Merrimack River Winter Eagle Roost Monitoring Annual Report

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environmental consultants

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1.0 Introduction

The Merrimack River Project (FERC Project No. 1893) is a federally-licensed hydroelectric project owned and operated by Public Service Company of New Hampshire d/b/a Eversource Energy. The Project is located on the Merrimack River in Merrimack and Hillsborough Counties, New Hampshire.

On May 18, 2007, the Federal Energy Regulatory Commission (FERC) issued a new license (119 FERC ¶61,170) for the 29.9-megawatt (MW) Project. This license includes a number of conditions, including license articles that PSNH must meet in order to maintain FERC compliance. Article 407 of the project license required PSNH to develop and file a Shoreline Management Plan (SMP) with FERC, prepared in consultation with agencies and interested parties. The SMP includes "measures to protect the bald eagle and its habitat within the project boundary." This report describes the Merrimack River Bald Eagle Winter Monitoring task conducted for PSNH for the 2015 season, which fulfills one of the SMP requirements.

The state-threatened bald eagle (*Haliaeetus leucocephalus*) is known to winter along the Merrimack River in the vicinity of PSNH's hydro power facilities between Manchester and Concord. Wintering eagles in the United States include thousands of eagles that breed in Canada (NHF&G 2005). Audubon Society of New Hampshire (ASNH) annual surveys show that the number of eagles documented during mid-winter in New Hampshire began at about five in 1982 (Martin 2005; NHF&G 2005). In January 2015, ASNH observed 90 eagles, surpassing the previous record (67 birds in 2014) by 34% (Martin 2014a; Martin 2015).

There are five primary eagle wintering areas in New Hampshire (NHF&G 2005). The Merrimack, Androscoggin and Connecticut Rivers have regular wintering populations, along with the Lakes Region and Great Bay. The numbers of wintering eagles observed along the Merrimack River in the ASNH mid-winter survey were 12 in 2007, 21 in 2008, and 19 in both 2009 and 2011, 13 in 2012, 14 in 2013, 14 in 2014, and 29 in 2015 (Martin 2007; Marchand & Martin 2008; NHF&G 2009,Martin 2009; Martin 2011a; Martin 2012a; Martin 2013a). No bald eagle nests are known in the project area. However, there is now one known bald eagle nest to the north and three to the south of the project area on the Merrimack River. In addition, some eagle courtship behavior was observed by scientists from Normandeau Associates, Inc. (Normandeau) and Audubon volunteers in the project area in February/March, 2014.

As part of the FERC approved SMP, annual surveys have been conducted in order to monitor for bald eagle presence and habitat use. The results of the monitoring efforts are compiled into an annual report for each year of surveying (this document). In addition, the plan set associated with the SMP that shows eagle use along the Merrimack River is updated annually with the survey results. This information is used to focus site protection and habitat enhancement efforts.

Results of the 2015 monitoring season are documented below. In any monitoring year that eagle-nesting activity occurs in the study area, monitoring will be extended until June 15th. No nesting activity was observed by Normandeau in the study area in the early spring of 2015, and the winter monitoring was halted on approximately March 15, 2015. However, given recent increases in nesting activity on the Merrimack, and recent evidence that a nesting territory may

have been established in the project area, a survey of the project area will also take place in May or June of 2015.

2.0 Study Area

The eagle study area includes the Merrimack River corridor between Amoskeag Falls (Manchester, NH) and Sewall's Falls (Penacook, NH; Figures 1 and 2). The river channel varies greatly in width and flow throughout this stretch. Significant elevation drops in the river flow within the study area include the Amoskeag dam at Amoskeag Falls, the Garvins Falls dam, and the Hooksett Dam. Additional notable features include the New Hampshire Technical Institute (NHTI)/Concord Island Reserve, the White Sands Conservation Area, the Bow Power Plant and the outlet of the Suncook River.

The river banks are steep and intermittently eroded throughout most of the study area. They are vegetated with mature eastern white pine (*Pinus strobus*), northern red oak (*Quercus rubra*) and white oak (*Quercus alba*) in many locations, and earlier successional trees and understory shrubs in some locations. Some stretches along the river have urban and suburban development. The top of the eastern bank includes the towns of Manchester, Hooksett, Allenstown, Pembroke, and Concord. The western bank includes Manchester, Hooksett, Bow, and Concord. The Boston and Maine Railroad, travelled by occasional freight trains, parallels the eastern bank of the river in Manchester and then crosses the river by bridge just below the Hooksett Dam. It then follows the western bank north throughout the remainder of the survey area.

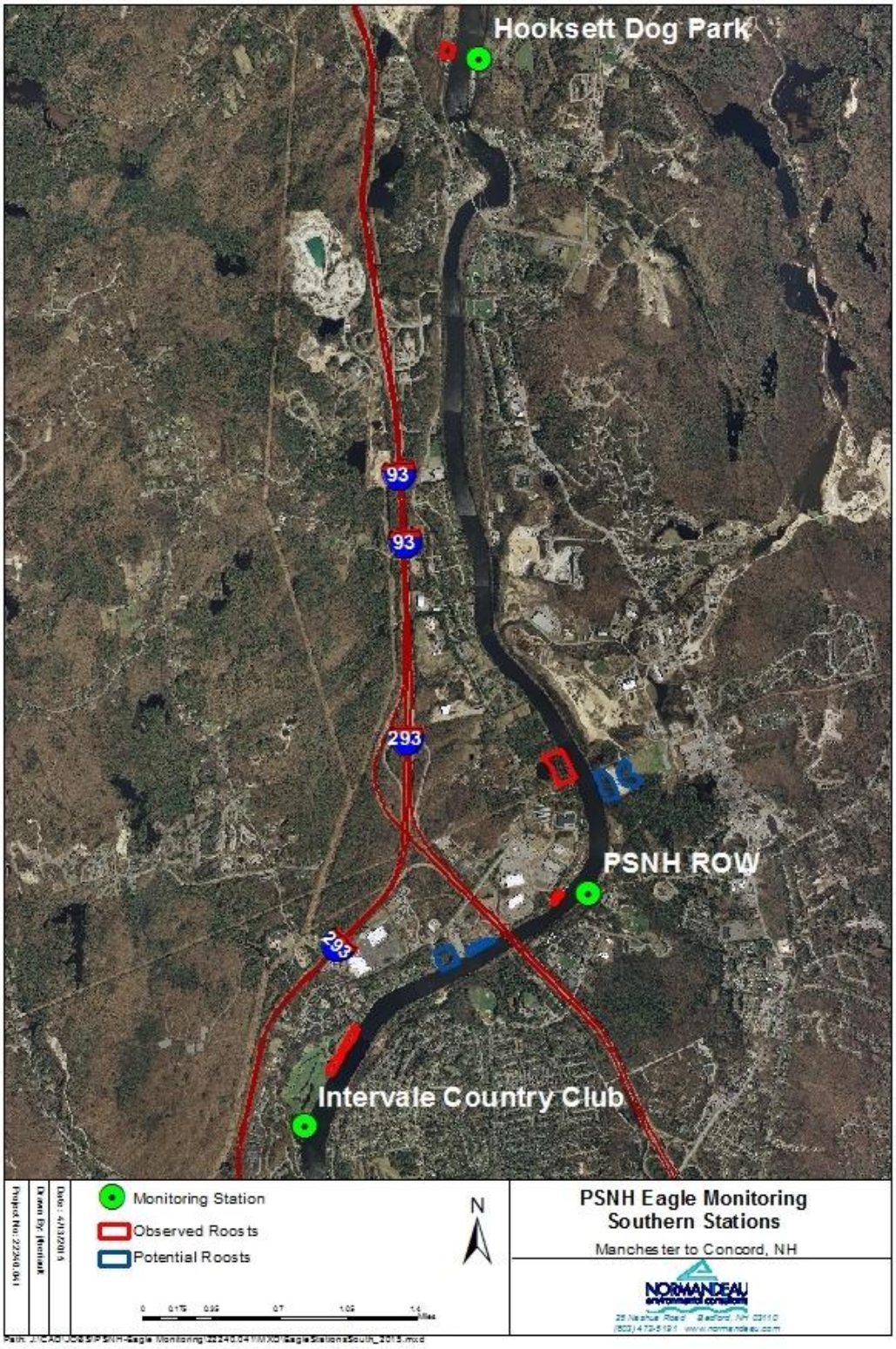
Table 1. 2015 Roost Survey Station Details

