

Appendix L8

MERLIN Avian Radar Survey for the Proposed Ocotillo Wind Project

MERLIN™ Avian Radar Survey for the proposed Ocotillo Wind Project

Year 1 Data Report, September 15, 2010 – July 9, 2011

September 8, 2011

Prepared for:

Pattern Energy Group LP

1600 Smith Street, Suite 4025
Houston, TX 77002

Prepared by:

DeTect, Inc

1902 Wilson Ave
Panama City, Florida 32405
USA





Notice

This report was prepared by DeTect, Inc. (DeTect) in the course of performing work for the proposed Ocotillo Wind Project, under DeTect's contract with Pattern Energy Group, LP (Pattern Energy). The data and information developed as a result of this study, and presented in this report, are the property of the client and are not to be disclosed to third parties without the express written consent of Pattern Energy.

Table of Contents

1. INTRODUCTION	1
1.1. Objectives	1
2. STUDY AREA.....	1
3. METHODS.....	6
3.1 Radar Equipment and Data Collection.....	6
3.1.1. MERLIN Avian Radar System	6
3.1.2. Vertical Scanning Radar (VSR) Operation	8
3.1.3. Horizontal Surveillance Radar (HSR) Operation	8
3.1.4. Radar Data Collection, Processing and Analysis	9
3.1.5. MERLIN Avian Radar Processing Software	9
3.2 Data Analysis	11
3.2.1. Radar Data	11
3.2.2. Vertical Radar Data - Target Counts and Altitudes	11
3.2.3. Horizontal Radar Data - Target Directions	12
3.2.4. Weather and Visibility Data	12
4. RESULTS for September 15 – November 30, 2010	13
4.1 Vertical Radar Data	13
4.1.1. Targets Passage Rates Over Time	13
4.1.2. Altitudinal Distribution of Targets.....	16
4.2. Horizontal Radar Data	23
4.2.1. Target Directions	23
4.3. Weather Data.....	26
4.3.1. Weather Information.....	26
4.3.2. Target Passage Rates and Weather Associations	29
5. RESULTS for December 1, 2010 – February 28, 2011	31
5.1 Vertical Radar Data	31
5.1.1. Targets Passage Rates Over Time.....	31
5.1.2. Altitudinal Distribution of Targets	34

5.2	Horizontal Radar Data	41
5.2.1	Target Directions	41
5.3	Weather Data.....	44
5.3.1	Weather Information.....	44
5.3.2	Target Passage Rates and Weather Associations.....	47
6.	RESULTS for March 1 – May 31, 2011	49
6.1	Vertical Radar Data	49
6.1.1	Targets Passage Rates Over Time.....	49
6.1.2	Altitudinal Distribution of Targets	52
6.2	Horizontal Radar Data	59
6.2.1	Target Directions	59
6.3	Weather Data.....	62
6.3.1	Weather Information.....	62
6.3.2	Target Passage Rates and Weather Associations.....	65
7.	RESULTS for June 1 – July 9, 2011	67
7.1	Vertical Radar Data	67
7.1.1	Targets Passage Rates Over Time.....	67
7.1.2	Altitudinal Distribution of Targets	70
7.2	Horizontal Radar Data	77
7.2.1	Target Directions	77
7.3	Weather Data.....	80
7.3.1	Weather Information.....	80
7.3.2	Target Passage Rates and Weather Associations.....	82
8.	CONCLUSIONS	83
	Literature Cited	88
	Appendix A - Glossary	89
	Appendix B - Abbreviations.....	90
	Appendix C – Target Counts, Passage Rates, Mean and Median Heights during four biological periods of Year 1, September 15, 2010 – July 9, 2011	91

List of Figures

Figure 2-1. Overview map of the proposed Ocotillo Wind Project site.	2
Figure 2-2. Surrounding landscape at the Ocotillo Wind Project site.	2
Figure 2-3. Dominant vegetation at the proposed Ocotillo Wind Project site.	3
Figure 2-4. Map of proposed turbine layout at the proposed Ocotillo Wind Project.....	4
Figure 2-5. The initial MERLIN Avian Radar System at the proposed Ocotillo Wind Project site.	5
Figure 2-6. The upgraded MERLIN Avian Radar system at the proposed Ocotillo Wind Project site.	5
Figure 3-1. Radar images illustrating ground clutter detected by the initial XS2530e MERLIN Avian Radar System (left) compared to the new XS25200e MERLIN Avian Radar System (right)	7
Figure 3-2. Illustration of beam coverage of the horizontal surveillance radar (HSR) and the vertical scanning radar (VSR).	8
Figure 4-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.	14
Figure 4-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the fall 2010 season.	14
Figure 4-1. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the fall 2010 season.....	15
Figure 4-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the fall 2010 season.	16
Figure 4-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.	17
Figure 4-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.	17
Figure 4-2. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the fall 2010 season. ..	18

Figure 4-8. Number of targets occurring in each 50-meter increment at the proposed Ocotillo Wind Project site during the fall 2010 season. 19

Figure 4-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the fall 2010 season.21

Figure 4-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the fall 2010 season.21

Figure 4-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the fall 2010 season.....22

Figure 4-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the fall 2010 season.....22

Figure 4-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the fall 2010 season.....23

Figure 4-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the fall 2010 season..24

Figure 4-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the fall 2010 season.....26

Figure 5-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.32

Figure 5-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the winter 2010-11 season.32

Figure 5-3. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the winter 2010-11 season.....33

Figure 5-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the winter 2010-11 season.34

Figure 5-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.35

Figure 5-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.35

Figure 5-4. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the winter 2010-11 season. ..36

Figure 5-8. Number of targets occurring in each 50-meter increment at the proposed Ocotillo Wind Project site during the winter 2010-11 season.37

Figure 5-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the winter 2010-11 season.39

Figure 5-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the winter 2010-11 season.39

Figure 5-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the winter 2010-11 season.....40

Figure 5-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the winter 2010-11 season.....40

Figure 5-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the winter 2010-11 season.....41

Figure 5-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the winter 2010-11 season.42

Figure 5-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the winter 2010-11 season.....44

Figure 6-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.50

Figure 6-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the spring 2011 season.50

Figure 6-5. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the spring 2011 season.....51

Figure 6-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the spring 2011 season.52

Figure 6-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.53

Figure 6-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.53

Figure 6-6. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the spring 2011 season. ..54

Figure 6-8. Number of targets occurring in each 50-meter increment at the proposed Ocotillo Wind Project site during the spring 2011 season55

Figure 6-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the spring 2011 season.57

Figure 6-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the spring 2011 season.57

Figure 6-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the spring 2011 season.....58

Figure 6-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the spring 2011 season.....58

Figure 6-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the spring 2011 season.....59

Figure 6-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the spring 2011 season.60

Figure 6-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the spring 2011 season.....62

Figure 7-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.....68

Figure 7-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the summer 2011 season.....68

Figure 7-7. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the summer 2011 season.....69

Figure 7-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the summer 2011 season.....70

Figure 7-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.....71

Figure 7-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.....71

Figure 7-8. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the summer 2011 season..72

Figure 7-8. Number of targets occurring in each 50-meter increment at the proposed Ocotillo Wind Project site during the summer 2011 season.....73

Figure 7-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the summer 2011 season.75

Figure 7-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the summer 2011 season.75

Figure 7-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the summer 2011 season.76

Figure 7-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the summer 2011 season.76

Figure 7-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the summer 2011 season.77

Figure 7-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the summer 2011 season.78

Figure 7-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the summer 2011 season.80

Figure 1-9. Average target passage rates during four biological time periods of half-monthly periods for year 1 at the proposed Ocotillo Wind Project site.....83

Figure 1-10. Seasonal comparisons of percent targets above, within, and below the RSZ for four biological period.....86

List of Tables

Table 4-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the fall 2010 season.....	13
Table 4-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the fall 2010 season.....	15
Table 4-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.	18
Table 4-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.	20
Table 4-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.	25
Table 4-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the fall 2010 season.	27
Table 4-7 . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the Fall 2010 season.....	29
Table 5-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the winter 2010-11 season.....	31
Table 5-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the winter 2010-11 season.	33
Table 5-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season. ...	36
Table 5-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.	38
Table 5-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during the winter 2010-11 season.	43
Table 5-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the winter 2010-11 season.	45
Table 5-7 . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the winter 2010-11 season.....	47



Table 6-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the spring 2011 season.....49

Table 6-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the spring 2011 season.51

Table 6-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.54

Table 6-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.56

Table 6-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during the spring 2011 season.61

Table 6-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the spring 2011 season.63

Table 6-7 . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the spring 2011 season..... 64

Table 7-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the summer 2011 season.....67

Table 7-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the summer 2011 season.69

Table 7-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.72

Table 7-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.74

Table 7-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during the summer 2011 season.79

Table 7-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the summer 2011 season.81

Table 7-7 . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the summer 2011 season.....82



Table 8-1. Average target passage rates during four biological periods and four seasons at the proposed Ocotillo Wind Project site.....83

Table 8-2. Average target passage rates from the proposed Ocotillo Wind Project site, CA compared to the Gulf Wind I Windfarm, TX and the proposed Ripley-Westfield Wind Farm, NY.....84

MERLIN™ Avian Radar Survey Data Report for Year 1 September 15, 2010 – July 9, 2011

1. INTRODUCTION

DeTect Inc. (DeTect) was contracted by Pattern Energy to conduct an Avian Radar Survey at the proposed Ocotillo Wind Project site. The MERLIN Avian Radar System collected data on bird movements and migration using both vertical scanning and horizontal surveillance radars. This report presents data collected during year 1 (September 15, 2010 – July 9, 2011).

1.1. Objectives

There were several objectives of this radar survey. A primary objective, and the focus of this report, was to collect near-continuous radar data on bird activity and movements at the proposed Ocotillo Wind Project site. This includes activity from birds during nocturnal migration and diurnal raptors. An additional objective not covered in this report was to use the radar for tracking potential bighorn sheep that may enter the proposed Ocotillo Wind Project.

2. STUDY AREA

The proposed Ocotillo Wind Project site is located in Imperial County, California, just northwest of Ocotillo, CA, 63 miles east of San Diego and 29 miles west of El Centro, CA (Figure 2-1). Nearby features include the Laguna mountains of the Peninsular Ranges to the west of the project, the Salton Sea approximately 30 miles northeast, and the heavily irrigated Imperial Valley to the east.

This location is in the Colorado Desert region of the larger Sonoran Desert and the surrounding landscape is primarily desert (Figure 2-2). Dominant vegetation includes shrubs (Ocotillo and Creosote Bush) and cacti (Teddy-bear Cholla and Jumping Cholla). (Figure 2-3). This site is included in the Sonoran Basin and Range ecoregion which is characterized by scattered low mountains, is slightly hotter than the Mojave, and contains large areas of palo verde-cactus shrub and giant saguaro cactus (U.S. Environmental Protection Agency, 2002).



Figure 2-1. Overview map of the proposed Ocotillo Wind Project site (Google Earth 2011, version 6.0.3.2197).



Figure 2-2. Surrounding landscape at the Ocotillo Wind Project site.

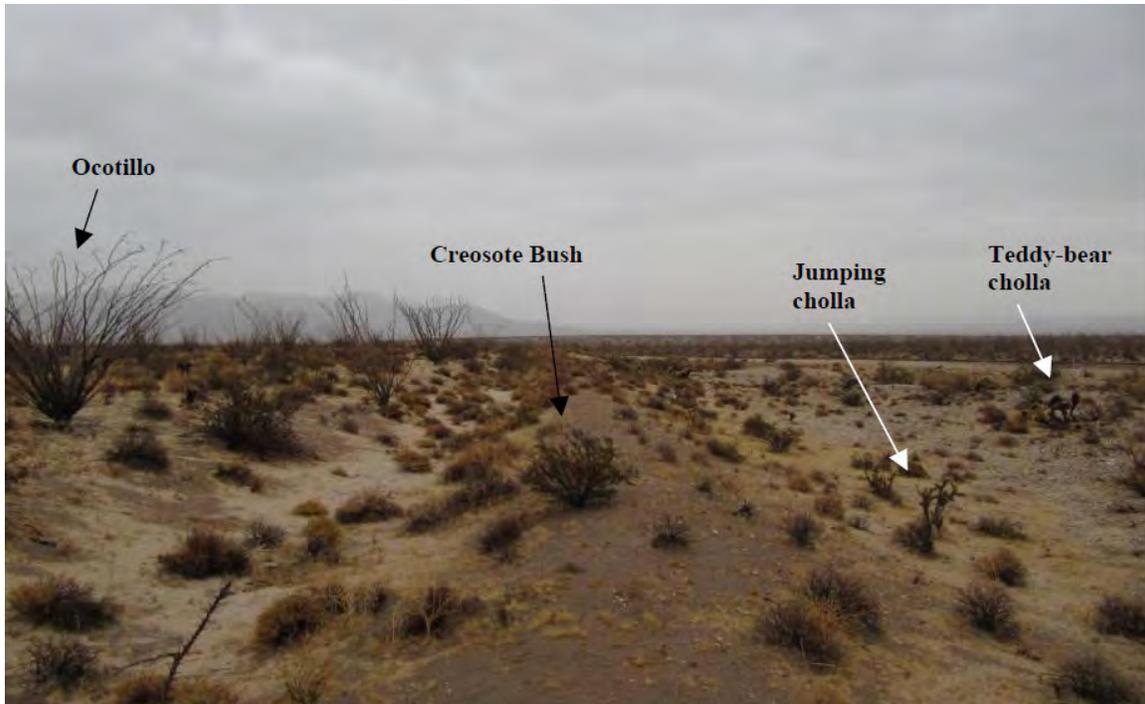


Figure 2-3. Dominant vegetation at the proposed Ocotillo Wind Project site.

At the time of this report, Siemens wind turbines were proposed for the approximate distribution as illustrated in Figure 2-4. The proposed Siemens turbine type would have a power rating of 2.3 Megawatts (MW) and approximately the following measurements: rotor diameter of 354 ft (108 m), tower height of 262 ft (80 m), total height of 439 ft (133.8 m) when blades are positioned at 12 o'clock, a rotor swept area of 98,608 ft² (9,161 m²) and a rotor swept zone of 85 to 439 ft (29.9 to 133.8 m) above the ground.

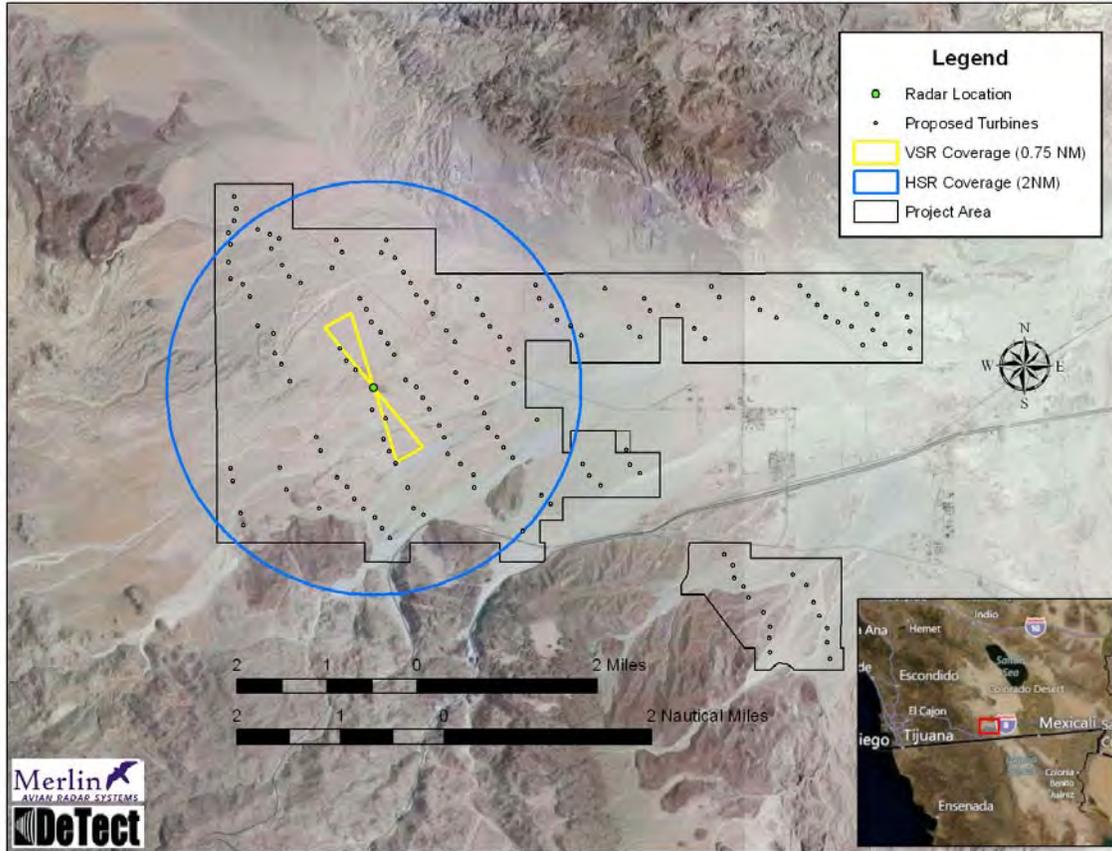


Figure 2-4. Map of proposed turbine layout at the proposed Ocotillo Wind Project. Blue circle notes the horizontal coverage and yellow bowtime notes the vertical coverage. Inset provides a regional map of the proposed project site.

Both the initial and upgraded radar units were located within the proposed project area at an elevation of ~950 ft (290 m) above mean sea level. This was a location that provided a clear view of the surrounding area and was relatively unobstructed by vegetation, buildings, powerlines, or other obstacles (Figures 2-5 and 2-6) and allowed for a clear line of sight for birds in the survey area. The coverage of the horizontal radar beam had a radius of 2.0 nautical miles (nm), and the vertical radar beam was orientated NW to SE with a coverage radius of 0.75 nm (Figure 2-4). The VSR orientation was approximately parallel to the arrays of proposed turbines, and slightly off perpendicular to the expected flight direction of migrating birds.



Figure 2-5. The initial MERLIN Avian Radar System at the proposed Ocotillo Wind Project site.



Figure 2-6. The upgraded MERLIN Avian Radar system at the proposed Ocotillo Wind Project site.

3. METHODS

3.1 *Radar Equipment and Data Collection*

3.1.1. MERLIN Avian Radar System

The MERLIN Avian Radar System is an advanced, automated radar system originally developed for, and currently used by the U.S. Air Force (USAF) and NASA for remote detection and tracking of hazardous bird activity on and around airfields and launch facilities, in support of aviation and flight safety (bird-aircraft strike avoidance). The MERLIN system is a fully self-contained, trailer-mounted, ornithological radar system developed and manufactured by DeTect, Inc. of Panama City, Florida, USA, specifically for bird detection and tracking. Since 2003, the MERLIN technology has also been extensively used for collection of pre-construction survey data, risk modeling and post-construction monitoring at proposed wind project sites in the United States, England, Scotland, The Netherlands, Poland, Norway, and New Zealand. Agency and research users of MERLIN include the U.S. Fish & Wildlife Service (USFWS), U.S. Environmental Protection Agency (USEPA), U.S. Geological Survey (USGS), various state natural resource agencies, the United Kingdom Central Science Lab (CSL, the UK environmental agency), and various U.S. and international universities.

A model XS2530e MERLIN Avian Radar System was initially used to survey the proposed Ocotillo Wind Project site, but was upgraded to an XX25200e model February 2011. The initial XS2530e MERLIN system had dual magnetron marine radar sensors consisting of a 25-kW power, X-band frequency (3 cm wavelength), vertical scanning radar (VSR) sensor, and a 30-kW power, S-band frequency (10 cm wavelength), horizontal surveillance radar (HSR) sensor. This system was converted to the XX25200e system by changing the horizontal radar to a 200 watt power, X-band (3 cm wavelength), horizontal surveillance, solid-state radar (HSR) sensor. This update was necessary because of significant ground clutter due to the high water content of the dominant shrubs and cacti (see Figure 2-3). The new horizontally scanning X-band is an ultra-high resolution radar with Doppler which allowed high resolution detection, minimizing the ground clutter issue while also allowing detection of sheep-sized targets walking on the ground, a primary focus of the year 1 study (Figure 3-1).

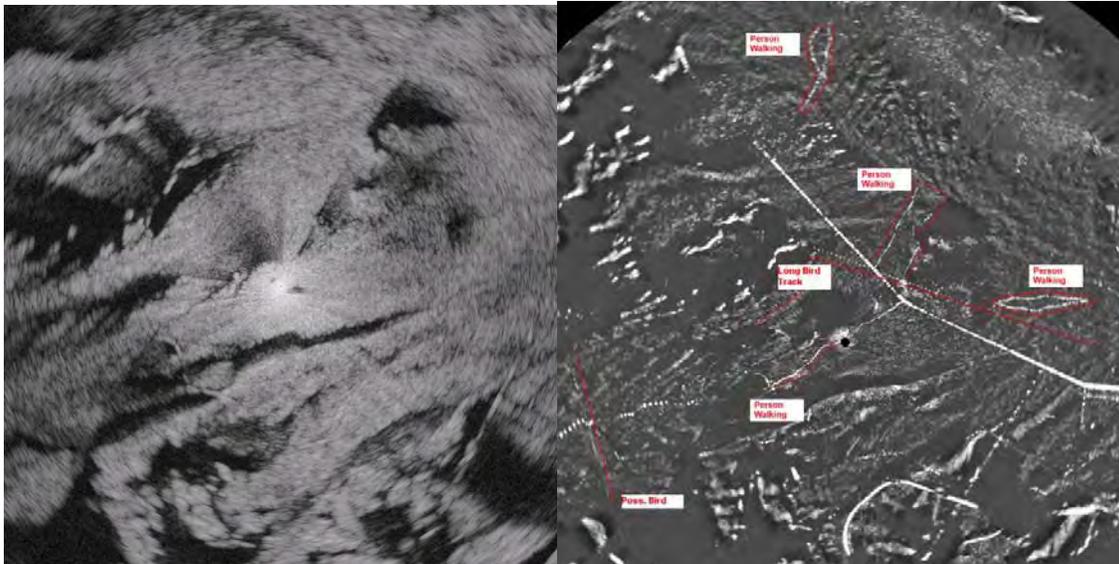


Figure 3-1. Radar images illustrating ground clutter detected by the initial XS2530e MERLIN Avian Radar System (left) compared to the new XS25200e MERLIN Avian Radar System (right). Targets actually detected by the latter system are noted in the image on the right.

MERLIN radar systems precisely tracks targets within avian size ranges, and displays the data in real-time (at the radar and remotely via the Internet) and records all data on targets, tracks, and system parameters to internal databases. For this study, the horizontal radar settings were optimized for detecting bighorn sheep, although a specific bird configuration is also available. The vertical radar was optimized for detecting birds. The recorded databases were then queried and used to develop statistical data from the target movements recorded in the study area.

A remote data uplink (WIFI) allowed remote system monitoring through the internet (remote data viewing in real time), access to recorded data, and system administration. DeTect biologists conducted the initial setups for both systems, after which each system was remotely monitored via the data uplink / internet connections for the remaining data collection periods.

The radar location was in open, desert habitat for which turbine locations are proposed, and was chosen based on good radar visibility (line-of-sight) at ground level with potential detection of bighorn sheep as a main consideration. The HSR collected data at a range of 2.0 nm and the VSR at 0.75 nm. These range settings allowed for optimal detection of bird-sized targets (Cooper et al. 1991) as well as sheep-sized targets. The MERLIN system collected radar data continuously (24 hours a day, 7 days a week), with the exception of limited periods of system maintenance and upgrade, service downtime, and periods of moderate to heavy precipitation.

3.1.2. Vertical Scanning Radar (VSR) Operation

The VSR or X-band radar operates in the vertical (y-z) plane transmitting a wedge-shaped beam from horizon-to-horizon using the vertical scanning technique (Harmata et al. 1999). In this configuration the radar is turned on its side so it scans a vertical slice through the atmosphere. The Merlin software detects and tracks targets that pass through or along the vertical beam, recording target size, speed, and altitude attributes, as well as other characteristics. This radar transmits a 22°, fan-shaped beam (Figure 3-2) at a scan rate of ~ 2.5 seconds/scan, and can reliably detect small, bird- and bat-sized targets up to 0.75 nm to either side and above the radar. The VSR in this configuration outputs the lowest power density, but provides high spatial resolution data with low side lobe returns to provide optimal detection of bird targets as they pass through the study site. As the X-band is a short wavelength radar (3 cm), it is susceptible to interference from precipitation, and data collection is suspended during moderate to heavy rain events. The VSR data is used to determine target altitudes, and is the primary dataset used to determine target passage rates through the rotor swept zones for mortality risk assessments.

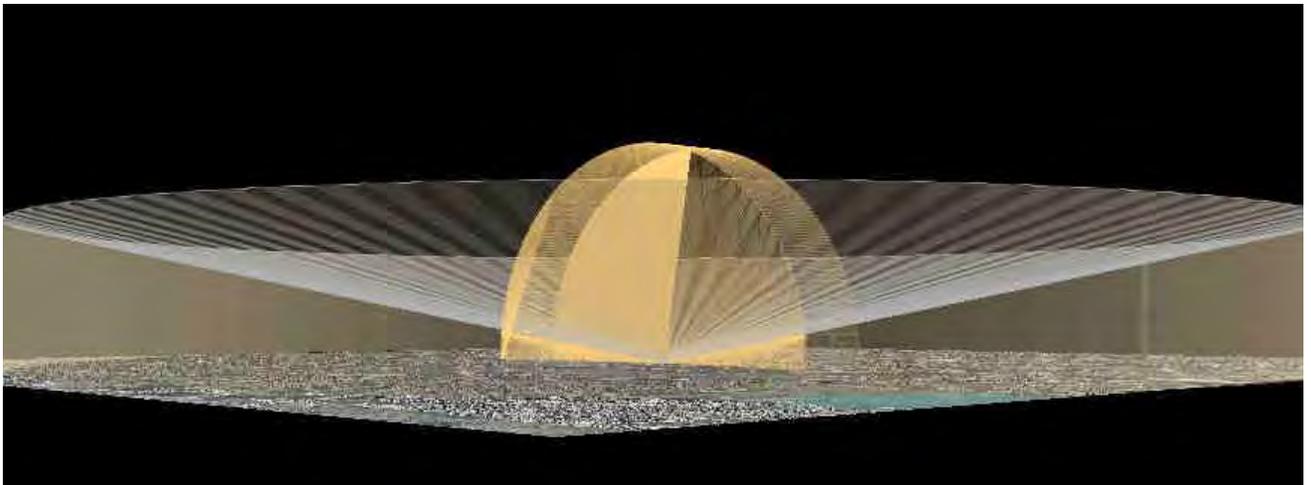


Figure 3-2. Illustration of beam coverage of the horizontal surveillance radar (HSR) and the vertical scanning radar (VSR).

