

## 4.0 Discussion

### 4.1 Nocturnal Marine Radar Survey

The nocturnal radar study was designed to collect data that could be used to characterize nocturnal migration over the project area and also be used in a larger statewide comparison of results from numerous sites (M. Woythal, NYSDEC, pers. comm.). In the analysis, the radar data were not corrected for differences in detectability with distance from the radar unit or due to ground clutter on the radar screen. Also, the 2-dimensional area represented by the radar image was treated as a 1-dimensional 3-km “front” perpendicular to the direction of migration, and all targets counted in the radar image during the sampling period were treated as if they had crossed the front. Thus, passage rate estimates should be considered a sample or index of the actual number of targets passing through the area.

Measurements from radar studies potentially are highly variable due to a number of factors including observer bias and the radar settings affecting target detection. To minimize these biases, efforts were made to standardize data collection and radar settings as much as possible. For example, the radar was operated under the shortest pulse length setting with the gain control turned up to near the highest setting. While short wave-length and high gain insure detection of small targets, these settings also have the effect of producing atmospheric or background noise on the screen which consequently can obscure small targets. To “clean up” the screen, the anti-sea clutter [which minimizes clutter and noise close to the radar] was slowly turned up to the point where background noise was dispersed and limited primarily to the outer edge of the screen. The anti-rain clutter [which reduces interference from small targets throughout the survey area (e.g., rain drops)] was kept at the lowest setting so that no small targets would be eliminated. These settings insure that small targets such as individual passerines can be detected by the radar. Also during sampling, specific functions or capabilities of the radar were used to determine data values to minimize observer bias. For example, the electronic bearing line and variable range marker used in offset mode allowed the compass bearing of a target trail and the speed at which the target was moving to be measured by the radar as opposed to estimated by the observer or measured with a hand held scale.

Results from the nocturnal radar study conducted at the St. Lawrence Windpower project area were similar to other sites studied in New York and the eastern U.S. (Table 9). Mean passage rate for fall 2006 was higher (346 t/km/hr) than the average for NY and the eastern U.S. (259 t/km/hr); however, it fell within the overall range of passage rates reported at other New York sites. Conversely, spring passage rate was on the lower end of the range of other studies. Mean fall flight direction for the St. Lawrence Windpower study was 209° and for the spring was 34°, slightly more southwesterly and northeasterly than most other New York studies but again within the range of directions reported at other New York sites. Mean flight height of targets was approximately 490 m in the fall and 441 m in the spring, which is similar to other studies in NY and near the means for all reported studies in the eastern U.S. (Table 9). The percent of targets (~8% fall and ~14% spring) which flew through the zone of risk, defined as the air space below

125 m, were also very near the mean for all other studies where flight height was recorded with vertical mode radar.

**Table 9.** Results of radar studies at proposed and existing wind project sites in the eastern U.S.

Site	Passage Rates (t/km/hr)		Mean Flight Height (m)		% Targets below 125 m		Mean Flight Direction	
	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr
	<b>St. Lawrence Windpower, NY (this report)</b>	<b>346</b>	<b>166</b>	<b>490</b>	<b>441</b>	<b>8</b>	<b>14</b>	<b>209</b>
Dairy Hills, Wyoming Co., NY (Young et al. 2006)	170	234	466	397	10	15	180	14
Alabama Ledge, Genessee Co., NY (Young et al. 2007)	165	200	487	413	11	14	219	35
Flat Rock, NY (Mabee et al. 2005)	158		415		8		184	
Chautauqua, NY (Cooper et al. 2004a,b)	238	395	532	528	5	4	199	29
Prattsburgh (1), NY (Mabee et al. 2004, 2005)	200	170	365	319	9	18	177	18
Clinton County, NY (Mabee et al. 2006)	197	110	333	338	12	20	162	30
Marble River, NY (Woodlot Alternatives 2006a,b)	152	254	438	422	5	11	193	40
Jordanville, NY (Woodlot Alternatives 2005a, b)	380	409	440	371	6	21	208	40
Prattsburgh (2), NY (B. Roy, pers. comm. 2006)	193	277	516	370	3	16	188	22
West Hill, NY (Woodlot Alternatives 2005)	732	160	664	291	3	25	223	31
High Sheldon, NY (Woodlot Alternatives 2005)	197	112	422	418	3	6	213	29
Fairfield Top Notch, NY (B. Gary, NYDEC, pers. comm.)	691	509	516	419	4	20	198	44
Searsburg, VT (Roy and Pelletier 2005a, 2005b)	178	404	556	523	4	6	203	69
Sheffield, VT (Roy et al. 2005)	109	199	564	522	1	6	200	40
Martindale, PA (Plissner et al. 2005)	187		436		8		188	
Casselman, PA (Plissner et al. 2005)	174		448		7		219	
Mount Storm, WV (Young et al. 2004)	199		410		16		184	
<b>Mean</b>	<b>259</b>	<b>259</b>	<b>472</b>	<b>412</b>	<b>7</b>	<b>14</b>	<b>197</b>	<b>34</b>