Surv. Stat. ID	Station Location/ Name	Station Access	Landowner/ Contact	Eagle Roost View Details
1	Passaconaway Club	Driveway off Garvins Falls Road in Concord, NH. Located at turn in river on a bluff on the east side.	Richard Bean	Potential roosting habitat upstream of station on the southwest shore
2	Hall Street	Park in gravel parking lot across from Blue Seal (used for employee overflow parking). Wooden staircase leads down to water's edge.	Blue Seal Feeds, 525 Hall Street	Roosting habitat in trees next to road and island just adjacent to site.
3	White Sands Road	Park at Pembroke town water pump on White Sands Road. Wooded path follows river to the south.	Town of Pembroke	Roosting habitat on west side of river just upstream of Bow Plant.

Surv. Stat. ID	Station Location/ Name	Station Access	Landowner/ Contact	Eagle Roost View Details
4	G146 Right-of-Way	Drive along Garvins Falls Road in Concord until transmission right-of-way crossing. Follow right of way to river on foot.	PSNHRight of Way Easement	Potential roost on east side of river
5	Garvins Falls Dam	Park in high public lot at the end of Garvins Falls Road near substation access.	PSNH	View of falls and downstream in known activity area, potential roost on east side of river.
6	Hooksett Dog Park	Park in Hooksett District Court Lot and walk to water's edge or upstream boat launch.	Town of Hooksett	Documented roosting sites in small pine stand just across the river from Hooksett Dog Park; Pine stand ~2,000 feet upstream on the west side
7	Eversource ROW	Park at Legends Drive sub-station and access river view via Eversource ROW. Alternate: Park off Depot Road, access site on foot via recreational trail parallel to railroad.	PSNH Right of Way Easement	Pine stand on west side of river; and pine stand on east side overlooking adjacent sand pit.
8	Intervale Country Club	Park at Intervale Country Club Parking Lot. Access river on foot.	Intervale Country Club, 1491 Front Street, Manchester, NH	Well-documented roosting area

Figure 1. Northern Eagle Survey Station Locations, 2015

Figure 2. Southern Eagle Survey Station Locations, 2015



2.0 Methods

During the winters of 2010-2011 and 2011-2012, Normandeau surveyed bald eagle roosting, perching and nesting activity. Beginning in 2013, the monitoring plan was modified to focus on identifying new night roosts and monitoring eagle use of known night roosts, and Normandeau identified potential roost sites and observation stations from aerial photos. New sites were chosen based on previous roosting records and/or the presence of features generally associated with eagle roost sites in New Hampshire (i.e., tall pines, open branching, west to southeast aspect, wind buffer, etc.). Normandeau scientists surveyed twice each week from January 1 through March 15, for a total of 10 weeks. Each survey day, observations were recorded in the early evening, when eagles generally settle into their night roost trees.

Before the 2015 monitoring period, Normandeau abandoned three unproductive survey stations from the previous year and included additional winter roost observation stations around Garvins Falls, where courting eagles were observed last winter and spring by Normandeau and Audubon observers. Additionally, Normandeau and PSNH agreed upon two study plan modifications for the 2015 survey year: surveys commenced January 5, 2015 rather than December 1, 2014, as few roosting observations were made in December during past surveys; and a summer shoreline habitat assessment was added. The study plan was submitted to the USFWS, NHF&G and NH Audubon in the fall of 2014 for review. The shoreline assessment includes the following elements:

- Normandeau scientists will assess and document conditions at any newly-discovered roost sites from land, collecting GPS points and other relevant data.
- Normandeau will conduct a survey from the water, using either canoes, kayaks, or other small craft to provide a view of potential roost and perch trees or nests from the river, especially in locations that have limited overland access and locations where eagle courtship behavior was observed. Locations warranting further review from land or during winter roost surveys will be identified and GPS-located.

During the winter, Normandeau altered one survey station due to access issues and eagle activity. The PSNH ROW station, originally located in line with the transmission line passing through Legends Road in Hooksett, was shifted downstream to the Southern New Hampshire University parking lot approximately 2,000 feet upstream from the I-93 bridge crossing. Normandeau scientists observed few eagles stopping at the original ROW station but consistently noted juveniles using the conifer stand across the river from the new location as a stopping location between upstream and downstream roosting locations.

3.1 Data Collection

Evening surveys were conducted simultaneously by two Normandeau scientists, each positioned at one of nine locations along the Merrimack River. The observation points were located on both the east and west banks of the river (Figures 1, 2). Station details are provided in Table 1.

Normandeau conducted roost surveys at two documented roost sites (observed from Intervale Country Club and Hooksett Dog Park; Figure 2) and at six potential roost sites (Passaconaway Club, Hall Street, G146 Right-of-way, Garvins Falls, and PSNH ROW in Hooksett; Figures 1 and 2). Surveys lasted approximately 2 hours at dusk. The scientists, wearing camouflage or neutral colors, arrived at their stations 1.0 to 1.5 hours before sunset and sat quietly in cover. Scientists remained in place until it was too dark for bird observations, and then they slowly and quietly left the observation station. The two scientists each conducted evening roost surveys on 20 dates, for a total of 40 surveys and approximately 80 observation-hours within the study area.

During each evening survey, the scientists recorded observations of bald eagles including the time of observation, number of birds, activity, age and direction of movement. Other raptors (potential competitors), gulls and waterfowl (potential prey) were tallied during each survey. Weather data, including air temperature, precipitation, cloud cover, wind speed at station, and wind direction at station were noted on data sheets, and gauge and flow data were obtained from the USGS Real-Time Water Data website for the Merrimack River near Goff's Falls (NWIS 2000). The data collection protocol was submitted to and reviewed by the US Fish and Wildlife Service, New Hampshire Fish &Game Department, and Audubon Society of New Hampshire (Appendix D). No nesting activity was observed in the study area, so monitoring was not extended into June in 2015.

3.2 Data Analysis

At the end of the survey period, data sheets were reviewed to determine numbers of individual birds observed during each survey. No attempt was made to identify or track birds that moved out of visual range and then returned unless clear identifying marks were observed (i.e. missing primaries on one wing), so these were counted as separate birds and have the potential to inflate the bird counts. Tally numbers for eagles and other birds should be considered an approximation, and are intended for comparison between observation points and with past and future surveys in the project area.

