

**Spring 2006 Daytime Avian Migration Survey  
Report for the  
Kibby Wind Power Project**

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## **1.0 PROJECT DESCRIPTION**

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TransCanada Energy Ltd. (TransCanada) is proposing to develop, own and operate a 100–200 megawatt (MW) wind power generating facility in the Boundary Mountains of Western Maine known as the Kibby Wind Power Project. The project is in a location for which a similar project proposal by U.S. Windpower was previously approved by the Land Use Regulation Commission (LURC).

The project will be located in Kibby and Skinner Townships (Twp.), an unincorporated area of Franklin County, Maine. At the time the study was conducted, up to four ridgelines were under consideration for turbine locations, as shown in Figure 1. The property is owned by Plum Creek, and the surrounding areas are currently actively managed for forest products. The Kibby Wind Power Project can take advantage of existing logging roads and cleared areas to access the ridgelines, and forestry activities can continue in a complementary fashion with the project in place. The project will utilize the superior wind resource found in this vicinity to create clean, renewable power generation.

In order to characterize flight paths used by daytime migrants through the project area, TransCanada performed daytime migrant surveys in the proposed project area.

### **1.1 Objectives**

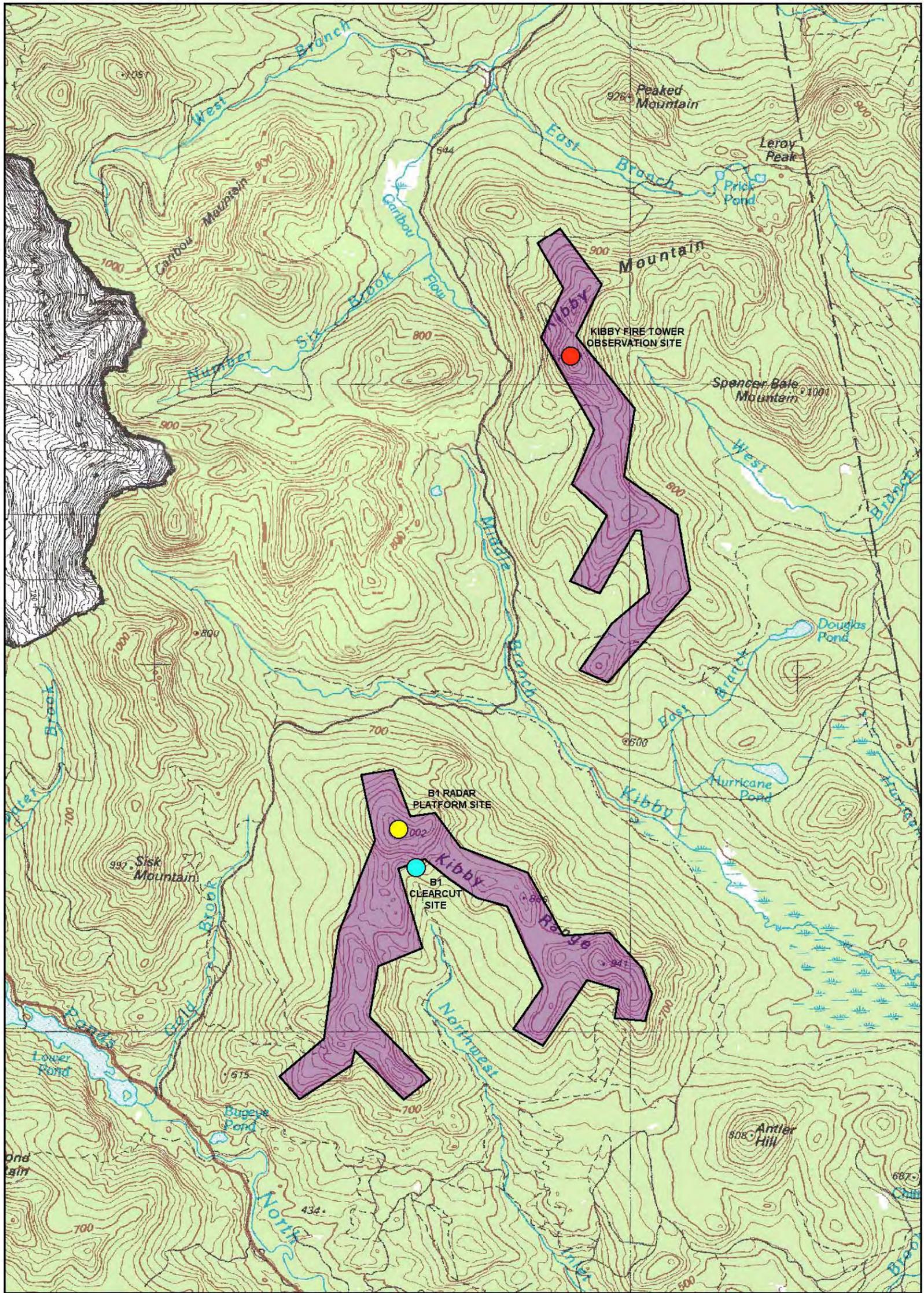
The main objectives of spring 2006 daytime avian migration surveys were to:

- Obtain a quantitative assessment of species composition, relative abundance, distribution, spatial patterns of use, and flight characteristics utilized by birds migrating during daytime hours in the Kibby vicinity and in the project area; and
- Identify route(s) used by daytime migrating birds passing through the Kibby vicinity and the project area.

### **1.2 Prior Studies**

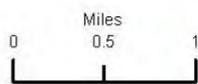
In 1992 and 1993, U.S. Windpower monitored fall raptor migration in the Kibby vicinity (NEWES 1993; U.S. Windpower 1994). Likewise, TransCanada performed a raptor migration study for this area in fall 2005. To date, however, no prior spring raptor migration studies have been performed in this area.

Figure 1: Project Location



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



SITE LOCATION



**TRC**

KIBBY WIND POWER PROJECT

PROJECT LOCATION MAP  
WITH 2006 SPRING AVIAN MIGRATION STUDY  
OBSERVATION LOCATIONS

FIGURE 1

## **2.0 STUDY METHODOLOGY**

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### **2.1 Survey Protocol**

The methods for the daytime migrant survey protocol are largely based on methods used during daytime migrant monitoring performed for U.S. Windpower for this site and standards set forth by the Hawk Migration Association of North America (HMANA), and by HawkWatch International (Hoffman and Smith 2003). An interagency meeting with Maine Department of Inland Fisheries and Wildlife (MDIFW), United States Fish and Wildlife Service (USFWS), LURC, Maine Department of Environmental Protection (MDEP), and United States Army Corps of Engineers (USACE) was held August 18, 2005, to discuss proposed migration studies for the Fall 2005. During this discussion, Mr. Thomas Hodgman, MDIFW Bird Group, noted that the daytime migration studies performed for U.S. Windpower were a good model to follow. Written comments were also submitted by Mr. Hodgman, August 30, 2005, which stated that the proposed protocol (see Appendix A) was adequate.

Another interagency meeting was held on February 23, 2006, to discuss plans for field work plans for spring and summer of 2006. At this meeting, Tom Hodgman stated that he thought it would be helpful to perform daytime migrant surveys at two locations simultaneously on each ridge to see if there was any correlation between the migrants flight between the different sites. TRC proposed to survey for migrants at two locations, one on Kibby Range and at the fire tower on Kibby Mountain and coordinate the two locations via radio.

#### ***2.1.1 Survey Site Locations***

The Kibby Mountain lookout tower, a 15-foot tall fire tower, was selected as one of the observation points for spring 2006 daytime migration surveys due to its northern location in relation to the project area and its 360-degree viewshed. This location is identified on Figure 1, and referred to in this report as “Kibby Fire Tower Observation Site.” Another site was located in a clear-cut on the southern slope of Kibby Range (“B1 Clear-cut Site” on Figure 1). The third site that was used was on the radar platform on the highest peak of Kibby Range, which was located at the B1 met tower site (“B1 Radar Platform Site” on Figure 1). This site was used on a few occasions, but it was discovered that visibility from the platform was very limited when compared to the viewshed from the Clear-cut Site; for this reason, it was decided that the platform was not a preferred observation location.

#### ***2.1.2 Number and Timing of Surveys***

Surveys were performed during periods of favorable weather for migration, i.e., preferably timed to start the morning after the passage of a warm front and winds from the south, 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. During the spring of 2006 there were few days with strong winds out of the south, and days with adequate visibility were limited. Due to the lack of ideal conditions, days with clear weather were targeted instead. 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 was approximately 6 hours per site per event.

### ***2.1.3 Surveyor Preparedness***

For the daytime migrant surveys, surveyors were familiarized with the topography of the area (including the elevation of the survey site, surrounding ridge elevations and distances from the sampling site, and tree height) prior to starting surveys. Each surveyor was trained in the methodology, and was expected to become familiar with the survey area prior to commencing surveys. Only persons experienced in bird identification performed these surveys.