Note: Some values are approximations based on the limited information provided in the report or averaged over more than one sampling location (e.g., Flat Rock, Mount Storm).

While the overall patterns of nocturnal migration in New York and along the Great Lakes shorelines are generally unknown, passage rates could be expected to be higher for coastal sites if birds and bats tend to move around the great lakes as opposed to flying directly over them. Diurnal migrants such as raptors are known to concentrate along and move parallel to the shorelines of large water bodies. If nocturnal migrants behave in a similar manner, then it would be expected that greater passage rates would be recorded for coastal sites than interior sites. For the studies conducted in New York, while results have been variable, the highest fall passage rates have been recorded at interior sites. For spring migration results again were variable with the highest passages rates coming from a coastal site as well as two interior sites (see Table 9). The results from the St. Lawrence study do not appear to support the hypothesis that nocturnal migrants may concentrate along the shoreline.

The passage rates in the study area may have been influenced locally by the close proximity of the radar unit to the shoreline (<1.5 km), though this distance was recommended by the NYSDEC and USFWS to investigate this question, or by weather patterns influenced by the coastal environment. During the fall the distribution of targets flying over the site was generally higher and relatively few targets were recorded within the zone of risk (see Figure 12). During the spring season the results were much more variable. While the mean flight height was greater than 125 m on all nights, the median flight height value fell within the zone of risk on two nights indicating that half the targets recorded on those nights were within the zone of risk. Weather variables recorded during the nights in the spring when target altitude was relatively lower suggest that weather events may have influenced migrant flight altitudes. Both nights when the median value fell below 125 m had intermittent precipitation with substantial cloud cover and lower passage rates (see Figure 5 and 6). While the results indicate some elevated risk on some nights, based on the overall radar survey results, collision risk to migrants within the project area is not expected to be greater than other sites studied in New York.

#### **4.2 Raptor Migration Surveys**

Typical raptor species for central New York were observed during the surveys (Table 1). One bald eagle, a former federally threatened species, was observed during the fall surveys. This individual was recorded flying above 125 m and outside of the zone of risk from turbine blades. Several northern harrier, a state threatened species, were recorded within the project area during spring and fall migration. Northern harriers are, in general, low-level fliers and most (76.23%) individuals recorded during the surveys were flying below the zone of risk; however 20.49% were flying within the rotor swept area. Two New York species of special concern, Cooper's hawk and sharp-shinned hawk, were also observed during surveys. Cooper's hawks were only observed during the fall surveys (4 individuals); however all of the individuals were flying within the zone of risk. Sharp-shinned hawks were observed during all survey seasons and 58.33% were recorded in the zone of risk.

Based on a standardization of raptors observed per survey hour, the St. Lawrence Windpower project area has less traffic during spring migration than the known hawk watch sites in New York. The nearest spring hawk watch site to the project area, Derby Hill Bird Observatory, was somewhat variable over the same survey days; however, the overall mean number of raptors