4.0 Results

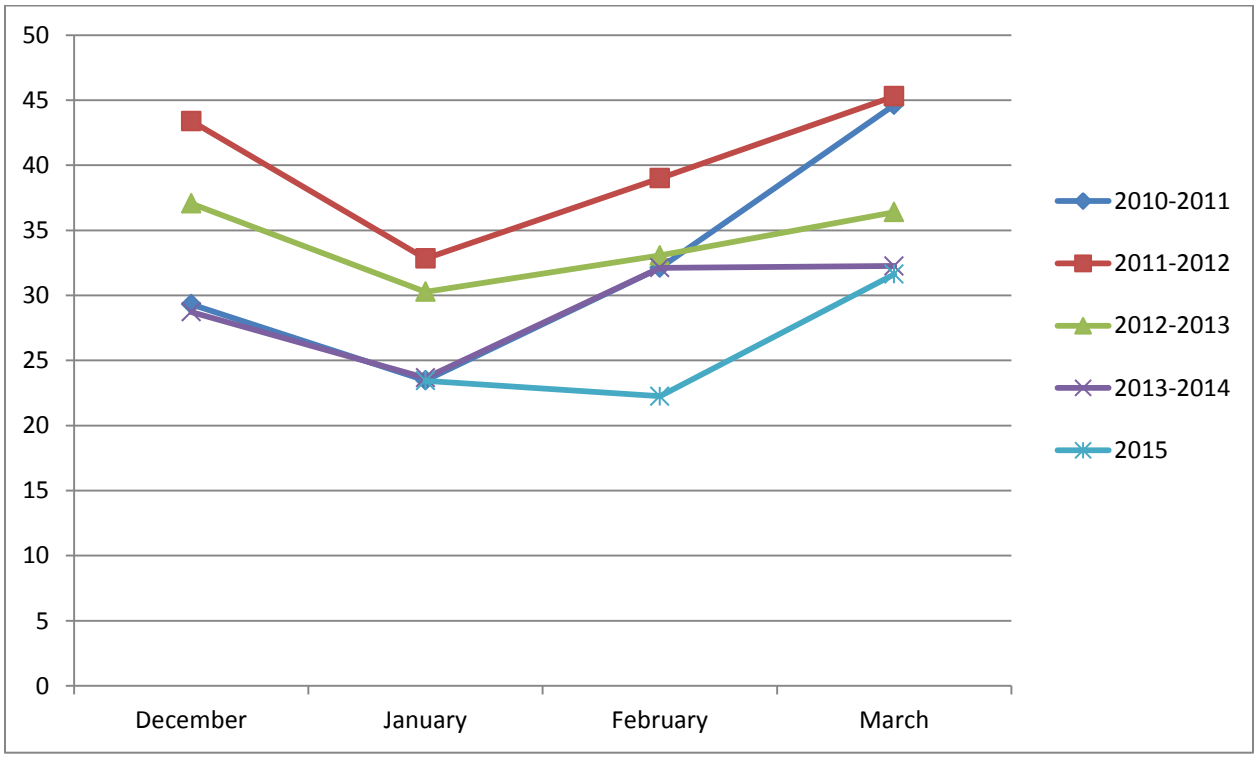
Table 2 summarizes eagle counts during the 10 weeks of evening eagle surveys at Normandeau's eight survey sites. A total of 66 eagles were observed in 17 different surveys during the 2015 monitoring effort. Surveys began on January 6, 2015, and the first eagle was observed along the Merrimack River during that first survey. Of the 66 eagles observed, 29 remained near a station to roost, and the other 37 eagles flew out of visual range and roosted in an unknown location.

Monthly mean survey temperatures in February and March, 2015 were the lowest measured temperatures recorded in this study since Winter 2010-2011. Normandeau scientists recorded an average of 23 degrees F in January, 22 degrees F in February, and 32 degrees F between March 1 and March 15 (Figure 3). Snow fell steadily during two surveys (5%), and there was

some form of precipitation during 6 surveys (15%), but these relatively low percentages are not representative of the actual snowfall amounts during the winter of 2015, because scientists avoided surveys in large storms with heavy snow conditions and limited visibility.

Normandeau scientists reported a frozen channel at the White Sands Road station during all three surveys between February 5, 2015 and March 5, 2015. The other northern stations (Passaconaway Club, Hall Street, Garvins Falls/G146 Right-of-Way) stayed frozen well into March with a small pool staying open just below the Garvins Falls Dam and occasional small open pools just downstream of Passaconaway Club and Hall Street stations. The channels at Intervale Country Club, Hooksett Dog Park, and PSNH Right-of-Way Stations narrowed as ice accumulated along their river banks but never completely froze.

Figure 3. Average Monthly Roost Survey Temperatures from 2010-2011 to 2015



4.1 Eagle Age Distribution

Normandeau attempted to categorize the immature (subadult) birds in the following age groups based on plumage and beak color: Juvenile, Basic I, Basic II, Basic III and Basic IV (Clark and Wheeler 2001). Of the 66 eagle observations in 2015, 26 were classified as adults and 38 were assigned into one of the sub-adult categories (Table 3). Normandeau scientists were unable to assign an age to two immature eagles due to poor visibility, so these were tallied as immature.

4.2 Eagle Activity and Roosting

Observed eagle activity by survey station is summarized in Figure 4. This tally assigns eagles to only one activity per survey as follows. Any eagle that occupied a tree in one location until after dark was classified as a roost. Eagles that flew through the study area and out of sight without perching were recorded as fly-bys. All other eagles were observed perching in the vicinity of the station sometime during the survey but flew out of sight before dark.

Normandeau scientists observed 19 eagles roosting in the winter of 2015. The roosts were observed from Intervale Country Club (11), PSNH ROW (2), Hooksett Dog Park (5), and G146 Right-of-Way (1) survey stations. Intervale Country Club (ICC) is a well-documented winter roost site, and Normandeau scientists regularly observed eagles roosting there during the winter of 2015. In 2010-2011, 12 roosting eagles were recorded at ICC in 31 surveys, and in 2011-2012, six roosting eagles were recorded at Intervale Country Club in 27 surveys. No roosts were observed at this station in 2012-2013 in six surveys, and in 2013-2014, four roosts were observed in 14 surveys (from both Intervale Country Club and Carolina Way observation stations). The observations from all five years indicate that eagles heavily use suitable roosts near the limited open water areas during cold winters and spread out to other locations when mild temperatures provide more open water availability.

Although only two confirmed roosts occurred on the west side of the Merrimack River at the PSNH ROW station, the channel remained open throughout the winter, and both adult and immature eagles were frequently observed near this station. During surveys on February 5, 2015 and February 24, 2015, numerous eagles of mixed ages were observed flying by this station and stopping to perch in the coniferous stand directly across the river. Before dusk, eagles would consistently leave this location and fly either downstream (in the direction of the Intervale Country Club roost) or upstream (in the direction of Hooksett Dog Park roost). On February 5, two eagles (one juvenile, one adult) roosted at that station, indicating possible overflow from the more popular roost stations.

During surveys late in the season, Normandeau scientists also monitored for potential nesting activity. During the months of February and March 2015, no pairs or courtship behavior were observed during evening roost surveys.

