In general, sparrows peaked early, tapering by mid-season with a small peak late in the month. Warblers remained fairly consistent and moderate in numbers over the course of the early and mid season, followed by a sharp peak in numbers late in the month. Wrens and several other families show moderate numbers early in the month, followed by a mid-month plateau, then a slight peak late in the month.

When the number of migrants observed foraging in the morning are compared with passage rates from radar studies the previous night, there appears to be no correlation in the numbers observed between the two types of surveys. It is still likely, however, that many of the foraging migrants observed the morning after a radar survey do reflect bird species that were undertaking migration flights the night before. Foraging migrant surveys also demonstrate that some species of birds (at least at the family level) appear to have peak migration times, as demonstrated by Figures 7-36 and 7-37.

Daytime Migration Studies

Description of Study Program

Daytime migration studies provide valuable insight into the species composition, relative abundance, spatial patterns of use, and flight characteristics utilized by birds migrating during daytime hours, as well as the routes used by birds migrating through the project area.

In 1992 and 1993, Kenetech monitored fall raptor migration in the Kibby vicinity (U.S. Windpower 1994). Their work consisted of day-long surveillance during peak migration and identified numbers and species of raptors crossing the project area. The goals were to identify raptor species' relative abundance, composition, and flight characteristics (flight height, direction, and consistency of use) in the project area. Where appropriate, the results from these surveys are compared to the results from the fall 2005 surveys. No prior spring raptor migration surveys are known to have been conducted in the area.

The methods for the daytime migrant survey protocol are largely based on methods used during daytime migrant monitoring performed for Kenetech for this site and standards set forth by the Hawk Migration Association of North America (HMANA), and by HawkWatch International (Hoffman and Smith 2003). The only difference between the methodology for the surveys is that during the current surveys, TransCanada also identified non-raptor migrants. Protocols were reviewed at an interagency meeting and prior to the fall 2005 studies by MDIFW, USFWS, and LURC. Another interagency meeting was held on February 23, 2006, to review fall results and discuss plans for field work plans for spring and summer of 2006. At this meeting, Mr. Hodgman suggested performing daytime migrant surveys at two locations simultaneously on each ridge to see if there was any correlation between migrant flights observed at the different sites. Studies have been conducted in accordance with agency comments (see Appendix 7-J).

The Kibby Mountain lookout tower, a 15-foot (4.6 m) tall fire tower, was selected as the observation point for fall 2005 daytime migration surveys due to its northern location in relation to the project area and its 360-degree viewshed. An alternate site was located in a clear-cut on

the northern slope of Kibby Range. This site was used in the fall when the cloud ceiling was low enough to limit visibility from the Kibby Mountain Lookout, but still allowed clear viewing up the Kibby Stream (Middle Branch) valley from another location.

In the spring study, the fire tower was utilized as one of the observation points, with two additional sites on Kibby Range initially selected. One was a site located in a clear-cut on the southern slope of Kibby Range ("B1 Clear-cut Site"). The third spring site was on the radar platform on the highest peak of Kibby Range, which was located at the B1 met tower site; this site was used on a few occasions, but was determined to be less preferred than the Clear-cut Site. The location of all observation sites is shown in Figure 7-38. During the spring observations, simultaneous observations occurred at the fire tower and Kibby Range sites, coordinated via radio communications (see Appendix 7-K).

Surveys were performed during periods of favorable weather for migration (timed to start the morning after the passage of a cold front in the fall and after the passage of warm front and winds from the south in the spring) and then conducted for three consecutive days, weather permitting. Surveys were not conducted during precipitation, in fog, on days that were overcast with low cloud cover, or during any other circumstances that hampered visibility. Some survey events were abbreviated if unfavorable weather conditions developed over the course of the survey effort.

Survey Results

A total of 13 survey days were completed during September 2005. Average survey duration during the fall was approximately six hours per event. The study consisted of a total of 75.5 observation hours at the Kibby Mountain fire tower.

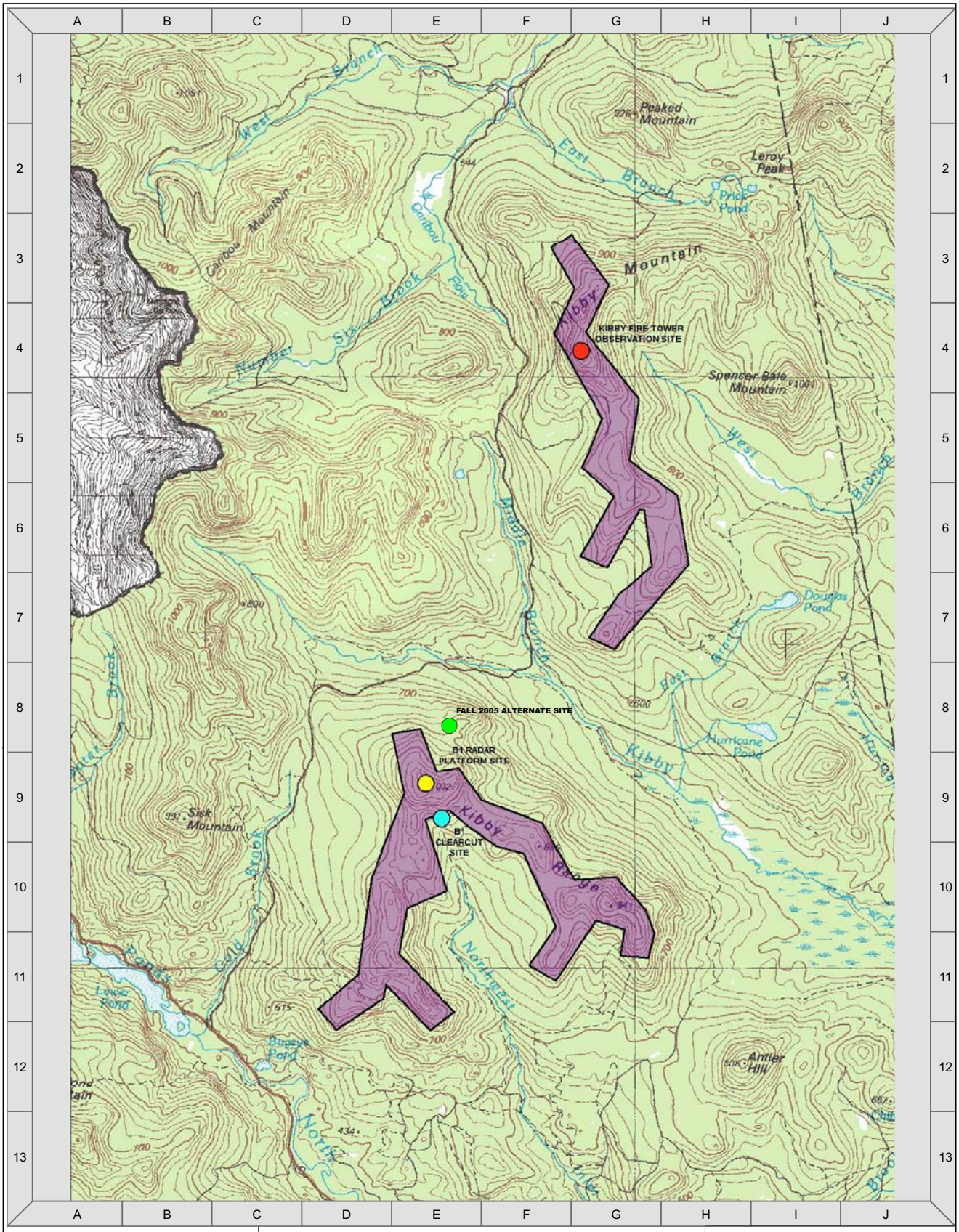
A total of eight survey days were completed during April and May 2006, with simultaneous surveys at two locations performed on six of those days. Average survey duration during the spring was approximately six hours per site per event. The study consisted of a total of 78.75 observation hours. Between sites, 43.5 hours of survey effort was at the Kibby Fire Tower Observation Site, 23.25 hours were spent at the B1 Clearcut site, and 12 hours were spent at the B1 Radar Platform site.

