires at the following waterbody crossings: Great Works Stream, Narraguagus River, Machias River, and St. Croix River (BHE 2005). Marking transmission lines in this manner has been shown to significantly reduce bird collisions with power lines and is also a cost-effective

and logistically feasible method of reducing collisions (Morkill and Anderson 1991). DOE has reviewed BHE's proposed construction and maintenance activities and determined that construction and maintenance of the NRI may affect, but is not likely to adversely affect, the bald eagle.

3.2 ATLANTIC SALMON (*Salmo salar*)

The Gulf of Maine DPS of the Atlantic salmon has no State listing but was Federally listed as endangered in 2000 (NMFS and USFWS 2000). A draft recovery plan for the Gulf of Maine DPS was published in 2004 (NMFS and USFWS 2004). Watersheds utilized by this DPS include the Sheepscot, Ducktrap, Narraguagus, Pleasant, Machias, East Machias, Dennys Rivers, and Cove Brook. The Gulf of Maine DPS encompasses all naturally reproducing remnant populations of Atlantic Salmon from the Kennebec River downstream of the former Edwards Dam site, northward to the mouth of the St. Croix River. The Penobscot River and its tributaries are only included downstream from the site of the Bangor Dam (Raddant 2005).

The NRI would cross the Narraguagus River, Machias River, and the East Machias River watersheds. Within these watersheds, the following streams that are crossed by the NRI are considered Atlantic salmon streams of special concern:[3] Narraguagus River, two tributaries to Fifth Machias Lake, a tributary to Fletcher Brook, Machias River, a tributary to Dead Stream, Lanpher Brook, Huntley Brook, and Joe Brook (Bartlett 2004; BHE 2005). The NRI would have 37 crossings of waterbodies that fall within the DPS of the Atlantic salmon (Table 3.1) and 67 crossings of waterbodies considered essential fish habitat (EFH). (An EFH assessment for the Atlantic salmon is provided in Appendix G of the EIS for the NRI [DOE 2005].) The NRI would not cross any Atlantic salmon spawning and rearing areas (BHE 2005). However, the NRI would cross streams that have been identified as providing suitable habitat for juvenile Atlantic salmon, particularly as cold water refugia during the summer. These include Joe Brook and Huntley Brook in the upper reach of the East Machias River watershed north of Crawford Lake (Raddant 2005). AC mitigation would not be installed where the M&N gas pipeline crosses waterbodies.

The following information on the life history of the Atlantic salmon has been abstracted from Atlantic Salmon Unlimited (2003), Lansky (2004), and New England Fishing Management Council (1998). The Atlantic salmon spawns in late fall, with eggs hatching in early spring. Young Atlantic salmon spend 1 to 3 years in their stream-rearing habitat, go to sea in spring (they may migrate as far as Greenland), and return to spawn after one to four winters at sea. Adults may spawn in more than 1 year, although post-spawning mortality rates are normally high. Freshwater habitat for the Atlantic salmon consists of rocky runs and pools of small to large rivers. Eggs are laid in gravel-bottomed riffles in a shallow depression (redd) excavated by the female and covered with gravel. Normal egg development requires water temperatures below 50ºF (below 10ºC), with an optimum temperature of 43ºF (6.1ºC). Rearing habitat includes shallow riffle areas interrupted

[3] Atlantic salmon streams of special concern are those identified by the Maine Atlantic Salmon Commission as those being most important to the various life stages of the species.

TABLE 3.1 Atlantic Salmon Gulf of Maine Distinct Population Segment Waterbodies That the NRI Would Cross

Penobscot River Watershed
Tributaries to Felts Brook (5 crossings)
Felts Brook
Narraguagus River Watershed
Tributaries to the West Branch of the Narraguagus River (6 crossings)
Narraguagus River
Allen Brook
Machias River Watershed
Thompson Brook
Tributaries to Lower Sabao Lake (4 crossings)
Connector between Lower Sabao Lake and Burnt Land Lake
Tributaries to Fifth Machias Lake (3 crossings)
Lake Brook
Tributary to Fletcher Brook
Machias River
Tributary to First Machias Lake
Lanpher Brook
East Machias River Watershed
Huntley Brook
Tributary to Huntley Brook
Joe Brook
Tributary to Joe Brook
Allen Stream
Lewys Brook
Rocky Brook
Tributaries to Dog Brook (2 crossings)

Source: Paquette (2005d).

by pools and deeper riffles. Parr (young freshwater salmon with distinctive vertical bars) require cover such as large rocks. Adults eat fishes and crustaceans when at sea but do not feed in freshwater. Young consume primarily invertebrates.