3.1.3. Horizontal Surveillance Radar (HSR) Operation

The initial HSR was an S-band antenna that operates in the horizontal (x-y) plane transmitting a 24°, wedge-shaped beam relatively perpendicular to the VSR (Figure 3-2). The HSR scans 360° in the horizontal plane at a scan rate of ~ 2.5 seconds / scan and a range setting of 2.0 nm radius (for this survey), detecting and tracking targets moving around the survey site. An S-band has the advantage of greater detection range and less signal attenuation (interference) from surrounding vegetation (typically referred to as ground clutter) and precipitation. It is also less sensitive to insect contamination. Ground clutter

interference can also be reduced by applying the MERLIN software clutter suppression algorithms that improve detection of small (bird- sized) targets in high clutter environments. However, the ground clutter at this site was quite significant, and a new HSR antenna was installed.

The new HSR antenna used for this project is an X-band antenna with a 5-meter slotted waveguide and ~0.4 degrees azimuth resolution. It scanned the horizontal plan at a scan rate of 7 rpm (~8.6 seconds / scan) but still had a range setting of 2.0 nm radius. It was also a solid-state radar, meaning it used a solid-state transmitter instead of a magnetron which allows a more focused transmission requiring less voltage (200 watt peak power output). This HSR also used high pulse compression of short- and medium-pulsed radar energy. The enhanced pulse compression also produces 15-meter range resolution. It is the ~0.4 degrees azimuth resolution along with the 15-meter range resolution that makes the radar Ultra High Resolution (UHR). This radar also uses a Doppler processor with 32 Doppler filters (16 inbound and 16 outbound). All together, these features greatly reduced ground clutter and also allowed for greatly improved target detection and tracking (Figure 2-1). The HSR data is only used to determine directional movement of targets over or through the project area, and does not provide data on target counts or passage rates.

3.1.4. Radar Data Collection, Processing and Analysis

The Merlin Avian Radar System uses modern, marine-grade radar signal processing technology to collect, process, and store 12-bit digitized radar data from both the VSR and HSR. Target data from both radars is processed in real-time by the MERLIN software at the radar with all data recorded to compact, internal system databases for target and track processing, analysis, and reporting.

All VSR and HSR target data and system metadata was written to internal system databases, and all radar data was processed at the radar in real-time by MERLIN system software. Database analysis of the radar data was conducted in DeTect's Data Lab in Panama City, Florida. The Data Lab uses Microsoft Windows® based computer systems, networks, and SQL (structured query language) servers for database processing and analysis. This database query development and analysis is conducted by DeTect staff programmers, radar ornithologists, and biologists.

3.1.5. MERLIN Avian Radar Processing Software

The MERLIN Avian Radar processing software uses automated clutter suppression in conjunction with biological target detection, tracking, and data recording to identify and track bird targets in the survey area. The software also identifies noise (undesired signals such as ground clutter and interference) within a given radar environment and applies a statistical approach to suppressing the

noise while still allowing targets within the noise to be detected, tracked, and recorded. This maximizes the probability of detecting moving targets in high clutter environments (such as over vegetation). The application of CFAR (constant false alarm rate) algorithms and ground clutter mapping techniques also provide automated, high resolution data while minimizing the amount of display lost to ground clutter.

The software allows the user to select settings specific to the conditions and objectives of each project. These settings include minimum and maximum target size (based on target pixel area), minimum and maximum target speed, and minimum reflectivity (a measure of target intensity). By using techniques common in image processing, the MERLIN software also extracts values other than the area or number of pixels. As an example, the length and width, roundness and elongation of a target are extracted and recorded. These are the same parameters an expert observer of a radar display would use to separate a fast-moving aircraft from a large skein of geese. In this way parameters are available to classify targets in the same manner a human radar ornithologist applies when interpreting the screen data, but with the MERLIN software this is accomplished with the precision and consistency of a computer program.

The detection and tracking algorithms in the MERLIN software locate plot sequences of biological targets in the raw radar data that fit together into a linear sequence over time as the radar scans. When a target meeting the criteria of a bird-like target is tracked for a minimum of three sequential scans or plots, it is identified as a bird target by the radar system, enumerated, and recorded to the system database. A target continues to track as long as it is detected three out of the last four scans or plots. Although the criteria for identifying bird targets has been developed to only track targets that are most likely birds, occasional targets such as insects or clutter will be falsely identified and tracked as bird targets. However, the inclusion of non-bird targets was minimized through optimization of the operational settings in the software and application of custom database queries.

During review of this dataset, likely insect activity was noted in trackplot images, frequently occurring alongside bird activity. In order to preserve the bird activity in this dataset, some insect activity was not able to be filtered out and likely included in the data results of this report. Time periods in which insect activity was noted by reviewers are marked in the target activity tables in Appendix C.

It must also be noted that an individual radar echo does not necessarily represent an individual bird, as individuals moving in and out of the radar beam (e.g. circling) would be “counted” by the radar system multiple times. Similarly, a target that is tracked but drops out of the radar line-of-sight (e.g. drops below a tree or brush line) is recorded as a “new” target once it “reappears” and is tracked again (within the MERLIN system, each target is assigned a unique, 64-digit, identification number which facilitates analysis of extended surveys). Therefore, an individual radar echo is referred to as a biological “target” in this

study, and when counted together they represent an index of bird activity or exposure level for any given period of time, and not necessarily a count of individuals.

3.2 Data Analysis

3.2.1. Radar Data

Radar data was analyzed for the first year of data collection (September 15, 2010 – July 9, 2011). A DeTect biologist set up the MERLIN avian radar system, after which the system ran automatically and was remotely monitored daily for the remaining data collection period. Data was processed using standard and custom database queries developed by DeTect on a SQL server data network in DeTect's Radar Lab located in Panama City, Florida. In order to filter out false tracks in both the horizontal and vertical data (insects, ground clutter, interference, etc.), targets that were only plotted once after they were defined as a target (leaving only one entry in the database) were eliminated from the database. The MERLIN software also dictated a minimum target-tracking area of 8 pixels in the VSR data, and 1, 2, or 6 pixels in the HSR data, to reduce tracking of possible insects. Two different MERLIN masks were also used, the latter was to eliminate persistent ground clutter in the HSR data from construction activity near the radar site.

3.2.2. Vertical Radar Data - Target Counts and Altitudes

As targets passed along or through the vertical scanning radar (VSR) beam, the altitude of the target was recorded with each scan (rotation) of the radar. The average altitude of each target AGL was generated and used to derive mean and median target heights, as well as to group targets into one of three categories: below rotor swept zone, in rotor swept zone, or above rotor swept zone to a maximum height of ~2,800 AGL. Some migrating birds fly even higher than this altitude, but these were not detected in this radar study. The turbine dimensions used for the altitude analyses included a rotor swept zone ranging from 29.9 to 133.8 m AGL.

The VSR data queries were standardized to a 1-km front per hour, generally the industry standard for most migratory and wind energy avian studies and risk analysis. For this report, target passage rates are further defined as the number of targets detected within 0.5 km to either side of the radar and up to ~ 2,8000 m AGL, for a total frontal width of 1 km, during a one hour period. Passage rates were standardized using the number of minutes with radar data within a given time period (minus any time with rain) and collated for each dawn (30 minutes before sunrise to 30 minutes after sunrise), day (30 minutes after sunrise to 30 minutes before sunset), dusk (30 minutes before sunset to 30 minutes after sunset), and night (30 minutes after sunset to 30 minutes before sunrise the next day) as well as the entire season. The average target passage rates (below,

within, and above the rotor swept zone, as well as total), and mean and median target heights, were calculated for dawns, days, dusks, and nights as well as hourly during this survey.

3.2.3. Horizontal Radar Data - Target Directions

The horizontal radar data collected was used only to develop information on the movement of targets throughout the project area, and was not used to derive any target counts or passage rates. As targets were detected on the horizontal surveillance radar (HSR), their bearings were recorded on each scan (rotation) of the radar. The average bearing of each target was then generated from all the scans as the target passed through the HSR beam.

The horizontal radar data were queried and the average target directions were generated for each dawn, day, dusk, and night. The overall distribution was also plotted for all dawns, days, dusks, and nights in each season in Microsoft Office Excel by developing a frequency table of target numbers occurring in 45° increments: eight groups centered on north, northeast, east, southeast, south, southwest, west, and northwest. This provided a directional assessment of the target movements throughout the survey area.

Calculations of mean direction and angular concentration (r) for these time periods were calculated using SQL and formulas based on Zar 1999. The value of r is a measure of concentration; it has no units and varies from 0 (no concentration, all values very dispersed) to 1.0 (all data concentrated in the same direction), whereas $1-r$ is a measure of angular dispersion (Zar 1999).

3.2.4. Weather and Visibility Data

Weather data was collected from two meteorological towers on site, one just NE of the radar and a second farther to the SE. Recordings of wind speed (m/s) at 60 m, wind direction at 60 m, and temperature at 3 m (°C) were recorded every ten minutes at the meteorological towers and used to derive averages for each of the four biological periods. The mean angle and angular concentration (r) of wind directions were calculated using Zar 1999. Precipitation data was derived from the recorded vertical radar data. Visibility records from this time period were accessed from two nearby airports: El Centro Naval Air Facility (NJK, ~24 miles west) and Imperial County Airport (IPL, ~29 miles west). Visibility observations (statue miles) were generally collected hourly at NJK and IPL presented daily averages. For the purpose of this study, low visibility potentially resulting in bird strike risk is defined as visibility less than 0.5 mile based on the National Weather Service's lowest visibility threat level for humans.

4. RESULTS for September 15 – November 30, 2010

The MERLIN Avian Radar System operated continuously (24 hours a day) during the fall 2010 season, September 15 – November 30, 2010. Of the 1,849.0 hours available during the fall season, 1,763.9 hours of vertical radar (95.4% of available time) and 1,755.9 hours of horizontal radar (95.0% of available time) were collected (Table 4-1). Weather can make some of this radar data unusable because precipitation can block the radar wavelength so few if any targets are discernable. This is more prevalent among X-band radars than S-band because the longer wavelength of the S-band radar allows almost all targets to be detected in rain with the help of digital processing.

Therefore, of the 1,763.9 hours of vertical radar data, 46.9 hours were removed because rain prevented the collection of radar data (2.7% of radar time). This left 1,717.0 hours of useable vertical radar data (97.3% of radar time, 92.9% of the fall 2010 season; Table 4-1). A total of 13.8 hours of horizontal radar data were removed because of rain (0.8% of radar time), leaving 1,742.1 hours of useable horizontal radar data (99.2% of radar time, 94.2% of the fall 2010 season; Table 4-1).

Table 4-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the fall 2010 season.

	Time in Spring 2010 season	Time radar collected data	Radar downtime	Radar data with rain or interference	Useable radar data
Vertical Radar (hrs)	1849.0	1763.9	85.1	46.9	1717.0
Horizontal Radar (hrs)	1849.0	1755.9	93.1	13.8	1742.1

4.1 Vertical Radar Data

Data collected from the vertical scanning radar (VSR) was used to quantify target movements through the project area. Data is presented as total number of targets / 1-km front / hr. This rate is also used when quantifying targets above (up to ~2,800 m AGL), below, and at the height of the rotor swept zone for the fall 2010 season.

4.1.1. Targets Passage Rates Over Time

Target passage rates during fall 2010 season were variable throughout the season (Figure 4-1) and among the four biological periods, but averaged the greatest during days, followed by nights, dawns, and then dusks (Figure 4-2). Summary statistics of the target passage rates for each of the four biological

periods are presented in table 4-2. (All target counts and target passage rates for each biological period are presented in Appendix C).

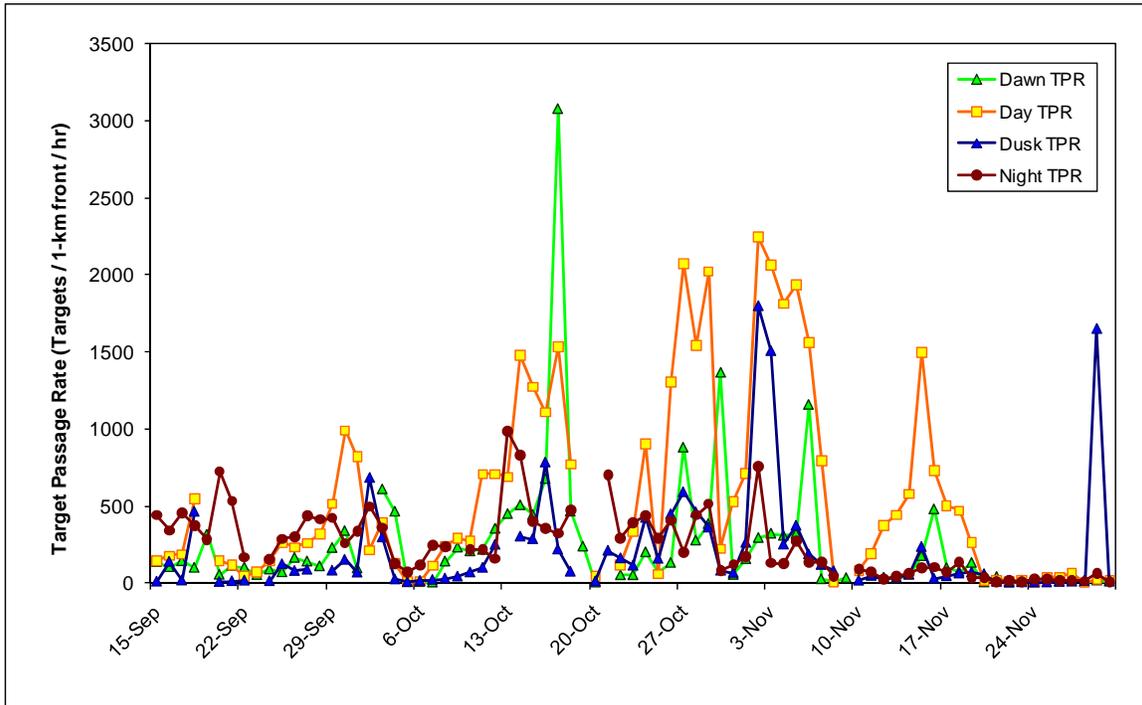


Figure 4-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.

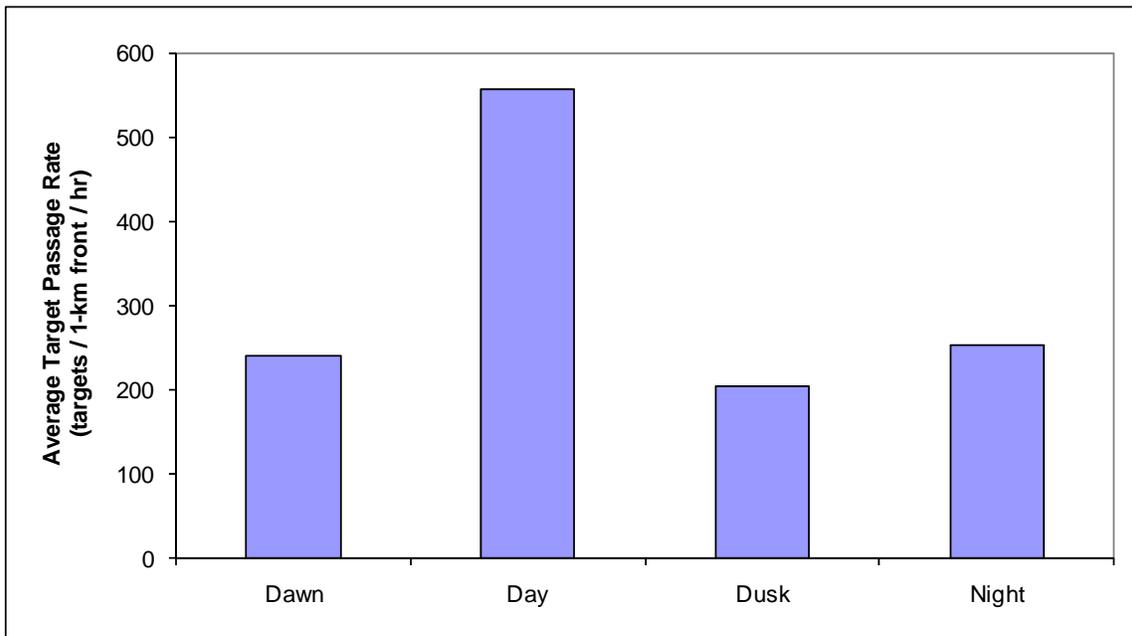


Figure 4-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the fall 2010 season.

Table 4-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the fall 2010 season.

	Dawn	Day	Dusk	Night
Average	241.8	556.7	205.6	253.3
Standard Deviation	420.1	619.9	351.5	216.7
Median	111.5	273.0	75.0	208.6
Minimum	4.0	3.7	4.0	7.3
Maximum	3082.0	2247.7	1802.0	986.0
Range	3078.0	2244.0	1798.0	978.8

Average target passage rates differed hourly throughout the fall 2010 season (Figure 4-3) and were greatest midday (hours 10-12, 10am-noon) with another peak around hour 18 (6pm). Target passage rates were greatest above the rotor swept zone compared to within and below the rotor swept zone.

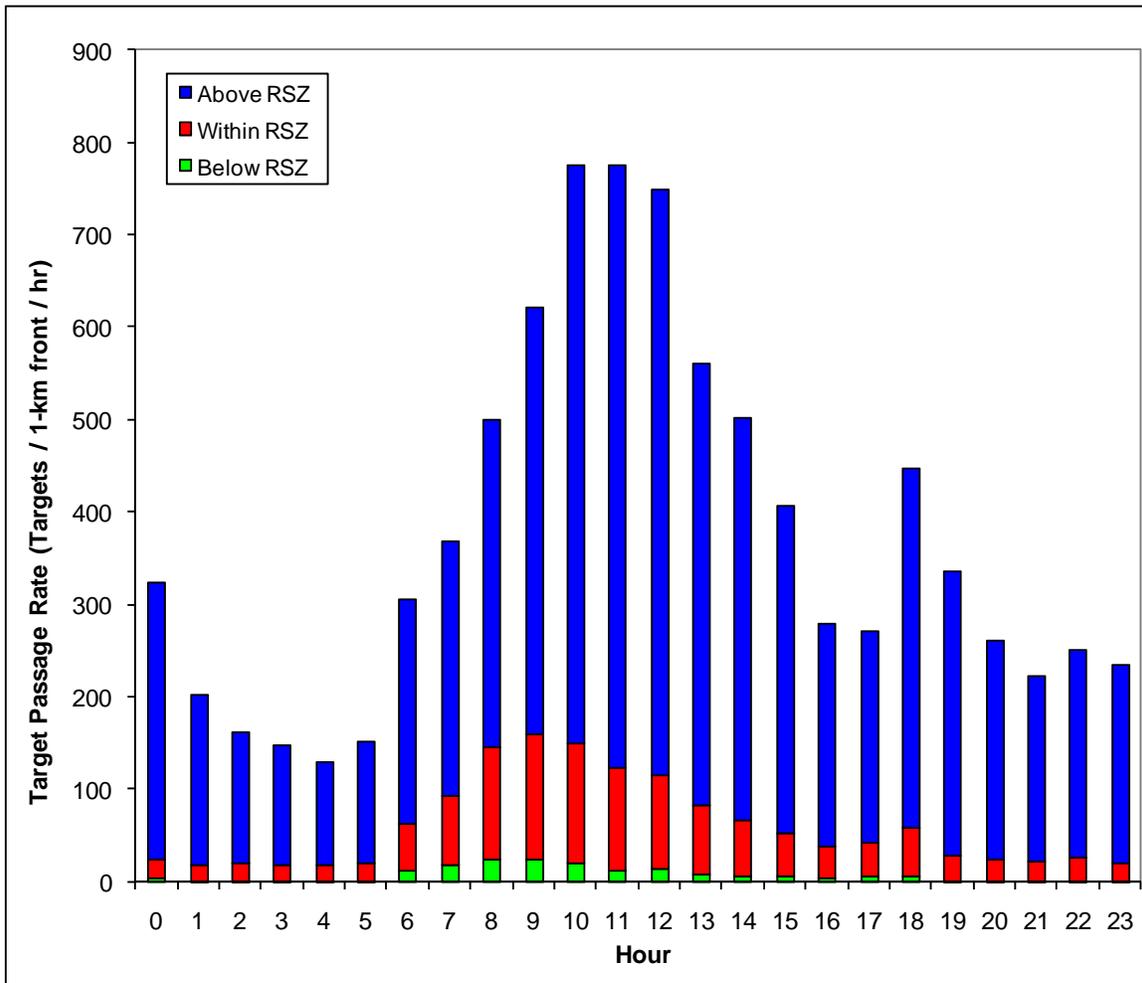


Figure 4-3. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the fall 2010 season.

4.1.2. Altitudinal Distribution of Targets

Average hourly target heights varied moderately, ranging between 253.4 m during hour 8 and 432.8 m during hour 23 (Figure 4-4).

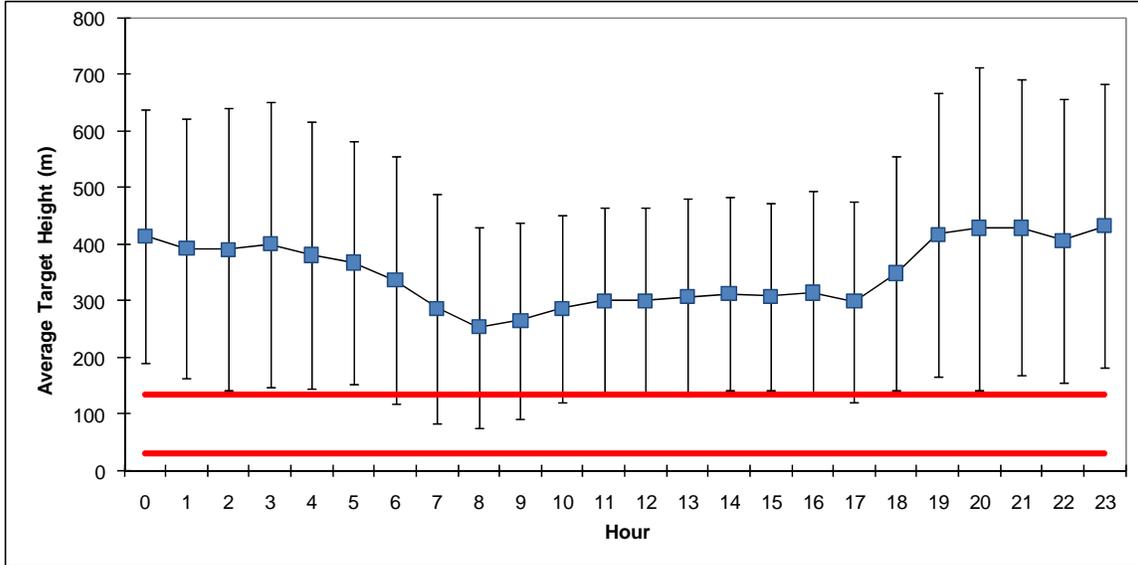


Figure 4-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the fall 2010 season. Error bars represent the standard deviation for each hour and red lines represent the top and bottom of the rotor swept zone (29.9 – 133.8 m AGL).

Mean target heights detected during the fall 2010 season were generally above the maximum RSZ height of 133.8 m AGL except during 7 dawns (10%), 0 days (0%), 4 dusks (6%), and 0 nights (0%) (Figure 4-5). Median target heights were slightly lower than the means but still generally above the maximum RSZ height of 133.8 m AGL except for 15 dawns (20%), 8 days (11%), 12 dusks (17%), and 0 nights (0%) (Figure 4-6).

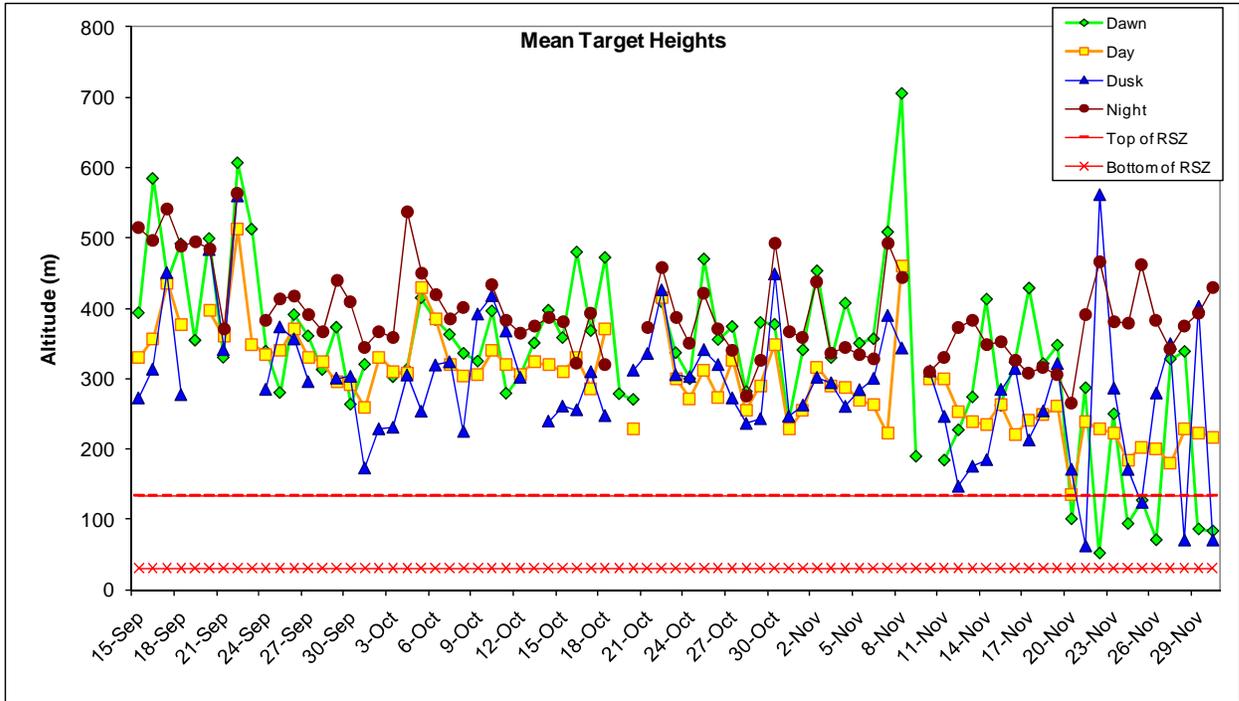


Figure 4-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.