Relative Species Abundance

Raptor Species

A total of 252 individual raptors were recorded in fall 2005, representing at least 13 different species from eight genera. Only 25 of these raptors could not be identified to the species level: 15 were identified as buteos, nine were identified as small accipiters, and one was identified as an unknown raptor.

A total of 31 individual raptors were recorded in spring 2006, representing at least eight different species from at least five genera. Only one of these raptors could not be identified to the species level: it was identified as a raptor, but the species was unknown. Nineteen of the total



SITE LOCATION

Legend

- Lands Within the United States
- Lands Within Canada
- Project Location
- Fall 2005 Alternate Site
- Kibby Fire Tower Observation Site
- B1 Radar Platform
- B1 Clearcut Site

Miles: 0, 0.5, 1

Figure 7-38

Kibby Wind Power Project

Avian Migration Study
Project Location Map

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raptors observed were recorded at the Kibby Fire Tower Observation site, and 12 were recorded at the B1 Clearcut site. No raptors were observed from the B1 Radar Platform site. The lower migratory volume observed is expected in the spring, as concentration of migrating raptors is typically not as pronounced as during the fall migration.

Buteos were most abundant during both seasons, comprising 57.9 percent of all individuals recorded in the fall and 35.5 percent in the spring. Accipiters comprised 21.1 percent of all individuals recorded in the fall and 19.4 percent in the spring. In the spring, vultures (Cathartidae) made up 25.8 percent of all individuals recorded, while in the fall only one turkey vulture was observed. The four most abundant species in fall 2005 were: red-tailed hawks (Buteo jamaicensis) (32.1 percent of all records), broad-winged hawks (Buteo platypterus) (19.8 percent of all records), osprey (Pandion haliaetus) (13.5 percent of all records), and sharp-shinned hawks (Accipiter striatus) (13.5 percent of all records). In spring 2006, the four most abundant species were turkey vultures (25.8 percent of all records), red-tailed hawks (22.6 percent of all records), sharp-shinned hawks (16.1 percent of all records), and broad-winged hawks (12.9 percent of all records).

In fall 2005, the number of raptors observed per hour of effort was highest during the middle of September, with lower frequency of observations early and late in the month. This generally agrees with the results of the 1992 and 1993 studies performed in the project area (US Windpower 1994). The average rate of observations for the fall 2005 season was 3.34 raptors per hour of effort. In spring 2006, the number of raptors observed per hour of effort was similar between the Kibby Fire Tower Observation site (0.44 raptors per hour) and the B1 Clearcut site (0.52 raptors per hour). The average rate of observations for the spring 2006 season was 0.39 raptors per hour of effort. The highest rate of observation per unit effort occurred during the last two weeks of April. Spring daytime migrant surveys were not performed by Kenetech.

Similar fall studies, performed by Kenetech in 1992 and 1993, reported somewhat variant findings. In 1992 and 1993, broad-winged hawks were the most abundant species, recorded at 55 percent and 60 percent, respectively. In 2005, they were among the most abundant species, but were observed less frequently (19.8 percent) than in the previous studies. Instead, red-tailed hawks (which represented 14.7 percent of all observations in 1992, and made up only 3.3 percent of the observations in 1993) were the most abundant species observed in 2005 (32.1 percent of all observations). Ospreys have been recorded fairly consistently in each study year (i.e., about 13.5 percent of the observations). Other species have been recorded at varying degrees of relative abundance in each of the study years.

Three state- and/or federal-listed raptor species were recorded during fall 2005 surveys. Three bald eagles (*Haliaeetus leucocephalus* – State Threatened, Federal Threatened), two golden eagles (*Aquila chrysaetos* – State Endangered) and three peregrine falcons (*Falco peregrinus* – State Endangered) were observed, for a total of eight individual listed birds. Collectively, these eight individuals represent 3 percent of all raptors recorded during the 2005 season. No state- and/or federal-listed raptor species were recorded during spring 2006 surveys.

Listed species were also recorded during the previous Kenetech studies. One peregrine falcon was seen in 1992, and three peregrines and one bald eagle were seen in 1993. Golden eagles were not observed during the previous formal surveys; however, two were observed flying together near Kibby Range on September 10, 1993.

Non-Raptor Species

A total of 207 individual non-raptor migrants were recorded during daytime migration surveys in fall 2005. The majority of these (an estimated 109 individuals, or 52.7 percent of all non-raptor daytime migrants) were Canada geese, which were observed in three separate flocks.

In spring 2006, a total of 15 individual non-raptor migrants were recorded during daytime migration surveys. The majority of these (12 individuals, or 80 percent of all non-raptor daytime migrants) were double-crested cormorants, which were observed in one flock. All non-raptor species observed were recorded at the Kibby Fire Tower Observation site.

It should be noted that passerine observations were limited to a small area (a few hundred feet) around the observer. Passerines within several hundred feet of the surveyors' vantage point were more likely to be observed than those further away. In comparison, larger species such as raptors, Canada geese (*Branta canadensis*) (in the fall) and double-crested cormorants (*Phalacrocorax auritis*) (in the spring) could be seen thousands of feet away.

It should also be noted that the only species that were documented to be moving in flocks during fall surveys were Canada geese and blue jays (*Cyanocitta cristata*). Three large flocks of Canada geese passed through the Kibby Mountain vicinity during observation. These flocks were observed between 9 a.m. and 3 p.m., and they moved through the vicinity at high altitudes. Several small flocks (less than 12 birds per flock) of blue jays were observed. All blue jays were observed between 7 a.m. and noon, and they typically moved through the project area at low altitudes. In the spring, the only species that was documented to be moving in a flock was the double-crested cormorant. This flock was observed gliding and soaring at a relatively high elevation, in a northerly direction.

Aside from blue jays, the passerines that were documented were typically noted moving singularly or in pairs. These species typically migrate nocturnally, and in flocks. They were noted during daytime migration studies only if they were observed in continuous flight along a consistent trajectory. Most of these species were documented prior to 9 a.m., and many of them were observed to come up out of the trees and head off in continuous flight. It is possible that these movements were associated with morning dispersal of nocturnal migrants for the purpose of foraging; however, they were recorded as migrants for the purposes of this study.