The Atlantic salmon was nearly extirpated from New England in the 1800s because of habitat loss and degradation from dam construction and logging. The endangered status for the DPS relates to low abundance of spawning individuals, poor marine survival, habitat degradation (e.g., sedimentation and water withdrawals), diseases, and genetic impacts on native salmon from salmon raised at aquaculture facilities. The Gulf of Maine DPS is declining steadily. The number of smolts (juvenile salmon that are migrating to the sea) leaving rivers is not increasing at the same rate as parr abundance is increasing (the parr increase results from stocking hatchery-raised fry in the habitats). The estimated total returns (i.e., adults returning from the sea for spawning) were 37 in 2002, 76 in 2003, and 82 in 2004 (Raddant 2005).

Overall, it is anticipated that there would be no significant adverse effects on the Atlantic salmon DPS from the proposed action. The potential effects of various construction-related activities on the Atlantic salmon, including EFH, are discussed below.

Surveying. It is expected that the surveying work required to establish the centerline and edges of the ROW would have no adverse effect on EFH for Atlantic salmon. This work would be conducted by survey crews using small items of survey equipment and would proceed primarily cross-country and on foot. The presence of the work crews is unlikely to affect EFH or individual salmon. While a limited number of trees and branches would be cut to establish a line of sight for the surveying measurements, such clearing would have no appreciable effect on shading or other stream conditions at any of the proposed stream crossing locations.

Construction of Access Roads. Construction of the transmission line would not require construction of any new access roads. However, some repairs and upgrades to existing access roads might be necessary. All access road modifications and upgrades would be performed under supervision to ensure that all construction specifications and Maine Department of Environmental Protection (MDEP) permit conditions were met. Compliance would include the implementation of various mitigation measures to control erosion and runoff of sediment and to ensure that fuel and other chemicals were not released into waterbodies (BHE 2005). In addition, a sufficient riparian vegetation buffer zone would be maintained along all waterways to ensure that shading characteristics were not affected (BHE 2005). Consequently, it is anticipated that there would be no impacts on EFH for Atlantic salmon from the upgrade or repair of access roads under the proposed action. The upgrade and repair of access roads could potentially include the replacement of damaged culverts. This could improve potential fish passage.

ROW Clearing. Perhaps the greatest potential for effects on EFH for Atlantic salmon would occur during clearing of the proposed ROW. All clearing work would be supervised to ensure that MDEP permit conditions and construction specifications were met (BHE 2005). A minimum riparian vegetation buffer of 75 ft (23 m) would be maintained along most streams and rivers, although the stream buffer zones would be 25 ft (76 m) wide where the NRI would parallel the existing MEPCO 345-kV transmission line. Some trees in the buffer zones would need to be selectively trimmed to maintain adequate clearance for the transmission line (a minimum of 15 ft [4.6 m] of clearance is required beneath the transmission line). Vegetation beneath the conductors in riparian buffer zones would be allowed to reach heights of at least 8 to 10 ft (2.4 to 3.1 m) before trimming would be required. The maintained vegetation heights in riparian buffer zones would typically be higher along streams of special concern for Atlantic salmon. Given the relatively small width of most of the streams crossed by the proposed route (more than 75% of the waterbodies crossed by the proposed route are less than 15 ft [4.5 m] wide), it is anticipated that shade characteristics for stream channels with potential Atlantic salmon habitat would be maintained. Runoff of sediment would continue to be controlled by the filtration capabilities of the riparian zone.

Although herbicides could be used to control vegetation along some portions of the proposed ROW, no herbicides would be used within riparian buffer zones. This practice would greatly reduce the potential for herbicides to reach streams containing Atlantic salmon, where these contaminants could otherwise affect salmon and aquatic organisms.

Under the proposed action, approximately 80 acres (32 ha) of forested land located within 150 ft (46 m) of the proposed ROW could be cleared and converted to scrub-shrub habitat. Clearing of forested habitat along the ROW could slightly increase the access of recreational anglers to particular streams. Although the inland fishery for anadromous Atlantic salmon in the State of Maine is currently closed (MDIFW 2005), this increased access could result in additional mortality to Atlantic salmon in some streams and rivers as a result of incidental hooking and handling. Because the increased access provided by the ROW would be small, and because only a small proportion of the streams crossed would be likely to support anadromous Atlantic salmon, the effect of the increased access on mortality would be negligible. In addition, it is anticipated that regulations that have been developed by the MDIFW and that are periodically changed to accommodate changes in fishing pressures would be sufficient to offset potential effects of the ROW on angler access.