### ***2.1.4 Data Collection***

Detailed weather and migratory bird observation data were collected during each survey. Data were entered on data sheets developed specifically for this project based on those used by HMANA (2005). Data were entered using codes and guidelines as suggested by HMANA (see Appendix B), with the exception that flight heights were characterized by relative height and location in relation to typical wind turbine heights instead of their position in relation to eye level (see Section 2.1.4.2).

#### ***2.1.4.1 Weather Observations***

Weather conditions were noted at the beginning of each survey and hourly thereafter if changes occurred. Data were collected based on codes and protocol used by HMANA, and were recorded directly onto weather observation data sheets. Parameters recorded included wind speed (estimated using Beaufort scale), wind direction (compass direction from which the wind is coming, or “variable”), temperature (degrees Celsius), relative humidity (as recorded daily for Berlin, New Hampshire), barometric pressure (as recorded daily for Berlin, New Hampshire), percent cloud cover (visually estimated by observer), visibility (distance estimated by observer based on landmarks and topography of known distances from observation point), and precipitation (general descriptions, such as light mist, drizzle, etc.).

#### ***2.1.4.2 Individual Bird Observations***

When collecting data for daytime migrant surveys, surveyors performed continuous scanning with the naked eye and with binoculars. Typically, several hours of consecutive data were collected during each survey event. Each bird was watched for as long as the surveyor was able to see it with binoculars. If instances arose where several birds passed at once, then efforts were made to keep track of all individuals. Rarely, observation of an individual bird may have been truncated in order to observe an incoming individual. In most instances, surveyors were able to watch each individual continuously from the time it was detected until it was out of sight. The following data were recorded for each bird observed:

- Species (if possible)
- Sex (if possible)

- Age class (if possible)
- Flight height at first observation, and any changes during observation. Flight height was documented in three categories relative to typical wind turbine rotor swept area (RSA) height for passage within the project area. A fourth category was used for flight outside of the project area. Categories were recorded as:
  - (0) below typical RSA height (less than 100 feet above the ground);
  - (1) within typical RSA height (between 100 and 300 feet above the ground); and
  - (2) above typical RSA height (greater than 300 feet above the ground); and
  - (3) outside of project area.
- General location at first detection, and general course of flight over duration of observation
- Activity, including soaring (wings and tail fully spread, wings not flapping, usually riding air currents upward), flapping (continuous wing-beats during flight), gliding (downward coasting flight with wing tips pulled back, tails typically closed), perching, hunting, and other
- General compass bearing flight direction (S, SSW, NE, etc.)

It should be noted that flight heights were estimated using relative known elevations of various geographic features. For example, the known difference in elevation of a saddle and its adjacent peak/s was used to as a reference to estimate the flight height of a bird passing through that area. Approximate tree heights at various locations were also considered when estimating flight height.

Also, birds traveling in groups were recorded as flocks (see Section 2.1.4.3) if they shared common data parameters. Individuals within a group were recorded separately if data parameters (such as species, flight height, etc.) varied within the group.

#### *2.1.4.3 Flock Observations*

Flock observations were treated in the same way as individual bird observations, with counts or estimates of the number of birds comprising the flock. Groups were treated as flocks only if all data parameters were common to all individuals within the group for the entire duration of observation.

#### *2.1.4.4 Field Quality Assurance and Quality Control*

Data sheets were reviewed for completeness, accuracy, and legibility prior to leaving the survey site. Any problems noted were rectified at that time, and any changes to the data sheets were initialed by the person making the change (if other than the original observer).

## 2.2 Data Analysis

Data were entered into and stored in a numerical database or spreadsheet format.

The following summaries and statistics were generated, as applicable, to address the objectives and goals of this study.

- Species lists and indices of bird relative abundance;
- Flight paths and heights, by species;
- Number of observations, by species, within the project area;
- Number and proportion of observations, by species, within typical wind turbine RSA height; and
- Frequency of activities observed.

## 3.0 RESULTS AND DISCUSSION

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### 3.1 Species Identified and Relative Abundance

The passage of both raptor and non-raptor migratory species was documented during daytime migration surveys. Raptor and non-raptor groups are discussed respectively in Sections 3.1.1 and 3.1.2, below.

#### 3.1.1 *Raptor Species*

Daytime migration surveys were performed on eight dates between April 12 and May 5, 2006. Surveys where two sites were observed simultaneously occurred on April 19, 20, 26, 27, 28, and May 5. Surveys where only the Kibby Fire Tower Observation Site was used occurred on April 12 and May 4. 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.

A total of 31 individual raptors were recorded, representing at least eight different species from at least five genera (Table 1). 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 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 (Table 2).