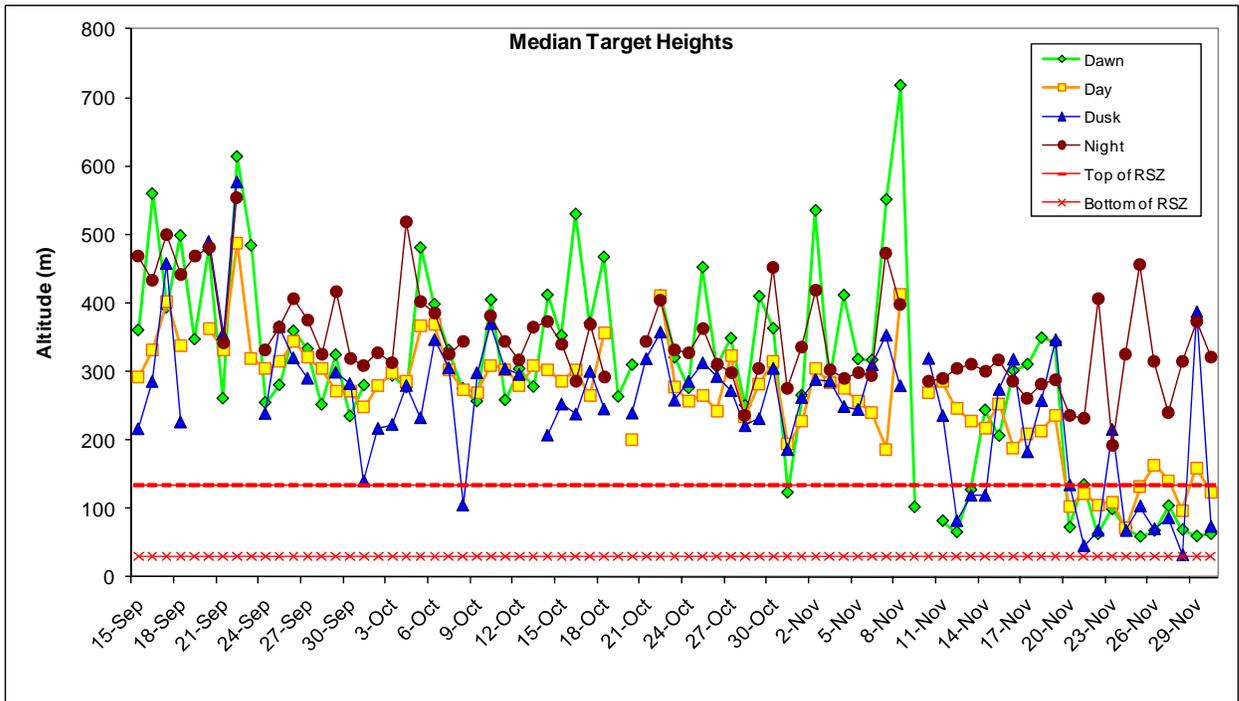


Figure 4-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.

The mean and median target heights during each biological period were calculated for all dates with $\geq 50\%$ data for that time period, averaged, and

presented in Table 4-3. (All mean and median target height values for each biological period can be found in Appendix C.) Table 4-3 also shows the overall mean and median for each biological period when all targets were combined (regardless of date). These overall means and medians are illustrated in Figure 4-7.

Table 4-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
Target data calculated for each date				
Average mean target height	337.7	297.0	291.0	392.2
Average median target height	300.0	263.8	251.0	347.3
All targets for season combined				
Mean target height	363.2	293.0	298.4	395.6
Median target height	341.1	274.3	276.1	357.5

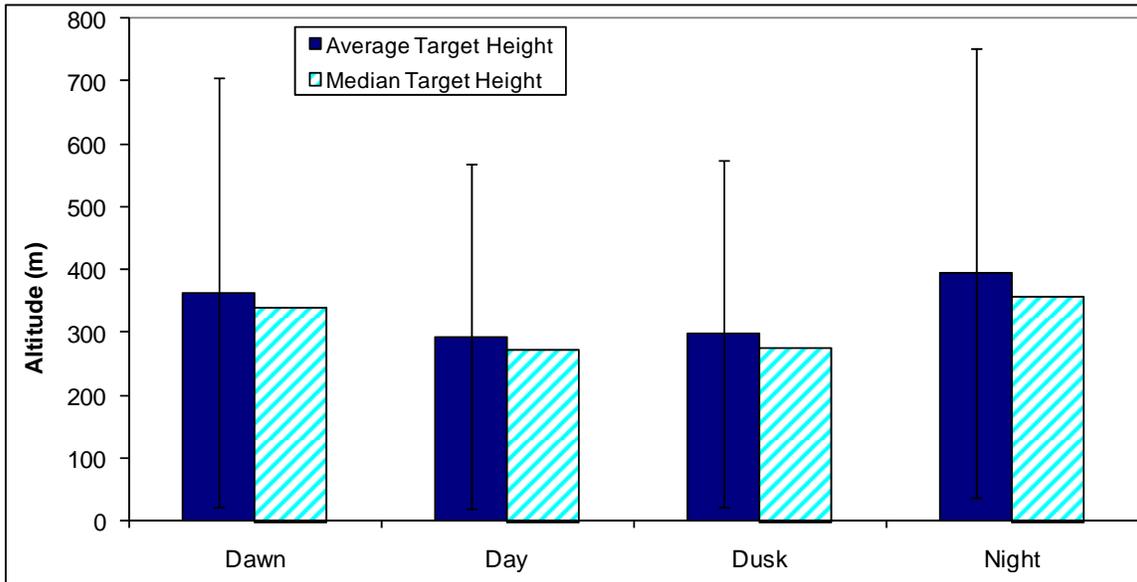


Figure 4-7. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the fall 2010 season. Error bars represent one standard deviation.

The distribution of targets in 50-meter increments was greatest above the rotor swept zone although targets also occurred within the rotor swept zone during the fall 2010 season (Figure 4-8).

Targets were detected up to 2,800 m AGL by the vertical radar. When all targets detected during the fall 2010 season were combined together, the majority of targets were recorded above the rotor swept zone (RSZ) of 29.9 – 133.8 m AGL and the least below the RSZ (Table 4-4). Within the RSZ, percents of targets were the greatest during days (16.3%) followed by dusks (12.9%), dawns (12.7%) and finally nights (9.4%) (Table 4-4).

When percent targets in the RSZ were calculated for each date, dawns averaged the greatest (22.7%), followed by dusks (20.0%), days (19.7%) and nights had the lowest average percent of targets in the RSZ (12.4%). Average target passage rates above, within, and below the RSZ were the greatest above the RSZ during all time periods. Averages are presented in Table 4-4 and individual target passage rates are illustrated in figure 4-9 (dawns), figure 4-10 (days), figure 4-11 (dusks), and figure 4-12 (nights). All target counts, passage rates, and percents in RSZ for each biological period can be found in Appendix C.

Table 4-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
All targets for season combined				
% targets above RSZ	85.2%	81.2%	85.3%	89.4%
% targets within RSZ	12.7%	16.3%	12.9%	9.4%
% targets below RSZ	2.1%	2.5%	1.9%	1.1%
% targets below turbine height	14.8%	18.8%	14.7%	10.6%
Target data calculated for each date				
Average % of targets in RSZ	22.7%	19.7%	20.0%	12.4%
Min target percentage within RSZ	0.0%	5.0%	0.0%	2.0%
Max target percentage within RSZ	78.6%	62.2%	93.3%	42.7%
Average target passage rate above RSZ	205.9	451.5	175.3	226.7
Average target passage rate within RSZ	30.7	91.2	26.4	23.7
Average target passage rate below RSZ	5.1	14.0	3.8	2.8

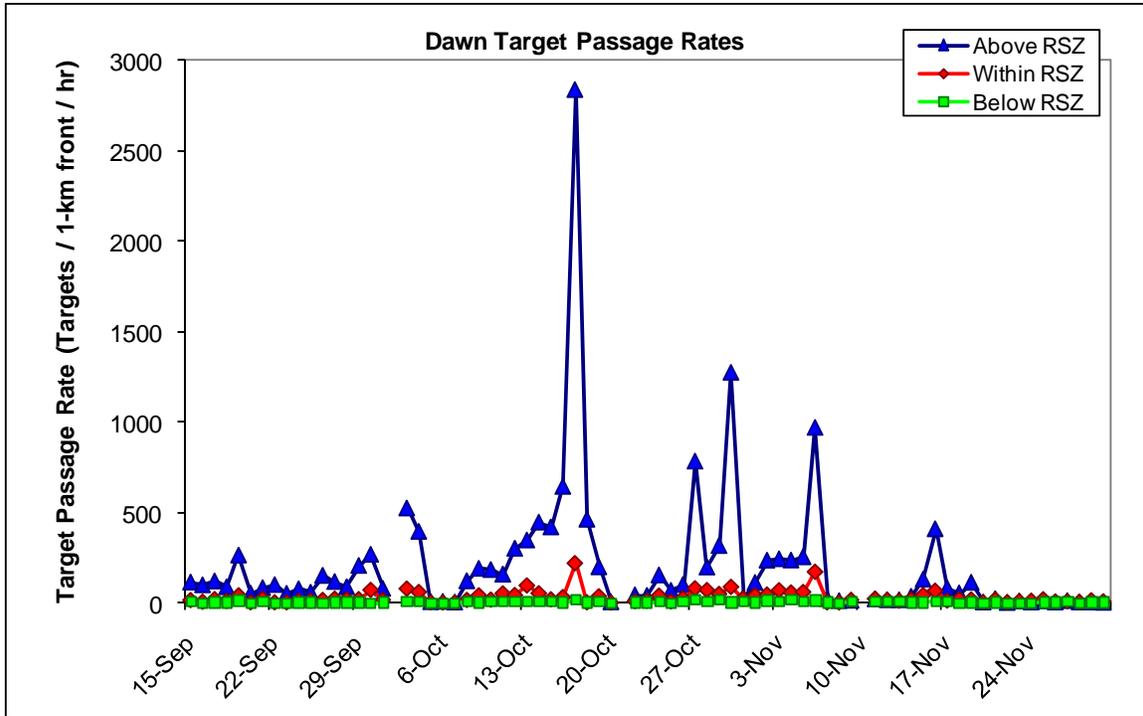


Figure 4-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the fall 2010 season.

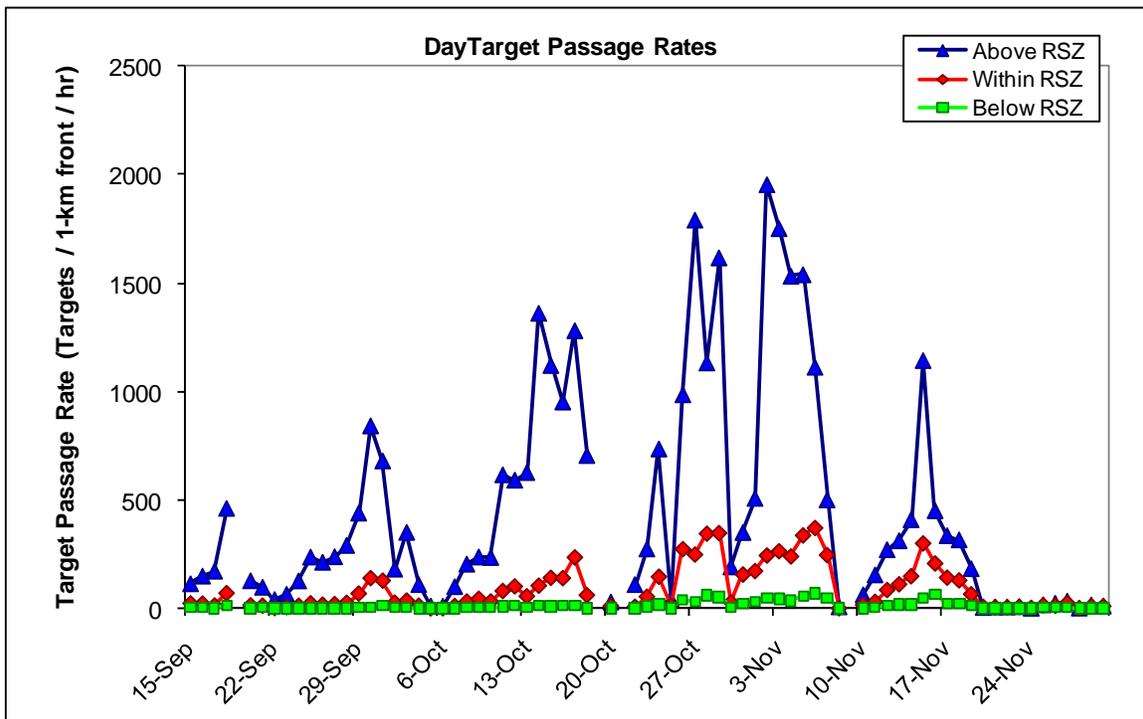


Figure 4-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the fall 2010 season.

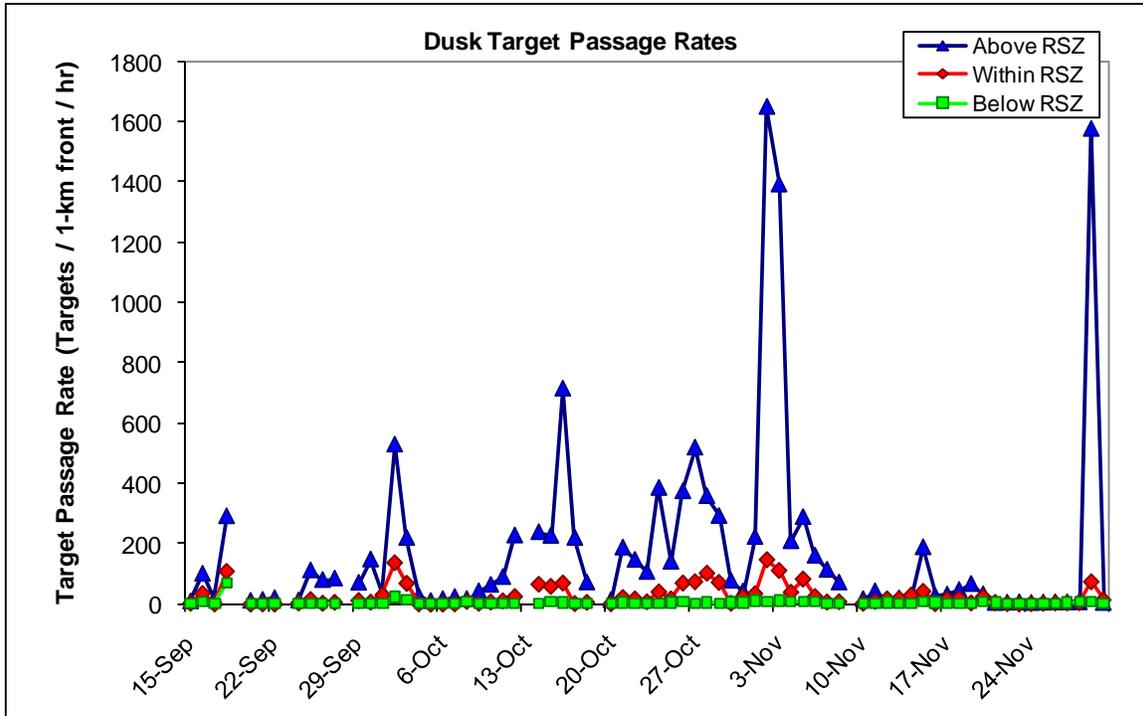


Figure 4-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the fall 2010 season.

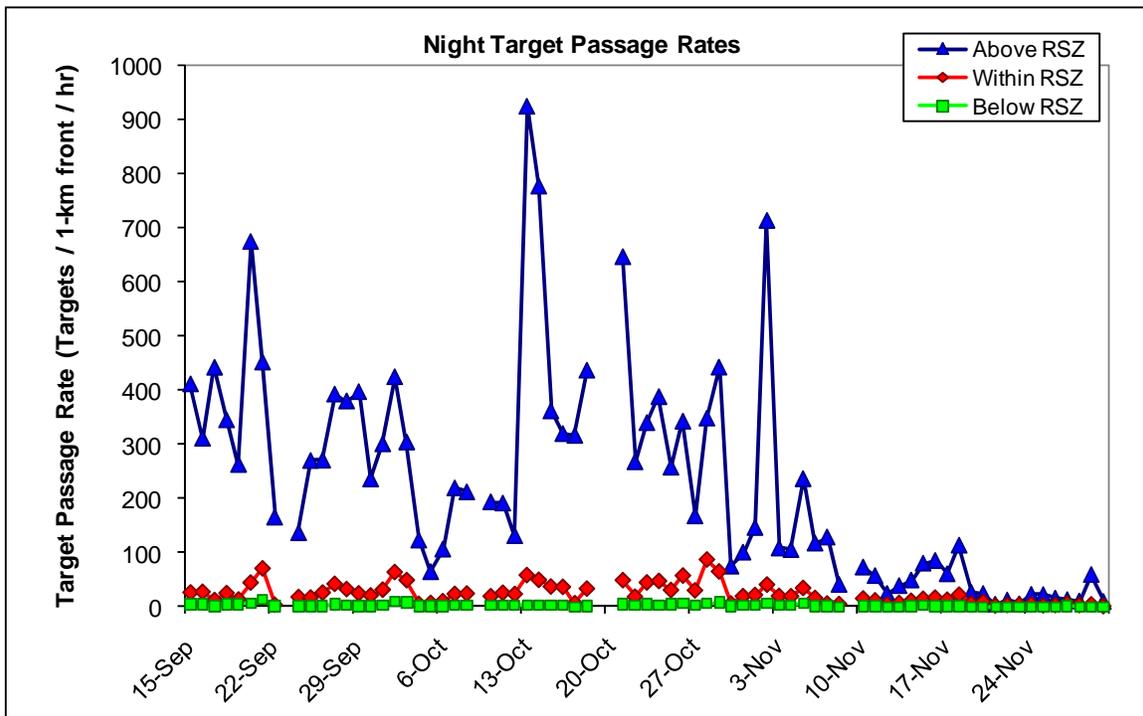


Figure 4-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the fall 2010 season.

4.2. Horizontal Radar Data

The Horizontal Surveillance Radar (HSR) was used to determine directional movements of targets during dawns, days, dusks, and nights of the fall 2010 season.

4.2.1. Target Directions

The average flight direction of all targets during the fall 2010 season was 111° (east), and averaged 75° (east) during dawns, 249° (west) during days, 257° (west) during dusks, and 112° (east) during nights. Prominent target movements varied by biological period; dawns had east and northeast movements, dusks had westerly movements, nights had east and southeast movements, and days were fairly dispersed. The distribution of average target movements during the four biological periods are displayed in figures 4-13 and 4-14 and the individual values for average target bearing and angular concentration (r) are presented in table 4-5. Target directions were only moderately concentrated, with dawns averaging the greatest angular concentration (average r = 0.51) and days the least (average r = 0.17).

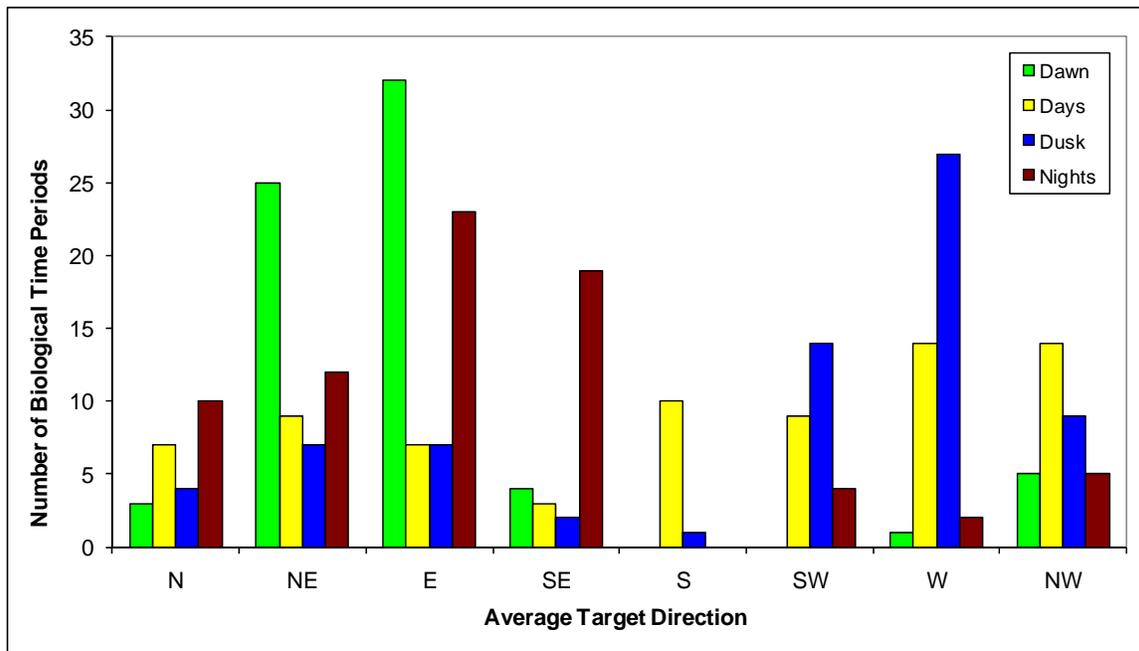


Figure 4-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the fall 2010 season.

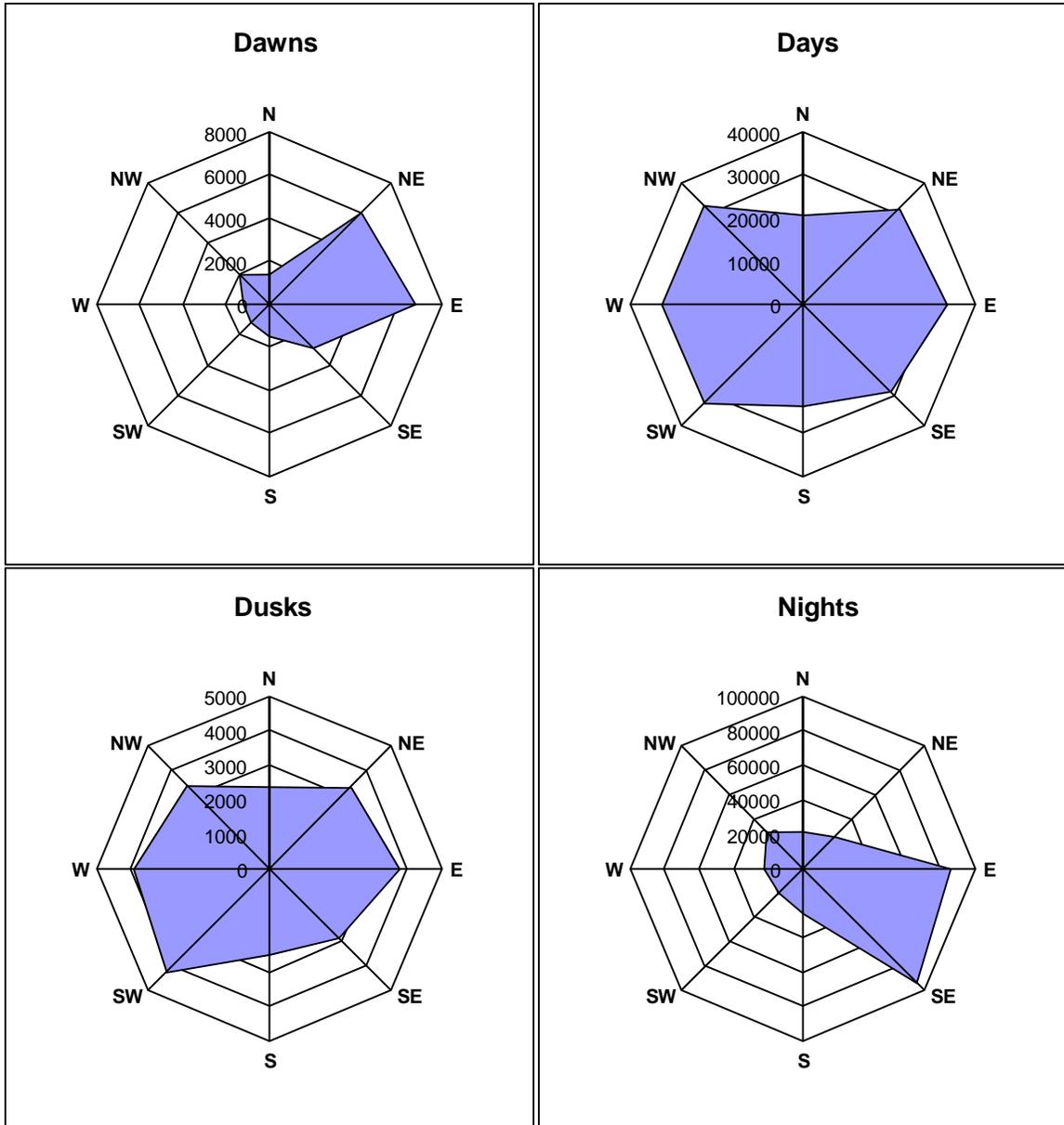


Figure 4-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the fall 2010 season.



Table 4-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during four biological periods of the fall 2010 season.