Flight Path Observations

Raptor Species

The overwhelming percentage of raptor flight path observations in fall 2005 (78 percent) trend in a southeast-to-southwest direction, with considerably fewer observations (combined total = 22 percent) trending to the north/northeast, east/southeast, southwest/west, and west/northwest.

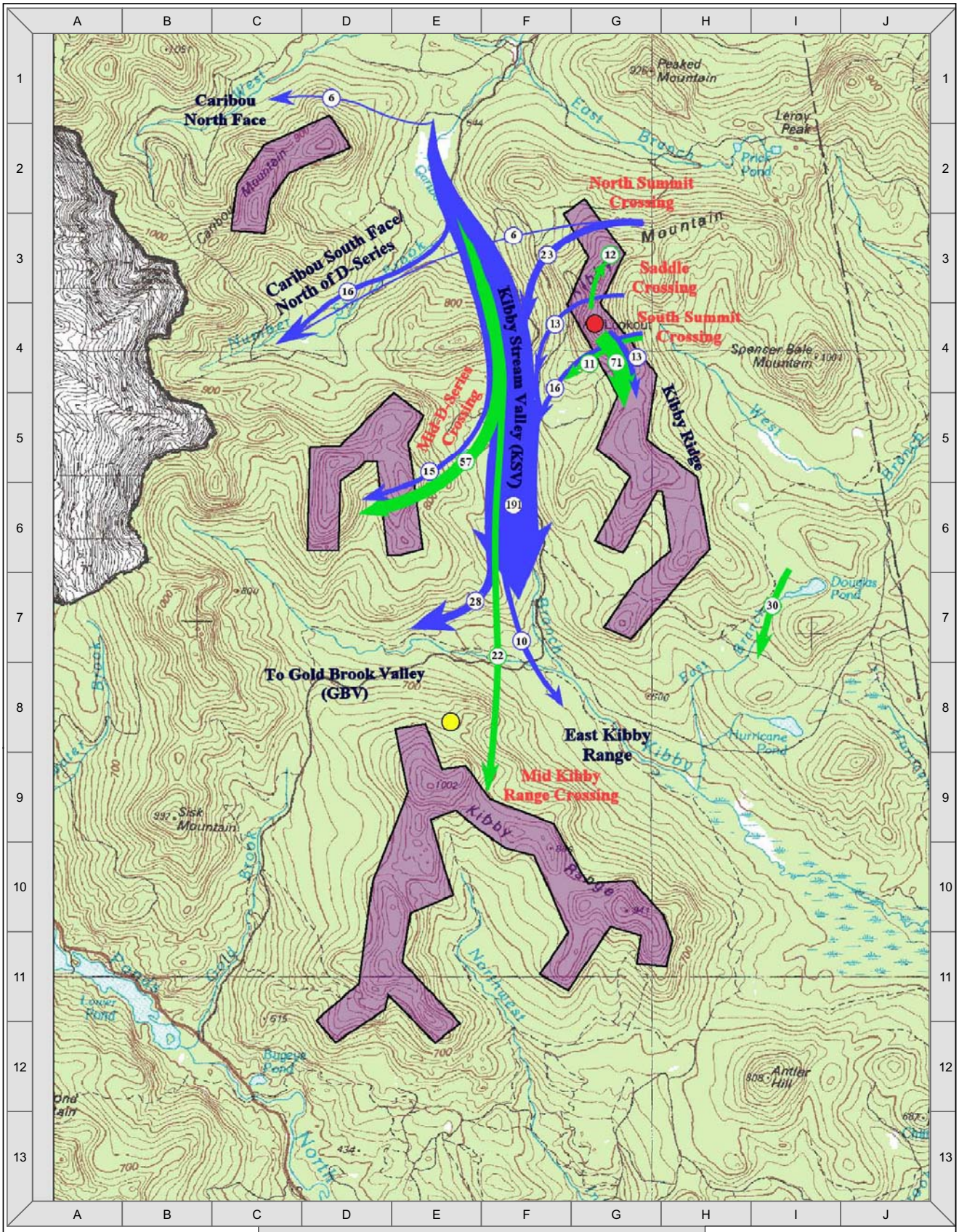
A diagrammatic representation of the flight paths used by migrating raptors through the project area during the fall 2005 migration season is depicted on Figure 7-39. The line weights of flight paths depicted on the figure are roughly relative to the number of birds documented to use that route; the actual numbers of birds using each flight path are also depicted. It should be stressed that the flight paths depicted are approximate, and based on the visual observations from the Kibby Mountain Lookout.

With respect to the effects of landscape features, as depicted on Figure 7-39, the majority (191 individuals) of raptors were first observed in the valley just west of the Kibby Mountain summit. Several others (71 individuals) approached from the northeast, crossing the north ridge of Kibby Mountain (i.e., north of the Kibby Mountain Lookout) in various locations. Most birds then traveled down Kibby Stream (Middle Branch) valley between Kibby Mountain and an unnamed mountain to the south west (D-Series), then toward the east shoulder of Kibby Range before going out of sight. This path appeared to have a divergence near the north summit of Kibby Range, where some birds (28 individuals) headed southwest to cross between the toe of D-Series ridge and the north end of Kibby Range; this route would lead to the Gold Brook valley on the west side of Kibby Range. Alternatively, some birds (10 individuals) continued southward along the east side of the Kibby Range. In most cases, birds were out of sight before their course at this divergence could be determined.

It should be noted that surveyors monitored the area 360 degrees around their vantage, and no raptors were observed to fly down the valley on the east side of Kibby Mountain. Rarely, individuals appeared on the east side of Kibby Ridge, but then crossed the mountain or traveled along the ridge to the Kibby Stream valley.

The flight paths described for fall 2005 are similar to those described for this area during the 1992 and 1993 Kenetech fall surveys (U.S. Windpower 1994).

The only migration routes that seemed to be dominated by a specific species were a west-southwesterly traverse through the valley between the south face of Caribou Mountain and the north summit of the D-Series ridge, and a westerly traverse along the north face of Caribou Mountain. These routes were frequented by red-tailed hawks, with most traffic occurring on one survey date. It is unclear if this trend was related to species preference or to ambient wind conditions on that day. During the fall 1993 survey, a similar flight path was observed by a number of raptors (U.S. Windpower 1994).



SITE LOCATION

Legend

- Lands Within the United States
- Lands Within Canada
- Project Location
- Raptor Flight Route
- Non-Raptor Flight Route
- Number of Birds
- Kibby Fire Tower Observation Site
- Kibby Range Alternate Observation Site

Miles 0 0.5 1

Figure 7-39

Kibby Wind Power Project

Daytime Migration Routes Fall 2005

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In the spring (shown in Figure 7-40), 69 percent (20 individuals) of the migrating raptors that were observed to be traveling in a consistent trajectory trended in a northeast to northwest direction, with 45 percent of all individuals heading generally north. The remaining nine individuals were observed to travel in various other random directions, with a small trend toward the south. This spike toward the south, however, represents the flight path of only three individuals.

With respect to the effects of landscape features in Spring migration, a large proportion of individual raptors (10) observed at the Kibby Fire Tower Observation Site crossed or traversed the north ridge of Kibby Mountain (i.e., north of the Kibby Fire Tower Observation Site). Two other raptors crossed Kibby Mountain south of the fire tower. Other raptors seen from this location were traveling north or south in the Middle Branch Kibby Stream valley, outside of the project area.