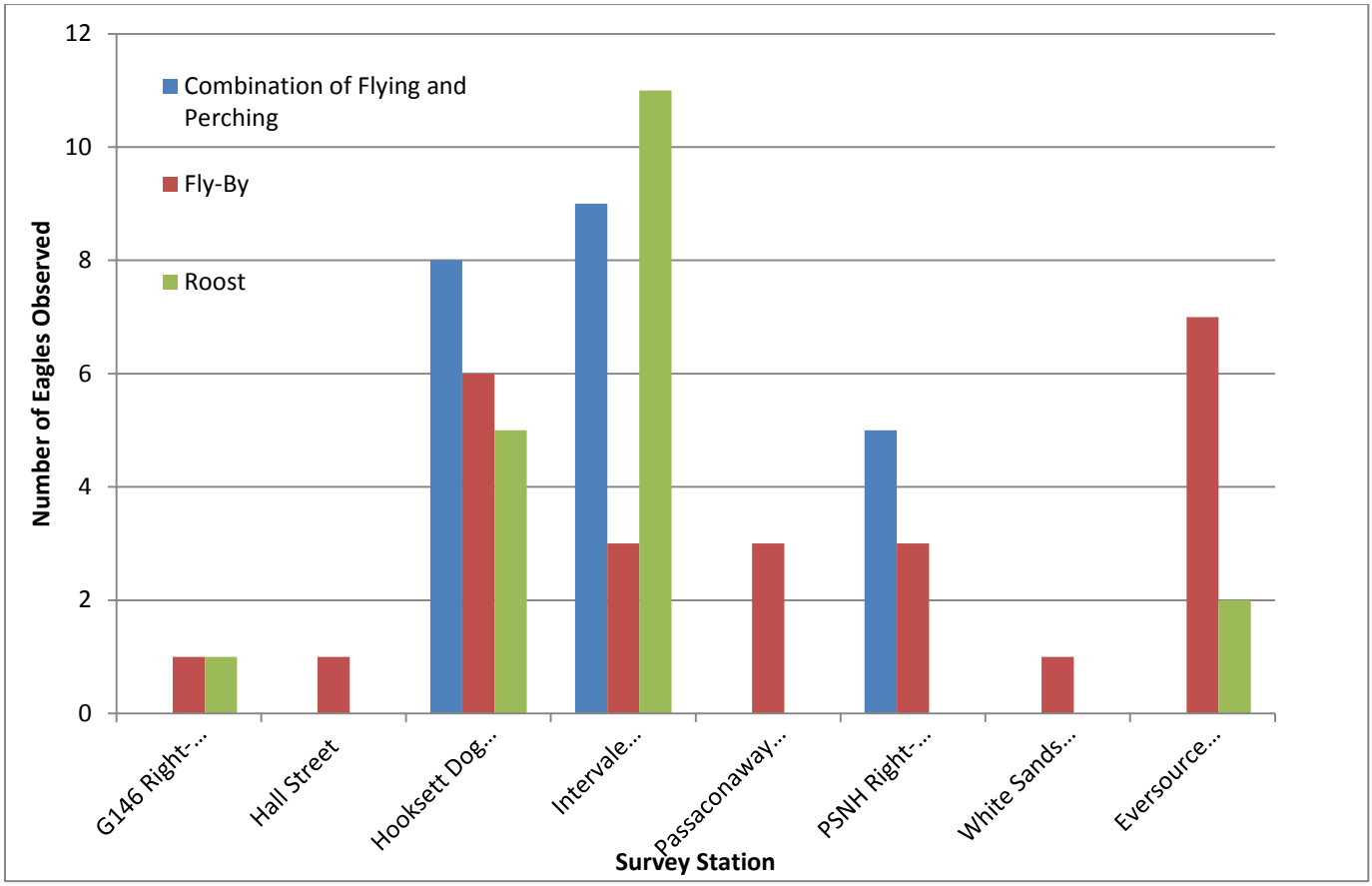
Table 2. 2015 Eagle Observation Summary for Evening Roost Surveys

	Total Number of Eagles Observed								
Survey Date	G146 Right-of-Way	Garvins Falls	Hall Street	Hooksett Dog Park	Intervale Country Club	Passaconaway Club	PSNH Right-of-Way	White Sands Road	Total
1/6/2015			0					1	**1**
1/10/2015		0	0						**0**
1/13/2015				0	1				**1**
1/15/2015	1					2			**3**
1/20/2015		0		2					**2**
1/22/2015							0	0	**0**
1/26/2015	0				2				**2**
1/28/2015			0			0			**0**
2/3/2015		0		4					**4**
2/5/2015							9	0	**9**
2/10/2015			0		1				**1**
2/12/2015	1					0			**1**
2/17/2015		0		8					**8**
2/19/2015					6			0	**6**
2/24/2015				4			8		**12**
2/26/2015			1			1			**2**
3/3/2015				1	10				**11**
3/5/2015		0						0	**0**
3/10/2015			0		3				**3**
3/12/2015	0					0			**0**
Total	**2**	**0**	**1**	**19**	**23**	**3**	**17**	**1**	**66**

Table 3. 2015 Age Distribution of Eagles by Date

Survey Date	Adult	Basic I	Basic II	Basic III	Basic IV	Immature	Juvenile	Total
1/6/2015	1							**1**
1/13/2015	1							**1**
1/15/2015	3							**3**
1/20/2015	1						1	**2**
1/26/2015	2							**2**
2/3/2015							4	**4**
2/5/2015	4		5					**9**
2/10/2015							1	**1**
2/12/2015							1	**1**
2/17/2015	2	2					4	**8**
2/19/2015	2			1			3	**6**
2/24/2015	5				5		2	**12**
2/26/2015	2							**2**
3/3/2015	1		1		1	6	2	**11**
3/10/2015	2					1		**3**
Total	**26**	**2**	**6**	**1**	**6**	**7**	**18**	**66**

Figure 4. Eagle Activity by Survey Station 2015



4.3 Waterfowl and Gulls

During the eagle surveys, ten species of waterfowl and gulls and one species of raptor other than bald eagle were recorded. When making observations, Normandeau scientists tallied all individuals observed, but if there were more than 20 observed during one survey, the tally should be considered approximate. The data are summarized in Table 4. The tally included 752 waterfowl (ducks, geese and gulls); notably fewer observations than the winter of 2013-2014 (1,299 observations). The most common waterfowl were mallards (*Anas platyrhynchos*; 270). Common goldeneyes (*Bucephala clangula*) were observed 189 times. Common mergansers (*Mergus merganser*) were the third most commonly observed waterfowl, with 124 observations.

4.4 Raptors and Other Birds

Fifteen raptors other than eagles were observed during the winter of 2015, and they were all identified as red-tailed hawks (*Buteo jamaicensis)*. Thirteen of the 15 red-tailed hawks were observed during surveys in January and early February. Nine of the hawks were observed while surveying from the G146 Right-of-Way and Garvins Falls stations, indicating a resident hawk or pair of hawks occupying the habitat near Garvins Falls Dam.

Table 4. 2015 Observations of Waterfowl and Non-Eagle Raptors by Date

Survey Date	CAGO	COGO	COME	DCCO	GBBG	GRCO	HEGU	MALL	RBGU	RTHA	UDUK	WODO	Total
1/6/2015			7				1	21			2		**31**
1/10/2015		85	6					15		3	2		**111**
1/13/2015		4	13					16		2	36		**71**
1/15/2015	54	3	32							1			**90**
1/20/2015		5	3								5		**13**
1/22/2015		4	3					5			4		**16**
1/26/2015		20	3							1	5		**29**
1/28/2015		5						62		1			**68**
2/3/2015		8	11					2		5			**26**
2/5/2015			2					5					**7**
2/10/2015		14	9		1	4	1	55	2				**86**
2/12/2015		3	2										**5**
2/17/2015	16	7	10	4				7			2		**46**
2/19/2015		10	1	1	1			7					**20**
2/24/2015		2	6	8			1		1				**18**
2/26/2015		1	2					9			3		**15**
3/3/2015		5	3	2		1						1	**12**
3/5/2015										1			**1**
3/10/2015	1	13	11	1				60			2		**88**
3/12/2015								6		1	7		**14**
Total	**71**	**189**	**124**	**16**	**2**	**5**	**3**	**270**	**3**	**15**	**68**	**1**	**767**

5.0 Discussion

Normandeau scientists have been monitoring bald eagle roosting on the Merrimack River between Manchester and Concord for five sequential winters. These five winters have shown wide variation in temperature, precipitation and percentage of ice cover on the river, and eagle distribution and habitat use have been equally variable. Our primary objectives for surveys this year were to observe and document new roost sites and confirm known roost sites within the project area.