Date	Dawn			Day			Dusk			Night		
	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)
September 15, 2010												
September 16, 2010	334.5	NW	0.05	296.8	NW	0.30	313.7	NW	0.07	52.0	NE	0.05
September 17, 2010	359.3	N	0.07	337.0	NW	0.03	359.9	N	0.03	28.0	NE	0.03
September 18, 2010	337.3	NW	0.05	298.1	NW	0.05	292.5	NW	0.11	63.1	NE	0.05
September 19, 2010	19.1	N	0.02	345.4	N	0.02	31.1	NE	0.05	347.0	N	0.02
September 20, 2010	25.5	NE	0.07	335.3	NW	0.02	94.2	E	0.02	16.9	N	0.03
September 21, 2010	289.3	W	0.32	346.4	N	0.03	33.5	NE	0.02	65.5	NE	0.03
September 22, 2010	136.7	SE	0.03	5.1	N	0.02	40.4	NE	0.02	25.1	NE	0.04
September 23, 2010	322.5	NW	0.21	294.1	NW	0.25	280.1	W	0.47	116.4	SE	0.29
September 24, 2010	307.0	NW	0.47	293.2	NW	0.12	287.8	W	0.34	92.9	E	0.23
September 25, 2010	307.6	NW	0.33	290.3	W	0.11				106.2	E	0.24
September 26, 2010										109.3	E	0.49
September 27, 2010				257.4	W	0.53	242.0	SW	0.20	107.1	E	0.65
September 28, 2010	135.9	SE	0.55	197.8	S	0.33	208.3	SW	0.27	119.3	SE	0.79
September 29, 2010	129.9	SE	0.49	194.4	S	0.25	214.0	SW	0.39	103.2	E	0.82
September 30, 2010	95.3	E	0.59	79.1	E	0.20	46.6	NE	0.52	83.9	E	0.43
October 1, 2010	113.4	SE	0.45	190.8	S	0.21	79.7	E	0.25	115.6	SE	0.71
October 2, 2010	117.8	SE	0.24	125.2	SE	0.22	119.9	SE	0.31	125.2	SE	0.67
October 3, 2010	101.8	E	0.70	211.6	SW	0.26	119.2	SE	0.57	105.9	E	0.50
October 4, 2010	82.2	E	0.37	67.6	E	0.32	338.1	N	0.19	105.0	E	0.78
October 5, 2010	17.1	N	0.29	49.0	NE	0.16	301.7	NW	0.33	116.7	SE	0.39
October 6, 2010	66.0	NE	0.35	23.0	NE	0.19	323.3	NW	0.26	102.9	E	0.52
October 7, 2010	75.4	E	0.51	162.4	S	0.15	268.8	W	0.34	127.9	SE	0.76
October 8, 2010	97.3	E	0.54	189.4	S	0.18	219.3	SW	0.12	121.5	SE	0.78
October 9, 2010	93.0	E	0.60	176.3	S	0.17	234.0	SW	0.24	118.0	SE	0.81
October 10, 2010	107.0	E	0.59	160.0	S	0.27	247.7	W	0.05	117.1	SE	0.69
October 11, 2010	81.7	E	0.57	213.4	SW	0.12	237.9	SW	0.20	114.8	SE	0.68
October 12, 2010	83.2	E	0.57	218.8	SW	0.13	311.4	NW	0.12	117.3	SE	0.82
October 13, 2010	76.4	E	0.50	161.1	S	0.17				122.4	SE	0.79
October 14, 2010	68.4	E	0.51	222.1	SW	0.14	92.3	E	0.37	122.6	SE	0.76
October 15, 2010	95.1	E	0.47	189.4	S	0.11	216.0	SW	0.27	119.9	SE	0.65
October 16, 2010	79.2	E	0.57	155.2	SE	0.11	56.6	NE	0.83	107.2	E	0.68
October 17, 2010	94.0	E	0.54	92.0	E	0.34	27.6	NE	0.48	73.1	E	0.41
October 18, 2010	57.4	NE	0.31	93.7	E	0.12	34.8	NE	0.14	93.8	E	0.24
October 19, 2010	82.7	E	0.39	270.6	W	0.07	265.3	W	0.23	23.1	NE	0.07
October 20, 2010	79.4	E	0.28	53.4	NE	0.07	70.6	E	0.03	129.0	SE	0.37
October 21, 2010	77.1	E	0.43	243.5	SW	0.11	228.9	SW	0.05	78.3	E	0.28
October 22, 2010	79.2	E	0.60	76.5	E	0.43	69.0	E	0.31	83.2	E	0.39
October 23, 2010	70.0	E	0.69	127.1	SE	0.10	79.1	E	0.17	65.5	NE	0.14
October 24, 2010	76.2	E	0.64	235.6	SW	0.22	5.2	N	0.09	61.3	NE	0.46
October 25, 2010	65.8	NE	0.59	24.8	NE	0.14	353.6	N	0.41	112.4	E	0.17
October 26, 2010				211.5	SW	0.11	270.2	W	0.11	139.0	SE	0.27
October 27, 2010	66.0	NE	0.42	244.1	SW	0.19	270.4	W	0.44	208.9	SW	0.19
October 28, 2010	65.7	NE	0.69	267.1	W	0.24	262.5	W	0.47	147.2	SE	0.27
October 29, 2010	71.1	E	0.59	248.0	W	0.19	263.3	W	0.51	53.4	NE	0.29
October 30, 2010	71.1	E	0.66	81.9	E	0.28	159.5	S	0.28	98.2	E	0.29
October 31, 2010	70.7	E	0.67	194.7	S	0.08	246.9	SW	0.36	118.1	SE	0.21
November 1, 2010				239.0	SW	0.20	246.6	SW	0.55	138.6	SE	0.09
November 2, 2010	66.4	NE	0.45	224.4	SW	0.02	251.1	W	0.54	73.3	E	0.14
November 3, 2010	52.8	NE	0.59	337.3	NW	0.03	255.1	W	0.57	94.9	E	0.22
November 4, 2010	53.1	NE	0.41	293.5	NW	0.06	246.0	SW	0.61	102.5	E	0.25
November 5, 2010	57.3	NE	0.50	253.4	W	0.11	250.8	W	0.51	82.5	E	0.25
November 6, 2010	61.9	NE	0.44	320.4	NW	0.08	248.8	W	0.49	83.5	E	0.29
November 7, 2010	54.3	NE	0.66	110.1	E	0.17	320.0	NW	0.18	54.2	NE	0.35
November 8, 2010	49.4	NE	0.69	58.9	NE	0.57	258.5	W	0.33	84.4	E	0.20
November 9, 2010	66.0	NE	0.57	65.1	NE	0.04						
November 10, 2010				30.3	NE	0.23	322.1	NW	0.36	0.9	N	0.18
November 11, 2010	74.6	E	0.63	264.9	W	0.24	258.8	W	0.64	246.0	SW	0.27
November 12, 2010	62.6	NE	0.68	282.3	W	0.19	259.4	W	0.50	63.3	NE	0.17
November 13, 2010	70.7	E	0.73	250.3	W	0.11	247.2	SW	0.44	102.2	E	0.17
November 14, 2010	71.9	E	0.78	251.6	W	0.05	242.2	SW	0.50	23.4	NE	0.22
November 15, 2010	67.4	NE	0.69	288.2	W	0.11	255.9	W	0.61	8.0	N	0.25
November 16, 2010	72.0	E	0.58	53.5	NE	0.04	310.6	NW	0.32	349.8	N	0.21
November 17, 2010	70.3	E	0.61	302.0	NW	0.15	257.3	W	0.70	327.1	NW	0.09
November 18, 2010	65.7	NE	0.63	299.0	NW	0.14	256.5	W	0.59	340.5	N	0.13
November 19, 2010	58.4	NE	0.71	342.2	N	0.25	283.6	W	0.54	341.0	N	0.31
November 20, 2010	68.3	E	0.78	33.3	NE	0.17	260.0	W	0.47	326.5	NW	0.31
November 21, 2010	67.0	NE	0.81	46.3	NE	0.16	265.7	W	0.35	20.8	N	0.17
November 22, 2010	61.4	NE	0.67	10.8	N	0.24	277.9	W	0.46	335.3	NW	0.31
November 23, 2010	68.6	E	0.66	13.7	N	0.13	308.3	NW	0.32	1.6	N	0.19
November 24, 2010	59.0	NE	0.55	347.5	N	0.26	77.8	E	0.23	270.4	W	0.29
November 25, 2010	62.8	NE	0.67	263.3	W	0.19	261.1	W	0.47	244.3	SW	0.24
November 26, 2010	62.4	NE	0.64	297.0	NW	0.09	268.0	W	0.39	205.1	SW	0.05
November 27, 2010	77.0	E	0.66	268.8	W	0.08	276.4	W	0.29	2.5	N	0.24
November 28, 2010	73.4	E	0.75	332.8	NW	0.23	277.9	W	0.39	309.0	NW	0.25
November 29, 2010	56.5	NE	0.53	276.7	W	0.24	226.4	SW	0.62	275.1	W	0.46
November 30, 2010	64.6	NE	0.53	308.9	NW	0.16	269.6	W	0.61	319.1	NW	0.33

*Periods with <50% of time recorded by radar are excluded from analysis

4.3. Weather Data

4.3.1. Weather Information

Table 4-6 presents nightly averages of wind speed, temperature and wind direction from an on-site meteorological tower, total minutes of precipitation as detected by the vertical radar, and the presence of low visibility conditions at two nearby airports. At a height of 60 m, nightly wind speeds averaged 5.4 m/s (12.1 mph). Average nightly wind directions were predominantly west (Figure 4-15). Temperatures averaged 21.4° C (70.5° F) during nights. During the 77-day fall 2010 season, rain occurred on portions of 11 nights (14%).

Low visibility potentially resulting in bird strike risk to nocturnal migrants is generally defined as less than 0.5 miles during nighttime. Visibility records were accessed from two nearby airports: El Centro Naval Air Facility (NJK, ~ 24 miles east) and Imperial County Airport (IPL, ~ 29 miles east). During the 77-day fall 2010 season, NJK recorded two records of low visibility on October 2, 2010. These occurred at 554 and 556 and were associated with snow. No low visibility or fog were recorded in the daily summaries at IPL.

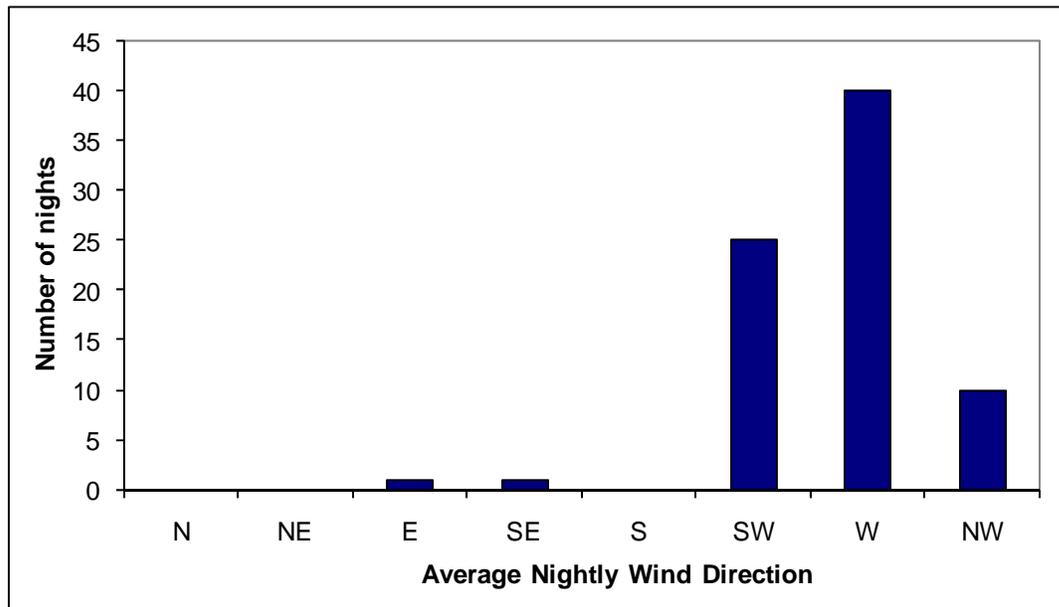


Figure 4-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the fall 2010 season.



Table 4-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the fall 2010 season.

Date	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
							NJK	IPL
15-Sep-10	6.3	30.1	244.3	SW	0.95	0		
16-Sep-10	8.8	31.0	236.2	SW	0.97	0		
17-Sep-10	7.4	30.1	247.5	W	0.95	0		
18-Sep-10	6.5	31.0	239.0	SW	0.88	0		
19-Sep-10	7.8	33.2	254.2	W	0.92	0		
20-Sep-10	8.7	30.5	227.5	SW	0.84	0		
21-Sep-10	9.9	24.6	245.9	SW	0.79	0		
22-Sep-10	9.6	22.9	243.5	SW	0.97	0		
23-Sep-10	2.4	26.9	297.0	NW	0.84	0		
24-Sep-10	2.3	29.3	273.6	W	0.90	0		
25-Sep-10	3.9	30.7	250.6	W	0.89	0		
26-Sep-10	1.8	33.7	305.4	NW	0.91	0		
27-Sep-10	3.1	33.3	247.7	W	0.32	30		
28-Sep-10	2.6	30.3	276.6	W	0.29	0		
29-Sep-10	4.7	31.9	248.7	W	0.72	30		
30-Sep-10	5.0	31.8	236.0	SW	0.71	180		
1-Oct-10	3.6	26.7	277.7	W	0.63	90		
2-Oct-10	3.7	24.6	291.0	W	0.46	208		
3-Oct-10	2.9	27.9	268.9	W	0.42	0		
4-Oct-10	16.5	17.8	249.7	W	1.00	0		
5-Oct-10	7.4	17.6	254.9	W	0.96	0		
6-Oct-10	8.2	17.7	264.5	W	0.95	0		
7-Oct-10	2.7	19.4	266.6	W	0.75	0		
8-Oct-10	2.5	22.5	270.8	W	0.88	0		
9-Oct-10	3.1	25.4	291.1	W	0.85	0		
10-Oct-10	3.2	26.7	263.4	W	0.89	0		
11-Oct-10	2.4	26.9	256.2	W	0.71	0		
12-Oct-10	2.7	28.1	298.1	NW	0.90	135		
13-Oct-10	2.9	28.9	299.2	NW	0.91	0		
14-Oct-10	2.6	28.2	286.4	W	0.61	0		
15-Oct-10	2.1	26.7	239.8	SW	0.44	0		
16-Oct-10	4.9	26.2	236.6	SW	0.92	0		
17-Oct-10	11.4	20.0	227.9	SW	1.00	0		
18-Oct-10	4.5	21.5	205.7	SW	0.63	45		
19-Oct-10	6.8	16.3	242.4	SW	0.88	463		
20-Oct-10	3.0	16.4	266.0	W	0.82	0		
21-Oct-10	6.4	18.9	243.1	SW	0.97	0		
22-Oct-10	10.1	18.0	240.7	SW	0.99	0		
23-Oct-10	7.4	18.6	232.3	SW	0.94	0		
24-Oct-10	12.1	21.8	251.3	W	0.99	0		
25-Oct-10	7.2	18.7	242.8	SW	0.97	0		
26-Oct-10	3.2	19.4	284.0	W	0.66	0		
27-Oct-10	2.9	17.3	307.3	NW	0.91	0		
28-Oct-10	1.7	20.4	285.8	W	0.64	0		
29-Oct-10	6.9	22.4	228.1	SW	0.71	0		
30-Oct-10	6.4	17.6	249.0	W	0.94	0		
31-Oct-10	2.7	19.3	277.8	W	0.86	0		



Table 4-6 continued. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the fall 2010 season.

Date	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Visibility Noted	
							NJK	IPL
1-Nov-10	2.9	23.0	300.4	NW	0.89	0		
2-Nov-10	2.3	23.1	294.4	NW	0.95	0		
3-Nov-10	2.2	25.2	293.1	NW	0.97	0		
4-Nov-10	2.5	23.2	258.5	W	0.80	0		
5-Nov-10	4.6	24.8	241.3	SW	0.76	0		
6-Nov-10	7.2	19.3	240.0	SW	0.82	15		
7-Nov-10	12.6	19.1	243.3	SW	0.95	0		
8-Nov-10	7.6	14.7	245.2	SW	0.98	0		
9-Nov-10	3.2	15.1	241.1	SW	0.65	0		
10-Nov-10	6.0	15.4	254.0	W	0.87	0		
11-Nov-10	3.1	16.5	156.3	SE	0.11	0		
12-Nov-10	2.7	15.6	277.2	W	0.89	0		
13-Nov-10	2.7	16.6	268.3	W	0.81	0		
14-Nov-10	3.2	19.0	261.3	W	0.89	0		
15-Nov-10	4.5	20.7	249.3	W	0.89	0		
16-Nov-10	4.6	20.2	275.3	W	0.76	0		
17-Nov-10	2.7	17.9	264.8	W	0.79	0		
18-Nov-10	4.3	19.9	229.9	SW	0.81	0		
19-Nov-10	10.4	16.4	252.1	W	0.95	0		
20-Nov-10	6.7	16.7	265.6	W	0.90	45		
21-Nov-10	14.0	12.5	264.0	W	0.99	0		
22-Nov-10	7.8	11.8	252.0	W	0.95	0		
23-Nov-10	12.6	13.9	261.1	W	1.00	0		
24-Nov-10	3.6	10.1	227.3	SW	0.53	0		
25-Nov-10	2.0	8.1	305.9	NW	0.44	0		
26-Nov-10	2.0	9.0	265.6	W	0.82	0		
27-Nov-10	14.3	13.4	266.5	W	0.98	135		
28-Nov-10	5.3	9.4	232.2	SW	0.66	0		
29-Nov-10	1.9	7.9	75.8	E	0.28	0		
30-Nov-10	2.0	9.1	299.6	NW	0.94	0		



4.3.2. Target Passage Rates and Weather Associations

Table 4-7 . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the fall 2010 season.

Date	Nightly Target Passage Rate (targets/1-km front/hr)	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
								NJK	IPL
13-Oct-10	986.0	2.9	28.9	299.2	NW	0.91	0		
14-Oct-10	829.7	2.6	28.2	286.4	W	0.61	0		
2-Nov-10	759.9	2.3	23.1	294.4	NW	0.95	0		
20-Sep-10	724.9	8.7	30.5	227.5	SW	0.84	0		
21-Oct-10	699.8	6.4	18.9	243.1	SW	0.97	0		
21-Sep-10	535.3	9.9	24.6	245.9	SW	0.79	0		
29-Oct-10	515.4	6.9	22.4	228.1	SW	0.71	0		
2-Oct-10	497.8	3.7	24.6	291.0	W	0.46	208		
18-Oct-10	471.7	4.5	21.5	205.7	SW	0.63	45		
17-Sep-10	455.5	7.4	30.1	247.5	W	0.95	0		
15-Sep-10	442.3	6.3	30.1	244.3	SW	0.95	0		
28-Oct-10	441.5	1.7	20.4	285.8	W	0.64	0		
27-Sep-10	439.5	3.1	33.3	247.7	W	0.32	30		
24-Oct-10	439.5	12.1	21.8	251.3	W	0.99	0		
29-Sep-10	422.9	4.7	31.9	248.7	W	0.72	30		
28-Sep-10	414.9	2.6	30.3	276.6	W	0.29	0		
26-Oct-10	406.3	3.2	19.4	284.0	W	0.66	0		
15-Oct-10	400.9	2.1	26.7	239.8	SW	0.44	0		
23-Oct-10	389.5	7.4	18.6	232.3	SW	0.94	0		
18-Sep-10	375.0	6.5	31.0	239.0	SW	0.88	0		
3-Oct-10	361.7	2.9	27.9	268.9	W	0.42	0		
16-Oct-10	358.3	4.9	26.2	236.6	SW	0.92	0		
16-Sep-10	343.5	8.8	31.0	236.2	SW	0.97	0		
1-Oct-10	335.5	3.6	26.7	277.7	W	0.63	90		
17-Oct-10	323.2	11.4	20.0	227.9	SW	1.00	0		
26-Sep-10	298.6	1.8	33.7	305.4	NW	0.91	0		
25-Oct-10	293.2	7.2	18.7	242.8	SW	0.97	0		
22-Oct-10	289.4	10.1	18.0	240.7	SW	0.99	0		
25-Sep-10	287.9	3.9	30.7	250.6	W	0.89	0		
19-Sep-10	280.8	7.8	33.2	254.2	W	0.92	0		
5-Nov-10	276.5	4.6	24.8	241.3	SW	0.76	0		
30-Sep-10	258.6	5.0	31.8	236.0	SW	0.71	180		
7-Oct-10	247.2	2.7	19.4	266.6	W	0.75	0		
8-Oct-10	238.9	2.5	22.5	270.8	W	0.88	0		
11-Oct-10	220.3	2.4	26.9	256.2	W	0.71	0		
10-Oct-10	216.1	3.2	26.7	263.4	W	0.89	0		
27-Oct-10	201.1	2.9	17.3	307.3	NW	0.91	0		
1-Nov-10	170.5	2.9	23.0	300.4	NW	0.89	0		
22-Sep-10	170.2	9.6	22.9	243.5	SW	0.97	0		
12-Oct-10	158.8	2.7	28.1	298.1	NW	0.90	135		
24-Sep-10	156.0	2.3	29.3	273.6	W	0.90	0		
18-Nov-10	137.1	4.3	19.9	229.9	SW	0.81	0		
7-Nov-10	135.8	12.6	19.1	243.3	SW	0.95	0		
6-Nov-10	135.3	7.2	19.3	240.0	SW	0.82	15		
3-Nov-10	132.2	2.2	25.2	293.1	NW	0.97	0		
4-Oct-10	130.1	16.5	17.8	249.7	W	1.00	0		
4-Nov-10	127.6	2.5	23.2	258.5	W	0.80	0		
31-Oct-10	122.8	2.7	19.3	277.8	W	0.86	0		
6-Oct-10	117.9	8.2	17.7	264.5	W	0.95	0		
16-Nov-10	103.8	4.6	20.2	275.3	W	0.76	0		



Table 4-7 continued . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the fall 2010 season.

Date	Nightly Target Passage Rate (targets/1-km front/hr)	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
								NJK	IPL
13-Oct-10	986.0	2.9	28.9	299.2	NW	0.91	0		
14-Oct-10	829.7	2.6	28.2	286.4	W	0.61	0		
2-Nov-10	759.9	2.3	23.1	294.4	NW	0.95	0		
20-Sep-10	724.9	8.7	30.5	227.5	SW	0.84	0		
21-Oct-10	699.8	6.4	18.9	243.1	SW	0.97	0		
21-Sep-10	535.3	9.9	24.6	245.9	SW	0.79	0		
29-Oct-10	515.4	6.9	22.4	228.1	SW	0.71	0		
2-Oct-10	497.8	3.7	24.6	291.0	W	0.46	208		
18-Oct-10	471.7	4.5	21.5	205.7	SW	0.63	45		
17-Sep-10	455.5	7.4	30.1	247.5	W	0.95	0		
15-Sep-10	442.3	6.3	30.1	244.3	SW	0.95	0		
28-Oct-10	441.5	1.7	20.4	285.8	W	0.64	0		
27-Sep-10	439.5	3.1	33.3	247.7	W	0.32	30		
24-Oct-10	439.5	12.1	21.8	251.3	W	0.99	0		
29-Sep-10	422.9	4.7	31.9	248.7	W	0.72	30		
28-Sep-10	414.9	2.6	30.3	276.6	W	0.29	0		
26-Oct-10	406.3	3.2	19.4	284.0	W	0.66	0		
15-Oct-10	400.9	2.1	26.7	239.8	SW	0.44	0		
23-Oct-10	389.5	7.4	18.6	232.3	SW	0.94	0		
18-Sep-10	375.0	6.5	31.0	239.0	SW	0.88	0		
3-Oct-10	361.7	2.9	27.9	268.9	W	0.42	0		
16-Oct-10	358.3	4.9	26.2	236.6	SW	0.92	0		
16-Sep-10	343.5	8.8	31.0	236.2	SW	0.97	0		
1-Oct-10	335.5	3.6	26.7	277.7	W	0.63	90		
17-Oct-10	323.2	11.4	20.0	227.9	SW	1.00	0		
26-Sep-10	298.6	1.8	33.7	305.4	NW	0.91	0		
25-Oct-10	293.2	7.2	18.7	242.8	SW	0.97	0		
22-Oct-10	289.4	10.1	18.0	240.7	SW	0.99	0		
25-Sep-10	287.9	3.9	30.7	250.6	W	0.89	0		
19-Sep-10	280.8	7.8	33.2	254.2	W	0.92	0		
5-Nov-10	276.5	4.6	24.8	241.3	SW	0.76	0		
30-Sep-10	258.6	5.0	31.8	236.0	SW	0.71	180		
7-Oct-10	247.2	2.7	19.4	266.6	W	0.75	0		
8-Oct-10	238.9	2.5	22.5	270.8	W	0.88	0		
11-Oct-10	220.3	2.4	26.9	256.2	W	0.71	0		
10-Oct-10	216.1	3.2	26.7	263.4	W	0.89	0		
27-Oct-10	201.1	2.9	17.3	307.3	NW	0.91	0		
1-Nov-10	170.5	2.9	23.0	300.4	NW	0.89	0		
22-Sep-10	170.2	9.6	22.9	243.5	SW	0.97	0		
12-Oct-10	158.8	2.7	28.1	298.1	NW	0.90	135		
24-Sep-10	156.0	2.3	29.3	273.6	W	0.90	0		
18-Nov-10	137.1	4.3	19.9	229.9	SW	0.81	0		
7-Nov-10	135.8	12.6	19.1	243.3	SW	0.95	0		
6-Nov-10	135.3	7.2	19.3	240.0	SW	0.82	15		
3-Nov-10	132.2	2.2	25.2	293.1	NW	0.97	0		
4-Oct-10	130.1	16.5	17.8	249.7	W	1.00	0		
4-Nov-10	127.6	2.5	23.2	258.5	W	0.80	0		
31-Oct-10	122.8	2.7	19.3	277.8	W	0.86	0		
6-Oct-10	117.9	8.2	17.7	264.5	W	0.95	0		
16-Nov-10	103.8	4.6	20.2	275.3	W	0.76	0		

5. RESULTS for December 1, 2010 – February 28, 2011

The MERLIN Avian Radar System operated continuously (24 hours a day) during the winter 2010-11 season, December 1, 2010 – February 28, 2011. Of the 2,159.7 hours available during the winter season, 1,838.5 hours of vertical radar (85.1% of available time) and 1,966.3 hours of horizontal radar (91.0% of available time) were collected (Table 5-1). Weather can make some of this radar data unusable because precipitation can block the radar wavelength so few if any targets are discernable. This is more prevalent among X-band radars than S-band because the longer wavelength of the S-band radar allows almost all targets to be detected in rain with the help of digital processing.

Therefore, of the 1,838.5 hours of vertical radar data, 321.3 hours were removed because rain prevented the collection of radar data (6.1% of radar time). This left 1,726.8 hours of useable vertical radar data (93.9% of radar time, 80.0% of the winter 2010-11 season; Table 5-1). A total of 21.4 hours of horizontal radar data were removed because of rain (1.1% of radar time), leaving 1,944.9 hours of useable horizontal radar data (98.6% of radar time, 90.1% of the winter 2010-11 season; Table 5-1).

Table 5-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the winter 2010-11 season.

	Time in Spring 2010 season	Time radar collected data	Radar downtime	Radar data with rain or interference	Useable radar data
Vertical Radar (hrs)	2159.7	1838.5	321.3	111.6	1726.8
Horizontal Radar (hrs)	2159.7	1966.3	193.4	21.4	1944.9

5.1 Vertical Radar Data

Data collected from the vertical scanning radar (VSR) was used to quantify target movements through the project area. Data is presented as total number of targets / 1-km front / hr. This rate is also used when quantifying targets above (up to ~2,800 m AGL), below, and at the height of the rotor swept zone for the winter 2010-11 season

5.1.1. Targets Passage Rates Over Time

Target passage rates during winter 2010-11 season were variable throughout the season (Figure 5-1) and among the four biological periods, but averaged the greatest during days, followed by nights, dusks, and then dawns (Figure 5-2). Summary statistics of the target passage rates for each of the four biological

periods are presented in table 5-2. (All target counts and target passage rates for each biological period are presented in Appendix C).