Buteos were most abundant, comprising 35.5 percent of all individual raptors recorded. Cathartids (vultures) made up 25.8 percent of all individuals recorded, and Accipiters comprised 19.4 percent of all individuals recorded. 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). All other genera/species combined comprised 22.6 percent of all observations. See Table 1.

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. See Table 2.

No state- and/or federal-listed raptor species were recorded during spring 2006 surveys. It should be noted, however, that several listed species were occasionally observed during fall 1992, 1993, and 2005 surveys (NEWES 1993, US Windpower 1994, TRC 2006). These included bald eagle, golden eagle, and peregrine falcon.

**Table 1: Raptor Species Observed During Spring 2006 Daytime Migration Surveys, and their Relative Abundance**

Species	Latin Name	Number Observed	Relative Abundance
<b>Buteo</b>			
Red-tailed hawk	<i>Buteo jamaicensis</i>	7	22.6%
Broad-winged hawk	<i>Buteo platypterus</i>	4	12.9%
<b>Subtotal</b>		<b>11</b>	<b>35.5%</b>
<b>Accipiter</b>			
Sharp-shinned hawk	<i>Accipiter striatus</i>	5	16.1%
Cooper's hawk	<i>Accipiter cooperii</i>	1	3.2%
<b>Subtotal</b>		<b>6</b>	<b>19.4%</b>
<b>Pandion</b>			
Osprey	<i>Pandion haliaetus</i>	1	3.2%
<b>Subtotal</b>		<b>1</b>	<b>3.2%</b>
<b>Falco</b>			
American kestrel	<i>Falco sparverius</i>	2	6.5%
Merlin	<i>Falco columbarius</i>	2	6.5%
<b>Subtotal</b>		<b>4</b>	<b>13.0%</b>
<b>Cathartes</b>			
Turkey vulture	<i>Cathartes aura</i>	8	25.8%
<b>Subtotal</b>		<b>8</b>	<b>25.8%</b>
<b>Unknown Raptors</b>			
Raptor sp. (sm)	N/A	1	3.2%
<b>Subtotal</b>		<b>1</b>	<b>3.2%</b>
<b>TOTALS</b>		<b>31</b>	<b>100.0%</b>

**Table 2: Number of Raptors Observed Per Hour of Effort, by Date**

Date	Kibby Fire Tower			B1 Clearcut			B1 Radar Platform			TOTALS		
	Hours of Observation	Number of Raptors	Raptors / Hour	Hours of Observation	Number of Raptors	Raptors / Hour	Hours of Observation	Number of Raptors	Raptors / Hour	Hours of Observation	Number of Raptors	Raptors / Hour
4/12/2006	6	3	<b>0.50</b>	0	n/a	n/a	0	n/a	n/a	6	3	<b>0.50</b>
4/19/2006	6	0	<b>0.00</b>	6.5	4	<b>0.62</b>	0	n/a	n/a	12.5	4	<b>0.32</b>
4/20/2006	6.25	5	<b>0.80</b>	6.25	4	<b>0.64</b>	0	n/a	n/a	12.5	9	<b>0.72</b>
4/26/2006	6	6	<b>1.00</b>	5.5	2	<b>0.36</b>	0	n/a	n/a	11.5	8	<b>0.70</b>
4/27/2006	5.25	1	<b>0.19</b>	0	n/a	n/a	6	0	<b>0</b>	11.25	1	<b>0.09</b>
4/28/2006	5	1	<b>0.20</b>	0	n/a	n/a	6	0	<b>0</b>	11	1	<b>0.09</b>
5/4/2006	4	2	<b>0.50</b>	0	n/a	n/a	0	n/a	n/a	4	2	<b>0.50</b>
5/5/2006	5	1	<b>0.20</b>	5	2	<b>0.40</b>	0	n/a	n/a	10	3	<b>0.30</b>
<b>TOTALS:</b>	<b>43.5</b>	<b>19</b>	<b>0.44</b>	<b>23.25</b>	<b>12</b>	<b>0.52</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>78.75</b>	<b>31</b>	<b>0.39</b>

### 3.1.2 Non-Raptor Species

A total of 15 individual non-raptor migrants were recorded during daytime migration surveys (Table 3). The majority of these (12 individuals, or 80 percent of all non-raptor daytime migrants) were double-crested cormorants, which were observed in 1 flock. All non-raptor species observed were recorded at the Kibby Fire Tower Observation site.

**Table 3: Non-Raptor Species Observed During Spring 2006 Daytime Migration Surveys, and their Relative Abundance**

Species	Latin Name	# Observed	Relative Abundance
Double-crested cormorant	<i>Phalacrocorax auritus</i>	12	80%
American robin	<i>Turdus migratorius</i>	2	13.3%
Tree swallow	<i>Tachycineta bicolor</i>	1	6.7%
<b>TOTALS:</b>		15	100.0%

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 and cormorants could be seen thousands of feet away.