In spring most birds observed at Kibby Range crossed the ridge on the east side of the peak of the mountain. It is important to note however, that this was only five birds and in general, few raptors were observed at the Kibby Range sites.

Non-Raptor Species

A diagrammatic representation of the approximate flight paths of non-raptor species during the fall 2005 survey is depicted on Figure 7-39. The majority of non-raptor species during fall 2005 were Canada geese and blue jays, which were observed in a few discrete flocks. Other species were observed relatively infrequently. For this reason, data for analysis of flight direction are limited. However, based upon the limited data available, the flight paths of non-raptor species trend in either a north/northeast direction (28 percent) or a southeast/south direction (36 percent), with lesser contributions towards the west/southwest (14 percent), southwest (12 percent), southeast (4 percent), and east/southeast (6 percent).

In large part, however, the movements of passerines recorded during daytime migration surveys were inconsistent. Individuals were typically observed in continuous flight in a given trajectory, however, trajectories varied widely per individual. Many of the species that were recorded during daytime migrant surveys are typically considered to be night-time migrants. It is possible that their observed movements were for the purposes of distributing to other, more desirable foraging habitats.

All blue jays recorded (except one) traveled at tree-top level along the higher elevations of Kibby Mountain's ridge, and then turned down the Kibby Stream valley. One blue jay flew down the valley without first traversing the ridgetop.

Three flocks of Canada geese passed through the project area during the fall 2005 survey period. One flock of 30 individuals traveled down the valley to the east of Kibby Mountain. One flock of 22 traveled down the Kibby Stream valley, then crossed over Kibby Range

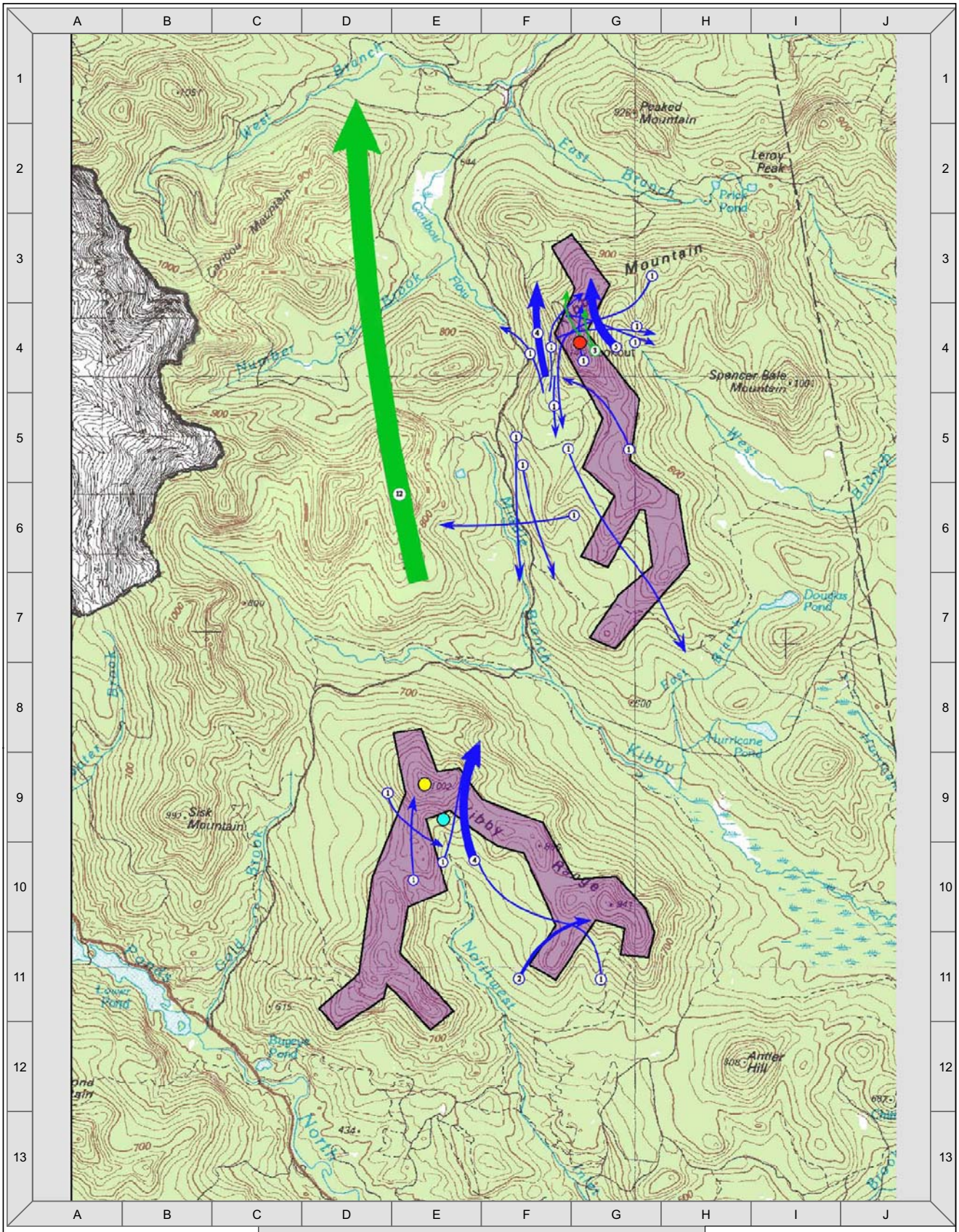

Figure 7-40

Kibby Wind Power Project

Daytime Migration Routes
Spring 2006

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approximately mid-way down its eastern ridge. One flock of 57 traveled down the Kibby Stream valley, then crossed D-Series ridge approximately mid-way down its eastern ridge.

Of 15 individual non-raptors recorded during the spring 2006 survey (including two American robins, one tree swallow, and a flock of 12 double-crested cormorants), all were heading north. A diagrammatic representation of the approximate flight paths of non-raptor species is also depicted on Figure 7-40.

Flight Paths and Flight Heights

Raptor Species

Most species moved through the Kibby vicinity at highly variable flight heights. For this reason, heights were only differentiated when birds passed within the project area. Flight height within the rotor swept area (RSA) of typical wind turbines was documented as (0) below, (1) within, or (2) above typical RSA height. Flight outside of the project area was recorded as a separate category (3). Each bird observed may have been recorded in one or more of these four categories while in the Kibby vicinity. Likewise, individuals may have been recorded in multiple flight height categories while in the project area.

Note that since the 2005 fall and the 2006 spring surveys were completed, the project area and layout has changed and removed several areas from consideration for turbine locations. Areas removed from the project construction area include three general areas: Caribou Mountain; the unnamed mountain known as the D-series; and the highest northern part of Kibby Mountain. The discussion below compares the changes, though the fall 2005 report, attached as Appendix 7-J, has not been changed to reflect the current layout. The spring 2006 report results and discussion has been updated to reflect the current layout, and is attached as Appendix 7-K.