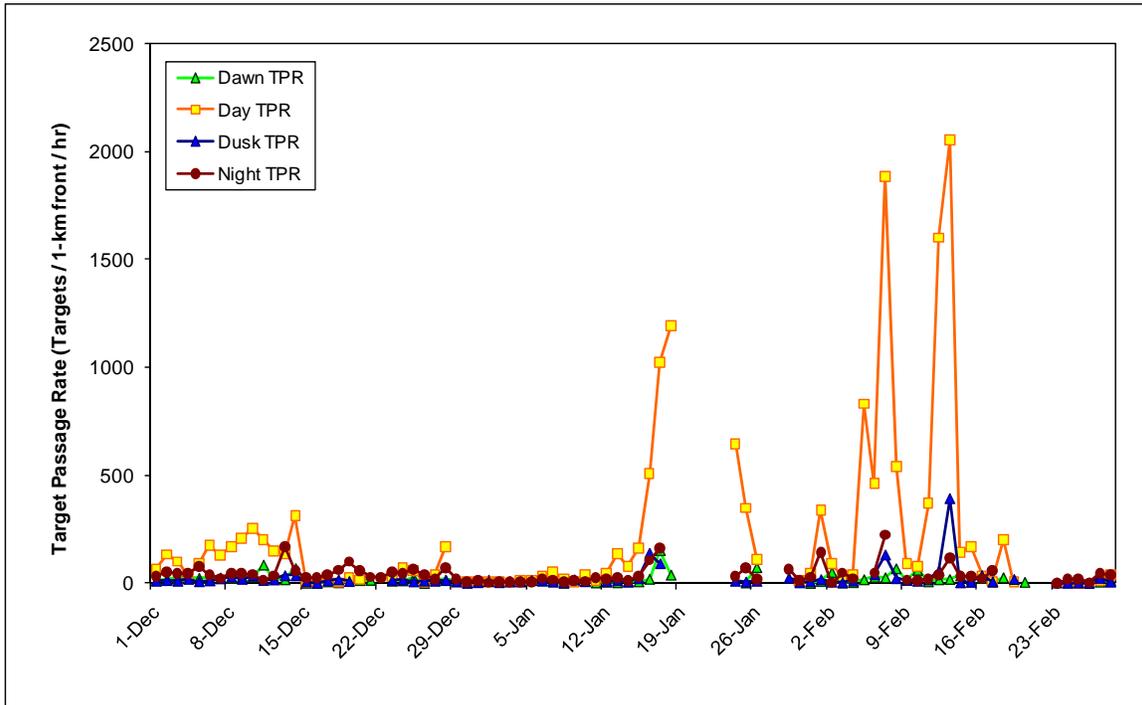


Figure 5-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.

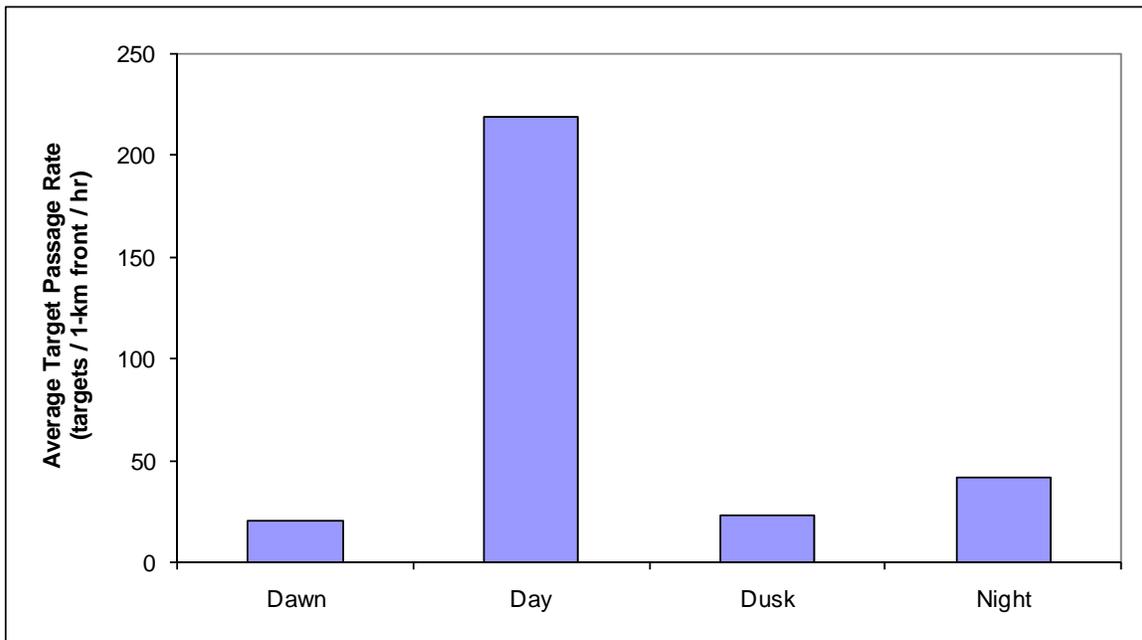


Figure 5-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the winter 2010-11 season.

Table 5-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the winter 2010-11 season.

	Daw n	Day	Dusk	Night
Average	21.2	218.8	23.6	41.6
Standard Deviation	23.0	407.9	49.6	40.3
Median	15.2	70.0	12.0	30.4
Minimum	2.0	1.9	1.0	2.1
Maximum	152.0	2054.7	389.0	224.2
Range	150.0	2052.8	388.0	222.1

Average target passage rates differed hourly throughout the winter 2010-11 season (Figure 5-3) and were greatest midday (hours 11-13, 11am-1pm). Target passage rates were greatest above the rotor swept zone compared to within and below the rotor swept zone.

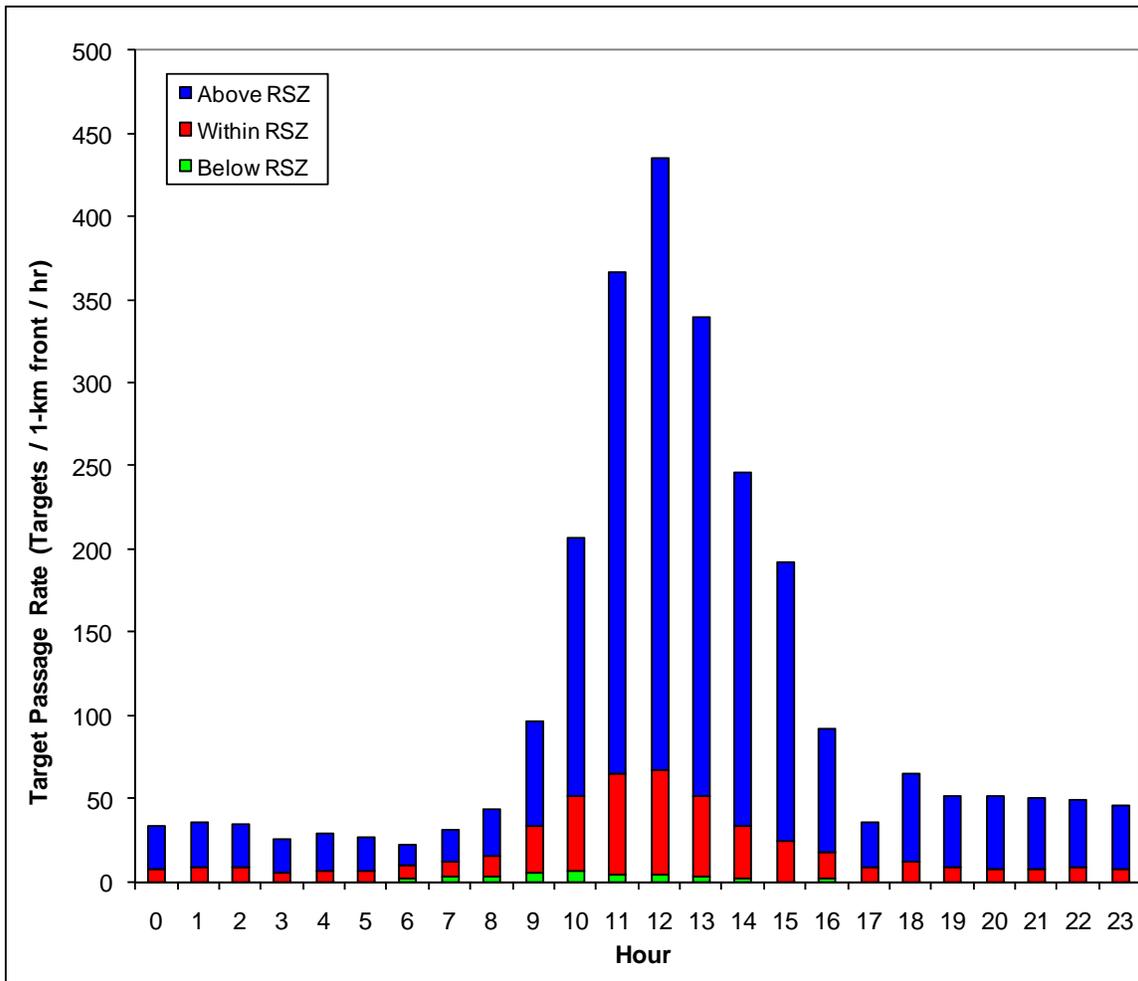


Figure 5-3. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the winter 2010-11 season.

5.1.2. Altitudinal Distribution of Targets

Average hourly target heights varied slightly, ranging between 232.5 m during hour 9 and 371.3 m during hour 18 (Figure 5-4).

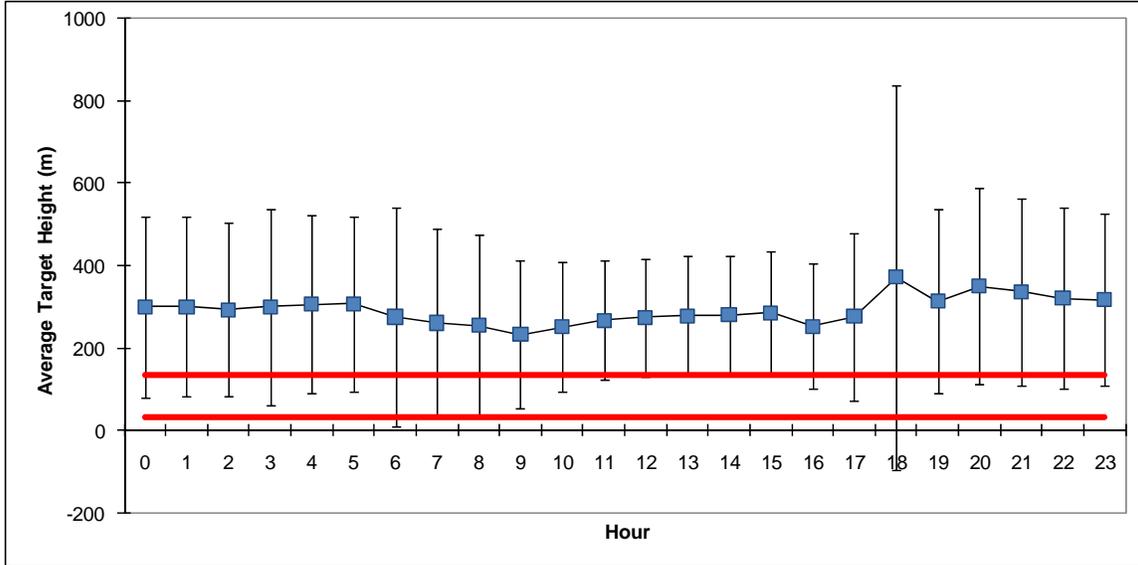


Figure 5-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the winter 2010-11 season. Error bars represent the standard deviation for each hour and red lines represent the top and bottom of the rotor swept zone (29.9 – 133.8 m AGL).

Mean target heights detected during the winter 2010-11 season were generally above the maximum RSZ height of 133.8 m AGL except during 31 dawns (41%), 3 days (4%), 24 dusks (33%), and 0 nights (0%) (Figure 5-5). Median target heights were lower than the means and a larger percentage of periods had median target heights below the maximum RSZ height of 133.8 m AGL including 50 dawns (66%), 19 days (26%), 38 dusks (52%), and 1 night (1%) (Figure 5-6).

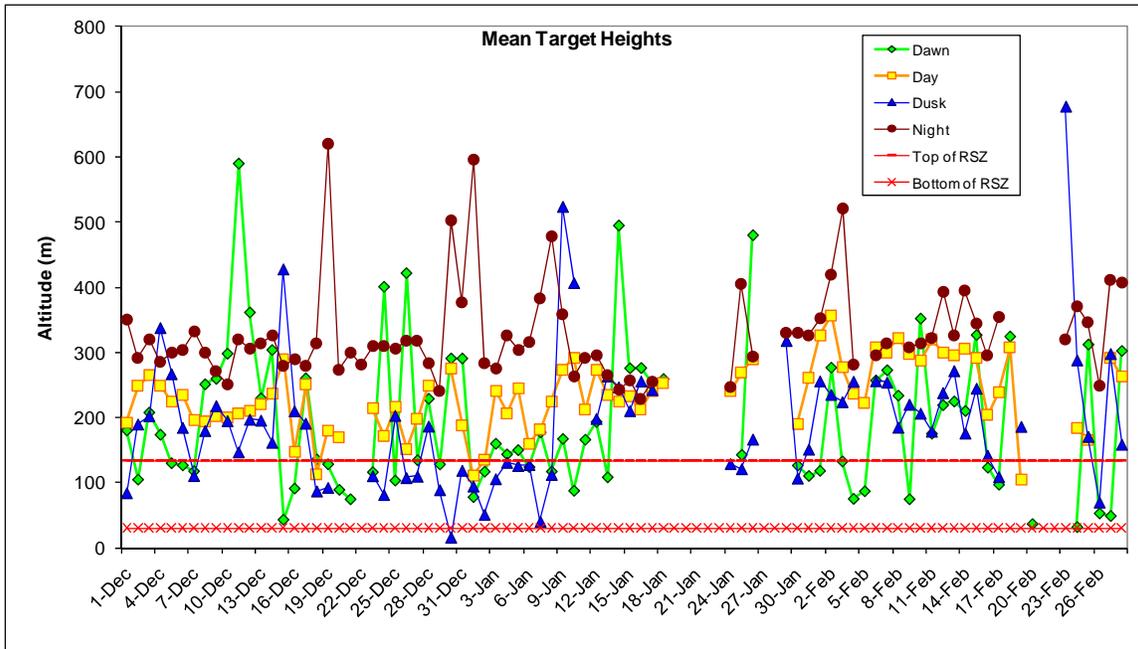


Figure 5-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.

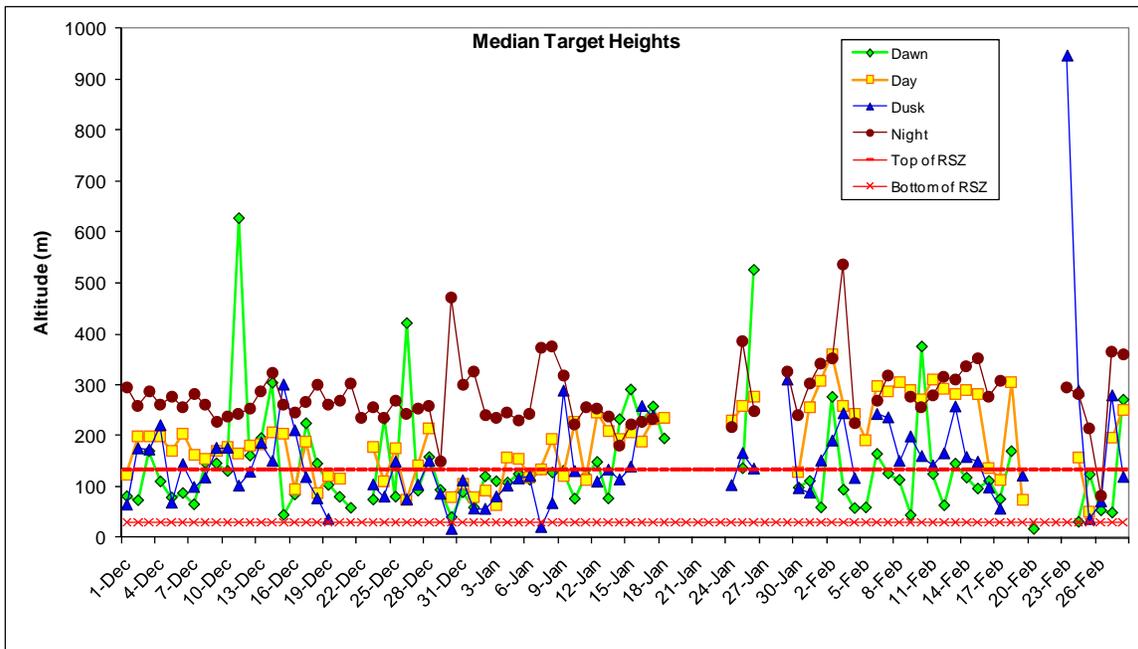


Figure 5-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.

The mean and median target heights during each biological period were calculated for all dates with $\geq 50\%$ data for that time period, averaged, and presented in Table 5-3. (All mean and median target height values for each

biological period can be found in Appendix C.) Table 5-3 also shows the overall mean and median for each biological period when all targets were combined (regardless of date). These overall means and medians are illustrated in Figure 5-7.

Table 5-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
Target data calculated for each date				
Average mean target height	195.2	233.6	193.7	327.4
Average median target height	140.8	189.8	151.7	277.3
All targets for season combined				
Mean target height	249.3	269.5	225.2	322.0
Median target height	158.2	253.6	191.3	279.8

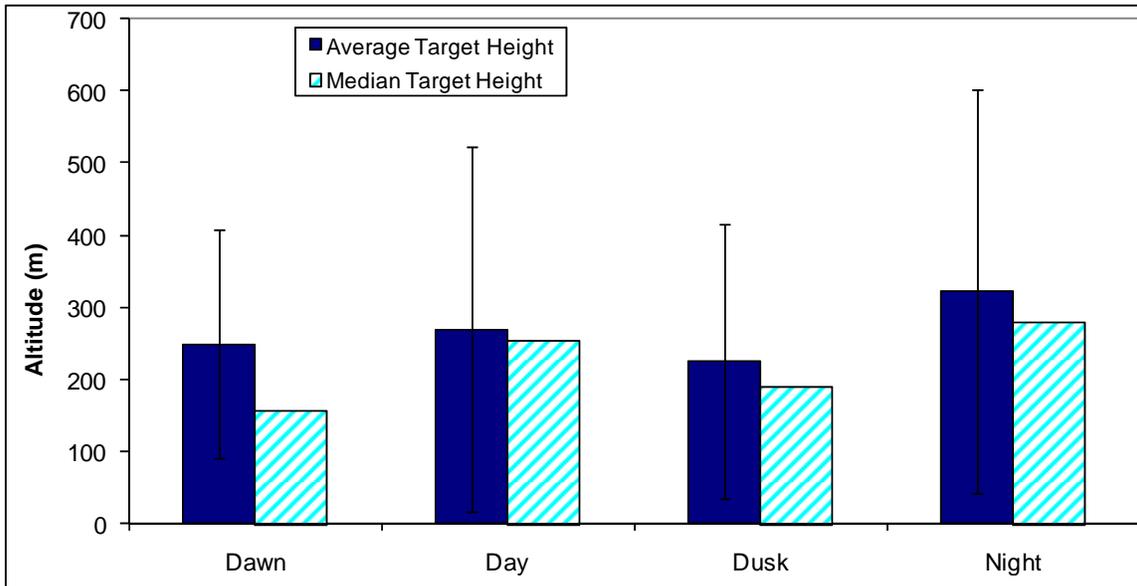


Figure 5-7. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the winter 2010-11 season. Error bars represent one standard deviation.

The distribution of targets in 50-meter increments was greatest above the rotor swept zone although targets also occurred within the rotor swept zone during the winter 2010-11 season (Figure 5-8).

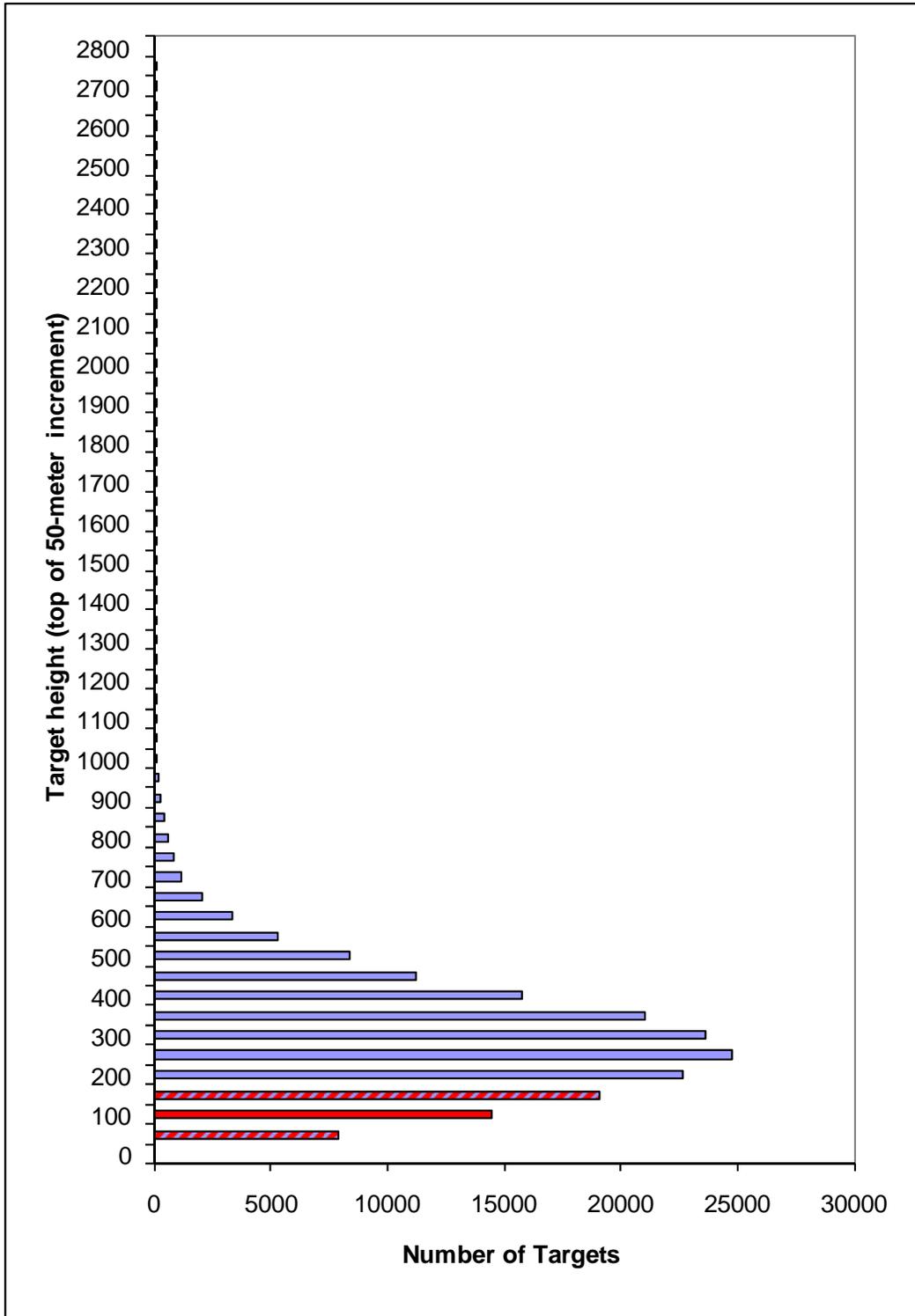


Figure 5-8. Number of targets occurring in each 50-meter increment at the proposed Ocotillo Wind Project site during the winter 2010-11 season. Red indicates rotor swept heights, and red-blue hashed indicates altitudes partially within rotor swept heights. Note: the height of the radar unit on this figure is 0 m. The location of the radar unit occasionally allows detection of targets flying below the radar, and those are noted in the 0 to -50 m band.

Targets were detected up to 2,800 m AGL by the vertical radar. When all targets detected during the winter 2010-11 season were combined together, the majority of targets were recorded above the rotor swept zone (RSZ) of 29.9 – 133.8 m AGL and the least below the RSZ (Table 5-4). Within the RSZ, percents of targets were the greatest during dawns (36.6%) followed by days (30.4%), nights (17.2%) and finally days (16.4%) (Table 5-4).

When percent targets in the RSZ were calculated for each date, dawns averaged the greatest (46.2%), followed by dusks (40.5%), days (30.4%) and nights had the lowest average percent of targets in the RSZ (19.4%). Average target passage rates above, within, and below the RSZ were the greatest above the RSZ during all time periods. Averages are presented in Table 5-4 and individual target passage rates are illustrated in figure 5-9 (dawns), figure 5-10 (days), figure 5-11 (dusks), and figure 5-12 (nights). All target counts, passage rates, and percents in RSZ for each biological period can be found in Appendix C.