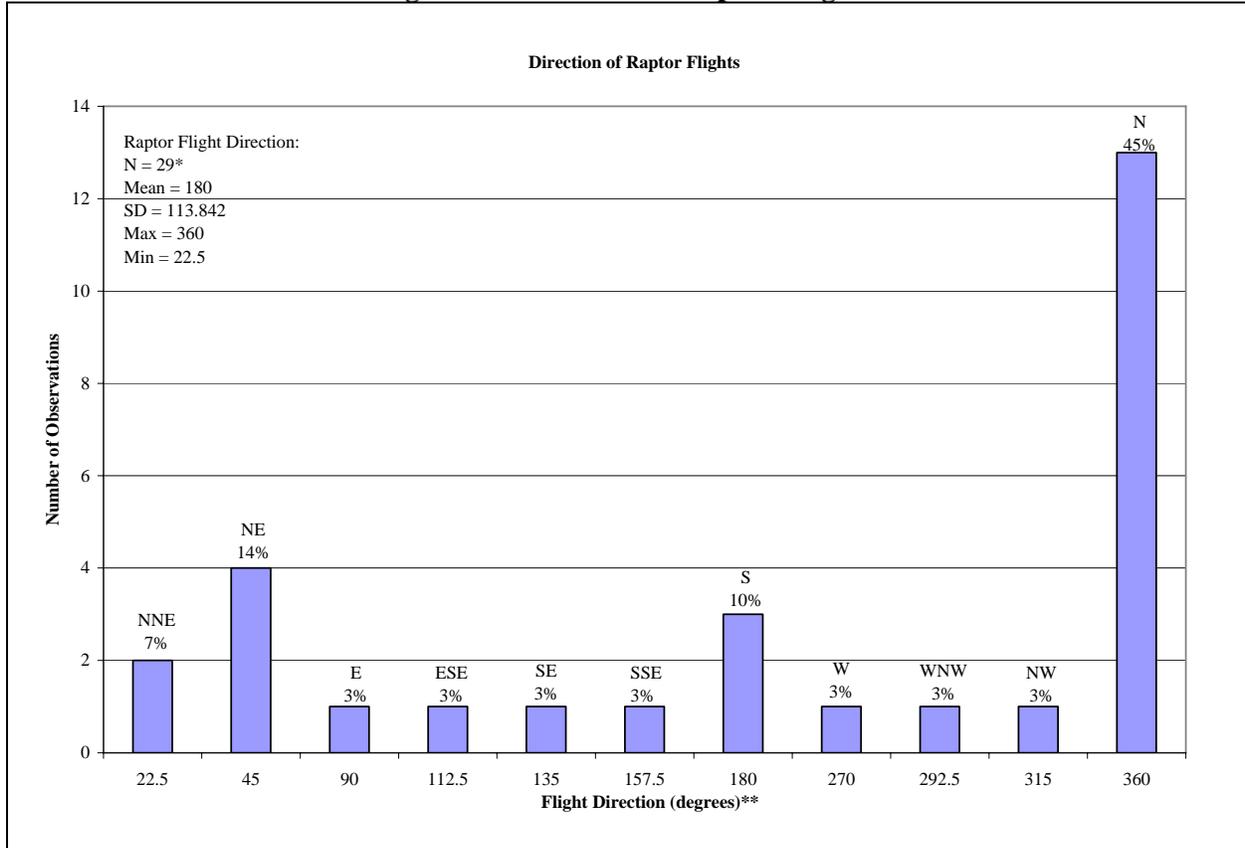
It should also be noted that the only species that were documented to be moving in a flock was the double-crested cormorants. This flock was observed gliding and soaring at a relatively high elevation, in a northerly direction.

## 3.2 General Flight Paths Observed in the Kibby Vicinity

### 3.2.1 Raptor Species

As illustrated in Figure 2, 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 9 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 3 individuals.

**Figure 2: Direction of Raptor Flights**



\* Two turkey vultures with “variable” flight direction has been omitted from this data set.