Of 252 raptors recorded during the fall 2005 survey, in relation to the original project layout, 87 individuals (35 percent) were observed within the project area at some point in their flight path. The remaining 165 individuals (65 percent) never passed within the project area. Among the 87 raptors that were recorded to pass within the project area, 33 (13 percent of the total) passed within typical RSA height at some point during their flight. Thirty-one raptors passed below typical RSA height at some point during their flight, and 39 raptors passed above typical RSA height at some point during their flight. When reassessed with the current layout, the number of individuals observed within the project area at some point in their flight path drops to 14 (5 percent). With the current layout, the remaining 238 individuals (95 percent) never passed within the project area. Note on Figure 7-39 that many of these individuals follow the valleys south. Among the 14 raptors that were recorded passing within current project area, five (2 percent) passed within typical RSA height at some point during their flight. Six raptors passed below typical RSA height at some point during their flight, and 9 raptors passed above typical RSA height at some point during their flight.

Most instances of passage into the current project area during the fall consisted of brief traverses (or crossings) in four general areas. These areas include:

- Along the southern ridge of Kibby Mountain (10);
- Across the middle of Kibby Range (2);
- Across the east part of Kibby Range (1); and
- Across the north end of Kibby Range (1).

The areas listed above are depicted on Figure 7-39. The southern ridge of Kibby Mountain was the most traversed crossing, with 10 individuals documented; four of these were buteos, three were accipiters, and the remaining three included a peregrine falcon, a northern harrier and a turkey vulture. Passage within typical RSA height at this location occurred three times. Passage below typical RSA height occurred five times, and passage above typical RSA height occurred five times. The distance traversed along the ridge was highly variable per individual, but generally consisted of a traverse along a portion of the ridge before moving off its west slope into the Kibby Stream valley.

In spring 2006, of 31 raptors recorded, in relation to the original project layout, 22 individuals (71 percent) were observed within the project area at some point in their flight path. The remaining nine individuals (29 percent) never passed within the project area. Among the 22 raptors that were recorded to pass within the project area, six passed within typical RSA height at some point during their flight. Eighteen raptors passed below typical RSA height at some point during their flight, and three raptors passed above typical RSA height at some point during their flight. When reassessed with the current project construction layout, 13 individuals (42 percent) were observed within the project area at some point in their flight path. The remaining 18 individuals (58 percent) never passed within the project area. Among the 13 raptors that were recorded to pass within the project area, one passed within typical RSA height at some point during its flight. Twelve raptors passed below typical RSA height at some point during their flight, and two raptors also passed above typical RSA height at some point during their flight.

Most instances of passage into the project area consisted of brief traverses (or crossings). General areas of concentration are described herein based on primary geographic features where most crossings occurred. These areas are described as:

- The shoulder of B-Range, just east of the B1 summit (B-Range East of Summit) (6)
- The southern ridge of Kibby Mountain (2)
- The shoulder of B-Range, just west of the B1 summit (B-Range West of Summit) (2), and
- The southeastern toe of the B-Range (B-Range BII-2) (3).

Based on the original layout, five individuals of three state- or federal-listed species were documented within the project area during fall 2005. One bald eagle crossed the project area near the south summit of Kibby Mountain, at an elevation above typical RSA height. Two peregrine falcons were documented within the project area at Kibby Mountain. One peregrine

falcon crossed the north summit within typical RSA height, then traveled down Kibby Stream valley, outside of the project area. The other peregrine falcon appeared near the north summit and traversed along Kibby Ridge. It flew within typical RSA height near the summits, and then above typical RSA height toward the south end of the ridge. Two golden eagles passed within the project area: one crossed the north summit of Kibby Mountain within typical SA height, and the other crossed the D-Series ridge well above typical RSA height.

Based on the current layout, only one state-listed species was documented flying within the project area during fall 2005. One peregrine falcon appeared near the north summit and traversed along Kibby Ridge. It flew above typical RSA height toward the south end of the ridge.

Non-Raptor Species

A total of 207 non-raptor individuals were observed during the 2005 fall surveys. These included some small passerines, but were comprised mostly of Canada geese and blue jays. Three flocks of Canada geese passed through the Kibby vicinity during fall 2005 surveys. With the original layout, two of these flocks passed within the project area. One flock of 22 individuals traveled down the Kibby Stream valley, then, crossed over Kibby Range approximately mid-way down its eastern ridge. This crossing occurred within typical RSA height. One flock of 57 individuals traveled down the Kibby Stream valley, then crossed the D-Series ridge approximately mid-way down its eastern ridge. This crossing occurred at an elevation well above typical RSA height.

Several small flocks of blue jays, comprising 50 total individuals, were documented traveling along Kibby Ridge during fall 2005. These flocks traveled along the ridge for variable distances before moving off the west side of the ridge into the Kibby Stream valley. Most of the blue jays traveled at tree-top level, below typical RSA height; however, 11 individuals ascended to within typical RSA height at some point during their observed flight.

Based on the new layout, of all the non-raptors observed, only one of the flocks of geese passed within the project area. The flock of 22 individuals traveled down the Kibby Stream valley, then, crossed over Kibby Range approximately mid-way down its eastern ridge. As described above, this crossing occurred within typical RSA height.

Of 15 individual non-raptors observed in spring 2006, with the original layout, all (100 percent) passed within the project area at some point during their flight. A total of three passage events occurred within the typical RSA, while 12 passage events occurred above typical RSA. No birds were recorded below the RSA. When reassessed with the current layout, none passed within the project area.

Breeding Bird/Bicknell's Thrush Studies

Description of Study Program

In addition to the daytime migration and foraging surveys, TransCanada's consultants conducted a summer 2006 breeding bird survey designed to document use of the proposed

project area by breeding bird species, with a particular focus on detecting Bicknell's thrush. The primary components of this study included:

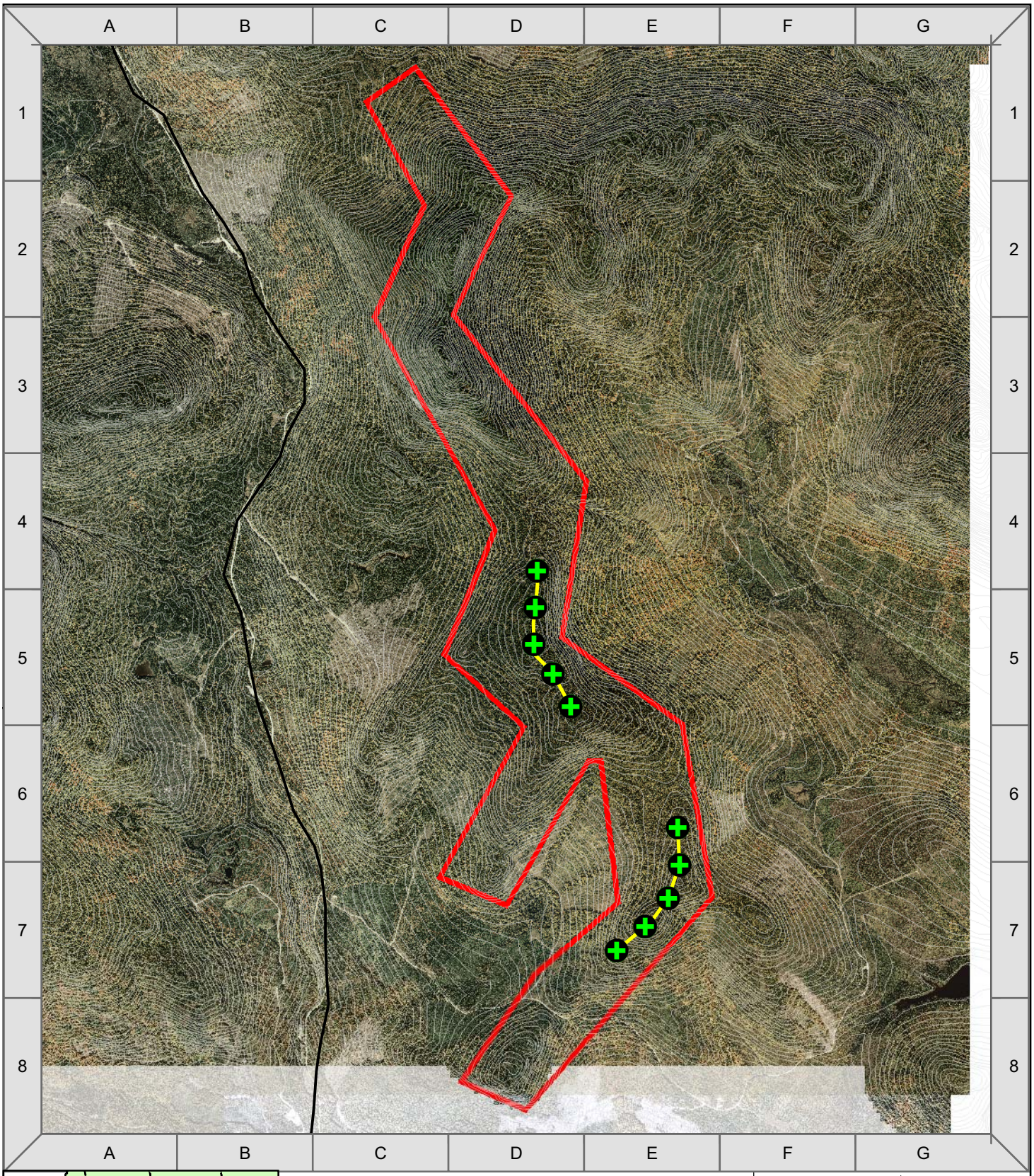
- compiling a species index and relative abundance for birds breeding in the project area;
- calculating frequency of occurrence for each species by dividing the number of survey transects where each species was detected by the total number of survey transects;
- collecting data at site plots for more detailed Bicknell's thrush studies (i.e., spot mapping); and
- estimating population density of Bicknell's thrush within the project area.

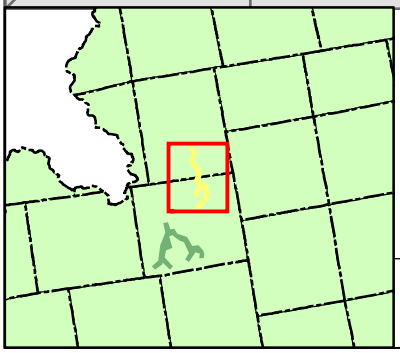
Point count survey procedures were based upon methods used in the Vermont Institute of Natural Science's Mountain Birdwatch program (VINS 2005) and Bird Studies Canada's High Elevation Landbird Program (HELP) (Whittam and Ball 2002, and 2003). These surveys were performed during the early morning hours starting at first light and at dusk. Seven transects, each consisting of five survey points were selected within the project area for point count studies. The transects were sited based on available habitat models for Bicknell's thrush, proposed turbine locations, and analysis of aerial photographs. Each transect consisted of five point counts spaced 820 feet (250 m) apart, for a total of 35 breeding bird point counts that were used for this study.

See Figures 7-41 and 7-42 for the location of these transects.

Point count surveys which failed to detect Bicknell's thrush were augmented by using playbacks to increase the likelihood of detecting this species. Playback protocol was based on those described by Rimmer et al. (1996), Whittam and Ball (2002 and 2003), and VINS (2005).

If Bicknell's thrush were found breeding in the study area, more detailed studies to estimate population density were to be undertaken. These surveys used spot-mapping techniques as presented in the United States Department of Agriculture (USDA) Forest Service's Handbook of Field Methods for Monitoring Landbirds (Ralph et al. 1993), and the United States Geological Survey (USGS) Manager's Monitoring Manual: Territory Mapping (USGS 2006). Close communication with MDIFW would continue throughout this effort. Specific methods are discussed in the attached report (see Appendix 7-N).





Survey Points

Transect

Project Boundary

GoldBrookRd

Notes: *Aerial photography: courtesy of James W. Sewall Company. Photo Date: September 2005.*