The winter of 2015 was harsh, with lower mean monthly temperatures than any of the previous four survey years. Roosting observations were significantly higher than in warmer winters, and roosting was concentrated near open water, as expected, particularly near the Hooksett Dam (Hooksett Dog Park station) and the Amoskeag Dam (Intervale Country Club station). We confirmed roosting at those two previously-documented roost areas, and also documented new roost sites from the G146 Right-of-Way station and the PSNH ROW station. The G146 Right-of-Way roost was an isolated event in early January when the channel below the Garvins Falls Dam was still open.

Two eagles roosted at the Eversource Right-of-Way station on February 5, 2015. The water remained open at the Eversource Right-of-Way, and the southeast aspect of the conifer stand was ideal for first-morning sun, but the stand is small and exposed to human development and noise. We hypothesize that these two eagles were overflow from the Intervale Country Club roost. Multiple eagles congregated at Intervale Country Club, often exhibiting competitive behavior for perches and flying back and forth between Intervale Country Club and the PSNH Right-of-Way.

With the gradual steady increase in New Hampshire's bald eagle population, there is also an increased possibility of eagle nesting within the project area. This year, active eagle nests have been reported along the Merrimack River both north and south of the project area, approximately 30 km apart, and more can be expected if this trend continues. Along the upper Mississippi River in Wisconsin and Minnesota, at locations with boat traffic, roads, rail lines, other human activity and sub-optimal nest sites, bald eagle nests were located an average of 1.84 km from the next nearest nest (straight-line distance) (Mundahl, Bilyeu, and Maas, 2013). The Eversource winter eagle survey would likely detect nesting attempts in the project area, as the nesting season typically begins in February in NH. Although suitable nesting sites are present along the river corridor, the river at these locations was still completely frozen at the conclusion of Normandeau's surveys on March 15, 2015.

During the summer of 2015, Normandeau scientists will conduct a survey from the water, using either canoes, kayaks, or other small craft to provide a view of potential roost and perch trees or nests from the river, especially in locations that have limited overland access and previous evidence of courtship behavior. The results of these surveys will provide information with which we will form our recommendations for surveys in the winter of 2015-2016.

6.0 Literature Cited

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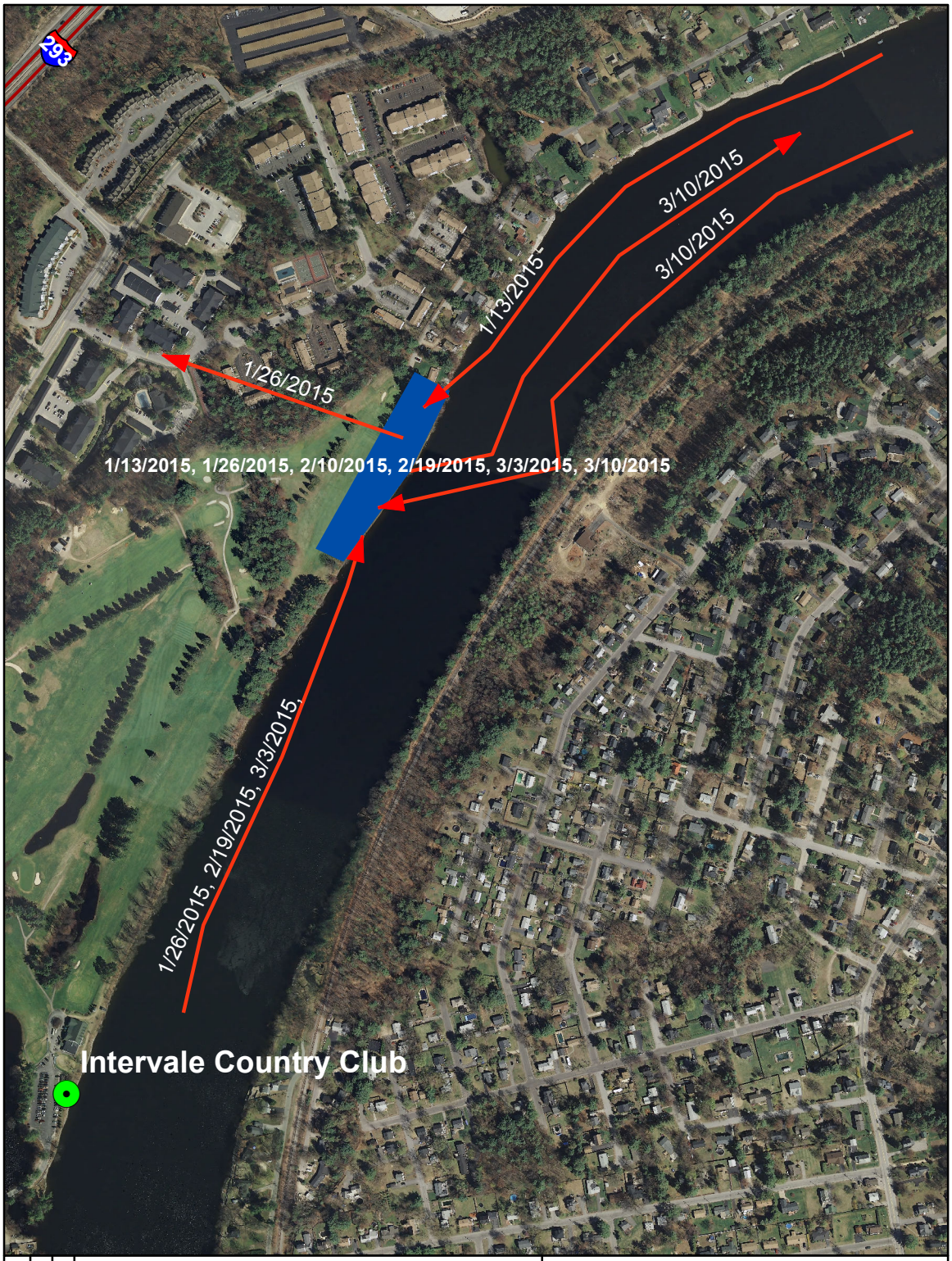
National Water Information System: Web Interface - USGS 01092000 MERRIMACK R NR GOFFS FALLS, BELOW MANCHESTER, NH 00060, Discharge, cubic feet per second Monthly mean in cubic feet/second (Calculation Period: 1936-12-01 -> 2008-09-30

Appendix A
Eagle Observation Locations on Aerial Photos



Project No: 22240.041

Drawn By: jtheriault

Date: 4/2/2015

Monitoring Station

Bald Eagle Flight Directions

Observed Roosts

N

0 0.025 0.05 0.1 0.15 0.2 Miles

Intervale Country Club
Eagle Observations 2015

Manchester, NH

NORMANDEAU
environmental consultants
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com

Path: J:\CAD\JOBS\PSNH-Eagle Monitoring\22240.041\MXD\Intervale_Observations 2015.mxd

Project No: 22240.041

Drawn By: jtherault

Date: 4/2/2015

Monitoring Station

Bald Eagle Flight Directions

Observed Roosts

N

0 0.0225 0.045 0.09 0.135 0.18 Miles

PSNH Right-Of-Way
Eagle Observations 2015

Hooksett, NH

NORMANDEAU
environmental consultants
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com