Overall, it is anticipated that route clearing activities for the proposed ROW would not adversely affect EFH for Atlantic salmon.

Support Structure Installation, Framing, and Stringing. Although up to 0.4 acre (0.16 ha) of land would be cleared for the installation of each support structure, support structures would be set back more than 75 ft (23 m) from streams and rivers that support coldwater fisheries. As a consequence, no heavy machinery or clearing would occur within the prescribed riparian vegetation buffer zone. Adhering to accepted management practices for controlling sediment transport to streams (e.g., installation of silt fences), coupled with the filtration capacity of the riparian buffer areas, would effectively preclude the transport of excessive sediment to streams that contain EFH for Atlantic salmon. In addition, the time required to install an individual support structure would be about 1 day. Therefore, the potential for effects to occur to Atlantic salmon in a particular stream would be limited to a relatively short period. It is anticipated that the installation of support structures would not adversely affect EFH for Atlantic salmon.

Installation of AC Mitigation for the M&N Gas Pipeline. The zinc ribbon for AC mitigation for the existing M&N gas pipeline would not be installed in stream crossings. Erosion control would be used at any riparian areas that might require AC mitigation. As a consequence, there would be no adverse effects from the planned AC mitigation activities on EFH for Atlantic salmon.

Post-Construction Maintenance Practices. Post-construction activities within the ROW would consist primarily of line inspection, line repairs, and vegetation management. Line inspections would mostly be aerial and on-the-ground inspections. Repairs would be made by

using techniques similar to those employed during construction of the line and currently used on other ROWs. It is anticipated that the existing access roads would be sufficient to gain access to the ROW for both inspections and repairs. No adverse impacts on EFH for Atlantic salmon are anticipated from these activities.

Vegetation management would be conducted through a combination of tree removal and vegetation control. Although foliar, basal, and cut-stump applications of herbicides could be used to control vegetation within some portions of the ROW, no herbicides would be applied within the riparian vegetation buffer zones. This practice would greatly reduce the potential for inadvertent release of herbicides to streams that might contain EFH for Atlantic salmon.

When applied outside the riparian vegetation buffer zones, the herbicides that are typically used for management of vegetation within the ROW (Accord®, Arsenal®, and Krenite®) would be relatively unlikely to affect stream habitats. The active ingredient in Accord is glyphosphate. Glyphosphate itself is of relatively low toxicity to fish. Some glyphosphate formulations are approved for aquatic use, although the surfactants used in some formulations can be toxic to fish. In addition, glyphosphate has an extremely high ability to bind to soil particles, thus reducing the mobility of the herbicide in the environment. It has an average half-life of 2 months in soil (Tu et al. 2001).

Imazapyr is the active ingredient in the herbicide Arsenal. Water contamination by imazapyr is generally not of concern because of its rapid photodegradation (average half-life of 2 days) in the presence of sunlight. This herbicide can also be strongly adsorbed to soils, which would restrict mobility in the environment. Imazapyr also has a low rate of bioaccumulation in aquatic organisms and is considered practically nontoxic to fish on the basis of standardized EPA protocols (Tu et al. 2001).

The active ingredient in Krenite is fosamine ammonium. Although highly water soluble, fosamine ammonium binds readily with some soils and does not leach readily through soil. The typical half-life in the environment ranges from 1 to 2 weeks. This herbicide is considered only slightly toxic to fish and aquatic invertebrates, and there is no evidence that fosamine ammonium bioaccumulates in fish (Tu et al. 2001).

Given the types of activities that would occur in the ROW following construction of the transmission line, the avoidance of major activities or herbicide applications within the riparian vegetation buffer zones, and the low probability of the selected herbicides affecting aquatic organisms, it is anticipated that post-construction maintenance activities would not adversely affect EFH for Atlantic salmon.