Table 5-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the winter 2010-11 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
<u>All targets for season combined</u>				
% targets above RSZ	54.6%	81.9%	64.0%	80.9%
% targets within RSZ	36.6%	16.4%	30.4%	17.2%
% targets below RSZ	8.8%	1.6%	5.6%	1.9%
% targets below turbine height	45.4%	18.1%	36.0%	19.1%
<u>Target data calculated for each date</u>				
Average % of targets in RSZ	46.2%	30.4%	40.5%	19.4%
Min target percentage within RSZ	6.5%	7.2%	0.0%	1.9%
Max target percentage within RSZ	100.0%	62.2%	100.0%	50.0%
Average target passage rate above RSZ	11.5	178.4	15.1	33.7
Average target passage rate within RSZ	7.8	36.8	7.2	7.1
Average target passage rate below RSZ	1.9	3.6	1.3	0.8

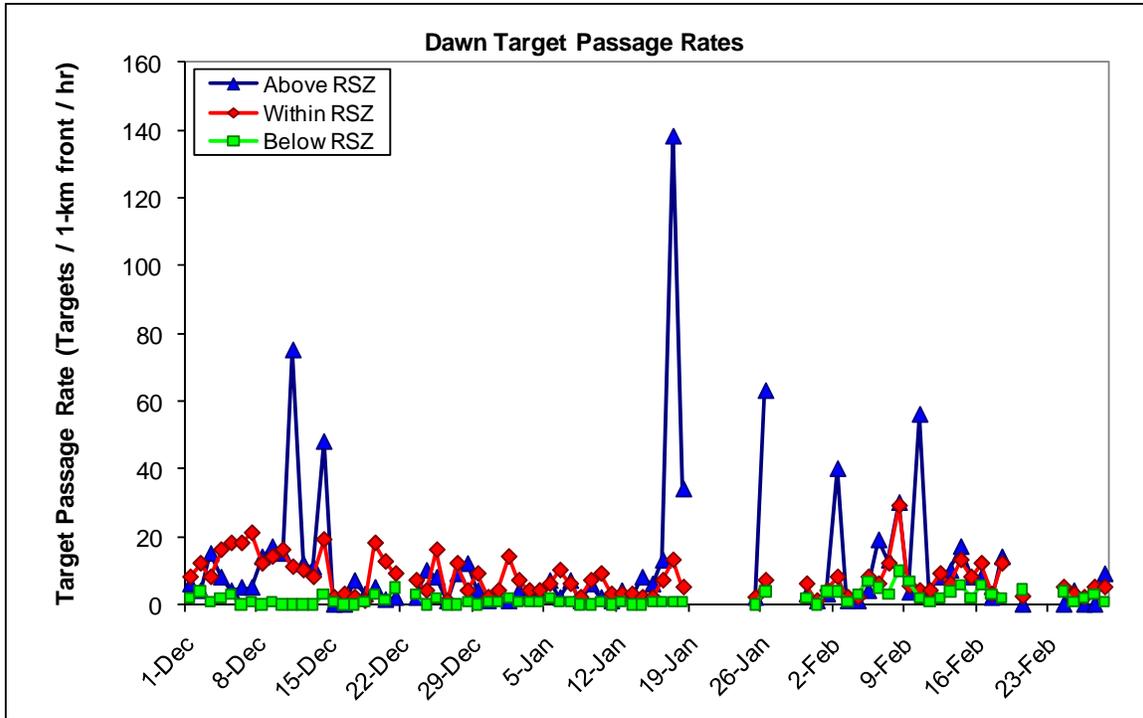


Figure 5-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the winter 2010-11 season.

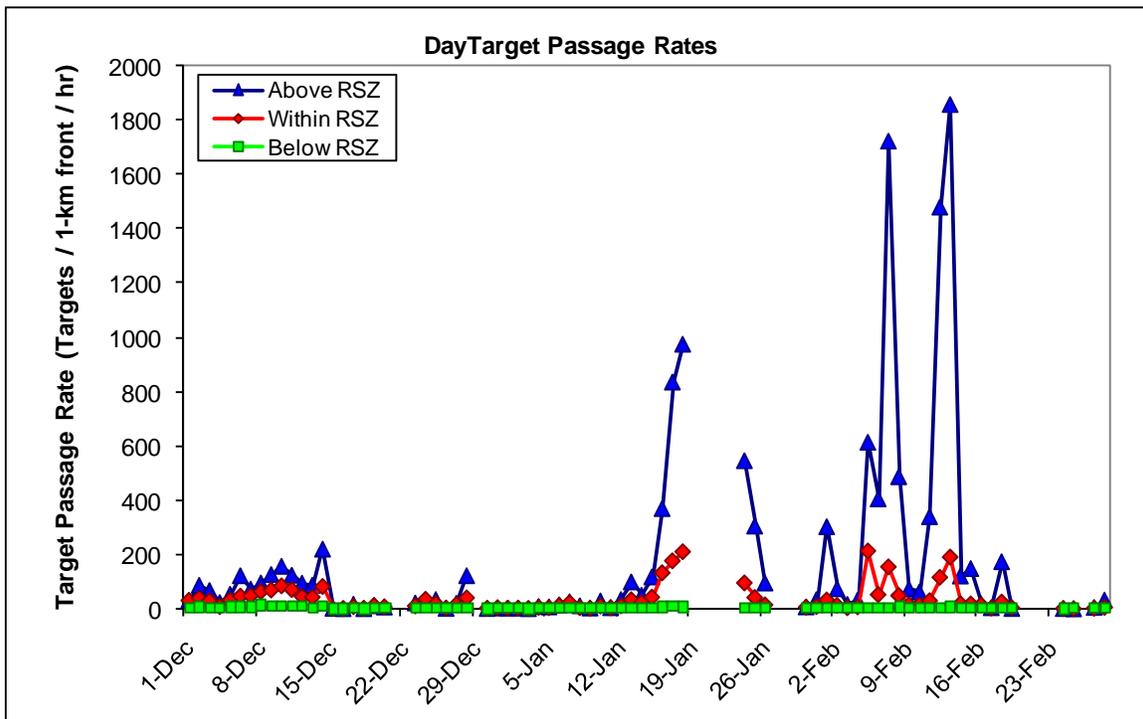


Figure 5-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the winter 2010-11 season.

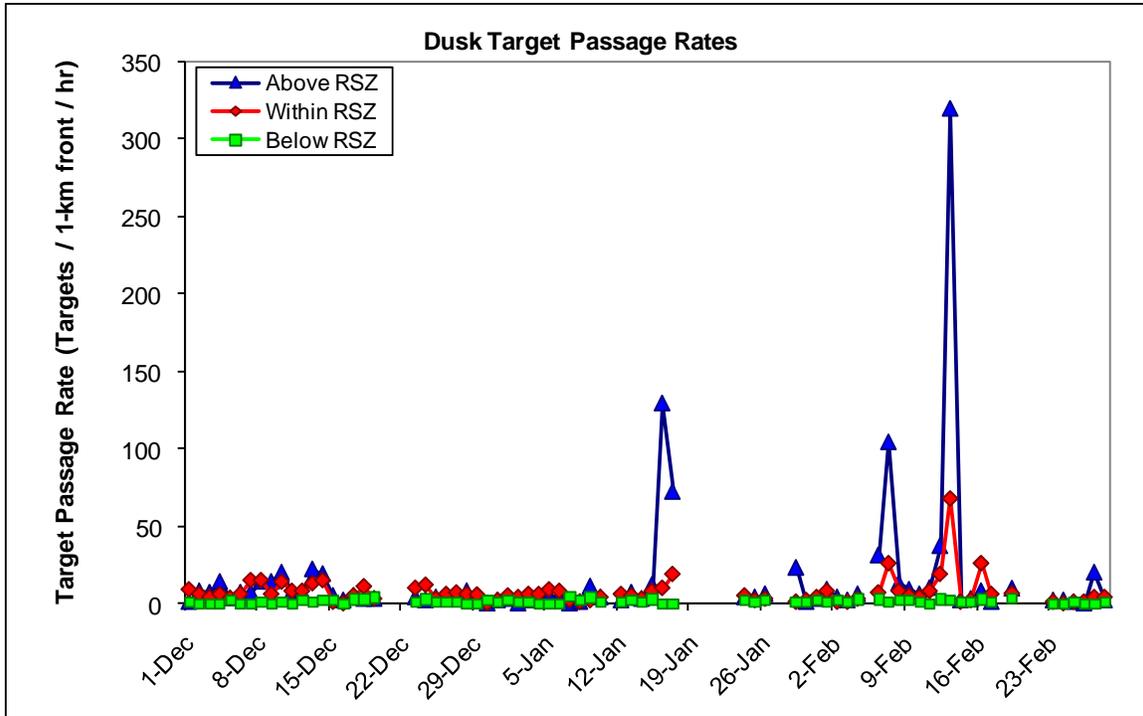


Figure 5-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the winter 2010-11 season.

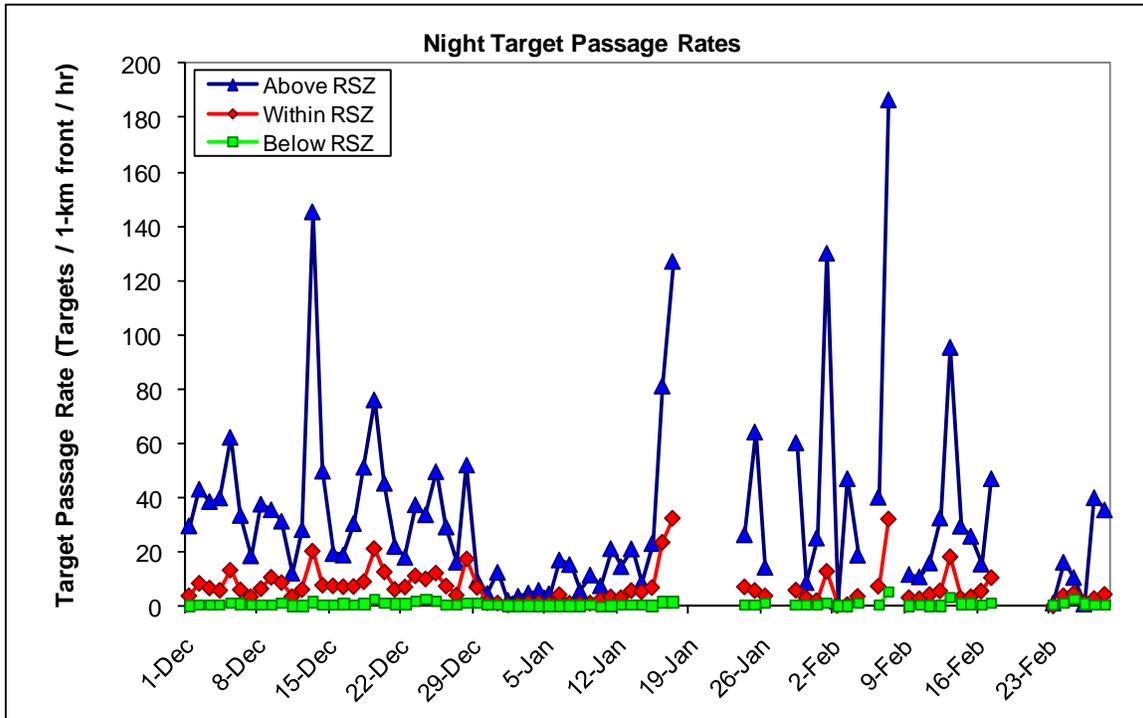


Figure 5-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the winter 2010-11 season.

5.2 Horizontal Radar Data

The Horizontal Surveillance Radar (HSR) was used to determine directional movements of targets during dawns, days, dusks, and nights of the winter 2010-11 season.

5.2.1 Target Directions

The average flight direction of all targets during the winter 2010-11 season was 317° (northwest), and averaged 77° (east) during dawns, 313° (northwest) during days, 279° (west) during dusks, and 314° (northwest) during nights. Target movements were predominantly southwest and west during dawns, southwest and south during days and nights, and east during dusks. The distribution of average target movements during the four biological periods are displayed in figures 5-13 and 5-14 and the individual values for average target bearing and angular concentration (r) are presented in table 5-5. Target directions were moderately concentrated, with dusks averaging the greatest angular concentration (average $r = 0.50$) and day the least (average $r = 0.18$).

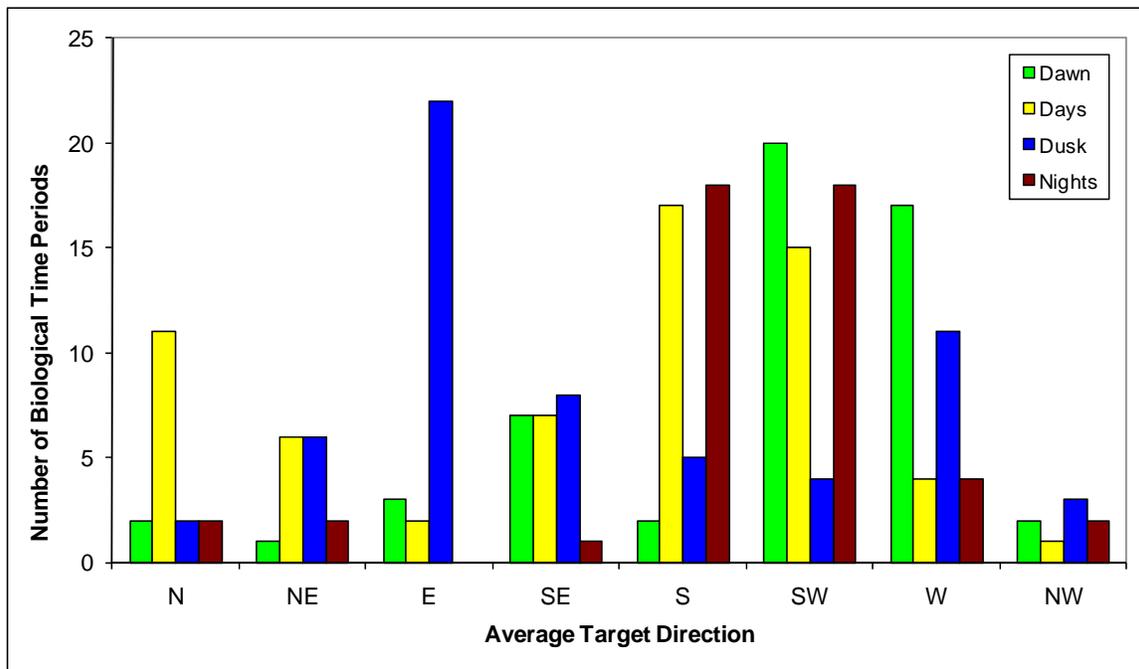


Figure 5-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the winter 2010-11 season.

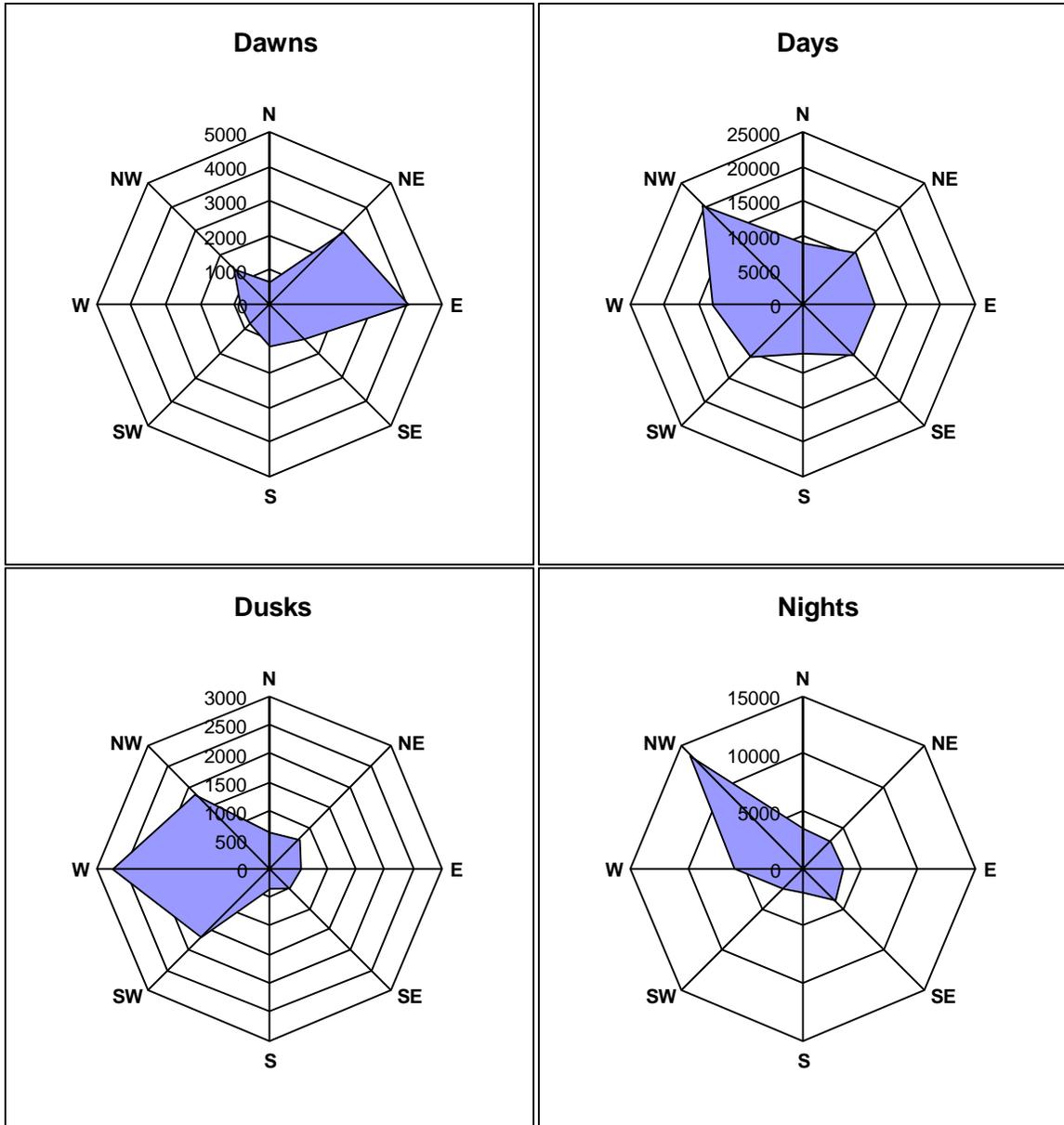


Figure 5-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the winter 2010-11 season.



Table 5-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during the winter 2010-11 season.

Date	Dawn			Day			Dusk			Night		
	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)
December 1, 2010	65.5	NE	0.50	267.5	W	0.15	270.1	W	0.62	297.5	NW	0.29
December 2, 2010	75.4	E	0.60	287.8	W	0.27	273.4	W	0.48	296.4	NW	0.28
December 3, 2010	73.3	E	0.51	275.6	W	0.30	268.2	W	0.50	306.5	NW	0.18
December 4, 2010	78.9	E	0.57	279.2	W	0.14	266.9	W	0.47	235.4	SW	0.06
December 5, 2010	81.8	E	0.68	274.6	W	0.17	279.8	W	0.41	300.6	NW	0.40
December 6, 2010	62.3	NE	0.45	287.8	W	0.30	279.0	W	0.49	273.8	W	0.09
December 7, 2010	67.2	NE	0.63	269.3	W	0.14	270.4	W	0.63	311.1	NW	0.26
December 8, 2010	60.2	NE	0.49	288.1	W	0.24	261.7	W	0.62	300.2	NW	0.44
December 9, 2010	64.1	NE	0.60	286.3	W	0.24	261.5	W	0.63	295.0	NW	0.54
December 10, 2010	66.4	NE	0.51	293.0	NW	0.26	271.9	W	0.52	301.6	NW	0.47
December 11, 2010	71.1	E	0.70	259.7	W	0.07	256.6	W	0.54	331.2	NW	0.19
December 12, 2010	64.7	NE	0.65	273.4	W	0.06	256.3	W	0.59	311.6	NW	0.34
December 13, 2010	63.5	NE	0.54	294.8	NW	0.21	263.5	W	0.63	296.7	NW	0.41
December 14, 2010	65.4	NE	0.58	276.1	W	0.24	263.6	W	0.62	320.3	NW	0.39
December 15, 2010	58.1	NE	0.72	26.7	NE	0.24	265.5	W	0.25	309.2	NW	0.57
December 16, 2010	66.2	NE	0.67	344.5	N	0.26	312.5	NW	0.63	306.3	NW	0.70
December 17, 2010	76.6	E	0.44	295.4	NW	0.15	278.6	W	0.52	311.4	NW	0.52
December 18, 2010	67.6	E	0.63	13.9	N	0.15	276.6	W	0.63	289.2	W	0.41
December 19, 2010	79.1	E	0.64	0.2	N	0.09	279.6	W	0.57	29.3	NE	0.54
December 20, 2010	47.7	NE	0.38	331.4	NW	0.33	283.7	W	0.59	306.9	NW	0.63
December 21, 2010	73.9	E	0.57	313.4	NW	0.24	273.5	W	0.63	306.1	NW	0.40
December 22, 2010	344.5	N	0.25	330.2	NW	0.21	304.2	NW	0.32	156.2	SE	0.11
December 23, 2010	73.8	E	0.61	294.0	NW	0.19	268.0	W	0.48	192.0	S	0.17
December 24, 2010	61.2	NE	0.59	293.1	NW	0.13	256.0	W	0.58	147.8	SE	0.16
December 25, 2010	66.7	NE	0.69	250.8	W	0.09	249.9	W	0.57	36.4	NE	0.16
December 26, 2010	71.1	E	0.87	338.1	N	0.14	277.0	W	0.50	290.8	W	0.12
December 27, 2010	60.6	NE	0.59	293.2	NW	0.15	260.0	W	0.53	305.7	NW	0.37
December 28, 2010	61.9	NE	0.67	308.6	NW	0.12	257.0	W	0.50	329.0	NW	0.21
December 29, 2010	61.4	NE	0.65	33.9	NE	0.21	27.9	NE	0.19	321.7	NW	0.16
December 30, 2010	70.2	E	0.61	351.7	N	0.13	316.9	NW	0.21	328.8	NW	0.31
December 31, 2010	64.2	NE	0.54	292.2	W	0.22	253.1	W	0.42	273.8	W	0.37
January 1, 2011	71.1	E	0.70	307.4	NW	0.11	268.3	W	0.54	300.2	NW	0.55
January 2, 2011	69.8	E	0.68	295.8	NW	0.17	277.1	W	0.66	304.2	NW	0.55
January 3, 2011	65.9	NE	0.72	313.5	NW	0.26	254.4	W	0.58	305.3	NW	0.64
January 4, 2011	56.6	NE	0.59	286.5	W	0.18	262.9	W	0.66	303.5	NW	0.59
January 5, 2011	57.5	NE	0.63	298.7	NW	0.23	266.2	W	0.67	306.8	NW	0.66
January 6, 2011	65.0	NE	0.65	295.5	NW	0.17	263.2	W	0.74	305.0	NW	0.64
January 7, 2011	62.6	NE	0.55	316.3	NW	0.16	267.7	W	0.52	322.7	NW	0.44
January 8, 2011	68.6	E	0.67	320.5	NW	0.22	293.7	NW	0.43	357.5	N	0.33
January 9, 2011	71.4	E	0.62	356.7	N	0.16	269.0	W	0.38	308.1	NW	0.58
January 10, 2011	66.2	NE	0.37	287.9	W	0.20	264.3	W	0.73	306.3	NW	0.67
January 11, 2011	62.5	NE	0.57	285.1	W	0.16	251.9	W	0.53	305.8	NW	0.70
January 12, 2011	52.3	NE	0.53	312.9	NW	0.15	255.4	W	0.67	306.1	NW	0.62
January 13, 2011	63.1	NE	0.45	305.7	NW	0.12	264.4	W	0.67	311.3	NW	0.58
January 14, 2011	61.3	NE	0.38	309.5	NW	0.10	270.2	W	0.64	307.5	NW	0.51
January 15, 2011	68.7	E	0.40	320.1	NW	0.14	261.2	W	0.51	342.0	N	0.34
January 16, 2011	72.4	E	0.45	4.6	N	0.05	262.4	W	0.56	311.6	NW	0.45
January 17, 2011	344.2	N	0.19	332.1	NW	0.14	264.8	W	0.38	339.7	N	0.36
January 18, 2011	18.4	N	0.27	321.8	NW	0.24	275.1	W	0.59	314.2	NW	0.44
January 19, 2011	42.5	NE	0.39	351.6	N	0.29	278.1	W	0.76	299.2	NW	0.59
January 20, 2011	21.3	N	0.20	298.5	NW	0.23	272.7	W	0.62	309.1	NW	0.59
January 21, 2011	333.9	NW	0.24	281.8	W	0.23	270.2	W	0.58	317.0	NW	0.70
January 22, 2011	155.2	SE	0.03	335.9	NW	0.21	267.6	W	0.32	305.5	NW	0.45
January 23, 2011	128.1	SE	0.16	252.8	W	0.05	270.0	W	0.50	307.2	NW	0.58
January 24, 2011	295.4	NW	0.14	314.3	NW	0.22	272.4	W	0.51	308.7	NW	0.63
January 25, 2011	6.3	N	0.07	324.6	NW	0.21	297.5	NW	0.58	306.2	NW	0.55
January 26, 2011	204.7	SW	0.09	292.8	NW	0.07	293.5	NW	0.44	292.1	W	0.64
January 27, 2011	114.6	SE	0.05	303.8	NW	0.12	290.3	W	0.45	308.8	NW	0.57
January 28, 2011	39.7	NE	0.14	325.9	NW	0.24	285.0	W	0.40	327.5	NW	0.47
January 29, 2011	246.0	SW	0.22	298.2	NW	0.20	50.2	NE	0.35	355.7	N	0.45
January 30, 2011	108.5	E	0.33	41.6	NE	0.29	338.5	N	0.58	320.7	NW	0.51
January 31, 2011	21.1	N	0.08	327.8	NW	0.19	342.8	N	0.32	320.8	NW	0.53
February 1, 2011	169.9	S	0.14	316.6	NW	0.17	315.4	NW	0.36	298.0	NW	0.62
February 2, 2011	144.9	SE	0.21	284.3	W	0.21	309.7	NW	0.24	304.6	NW	0.66
February 3, 2011	145.6	SE	0.26	311.7	NW	0.23						
February 4, 2011										279.8	W	0.33
February 5, 2011	144.8	SE	0.25	277.6	W	0.18	326.5	NW	0.25	325.3	NW	0.41
February 6, 2011	148.5	SE	0.11	310.3	NW	0.10	346.2	N	0.27	330.4	NW	0.42
February 7, 2011	259.0	W	0.08	310.7	NW	0.22	303.6	NW	0.47	37.8	NE	0.44
February 8, 2011	179.3	S	0.33	305.4	NW	0.24	319.2	NW	0.60	293.8	NW	0.51
February 9, 2011	192.4	S	0.26	302.0	NW	0.18	340.3	N	0.38	300.4	NW	0.60
February 10, 2011	198.7	S	0.27	302.1	NW	0.18	329.7	NW	0.50	306.4	NW	0.71
February 11, 2011	186.9	S	0.30	308.7	NW	0.19	332.0	NW	0.45	324.4	NW	0.40
February 12, 2011	172.7	S	0.22	329.0	NW	0.15	347.9	N	0.47	340.8	N	0.36
February 13, 2011	169.1	S	0.16	325.0	NW	0.13	356.3	N	0.27	317.2	NW	0.49
February 14, 2011	158.3	S	0.32	48.0	NE	0.34	7.0	N	0.56	333.1	NW	0.49
February 15, 2011	174.9	S	0.37	313.0	NW	0.19	355.6	N	0.50	332.6	NW	0.52
February 16, 2011	172.8	S	0.31	41.9	NE	0.15	351.5	N	0.42	56.7	NE	0.39
February 17, 2011	164.1	S	0.33	2.5	N	0.27	345.5	N	0.45	316.7	NW	0.55
February 18, 2011	189.3	S	0.30	320.6	NW	0.14	310.0	NW	0.51	315.4	NW	0.12
February 19, 2011	134.4	SE	0.51	43.5	NE	0.26	31.4	NE	0.51	336.0	NW	0.17
February 20, 2011	147.3	SE	0.73	96.1	E	0.39						
February 21, 2011				336.7	NW	0.26	308.8	NW	0.17			
February 22, 2011												
February 23, 2011												
February 24, 2011												
February 25, 2011										281.0	W	0.15
February 26, 2011	86.2	E	0.88	179.2	S	0.08	71.1	E	0.50	34.8	NE	0.08
February 27, 2011	210.4	SW	1.00	261.0	W	0.05	85.9	E	0.15	326.9	NW	0.14
February 28, 2011	308.2	NW	0.20	210.1	SW	0.09	24.3	NE	0.64	132.6	SE	0.35

5.3 Weather Data

5.3.1 Weather Information

Table 5-6 presents nightly averages of wind speed, temperature and wind direction from an on-site meteorological tower, total minutes of precipitation as detected by the vertical radar, and the presence of low visibility conditions at two nearby airports. At a height of 60 m, nightly wind speeds averaged 4.2 m/s (9.4 mph). Average nightly wind directions were predominantly west (Figure 5-15). Temperatures averaged 14.1° C (57.4° F) during nights. During the 91-day winter 2010-11 season, rain occurred on portions of 15 nights (16%).