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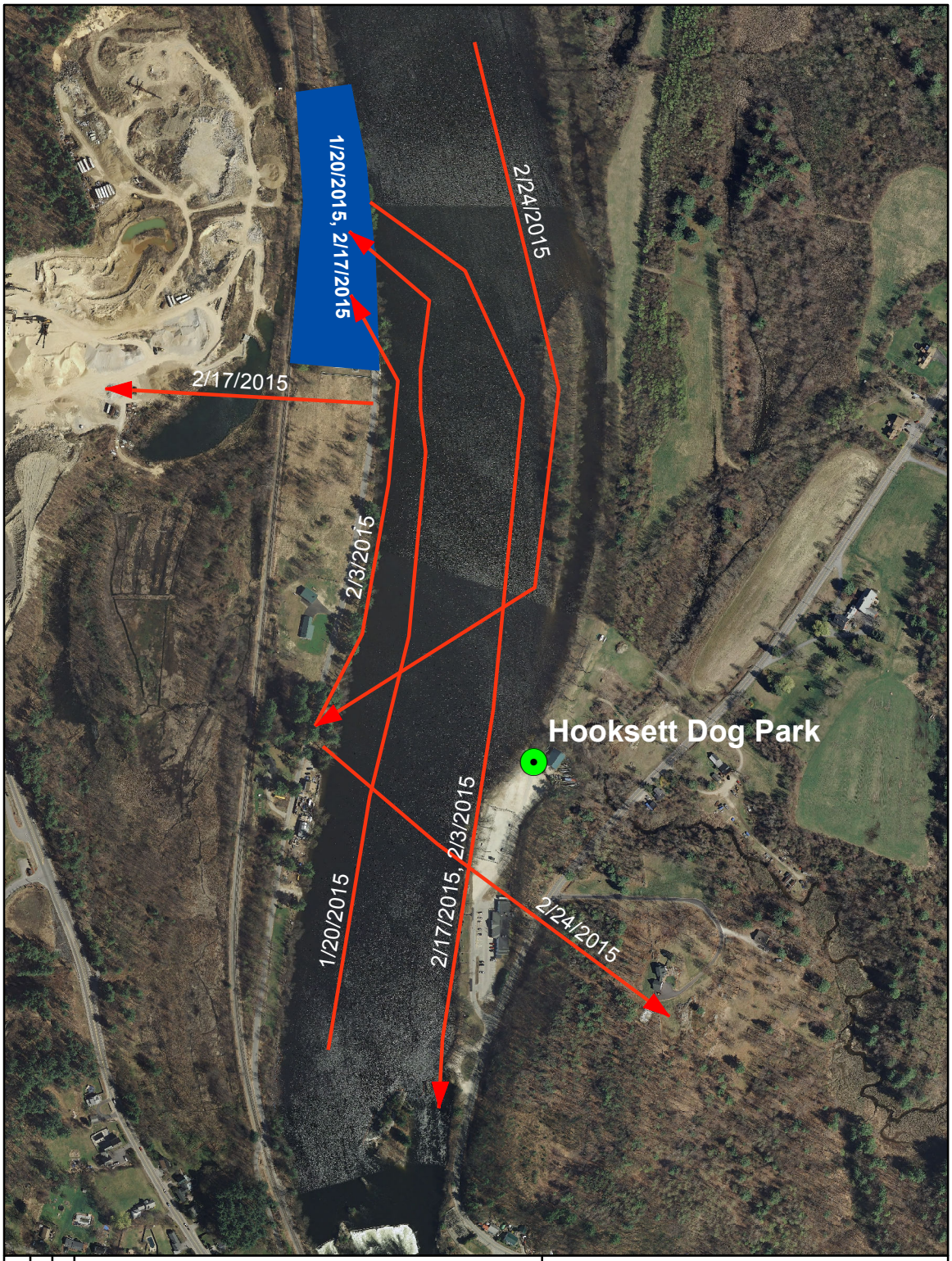


Monitoring Station

Bald Eagle Flight Directions

Observed Roosts

N

0 0.025 0.05 0.1 0.15 0.2 Miles

Project No: 22240.041

Drawn By: jtheriault

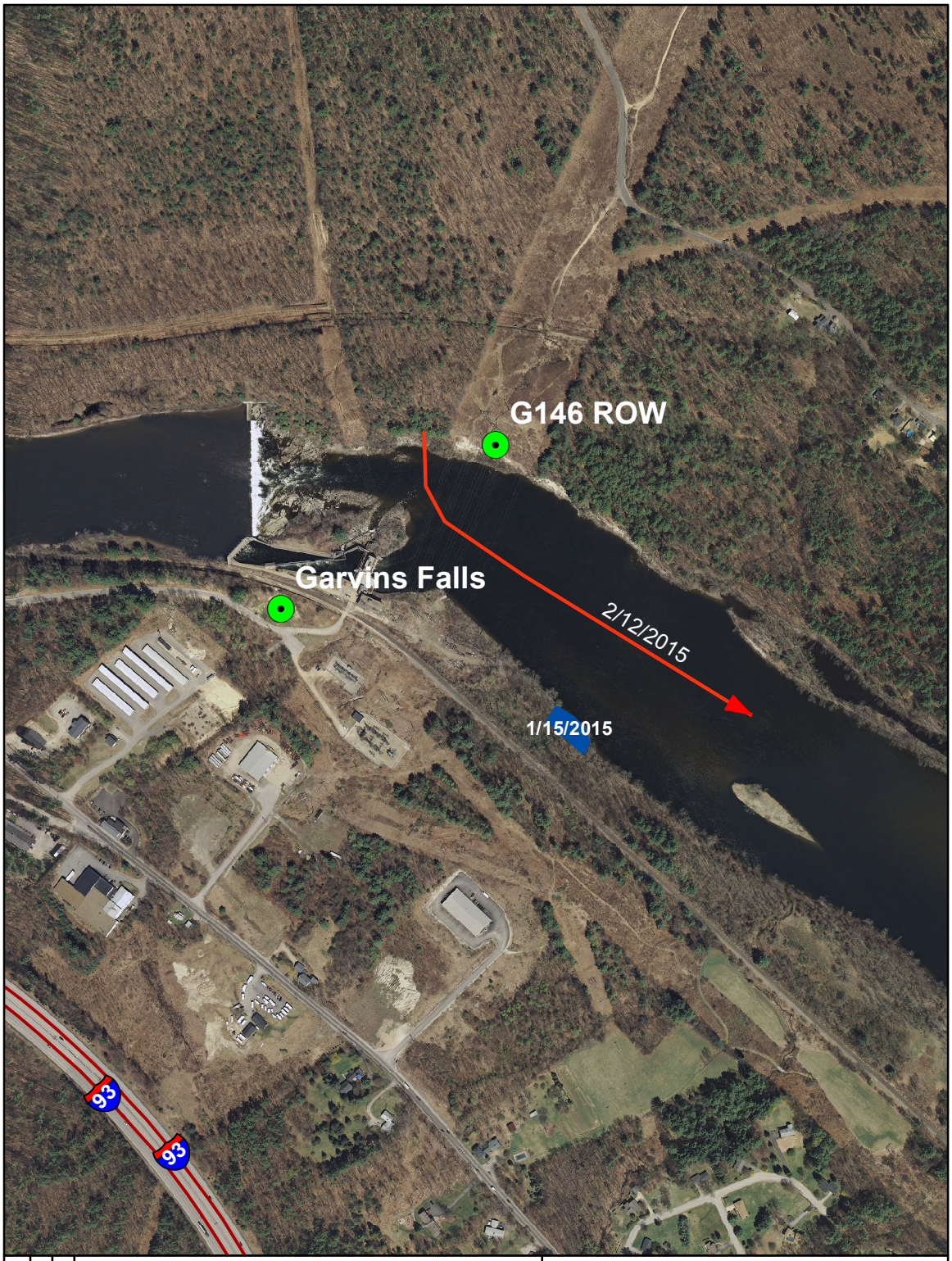
Date: 4/2/2015

Hooksett Dog Park
Eagle Observations 2015

Hooksett, NH

NORMANDEAU
environmental consultants
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com