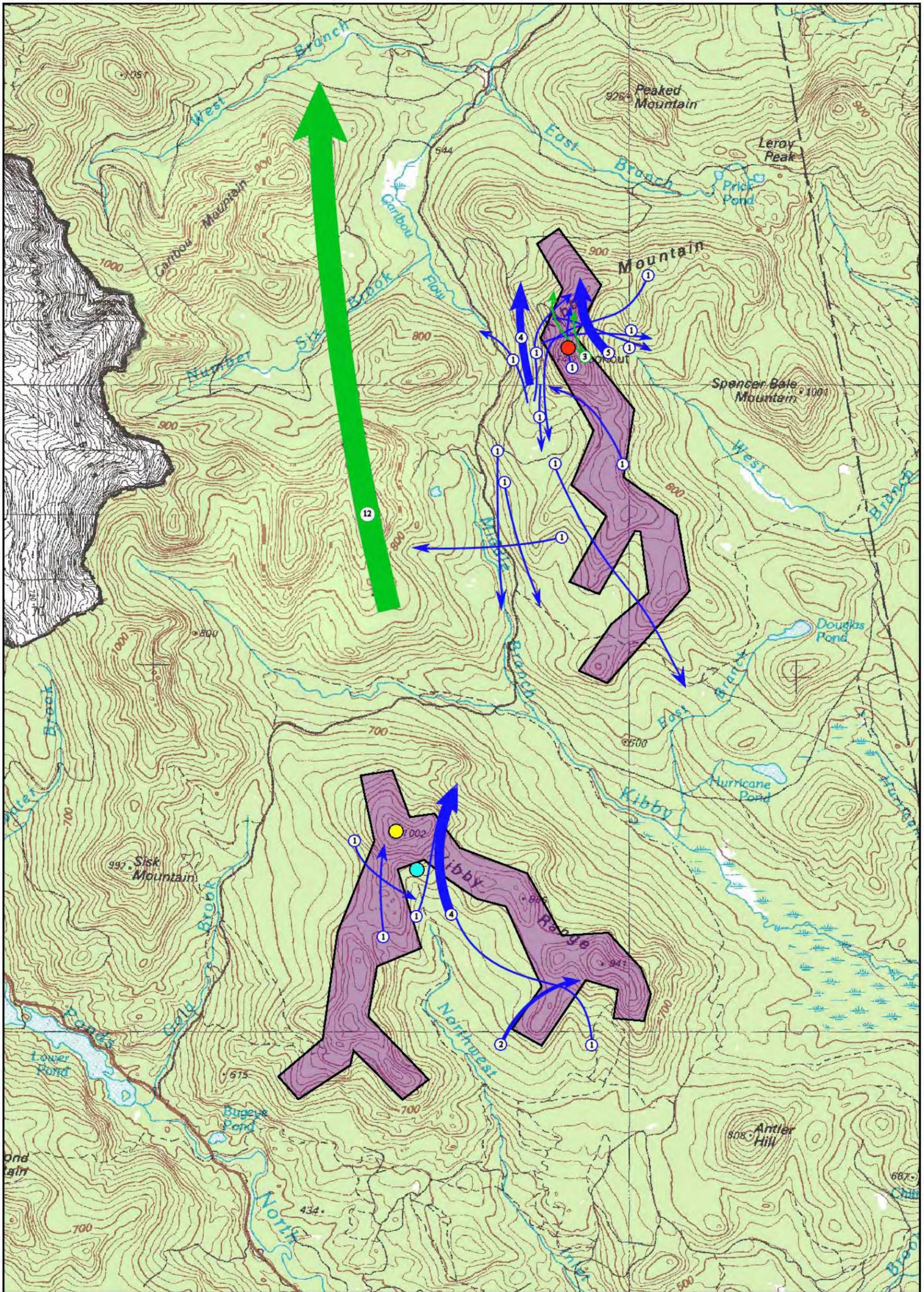
\*\* (N=360°; E = 90°; S=180°; and W=270°)

A diagrammatic representation of the flight paths used by migrating raptors through the project vicinity during the spring 2006 migration season is depicted on Figure 3. The line weights of flight paths depicted on Figure 3 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 various lookouts.

With respect to the effects of landscape features, as depicted on Figure 3, 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), which is outside of the project area. Several other raptors seen from this location were traveling north or south in the Middle Branch Kibby Stream valley, outside of the project area. Only two raptors flew within the project area along Kibby Mountain’s south ridge, south of the fire tower.

Most birds observed at Kibby Range crossed the ridge on the east side of the peak of the mountain. It is important to note that this was only 7 birds and, in general, few raptors were observed at the Kibby Range sites.

Figure 3: Daytime Migrant Migration Routes



<p>Lands Within the United States</p> <p>Lands Within Canada</p> <p>Project Location</p>	<p>Raptor Flight Route</p> <p>Non-Raptor Flight Route</p>	<p>Number of Birds</p>	<p>Kibby Fire Tower Observation Site</p> <p>B1 Radar Platform</p> <p>B1 Clearcut Site</p>	<p>SITE LOCATION</p>	
					<p>FIGURE 3</p>

R:\Projects\GIS\_2005\42298\_Kibby\FIG1.mxd

### 3.2.2 *Non-Raptor Species*

Of 15 individual non-raptors recorded (including 2 American robins, 1 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 depicted on Figure 3.