N

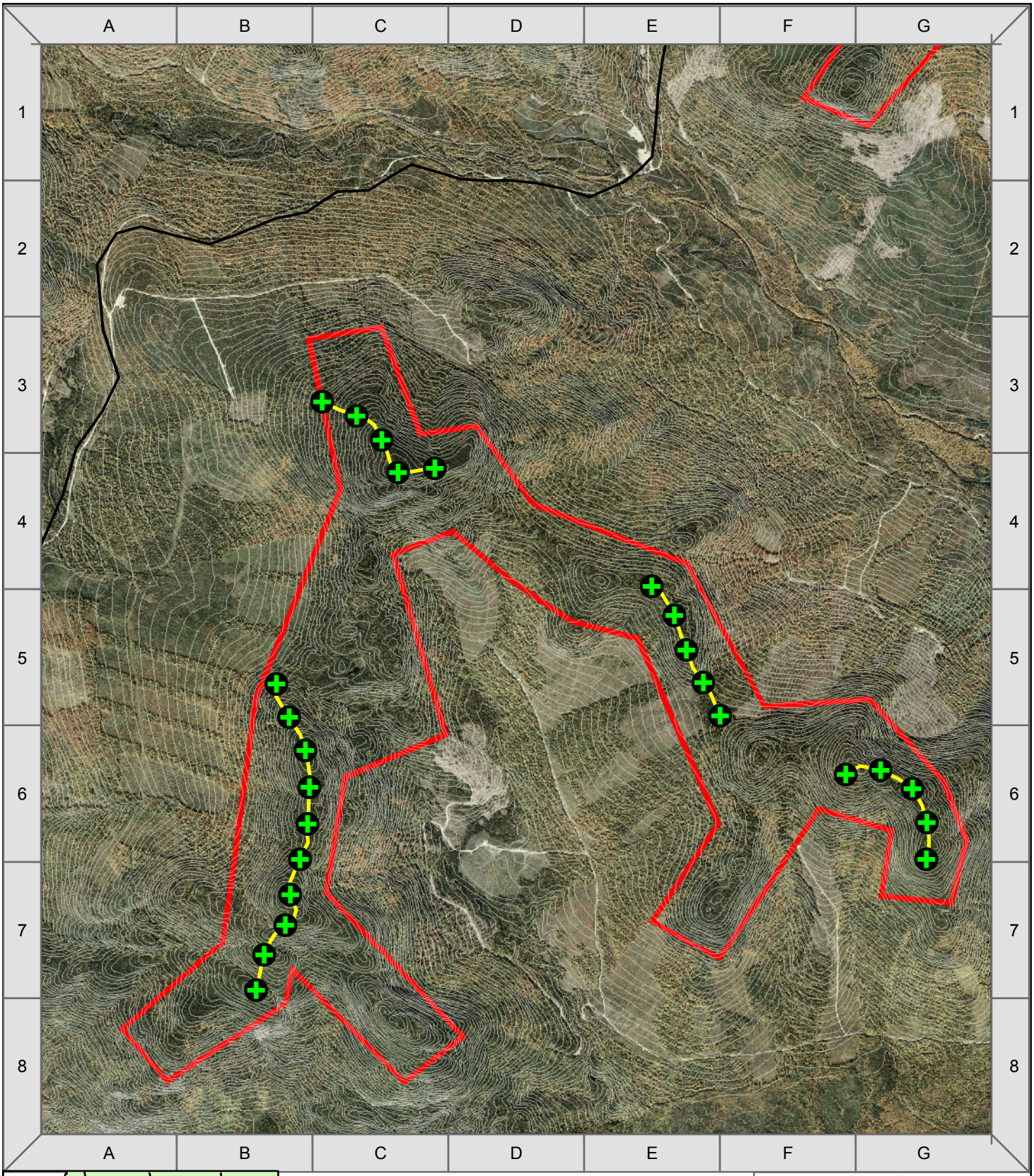
1,000

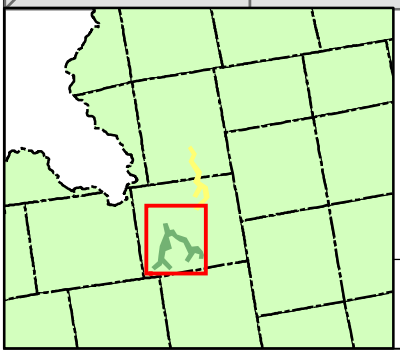
Meters

Figure 7-41

Kibby Wind Power Project

A-Series Breeding Bird Survey Transects





Survey Points

Transect

GoldBrookRd

Project Boundary

Notes: *Aerial photography: courtesy of James W. Sewall Company. Photo Date: September 2005.*

1,000

Meters

Figure 7-42

Kibby Wind Power Project

B-Series Breeding Bird Survey Transects

Habitat evaluation was performed using methods described by James and Shugart (1970). Quantitative estimates of vegetation were made using tenth-acre (0.04-hectare) circular plots, consisting of a 37-foot (11.3 m) radius around a center point. These plots were located at each survey point.

Survey Results

Prior Surveys

In 1992, Kenetech performed breeding bird surveys in the Kibby vicinity (ND&T 1993). Surveys were performed at 24 points at representative habitats and on or near tops of the mountains or ridges in the project vicinity. Each point was visited four times: twice in the morning (1/2 hour before sunrise to 9 a.m.); once between 9 a.m. and 5 p.m.; and once between 6 p.m. to 30 minutes after sunset. Each survey point visit lasted for 10 minutes. The study period was from June 1 through July 30. A species list from these 1992 surveys is provided in Table 7-4.

Table 7-4: Kenetech Ridge Top Breeding Bird List 1992

Species	Latin Name
Ruffed Grouse	*Bonasa umbellus*
Hairy Woodpecker	*Picoides villosus*
Black-backed Woodpecker	*Picoides arcticus*
Least Flycatcher	*Empidonax minimus*
Solitary Vireo	*Vireo solitarius*
Red-eyed Vireo	*Vireo olivaceus*
Gray Jay	*Perisoreus canadensis*
Common Raven	*Corvus corax*
Tree Swallow	*Tachycineta bicolor*
Black-capped Chickadee	*Poecile atricapillus*
Boreal Chickadee	*Poecile hudsonica*
Red-breasted Nuthatch	*Sitta canadensis*
Winter Wren	*Troglodytes troglodytes*
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
Veery	*Catharus fuscescens*
Gray-cheeked Thrush	*Catharus minimus*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratorius*
Cedar Waxwing	*Bombycilla cedrorum*
Chestnut-sided Warbler	*Dendroica pensylvanica*
Magnolia Warbler	*Dendroica magnolia*
Black-throated Blue Warbler	*Dendroica caerulescens*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Green Warbler	*Dendroica virens*
Blackburnian Warbler	*Dendroica fusca*
Palm Warbler	*Dendroica palmarum*
Bay-breasted Warbler	*Dendroica castanea*
Blackpoll Warbler	*Dendroica striata*
American Redstart	*Setophaga ruticilla*
Ovenbird	*Seiurus aurocapilla*

Species	Latin Name
Mourning Warbler	*Oporornis philadelphia*
Common Yellowthroat	*Geothlypis trichas*
Canada Warbler	*Wilsonia canadensis*
Fox Sparrow	*Passerella iliaca*
White-throated Sparrow	*Zonotrichia albicollis*
Chipping Sparrow	*Spizella passerina*
Dark-eyed Junco	*Junco hyemalis*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Pine Grosbeak	*Pinicola enucleator*
Purple Finch	*Carpodacus purpureus*
Pine Siskin	*Carduelis pinus*

In June and July 1992, a total of four Bicknell's thrush individuals were observed in the Kibby project area during breeding bird surveys[2].

During visits in June 2005 to the project area, Bicknell's thrush was not encountered. However, during fall 2005 migration surveys outside of the current project layout at the fire tower on Kibby Mountain, three Bicknell's thrush and one unidentified thrush were observed.

Spring/Summer 2006 Study Implementation

A total of 29 breeding bird surveys were completed along seven transects between June 1 and June 21, 2006. Nineteen were completed at first light, and another 10 were completed at dusk. Additional surveys were performed at transect B1 due to observations of Bicknell's thrush near and along that transect in early June in an attempt to locate an appropriate area for more detailed Bicknell's thrush surveys (i.e., spot-mapping).

The data were analyzed by survey transect, as opposed to point count or project area, to give the best summary of information gathered while also revealing the diversity of bird habitats within the project area.

Species Identified and Avian Diversity

A total of 1,022 birds were counted, with 1,006 identified to species, four identified to genera, and 12 unidentified. These comprised 34 species in 23 genera, plus two genera not identified to species. Table 7-5 provides a listing of breeding bird species encountered.

The number of avian species found in the project area during the 2006 surveys is similar to those observed during the surveys performed in 1992 for Kenetech. The numbers of species found in the project area are also comparable to that found in other higher elevation spruce-fir-hardwood forests in the Northeast (Rimmer et al. 2006). The most diverse transect was B4, with

[2] Note that until 1995, Bicknell's thrush was not recognized as a species by the American Ornithologist Union (AOU), and was considered a subspecies to the gray-cheeked thrush.

19 species recorded. The least diverse was B3 with 13 species. Sixteen, or 47 percent, of the species identified during the 2006 surveys were neo-tropical migrants.

An additional 39 species in 30 genera were seen during incidental observations in June 2006 in the Kibby vicinity, but not on the breeding bird survey transects. Many of these sightings were at lower elevation and in different cover types than those found on the ridges during other studies or during travel to and from the breeding bird survey transects.