Path: J:\CAD\JOBS\PSNH-Eagle Monitoring\22240.041\MXD\HooksettDogPark_Observations 2015.mxd



Project No: 22240.041

Drawn By: jtherault

Date: 4/2/2015

Monitoring Station

Bald Eagle Flight Directions

Observed Roosts

N

0 0.0275 0.055 0.11 0.165 0.22 Miles

G-146 Right-Of-Way
Eagle Observations 2015

Concord, NH

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Path: J:\CAD\JOBS\PSNH-Eagle Monitoring\22240.041\MXD\G146Line_Observations 2015.mxd

Project No: 22240.041

Drawn By: jtheriault

Date: 4/2/2015

Monitoring Station

Bald Eagle Flight Directions

Observed Roosts

N

0 0.015 0.03 0.06 0.09 0.12 Miles

Hall Street
Eagle Observations 2015
Concord, NH

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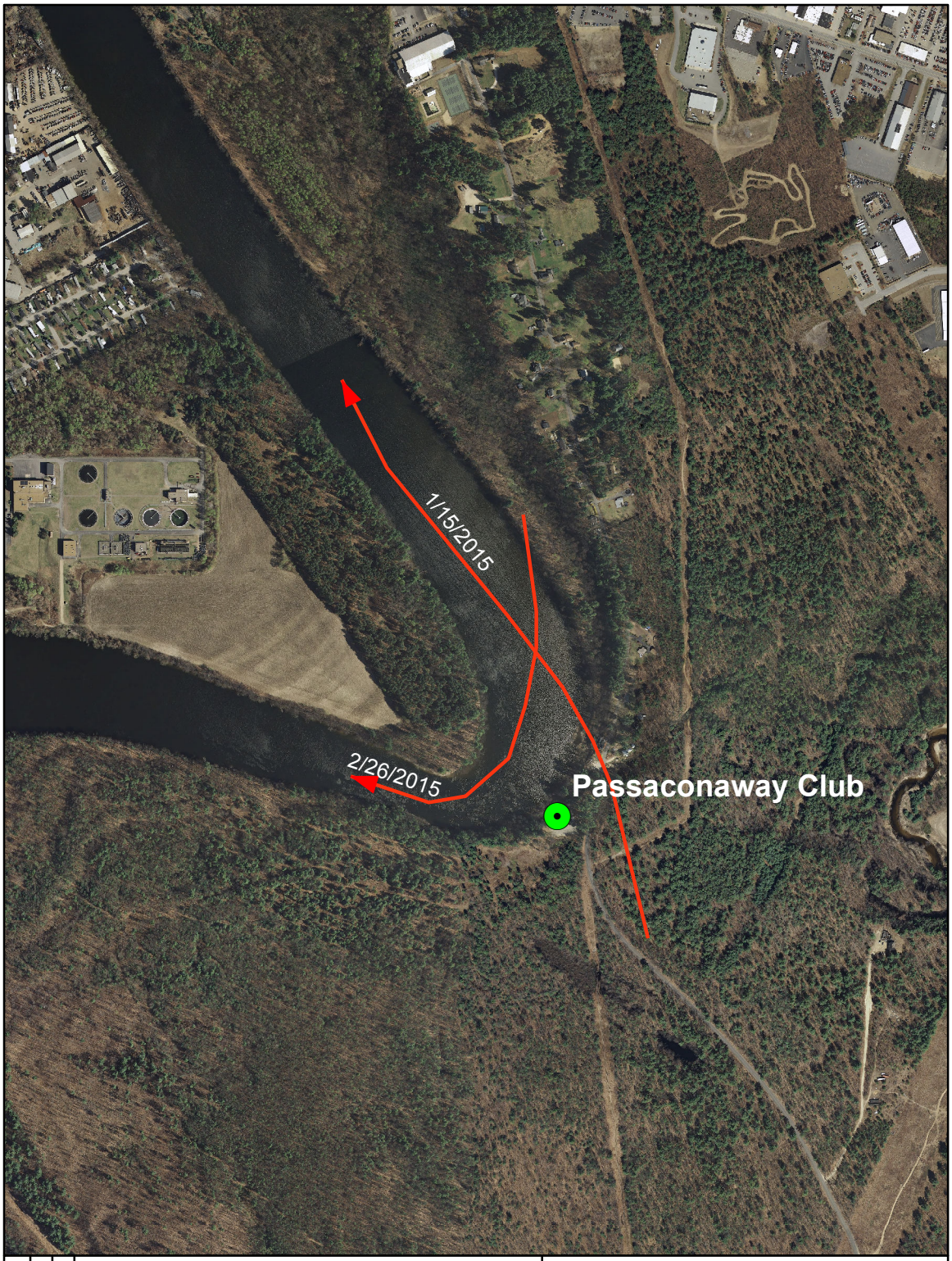
Path: J:\CAD\JOBS\PSNH-Eagle Monitoring\22240.041\MXD\HallStreet_Observations 2015.mxd