## 3.3 **Project Area Flight Paths and Flight Heights**

### 3.3.1 *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 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.

Of 31 raptors recorded, 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 (see Table 4). 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 (Table 4). Twelve raptors passed below typical RSA height at some point during their flight, and two raptors 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 ridge of Kibby Mountain, south of the summit and fire tower (“Kibby Ridge”);
- the shoulder of Kibby Range, just east of the B1 summit (“East of Kibby Range Summit”);
- the shoulder of Kibby Range, just west of the B1 summit (“West of Kibby Range Summit”); and
- the south-eastern toe of the Kibby Range (“Kibby Range BII-2”).

The number of individuals, by species, which used these respective areas are listed on Table 4. The numbers of occurrences of passage below, within and above typical RSA height, by location and by species, are presented in Table 5. Table 5 also delineates the number of individuals, by species, which crossed the project area in multiple locations.

**Table 4: Raptor Flight Heights, Passages Within Areas of Proposed Arrays, and Crossing Locations by Genre and Species**

Species	Total Individuals Observed	Flight Height During Crossing Events <sup>1</sup>			Individual Passage <sup>2</sup>		Number of Individuals per Crossing Area <sup>3</sup>			
		Below Rotor Sweep	Within Rotor Sweep	Above Rotor Sweep	IN	OUT	Kibby Ridge	East of Kibby Range Summit	West of Kibby Range Summit	Kibby Range BII-2
<b>Buteo</b>										
Red-tailed hawk	7	2	0	0	2	5	1	1	0	0
Broad-winged hawk	4	0	0	0	0	4	0	0	0	0
<i>Subtotal</i>	<i>11</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>9</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>
<b>Accipiter</b>										
Sharp-shinned hawk	5	1	0	0	1	4	0	0	1	0
Cooper's hawk	1	0	0	0	0	1	0	0	0	0
<i>Subtotal</i>	<i>6</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>
<b>Pandion</b>										
Osprey	1	0	0	0	0	1	0	0	0	0
<i>Subtotal</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<b>Falco</b>										
American kestrel	2	0	0	0	0	2	0	0	0	0
Merlin	2	1	0	0	1	1	0	1	0	0
<i>Subtotal</i>	<i>4</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>3</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>
<b>Cathartes</b>										
Turkey vulture	8	7	1	2	8	0	1	5	1	2
<i>Subtotal</i>	<i>8</i>	<i>7</i>	<i>1</i>	<i>2</i>	<i>8</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>1</i>	<i>2</i>
<b>Unknown Raptors</b>										
Raptor sp. (sm)	1	1	0	0	1	0	0	0	0	1
<i>Subtotal</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>
<b>TOTALS</b>	<b>31</b>	<b>12</b>	<b>1</b>	<b>2</b>	<b>13</b>	<b>18</b>	<b>2</b>	<b>7</b>	<b>2</b>	<b>3</b>

<sup>1</sup>This section reflects multiple crossing events by single individuals

<sup>2</sup>This section indicates the actual number of individuals that crossed within the rotor swept area at some point during their flight path, regardless of multiple crossings

<sup>3</sup>This section reflects multiple crossing events by single individuals

**Table 5: Number of Occurrences of Raptor Species Below,  
Within and Above Typical RSA Height, by Crossing**

Species	# of Individuals	Flight heights used while within RSA			Location of passage within RSA
		below	within	above	
Merlin	1	1			Saddle to east of Kibby Range summit
Red-tailed hawk	1	1			Saddle to east of Kibby Range summit
	1	1			Kibby Mountain Ridge, south of summit
Sharp-shinned hawk	1	1			West saddle and summit of Kibby Range
Turkey Vulture	1	1			West of Kibby range summit
	4	4			Saddle to east of Kibby Range summit
	1			1	Kibby Mountain Ridge, near met tower site
	2	2	1	1	Kibby Range near BII-2
Unknown raptor	1	1			Kibby Range near BII-2
<b>TOTALS</b>	<b>13</b>	<b>12</b>	<b>1</b>	<b>2</b>	

### 3.3.2 *Non-Raptor Species*

Of 15 individual non-raptors observed, none passed within the project area at any point during their flight. See Figure 3 for a diagrammatic representation of observed non-raptor flight paths.