Relative Abundance

The maximum, average, and frequency of individuals were used to assess the relative abundance for each species. The maximum number of breeding individuals at all 35 point counts combined was 506 individuals, with Swainson's thrush (*Catharus ustulatus*) making up 20 percent of the birds observed: darkeyed juncos (*Junco hyemalis*) comprised 11 percent, and yellowrumped warbler (*Dendroica coronata*), white-throated sparrow (*Zonotrichia albicollis*), and winter wren (*Troglodytes troglodytes*) each accounted for about 10 percent of the maximum number of breeding birds. Transect B1 had the greatest number of possible breeding individuals, with a total of 90.

The total average number of breeding birds along the transects was 248.13 ± 5.5SD. Transect A1 had the greatest average number of breeding birds, 42, and B4 the next highest with 41.7. Swainson's thrush accounted for 26 percent of these averages. Winter wrens accounted for 12.2 percent, white-throated sparrows for 11.8 percent, yellow-rumped warbler for 10.8 percent, and dark-eyed juncos for 8.9 percent.

The most common bird detected was the Swainson's thrush. This species was present on every survey and also had the highest average and maximum number detected. Additionally, blackpoll warbler, golden-crowned kinglet, magnolia warbler, yellow-rumped warbler, dark-eyed junco, winter wren, and white-throated sparrow were found along each transect. The following 10 most common species were: blackpoll warbler, boreal chickadee, black-throated blue warbler, golden-crowned kinglet, hermit thrush, magnolia warbler, yellow-rumped warbler, dark-eyed junco, winter wren, and white-throated sparrow.

Table 7-5: Breeding Bird Species List

Family	AOU Code	Common Name	Latin Name	Residence*	Nest Found
Anatidae	Waterfowl	Unknown Waterfowl	*Anatidae spp.*		
Phasianidae	RUGR	Ruffed Grouse	*Bonasa umbellus*	L	
	YBSA	Yellow-bellied Sapsucker	*Sphyrapicus varius*	US	
	DOWO	Downy Wookpecker	*Picoides pubescens*	L	
	HAWO	Hairy Woodpecker	*Picoides villosus*	L	
	BBWO	Black-backed Woodpecker	*Picoides arcticus*	L	Y
Picidae	Woodpecker	Unidentified Woodpecker	*Picadae spp.*		
	YBFL	Yellow-bellied Flycatcher	*Empidonax flaviventris*	NT	
Tyrannidae	LEFL	Least Flycatcher	*Empidonax minimus*	NT	
	BHVI	Blue-headed Vireo	*Vireo solitarius*	US/NT	
Vieonidae	REVI	Red-eyed Vireo	*Vireo olivaceus*	NT	
	GRJA	Gray Jay	*Perisoreus canadensis*	L	
Corvidae	BLJA	Blue Jay	*Cyanocitta cristata*	US/L	
	BCCH	Black-capped Chickadee	*Poecile atricapillus*	L	
Paridae	BOCH	Boreal Chickadee	*Poecile hudsonica*	L	
Sittidae	RBNU	Red-breasted Nuthatch	*Sitta canadensis*	L/US	
Certhiidae	BRCR	Brown Creeper	*Certhia americana*	L/US	Y
Troglodytidae	WIWR	Winter Wren	*Troglodytes troglodytes*	US	
Regulidae	GCKI	Golden-crowned Kinglet	*Regulus calendula*	L/US	
	BITH	Bicknell's Thrush	*Catharus bicknelli*	NT	
	SWTH	Swainson's Thrush	*Catharus ustulatus*	NT	Y
Turdidae	HETH	Hermit Thrush	*Catharus guttatus*	US	
Bombycillidae	CEDW	Cedar Waxwing	*Bombycilla cedrorum*	L/US	
	NAWA	Nashville Warbler	*Vermivora ruficapilla*	NT	
	PAWA	Palm Warbler	*Dendroica palmarum*	NT	
	MAWA	Magnolia Warbler	*Dendroica magnolia*	NT	
	BTBW	Black-throated Blue Warbler	*Dendroica caerulescens*	US/NT	
	MYWA	Myrtle Warbler	*Dendroica coronata*	US/NT	
	BTGW	Black-throated Green Warbler	*Dendroica virens*	NT	
	BLPW	Blackpoll Warbler	*Dendroica striata*	US/NT	
	AMRE	American Redstart	*Detophaga ruticilla*	NT	
	OVEN	Ovenbird	*Seiurus aurocapillus*	US/NT	Y
Parulidae	MOWA	Mourning Warbler	*Oporornis philadelphia*	NT	
	WTSP	White-throated Sparrow	*Zonotrichia albicollis*	US	Y
Emberizidae	SCJU	Slate-colored Junco	*Junco hyemalis*	L/US	Y
Fringillidae	PUFI	Purple Finch	*Carpodacus purpureus*	L/US	
Unknown	Unknown	Unidentified passerine	NA		
Total Species	36				

* L – Local year round resident; US – Migrates within US; NT – Neotropical migrant

Summary of Bicknell's Thrush Surveys

During the breeding bird surveys, an emphasis was placed on detecting breeding Bicknell's thrush. Bicknell's thrush is recognized as a "Species of Special Concern" by the State of Maine. This designation refers to "any species of fish or wildlife that does not meet the criteria as Endangered or Threatened but is particularly vulnerable and could easily become a Threatened Species or an Endangered or Extirpated Species due to restricted distribution, low or declining numbers, specialized habitat needs or limits, or other factors, or is a species suspected to be Endangered or Threatened or likely to become so but for which insufficient data are available" (12 M.R.S.A. Part 10 Chapter 701).

Bicknell's thrush breeds in high elevation, high density, complex, small diameter fir-spruce habitats that are somewhat disturbed. Dead standing snags, blown-down trees, and dense regeneration are typical components of this habitat (personal communication with Chris Rimmer, August 24, 2006). It is a montane forest specialist, and considered one the rarest and range restricted species of the northeast (Rimmer and Faccio 2004).

Bicknell's Thrush Observed During Breeding Bird Surveys

During the breeding bird surveys completed in June 2006, Bicknell's thrush were observed on five occasions along transect B1. This transect, as with all the transects, is in close proximity to and within the current project area. Bicknell's thrush were not found on any other transect. The five observations at B1 all occurred during the first week of June, scattered among three different points (see Figure 7-43). During two later surveys at transect B1 (June 18 and 21), Bicknell's thrush was not encountered.

Since B1 was the only transect where Bicknell's thrush was observed, it was the only potential area for estimating Bicknell's thrush density (i.e., spot-mapping). A systematic search for potential Bicknell's thrush habitat was performed along the B1 transect, extending 492 feet (150 m) out from the transect. Three potential sites were identified and then returned to for additional dawn surveys on June 16, 17, 18, and 19. No Bicknell's thrush were detected during these surveys.

Bicknell's thrush was observed in two locations outside of the project area: one was at a non-ridge area that was cut in 1994, and is dominated by dense, small fir. The access trail to the B1 transect traverses this area (see Figure 7-44). The other area was near the fire tower on Kibby Mountain. This is a high elevation habitat dominated by dense, small fir (see Figure 7-45). Singing Bicknell's thrush were observed in these areas throughout the breeding season.