Project No: 22240.041

Drawn By: jtherault

Date: 4/2/2015

Monitoring Station

Bald Eagle Flight Directions

Observed Roosts

N

0 0.0375 0.075 0.15 0.225 0.3 Miles

Passaconaway Club
Eagle Observations 2015

Concord, NH

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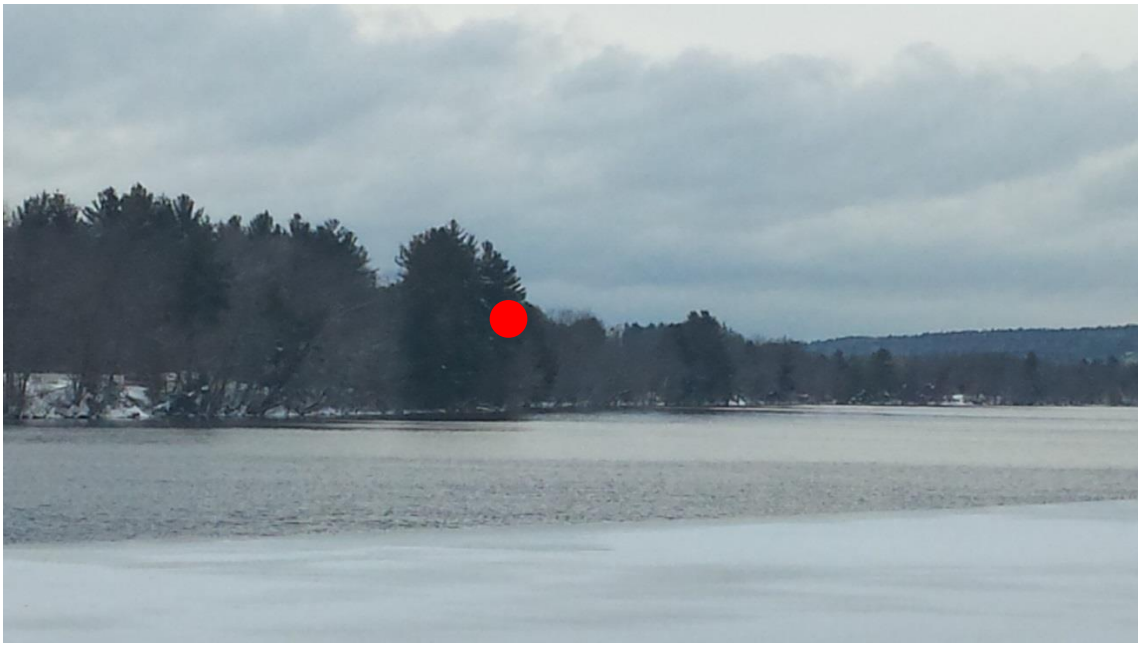
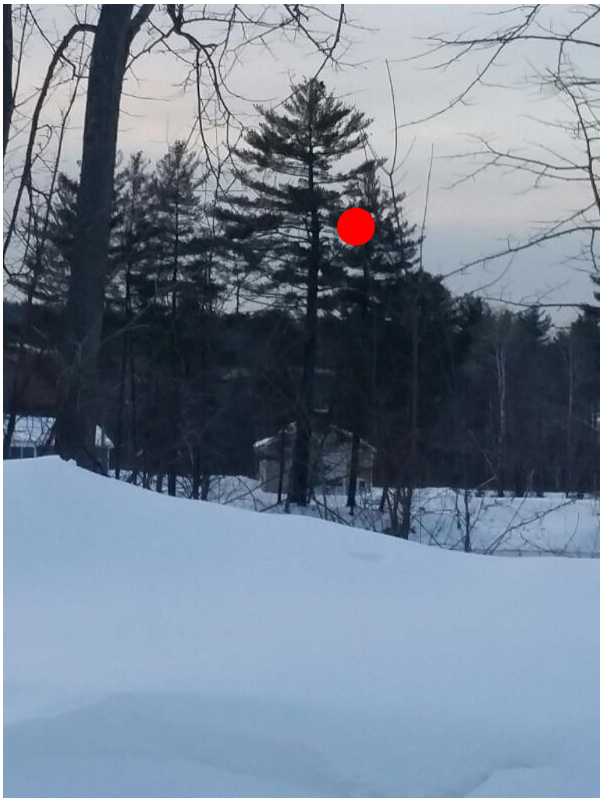
(603) 472-5191 www.normandeau.com

Path: J:\CAD\JOBS\PSNH-Eagle Monitoring\22240.041\MXD\Passaconnaway_Observations 2015.mxd

Appendix B
Photographs of Roost Locations



Hooksett Dog Park Upstream Roost Tree



Hooksett Dog Park Downstream Roost Tree

Adult Eagle in Flight at Hooksett Dog Park Station

PSNH Right-of-Way Roost Tree

PSNH Right-of-Way Perched Eagle

Intervale Country Club Roost Stand and Eagle in Flight

Appendix C
Key to Species Names

NAI Species Codes for Raptors and Waterfowl on Merrimack River

ABDU	American Black Duck
AGWT	American Green-winged Teal
BAEA	Bald Eagle*
BAGO	Barrow's Goldeneye
BWHA	Broad-winged Hawk
BWTE	Blue-winged Teal
CAGO	Canada Goose*
COGO	Common Goldeneye*
COHA	Cooper's Hawk
COME	Common Merganser*
DCCO	Double-Crested Cormorant
GBBG	Great Black-backed Gull*
HERG	Herring Gull*
HOME	Hooded Merganser*
MAKE	American Kestrel
MALL	Mallard*
OSPR	Osprey
PBGR	Pied-billed Grebe
RBGU	Ring-billed Gull
RBME	Red-breasted Merganser
RNDU	Ring-necked Duck
RSHA	Red-shouldered Hawk
RTHA	Red-tailed Hawk
SSHA	Sharp-shinned Hawk
UDUK	Unknown Duck*
UGUL	Unknown Gull*
URAP	Unknown raptor
WODO	Wood Duck

* 10 most common birds observed in our previous Manchester surveys

Appendix D
Agency Correspondence

December 3, 2014

Mr. Anthony Tur (Anthony_Tur@fws.gov)
US Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5094

Mr. Michael Marchand (Michael.N.Marchand@wildlife.nh.gov)
NH Fish and Game Department
11 Hazen Drive
Concord, NH 03301

RE: PSNH FERC License - Eagle Monitoring Plan 2015

Dear Messrs. Tur and Marchand:

Normandeau Associates wildlife biologists will again be monitoring bald eagle activity on the Merrimack River between Sewalls Falls and the Amoskeag Dam for Public Service Company of New Hampshire in accordance with Article 407 of their FERC license. The 2013-2014 eagle monitoring effort included a focus on winter roost sites. This winter, the focus will again be the identification of eagle roost sites within the project area, but we are proposing to modify the monitoring program slightly.

The project survey area and winter roost survey protocols will be the same as the previous monitoring seasons, as outlined below. Normandeau will also continue to participate in the NHA mid-winter and late-winter Saturday bald eagle surveys. However, winter roost observation stations will be shifted to include slightly more surveys from locations around Garvin's Falls, where courting eagles were observed last winter and spring by Normandeau and Audubon observers, in an attempt to identify any new nest sites in the area. In addition, we propose to omit the December roost surveys, as all of our previous winter roost surveys in this project area have resulted in relatively few eagle observations in December, and there is typically little or no river ice to confine eagle activities. We propose instead to conduct the roost surveys from January through mid-March, and add spring and summer shoreline field assessment work relevant to the Merrimack Shoreline Management Plan (SMP), including documentation of eagle roost or nest site suitability from the river.

Winter Evening Eagle Activity/Roost Monitoring:

- Twice per week From January 5 through March 15, two roosting locations will be monitored by biologists for 2 hours just before dusk.

- Survey locations will change each night, and will include previously documented roost sites and potential roost sites. Each station will be monitored at least 3 times, although some locations may be eliminated if warranted.
- Biologists will remain hidden for the duration of the survey session, leaving quietly after dusk to avoid disturbing eagles to the extent possible.
- Biologists will record survey date, time, location, weather and river conditions, eagle activity (perching, roosting, hunting, flyby, etc.), available prey (waterfowl), other raptors, predators, disturbances and other relevant observations.
- An Eagle Survey Form will be completed for each eagle observed noting any distinctive features such as plumage patterns (dark or light), missing feathers, or any colored wing tags or leg bands observable. Approximate age of sub-adult eagles will be estimated.
- Eagle locations will be noted on plans as accurately as possible. Perch and roost sites and other important features will be photographed and described.
- Monitoring will cease after March 15 if no further eagle activity, as determined with input from agencies, is known to be occurring in the project area.

Summer Shoreline Habitat Assessment

- Normandeau scientists will assess and document conditions at any newly discovered roost sites from land, collecting GPS points and other relevant data.
- Normandeau will also conduct a survey from the water, using either canoes, kayaks, or other small craft to provide a view of potential roost and perch trees or nests from the river, especially in locations that have limited overland access. Locations warranting further review from land or during winter roost surveys will be identified and GPS located.
- Leaf-off conditions would provide the best information, but the dates will be worked out with PSNH and with safety in mind.

Thank you for reviewing this letter. We welcome your questions, comments, and/or suggestions.

Sincerely,
Normandeau Associates, Inc.

Lee E. Carbonneau
Principal Scientist

Cc. Chris Martin, NH Audubon

Curt Mooney, PSNH