Low visibility potentially resulting in bird strike risk to nocturnal migrants is generally defined as less than 0.5 miles during nighttime. Visibility records were accessed from two nearby airports: El Centro Naval Air Facility (NJK, ~ 24 miles east) and Imperial County Airport (IPL, ~ 29 miles east). During the 91-day winter 2010-11 season NJK recorded three records of low visibility on January 30, 2011. These occurred at 556, 656, and 756 and were associated with fog. Fog was also recorded fog on December 19, 2010 and January 30, 2011 in the daily summaries at IPL.

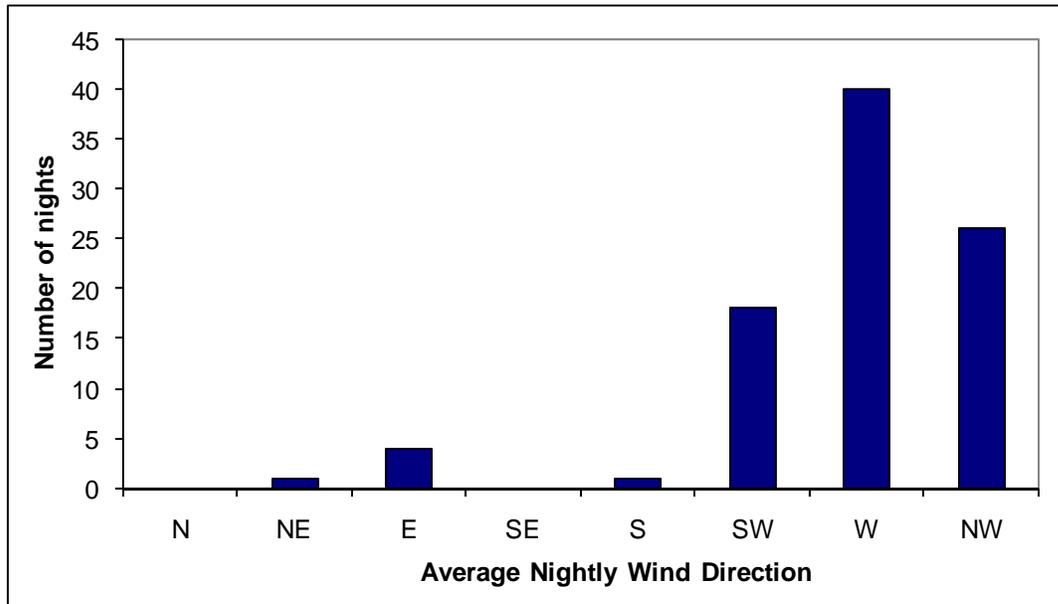


Figure 5-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the winter 2010-11 season.



Table 5-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the winter 2010-11 season.

Date	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
							NJK	IPL
1-Dec-10	2.0	9.1	299.6	NW	0.94	0		
2-Dec-10	1.8	12.8	284.7	W	0.81	0		
3-Dec-10	1.1	15.8	316.6	NW	0.68	0		
4-Dec-10	1.5	15.1	308.3	NW	0.54	0		
5-Dec-10	1.2	15.1	303.6	NW	0.69	60		
6-Dec-10	2.3	17.7	309.2	NW	0.60	0		
7-Dec-10	2.6	16.0	299.4	NW	0.79	0		
8-Dec-10	2.8	15.8	262.1	W	0.92	0		
9-Dec-10	1.7	17.4	312.9	NW	0.77	0		
10-Dec-10	1.4	18.5	286.9	W	0.30	0		
11-Dec-10	1.8	18.0	290.1	W	0.55	0		
12-Dec-10	2.3	19.4	289.7	W	0.85	0		
13-Dec-10	2.3	19.7	269.4	W	0.86	0		
14-Dec-10	1.5	18.8	319.1	NW	0.42	0		
15-Dec-10	9.6	20.8	246.8	SW	0.98	0		
16-Dec-10	8.8	16.5	241.3	SW	0.84	0		
17-Dec-10	4.6	14.2	261.7	W	0.58	0		
18-Dec-10	5.9	17.2	225.4	SW	0.75	0		
19-Dec-10	3.5	17.8	240.8	SW	0.51	163		Fog
20-Dec-10	8.0	18.1	236.3	SW	0.99	45		
21-Dec-10	4.7	17.9	192.1	S	0.92	316		
22-Dec-10	2.7	14.6	98.7	E	0.56	30		
23-Dec-10	7.0	13.4	267.9	W	0.97	0		
24-Dec-10	1.6	12.1	295.2	NW	0.57	0		
25-Dec-10	2.0	12.8	300.8	NW	0.92	0		
26-Dec-10	8.1	15.3	233.7	SW	0.84	0		
27-Dec-10	2.2	12.9	281.3	W	0.84	0		
28-Dec-10	1.9	12.6	238.4	SW	0.82	0		
29-Dec-10	7.0	16.4	249.4	W	0.76	60		
30-Dec-10	12.7	11.9	285.1	W	0.96	0		
31-Dec-10	8.9	8.3	259.9	W	0.98	0		
1-Jan-11	2.6	5.3	40.7	NE	0.41	0		
2-Jan-11	2.0	5.0	306.8	NW	0.53	315		
3-Jan-11	1.9	6.9	293.9	NW	0.63	0		
4-Jan-11	2.5	8.4	315.2	NW	0.98	0		
5-Jan-11	2.3	8.8	300.9	NW	0.82	0		
6-Jan-11	1.9	10.6	293.8	NW	0.83	15		
7-Jan-11	1.5	13.3	292.4	W	0.78	0		
8-Jan-11	9.9	13.9	236.9	SW	0.99	0		
9-Jan-11	9.7	12.4	243.6	SW	0.85	0		
10-Jan-11	4.1	12.1	242.7	SW	0.71	0		
11-Jan-11	1.4	9.2	287.1	W	0.51	107		
12-Jan-11	2.0	10.7	289.4	W	0.78	0		
13-Jan-11	1.9	12.8	296.5	NW	0.75	0		
14-Jan-11	2.3	14.4	276.3	W	0.76	0		
15-Jan-11	2.0	17.7	276.6	W	0.66	0		



Table 5-6 continued. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the fall 2010 season.

Date	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
							NJK	IPL
16-Jan-11	2.9	17.0	248.7	W	0.92	0		
17-Jan-11	1.9	20.3	258.1	W	0.49	0		
18-Jan-11	2.3	22.3	272.8	W	0.72	0		
19-Jan-11	3.3	21.2	256.5	W	0.63	0		
20-Jan-11	2.1	18.4	70.7	E	0.33	0		
21-Jan-11	2.1	12.7	276.7	W	0.76	0		
22-Jan-11	2.0	16.0	265.6	W	0.62	0		
23-Jan-11	3.0	18.2	329.2	NW	0.59	0		
24-Jan-11	2.2	13.0	275.8	W	0.81	0		
25-Jan-11	1.9	15.9	294.9	NW	0.92	0		
26-Jan-11	2.8	15.3	300.3	NW	0.70	85		
27-Jan-11	3.3	16.4	323.2	NW	0.81	0		
28-Jan-11	2.3	14.5	276.4	W	0.95	0		
29-Jan-11	1.8	17.0	291.2	W	0.71	0		
30-Jan-11	9.2	17.7	245.4	SW	0.94	0	Fog	Fog
31-Jan-11	8.8	13.6	269.8	W	0.93	0		
1-Feb-11	6.7	13.7	240.0	SW	0.86	90		
2-Feb-11	5.3	8.6	112.3	E	0.88	0		
3-Feb-11	1.9	4.8	108.8	E	0.69	0		
4-Feb-11	1.6	6.8	329.6	NW	0.81	0		
5-Feb-11	0.9	12.4	267.3	W	0.12	0		
6-Feb-11	1.6	18.2	302.9	NW	0.48	0		
7-Feb-11	2.3	17.0	290.2	W	0.82	0		
8-Feb-11	11.9	20.6	259.5	W	0.89	0		
9-Feb-11	1.6	13.6	334.8	NW	0.07	0		
10-Feb-11	1.4	12.3	299.5	NW	0.65	0		
11-Feb-11	1.7	10.8	276.8	W	0.73	0		
12-Feb-11	2.3	14.1	292.6	NW	0.90	0		
13-Feb-11	2.9	15.1	272.6	W	0.88	0		
14-Feb-11	5.0	19.1	230.1	SW	0.77	0		
15-Feb-11	8.1	17.4	247.4	SW	0.97	0		
16-Feb-11	10.1	16.8	247.8	W	0.97	59		
17-Feb-11	9.9	14.2	276.5	W	0.94	0		
18-Feb-11	7.6	13.2	225.9	SW	0.86	709		
19-Feb-11	5.1	11.4	278.2	W	0.10	511		
20-Feb-11	6.9	10.1	281.2	W	0.84	0		
21-Feb-11	3.4	8.9	255.0	W	0.89	0		
22-Feb-11	5.9	10.5	242.0	SW	0.89	0		
23-Feb-11	5.2	11.9	235.7	SW	0.80	0		
24-Feb-11	13.3	12.0	258.9	W	0.99	0		
25-Feb-11	8.8	12.1	245.2	SW	0.93	0		
26-Feb-11	6.6	12.0	262.9	W	0.88	75		
27-Feb-11	8.9	7.5	279.0	W	0.92	0		
28-Feb-11	1.9	8.8	304.3	NW	0.53	0		

5.3.2. Target Passage Rates and Weather Associations

Table 5-7 . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the winter 2010-11 season.

Date	Nightly Target Passage Rate (targets/1-km front/hr)	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
								NJK	IPL
7-Feb-11	224.2	2.3	17.0	290.2	W	0.82	0		
13-Dec-10	167.4	2.3	19.7	269.4	W	0.86	0		
17-Jan-11	161.3	1.9	20.3	258.1	W	0.49	0		
1-Feb-11	144.3	6.7	13.7	240.0	SW	0.86	90		
13-Feb-11	117.3	2.9	15.1	272.6	W	0.88	0		
16-Jan-11	106.6	2.9	17.0	248.7	W	0.92	0		
19-Dec-10	100.2	3.5	17.8	240.8	SW	0.51	163		Fog
5-Dec-10	77.2	1.2	15.1	303.6	NW	0.69	60		
28-Dec-10	71.1	1.9	12.6	238.4	SW	0.82	0		
25-Jan-11	70.8	1.9	15.9	294.9	NW	0.92	0		
29-Jan-11	67.1	1.8	17.0	291.2	W	0.71	0		
25-Dec-10	63.8	2.0	12.8	300.8	NW	0.92	0		
18-Dec-10	61.5	5.9	17.2	225.4	SW	0.75	0		
20-Dec-10	59.6	8.0	18.1	236.3	SW	0.99	45		
17-Feb-11	59.0	9.9	14.2	276.5	W	0.94	0		
14-Dec-10	58.5	1.5	18.8	319.1	NW	0.42	0		
2-Dec-10	52.5	1.8	12.8	284.7	W	0.81	0		
23-Dec-10	50.6	7.0	13.4	267.9	W	0.97	0		
6-Feb-11	48.3	1.6	18.2	302.9	NW	0.48	0		
3-Feb-11	48.2	1.9	4.8	108.8	E	0.69	0		
9-Dec-10	46.9	1.7	17.4	312.9	NW	0.77	0		
4-Dec-10	46.7	1.5	15.1	308.3	NW	0.54	0		
24-Dec-10	46.5	1.6	12.1	295.2	NW	0.57	0		
3-Dec-10	46.2	1.1	15.8	316.6	NW	0.68	0		
8-Dec-10	44.8	2.8	15.8	262.1	W	0.92	0		
27-Feb-11	43.6	8.9	7.5	279.0	W	0.92	0		
10-Dec-10	41.4	1.4	18.5	286.9	W	0.30	0		
6-Dec-10	40.8	2.3	17.7	309.2	NW	0.60	0		
28-Feb-11	40.6	1.9	8.8	304.3	NW	0.53	0		
12-Feb-11	38.8	2.3	14.1	292.6	NW	0.90	0		
17-Dec-10	38.7	4.6	14.2	261.7	W	0.58	0		
26-Dec-10	37.6	8.1	15.3	233.7	SW	0.84	0		
12-Dec-10	34.9	2.3	19.4	289.7	W	0.85	0		
24-Jan-11	34.5	2.2	13.0	275.8	W	0.81	0		
1-Dec-10	34.0	2.0	9.1	299.6	NW	0.94	0		
14-Feb-11	33.8	5.0	19.1	230.1	SW	0.77	0		
15-Jan-11	30.5	2.0	17.7	276.6	W	0.66	0		
15-Feb-11	30.4	8.1	17.4	247.4	SW	0.97	0		
21-Dec-10	29.5	4.7	17.9	192.1	S	0.92	316		
31-Jan-11	28.2	8.8	13.6	269.8	W	0.93	0		
13-Jan-11	27.7	1.9	12.8	296.5	NW	0.75	0		
15-Dec-10	27.6	9.6	20.8	246.8	SW	0.98	0		
16-Dec-10	27.2	8.8	16.5	241.3	SW	0.84	0		
22-Dec-10	26.4	2.7	14.6	98.7	E	0.56	30		
11-Jan-11	25.3	1.4	9.2	287.1	W	0.51	107		
4-Feb-11	23.8	1.6	6.8	329.6	NW	0.81	0		
7-Dec-10	22.8	2.6	16.0	299.4	NW	0.79	0		
16-Feb-11	22.1	10.1	16.8	247.8	W	0.97	59		
6-Jan-11	21.7	1.9	10.6	293.8	NW	0.83	15		
24-Feb-11	21.4	13.3	12.0	258.9	W	0.99	0		



Table 5-7 continued . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the winter 2010-11 season.

Date	Nightly Target Passage Rate (targets/1-km front/hr)	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
								NJK	IPL
27-Dec-10	21.1	2.2	12.9	281.3	W	0.84	0		
11-Feb-11	20.8	1.7	10.8	276.8	W	0.73	0		
26-Jan-11	19.7	2.8	15.3	300.3	NW	0.70	85		
12-Jan-11	18.4	2.0	10.7	289.4	W	0.78	0		
25-Feb-11	18.3	8.8	12.1	245.2	SW	0.93	0		
29-Dec-10	18.3	7.0	16.4	249.4	W	0.76	60		
7-Jan-11	17.0	1.5	13.3	292.4	W	0.78	0		
11-Dec-10	16.2	1.8	18.0	290.1	W	0.55	0		
9-Feb-11	15.5	1.6	13.6	334.8	NW	0.07	0		
14-Jan-11	15.1	2.3	14.4	276.3	W	0.76	0		
31-Dec-10	14.5	8.9	8.3	259.9	W	0.98	0		
10-Feb-11	14.4	1.4	12.3	299.5	NW	0.65	0		
9-Jan-11	13.4	9.7	12.4	243.6	SW	0.85	0		
30-Jan-11	12.7	9.2	17.7	245.4	SW	0.94	0	Fog	Fog
10-Jan-11	10.4	4.1	12.1	242.7	SW	0.71	0		
4-Jan-11	7.8	2.5	8.4	315.2	NW	0.98	0		
8-Jan-11	7.4	9.9	13.9	236.9	SW	0.99	0		
3-Jan-11	6.9	1.9	6.9	293.9	NW	0.63	0		
30-Dec-10	6.9	12.7	11.9	285.1	W	0.96	0		
5-Jan-11	6.2	2.3	8.8	300.9	NW	0.82	0		
2-Jan-11	5.2	2.0	5.0	306.8	NW	0.53	315		
26-Feb-11	3.5	6.6	12.0	262.9	W	0.88	75		
1-Jan-11	3.1	2.6	5.3	40.7	NE	0.41	0		
2-Feb-11	2.6	5.3	8.6	112.3	E	0.88	0		
23-Feb-11	2.1	5.2	11.9	235.7	SW	0.80	0		
18-Jan-11		2.3	22.3	272.8	W	0.72	0		
19-Jan-11		3.3	21.2	256.5	W	0.63	0		
20-Jan-11		2.1	18.4	70.7	E	0.33	0		
21-Jan-11		2.1	12.7	276.7	W	0.76	0		
22-Jan-11		2.0	16.0	265.6	W	0.62	0		
23-Jan-11		3.0	18.2	329.2	NW	0.59	0		
27-Jan-11		3.3	16.4	323.2	NW	0.81	0		
28-Jan-11		2.3	14.5	276.4	W	0.95	0		
5-Feb-11		0.9	12.4	267.3	W	0.12	0		
8-Feb-11		11.9	20.6	259.5	W	0.89	0		
18-Feb-11		7.6	13.2	225.9	SW	0.86	709		
19-Feb-11		5.1	11.4	278.2	W	0.10	511		
20-Feb-11		6.9	10.1	281.2	W	0.84	0		
21-Feb-11		3.4	8.9	255.0	W	0.89	0		
22-Feb-11		5.9	10.5	242.0	SW	0.89	0		

6. RESULTS for March 1 – May 31, 2011

The MERLIN Avian Radar System operated continuously (24 hours a day) during the spring 2011 season, March 1 – May 31, 2011. Of the 2,206.4 hours available during the spring season, 1,929.5 hours of vertical radar (87.4% of available time) and 2,041.0 hours of horizontal radar (92.5% of available time) were collected (Table 6-1). Weather can make some of this radar data unusable because precipitation can block the radar wavelength so few if any targets are discernable. This is more prevalent among X-band radars than S-band because the longer wavelength of the S-band radar allows almost all targets to be detected in rain with the help of digital processing.

Therefore, of the 1,929.5 hours of vertical radar data, 104.6 hours were removed because rain prevented the collection of radar data (5.4% of radar time). This left 1,824.9 hours of useable vertical radar data (94.6% of radar time, 82.7% of the spring 2011 season; Table 6-1). A total of 13.3 hours of horizontal radar data were removed because of rain (0.6% of radar time), leaving 2,027.7 hours of useable horizontal radar data (99.4% of radar time, 91.9% of the spring 2011 season; Table 6-1).

Table 6-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the spring 2011 season.

	Time in Spring 2010 season	Time radar collected data	Radar downtime	Radar data with rain or interference	Useable radar data
Vertical Radar (hrs)	2206.4	1929.5	276.9	104.6	1824.9
Horizontal Radar (hrs)	2206.4	2041.0	165.5	13.3	2027.7

6.1 Vertical Radar Data

Data collected from the vertical scanning radar (VSR) was used to quantify target movements through the project area. Data is presented as total number of targets / 1-km front / hr. This rate is also used when quantifying targets above (up to ~2,800 m AGL), below, and at the height of the rotor swept zone for the spring 2011 season

6.1.1. Targets Passage Rates Over Time

Target passage rates during spring 2011 season were variable throughout the season (Figure 6-1) and among the four biological periods, but averaged the greatest during days and nights, and the least during dawns and dusks (Figure 6-

2). Summary statistics of the target passage rates for each of the four biological periods are presented in table 6-2. (All target counts and target passage rates for each biological period are presented in Appendix C).

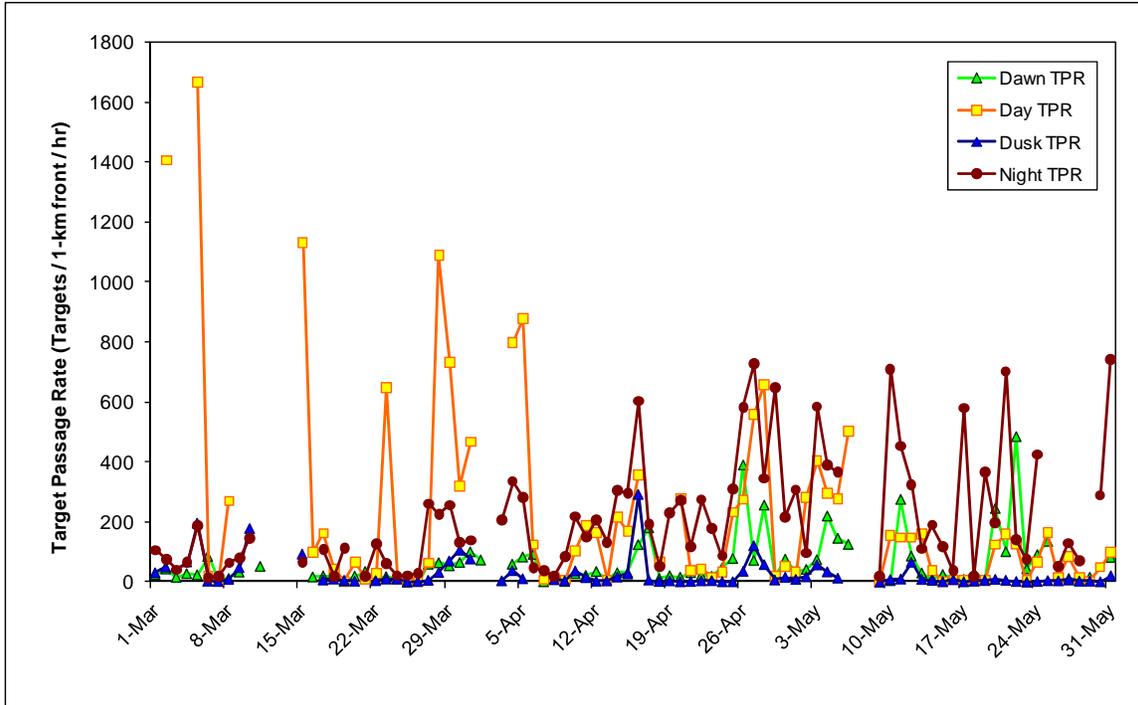


Figure 6-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.

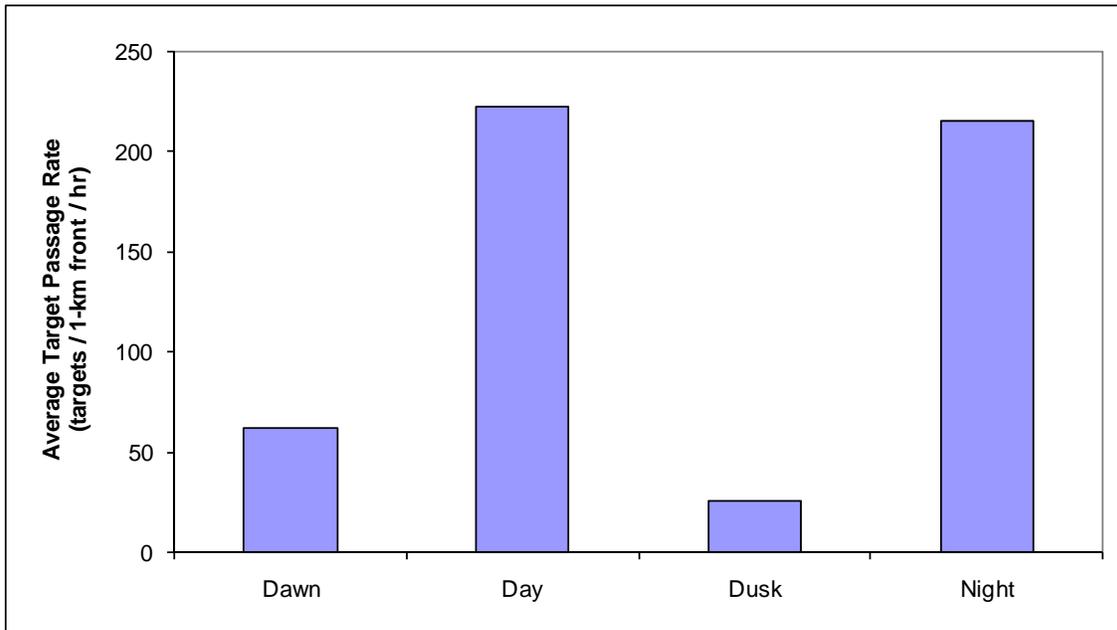


Figure 6-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the spring 2011 season.

Table 6-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the spring 2011 season.

	Dawn	Day	Dusk	Night
Average	62.5	222.4	26.4	215.6
Standard Deviation	84.3	334.2	48.1	193.6
Median	31.0	97.5	7.5	145.9
Minimum	0.0	1.3	0.0	14.7
Maximum	482.0	1667.0	292.0	742.7
Range	482.0	1665.7	292.0	728.0

Average target passage rates differed hourly throughout the spring 2011 season (Figure 6-3) and were greatest midday (hours 10-12, 10am-noon) followed by a secondary peak during evening (hours 19-22). Target passage rates were greatest above the rotor swept zone compared to within and below the rotor swept zone.