Mitigation measures for the proposed project are largely based on the applicant's erosion and sedimentation control plan (TRC 2005a) and post-construction vegetation maintenance plan (TRC 2005b). These mitigation measures would be highly effective in minimizing the potential for adverse environmental effects associated with the construction, operation, and maintenance of the NRI and associated ROW. Some of the generalized mitigation measures that the applicant would undertake to minimize impacts on Atlantic salmon habitat were listed earlier for the bald

eagle. The following summarizes mitigation measures that the applicant would implement that would directly or indirectly minimize potential impacts on Atlantic salmon:

- All personnel who would be working on the ROW, or present at a construction site at any time during construction, would be given some form of environmental training before being allowed access to the construction site. They would also be given refresher training on a monthly basis throughout the construction period.

- Environmentally sensitive areas where activities would be restricted or prohibited would be flagged and/or have signage posted.

- Prior to any clearing or construction work in or near sensitive natural areas, a walk-through would be conducted by the contractor, the applicant and/or designated representative, and third-party inspectors and/or other agency representatives such as Atlantic Salmon Commission and USFWS representatives. Its objectives would include, but not be limited to, the following: identify available or alternate points of access, determine appropriate operating methods to protect sensitive areas, and identify future no-access areas and buffers.

- To the extent practicable, the applicant would use existing public roads, abandoned roads, Stud Mill Road, and other smaller logging roads to access the ROW.

- Requirements for standard stream buffers and salmon stream buffers would be adhered to, including restrictions on support structure placement, soil disturbance, vehicular traffic, and vegetation clearing.

- Except for the Narraguagus and Machias River crossings, support structures would be placed as close to the salmon stream buffer as possible to minimize the amount of clearing required, thus maximizing shading (cooling) potential.[4]

- Appropriate erosion and sediment control barriers, dewatering structures, and/or nonstructural procedures (such as mulching and seeding) would be used, as necessary, to minimize stream impacts.

- Erosion control structures would be maintained to make sure that they functioned effectively.

[4] The Narraguagus and Machias Rivers have Outstanding River Segments that could be adversely affected by the NRI. The applicant would minimize viewshed disturbances of these two Outstanding River Segments by locating the support structures farther away from the rivers than they otherwise would be located (BHE 2005). However, as the river crossings are wide at these locations, the existing vegetative buffer does not completely shade the stream channel anyway. Therefore, no stream warming would be expected from the support structures being located farther from these rivers.

- As feasible, construction activities, including clearing, would be conducted during winter when the ground is frozen, and ROW preparation activities, such as clearing and excavation, would be avoided during the spring and fall (wet) seasons.

- Requirements for site restoration methods and timing following construction would be adhered to, with stream crossing areas being among the areas given the highest priority.

- No refueling or maintenance of equipment (including chain saws) would occur within stream buffers.

- Herbicides would be used in strict accordance with manufacturers' and EPA-approved labeling; would not be applied directly to water or areas where surface water was present, within stream buffers, or within 25 ft (8 m) of wetlands that had water present at the surface; and would not be mixed, transferred, or stored within 50 ft (15 m) of waterbodies and wetlands.

Construction and maintenance procedures for the NRI were designed to minimize environmental impacts, and BHE would review ROW maintenance activities with regard to potential resource issues (TRC 2005b). Access and activity restrictions would be determined on the basis of knowledge about the Atlantic salmon in the area. Both mechanical and hand clearing, coupled with selective herbicide use, would be used during construction of the NRI, while only hand cutting and selective herbicide use would be used during ROW maintenance. Herbicide application would be carefully controlled, and personnel who applied the herbicides would be trained and licensed and would follow manufacturers' guidelines, EPA guidelines, and State regulations.

DOE has reviewed BHE's proposed construction and maintenance activities and determined that the construction and maintenance of the NRI may affect, but is not likely to adversely affect, the Atlantic salmon.

4 CONCLUSION

The bald eagle and the Atlantic salmon, Federally listed as threatened and endangered, respectively, under the ESA, have been identified as having the potential to occur in the vicinity of the proposed transmission line ROW for the NRI (Bartlett 2004). No 0.5-mi (0.8-km) buffer zones for any bald eagle nests would be traversed by the proposed transmission line. However, the Atlantic salmon is known to inhabit several of the rivers and streams that would be crossed by the transmission line. No designated critical habitat for either species occurs within the project area. The applicant has designated, and would implement, mitigation procedures during construction, operation, and maintenance of the transmission line that would protect the listed species and their habitats.

DOE has determined that construction, operation, and maintenance of the NRI may affect, but is not likely to adversely affect, the bald eagle and the Atlantic salmon.

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