### 3.4 Correlation between Kibby Mountain and Kibby Range observations

Observations were performed simultaneously at the Kibby Fire Tower Observation Site and one of the Kibby Range sites on six days. Observers were in radio contact throughout these surveys. When a bird was observed at one of the sites, radio contact was made with the observer at the other site. Information such as species, flight height, and flight direction was relayed to the other observer.

No correlation of raptor movement between the two ridges was observed.

### 3.5 Frequency of Activities Observed

#### 3.5.1 *Raptor Species*

Of several potential activities, only five general categories were observed among migrating raptors during the spring of 2006: these behaviors were flapping, soaring, gliding, perching and hunting. Many birds performed more than one of these activities while being observed.

Gliding was the most frequent activity observed, with 28 out of 31 raptors observed (90 percent) gliding at some point during their observed flight (Table 6). The next most frequent was soaring, with 35 percent (11 birds) of all raptors recorded performing this at some point during their observed flight. Flapping was similar in frequency, with 32 percent of individuals performing this activity. Perching and hunting were observed infrequently. Migrating raptors typically employ primarily soaring and gliding as an energy saving strategy, so these observations are not surprising (Burton 1985). These results are consistent with the assumption that raptors were actively moving through the area as part of their migratory journey.

Hunting activity was recorded for 3 individual raptors, all which were red-tailed hawks. These hawks were observed hunting over clear-cuts along the Kibby Stream valley. It is possible that these individuals were residents of the area, however, it is also possible that these were migrants stopping over to feed, therefore, they were counted as migrants.

**Table 6: Raptor Activities Observed During Spring 2006 Surveys**

Species	Behavior				
	Glide	Soar	Flap	Perch	Hunt
<b>Buteo</b>					
Red-tailed hawk	5	3	0	2	3
Broad-winged hawk	4	0	0	0	0
<i>Subtotal</i>	9	3	0	2	3
<b>Accipiter</b>					
Sharp-shinned hawk	5	1	3	0	0
Cooper's hawk	1	0	1	0	0
<i>Subtotal</i>	6	1	4	0	0
<b>Pandion</b>					
Osprey	1	0	0	0	0
<i>Subtotal</i>	1	0	0	0	0
<b>Falco</b>					
American kestrel	2	0	2	0	0
Merlin	1	0	1	0	0
<i>Subtotal</i>	3	0	3	0	0
<b>Cathartes</b>					
Turkey vulture	8	7	2	0	0
<i>Subtotal</i>	8	7	2	0	0
<b>Unknown Raptors</b>					
Raptor sp. (sm)	1	0	1	0	0
<i>Subtotal</i>	1	0	1	0	0
<b>TOTALS</b>	<b>28</b>	<b>11</b>	<b>10</b>	<b>2</b>	<b>3</b>

### 3.5.2 Non-Raptor Species

The only activities observed for non-raptor species were flapping and soaring. All of the 15 non-raptorial migrating birds that were recorded were flapping. The group of 12 double-crested cormorants was also observed to soar. These results are not surprising as, by way of definition,

only birds that were clearly moving through the area on an apparent migratory path were recorded onto daytime migrant data sheets.

## 4.0 SUMMARY OF FINDINGS

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In total, 31 individual raptors were recorded. The four most abundant raptor species were turkey vultures (eight or 25.8 percent), red-tailed hawks (seven or 22.6 percent), sharp-shinned hawks (five or 16.1 percent), and broad-winged hawks (four or 12.9 percent). No state- and/or federal-listed species were observed. All other species combined comprised the remaining seven (22.6 percent) raptors.

Of 31 raptors recorded throughout the course of the study, 13 (42%) entered the project area at some point during their observed flight path. The majority of these crossings occurred just to the east of the BI summit of Kibby Range. Of the 13 individuals which passed within the project area, 1 flew at a height which is within typical RSA. This represents 3% of all raptors observed.

A total of 78.75 hours of observation effort were expended over the course of this study. The average rate of raptors observed per hour of unit effort was 0.39 raptors per hour. In comparison, similar observations were conducted at Bradbury Mountain, in southern Maine, during the spring 2006 migration: this effort covered 90.5 hours of observation, and recorded 1170 individual raptors for an average of 12.93 raptors per unit effort. The relatively slow rate of observations per unit effort at the Kibby Wind Power Project indicates that the project area does not constitute a significant spring migration corridor for raptors.

In addition to raptor species, 15 individual non-raptorial migrants were recorded. The majority of these (12 individuals, or 80 percent of all non-raptors) were double-crested cormorants, which were observed in a flock. The remaining birds were comprised of two American robins, and one tree swallow. None of these individuals passed within the project area at any point during their observed flight path.

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