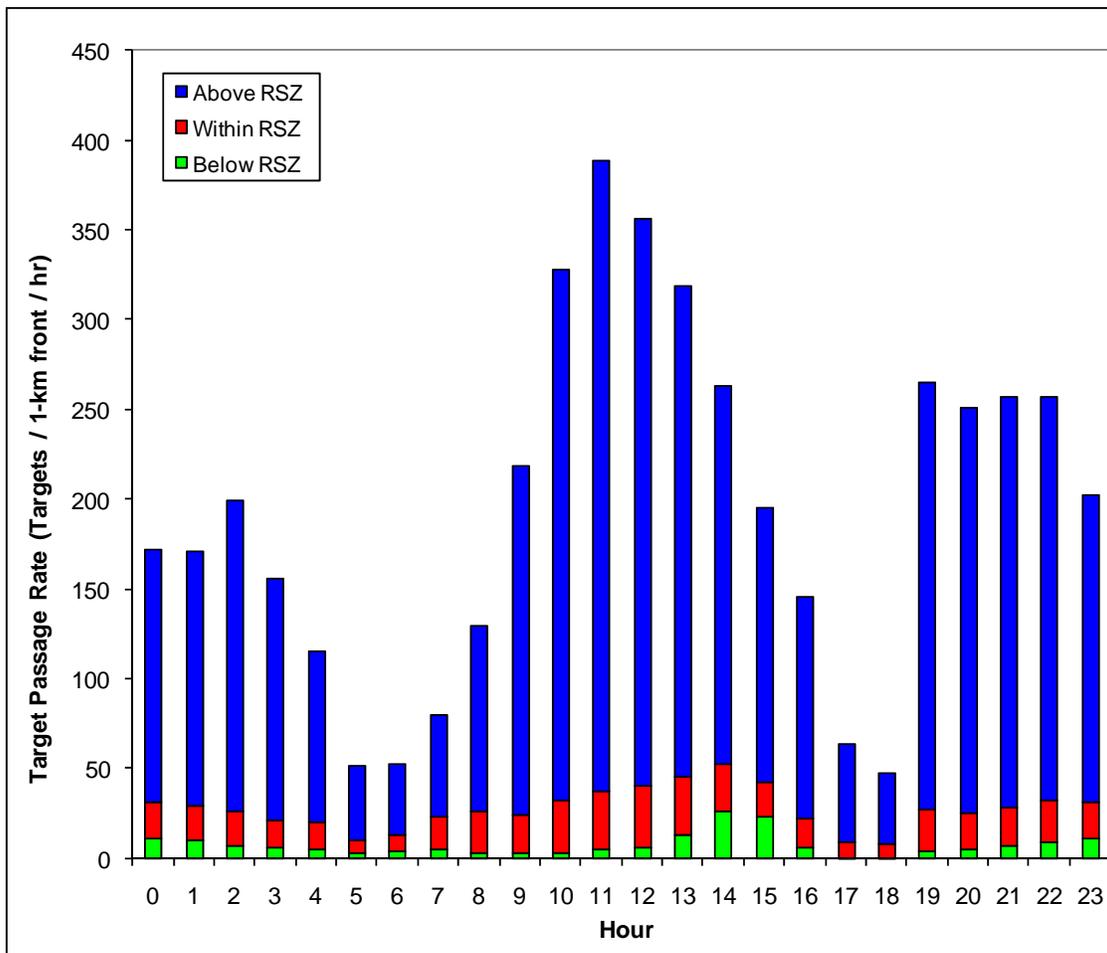


Figure 6-3. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the spring 2011 season.

6.1.2. Altitudinal Distribution of Targets

Average hourly target heights varied slightly, ranging between 257.2 m during hour 15 and 465.0 m during hour 22 (Figure 6-4).

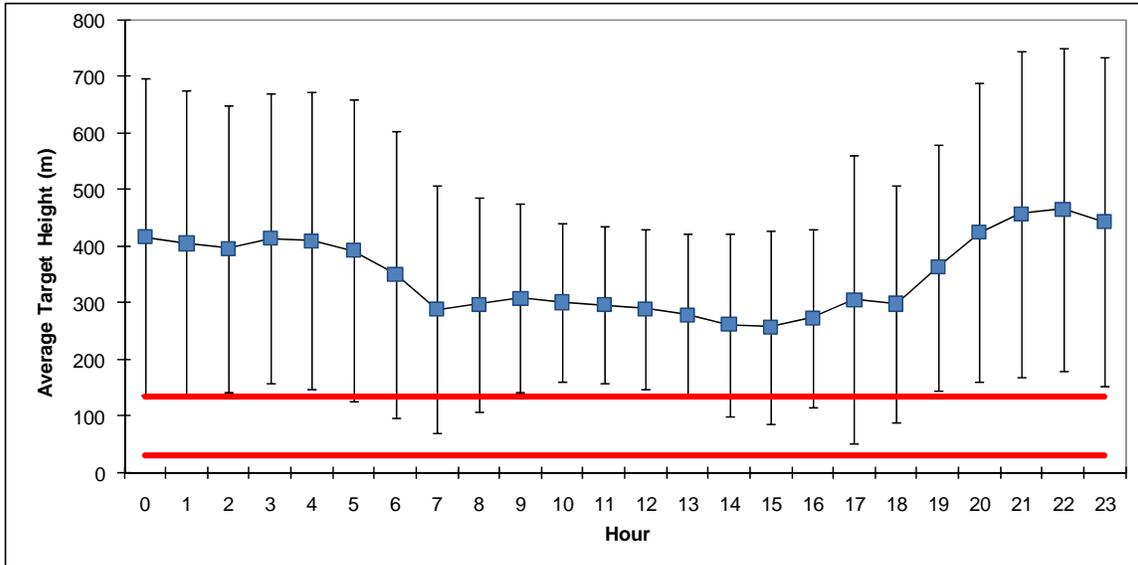


Figure 6-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the spring 2011 season. Error bars represent the standard deviation for each hour and red lines represent the top and bottom of the rotor swept zone (29.9 – 133.8 m AGL).

Mean target heights detected during the spring 2011 season were generally above the maximum RSZ height of 133.8 m AGL except during 1 dawn (1%), 0 days (0%), 12 dusks (16%), and 0 nights (0%) (Figure 6-5). Median target heights were lower than the means and a larger percentage of periods had median target heights below the maximum RSZ height of 133.8 m AGL including 8 dawns (10%), 1 days (1%), 19 dusks (26%), and 2 nights (3%) (Figure 6-6).

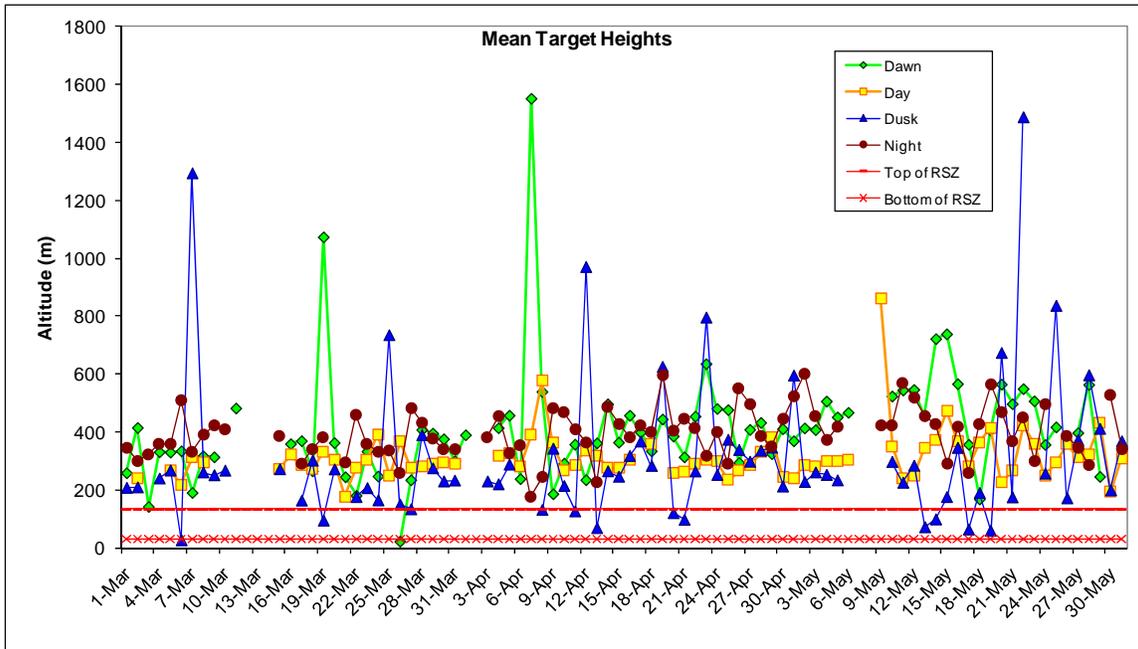


Figure 6-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.

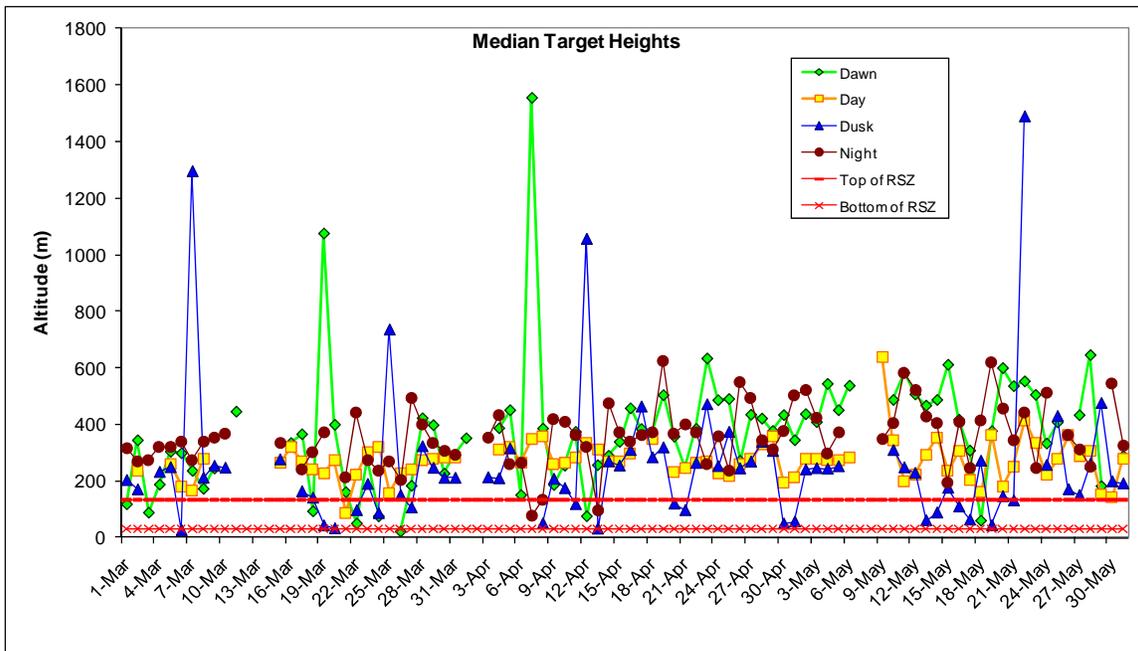


Figure 6-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.

The mean and median target heights during each biological period were calculated for all dates with $\geq 50\%$ data for that time period, averaged, and presented in Table 6-3. (All mean and median target height values for each

biological period can be found in Appendix C.) Table 6-3 also shows the overall mean and median for each biological period when all targets were combined (regardless of date). These overall means and medians are illustrated in Figure 6-7.

Table 6-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
Target data calculated for each date				
Average mean target height	411.9	314.7	313.7	396.8
Average median target height	375.1	271.2	255.9	355.8
All targets for season combined				
Mean target height	428.9	289.3	277.1	417.4
Median target height	424.6	276.1	247.5	377.3

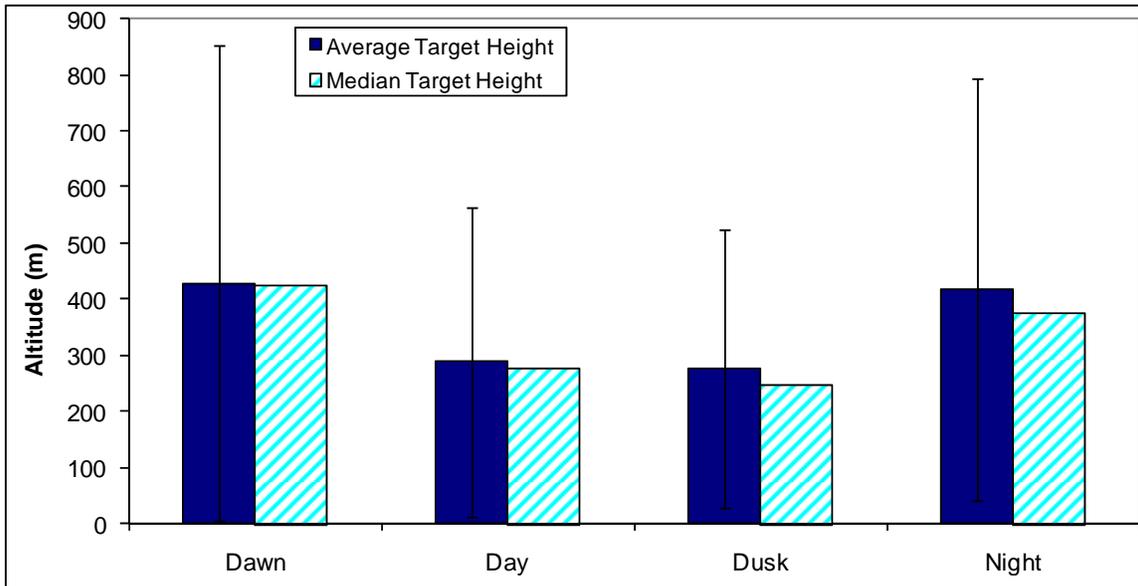


Figure 6-7. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the spring 2011 season. Error bars represent one standard deviation.

The distribution of targets in 50-meter increments was greatest above the rotor swept zone although targets also occurred within the rotor swept zone during the spring 2011 season (Figure 6-8).

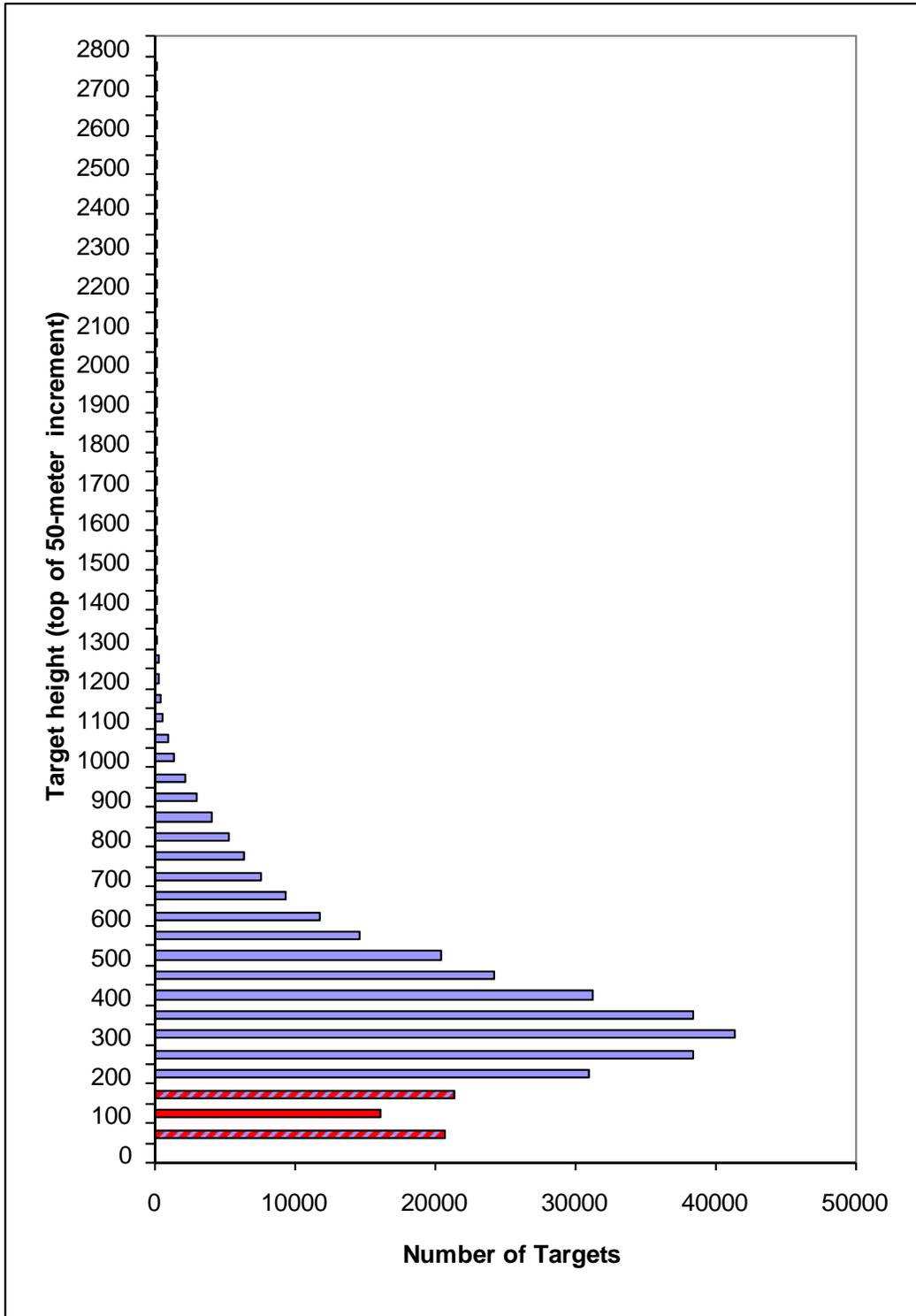


Figure 6-8. Number of targets occurring in each 50-meter increment at the proposed Ocotillo Wind Project site during the spring 2011 season. Red indicates rotor swept heights, and red-blue hashed indicates altitudes partially within rotor swept heights. Note: the height of the radar unit on this figure is 0 m. The location of the radar unit occasionally allows detection of targets flying below the radar, and those are noted in the 0 to -50 m band.

Targets were detected up to 2,800 m AGL by the vertical radar. When all targets detected during the spring 2011 season were combined together, the majority of targets were recorded above the rotor swept zone (RSZ) of 29.9 – 133.8 m AGL and the least below the RSZ (Table 6-4). Within the RSZ, percents of targets were the greatest during dusks (16.2%) followed by dawns (12.2%), days (10.5%) and finally nights (9.7%) (Table 6-4).

When percent targets in the RSZ were calculated for each date, dusks again averaged the greatest (23.52%), followed by dawns (16.45%), days (15.6%) and nights had the lowest average percent of targets in the RSZ (12.7%). Average target passage rates above, within, and below the RSZ were the greatest above the RSZ during all time periods. Averages are presented in Table 6-4 and individual target passage rates are illustrated in figure 6-9 (dawns), figure 6-10 (days), figure 6-11 (dusks), and figure 6-12 (nights). All target counts, passage rates, and percents in RSZ for each biological period can be found in Appendix C.

Table 6-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the spring 2011 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
All targets for season combined				
% targets above RSZ	84.2%	85.5%	79.8%	86.7%
% targets within RSZ	12.2%	10.5%	16.2%	9.7%
% targets below RSZ	3.6%	3.9%	4.0%	3.6%
% targets below turbine height	15.8%	14.5%	20.2%	13.3%
Target data calculated for each date				
Average % of targets in RSZ	16.4%	15.6%	23.5%	12.7%
Min target percentage within RSZ	0.0%	0.0%	0.0%	2.6%
Max target percentage within RSZ	63.6%	51.8%	100.0%	40.1%
Average target passage rate above RSZ	52.6	190.8	21.1	187.1
Average target passage rate within RSZ	7.6	23.7	4.3	20.7
Average target passage rate below RSZ	2.3	7.9	1.1	7.7

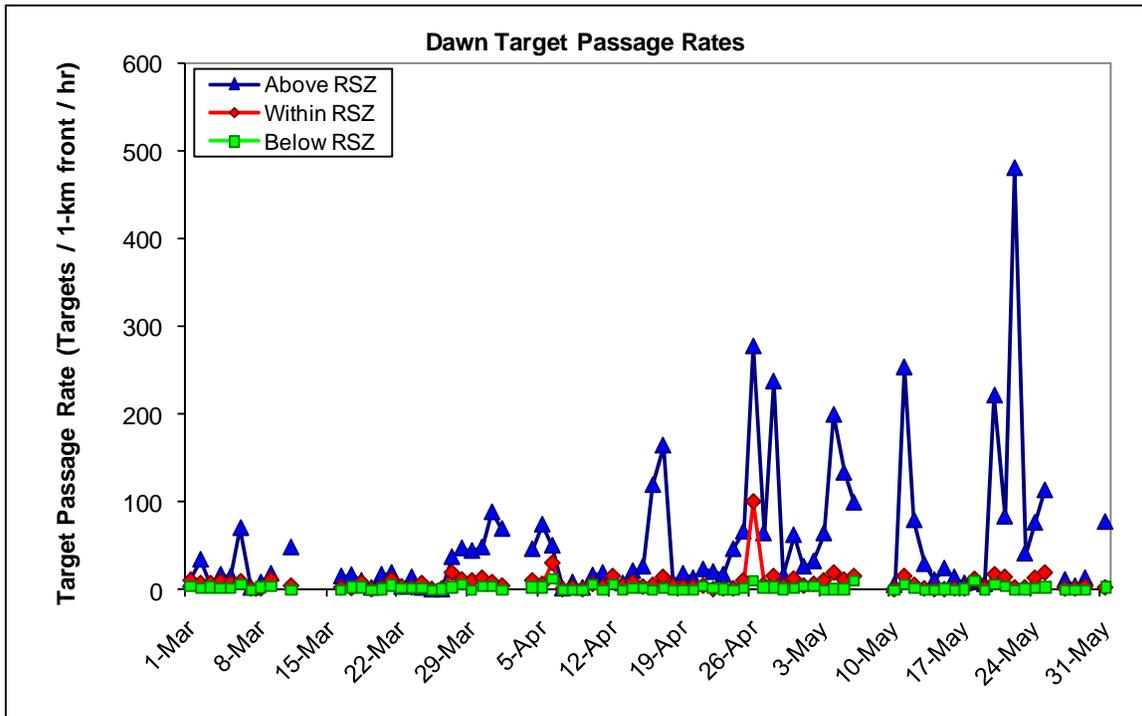


Figure 6-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the spring 2011 season.

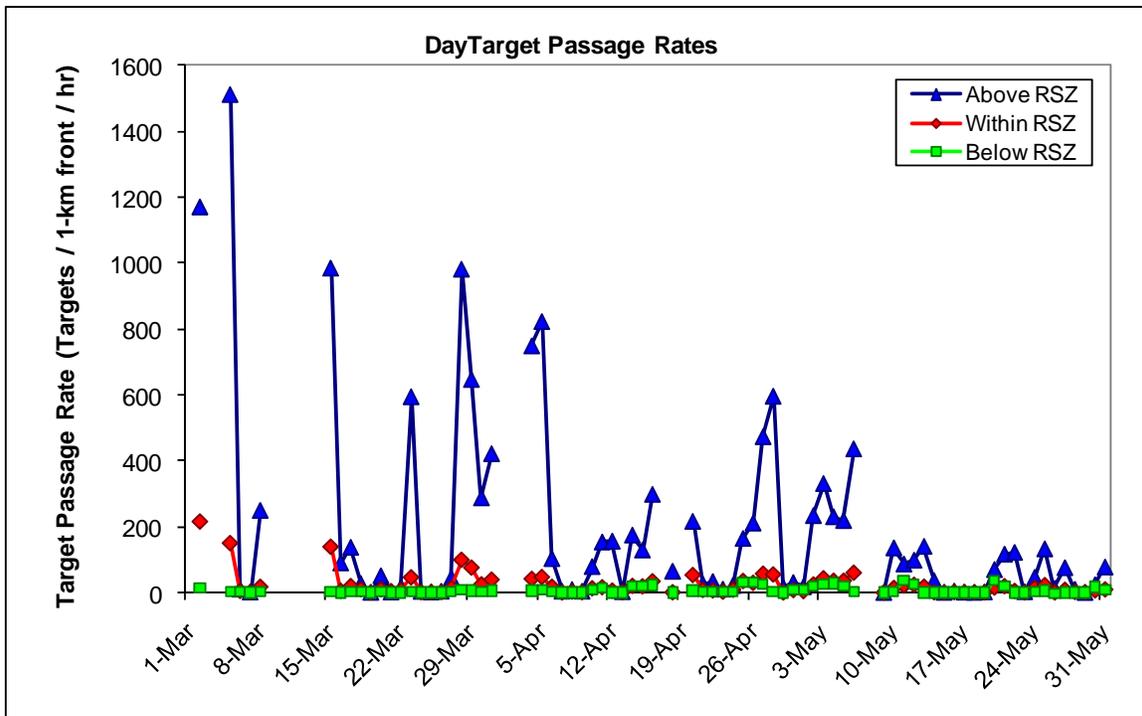


Figure 6-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the spring 2011 season.

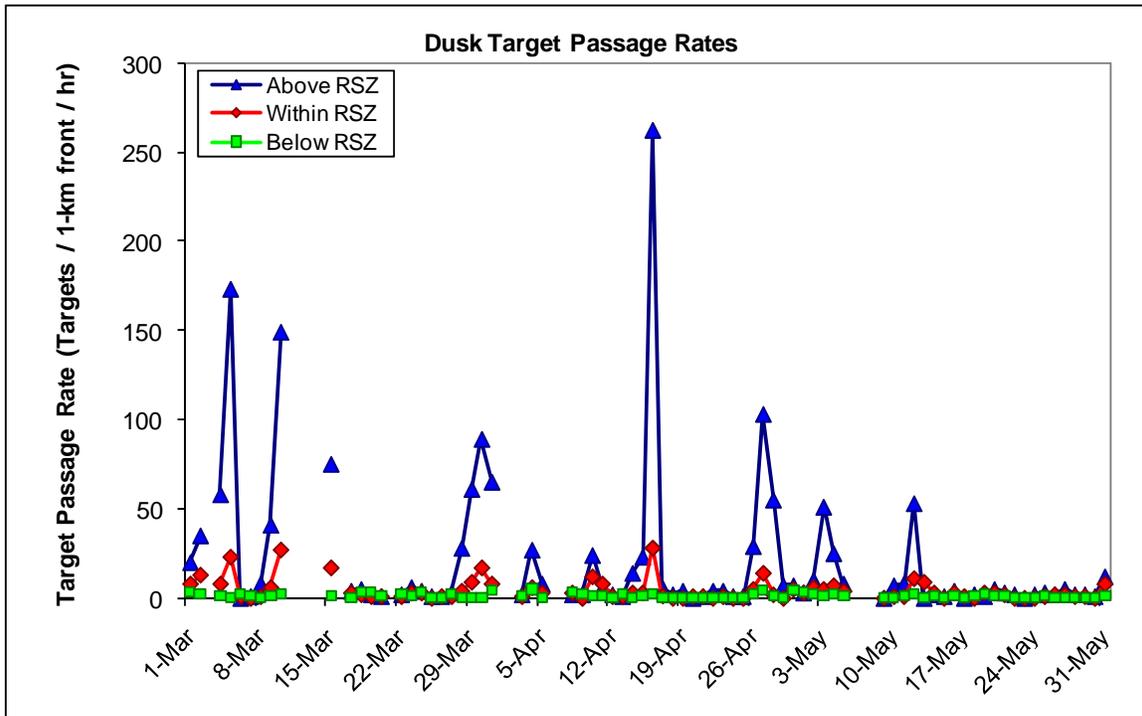


Figure 6-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the spring 2011 season.

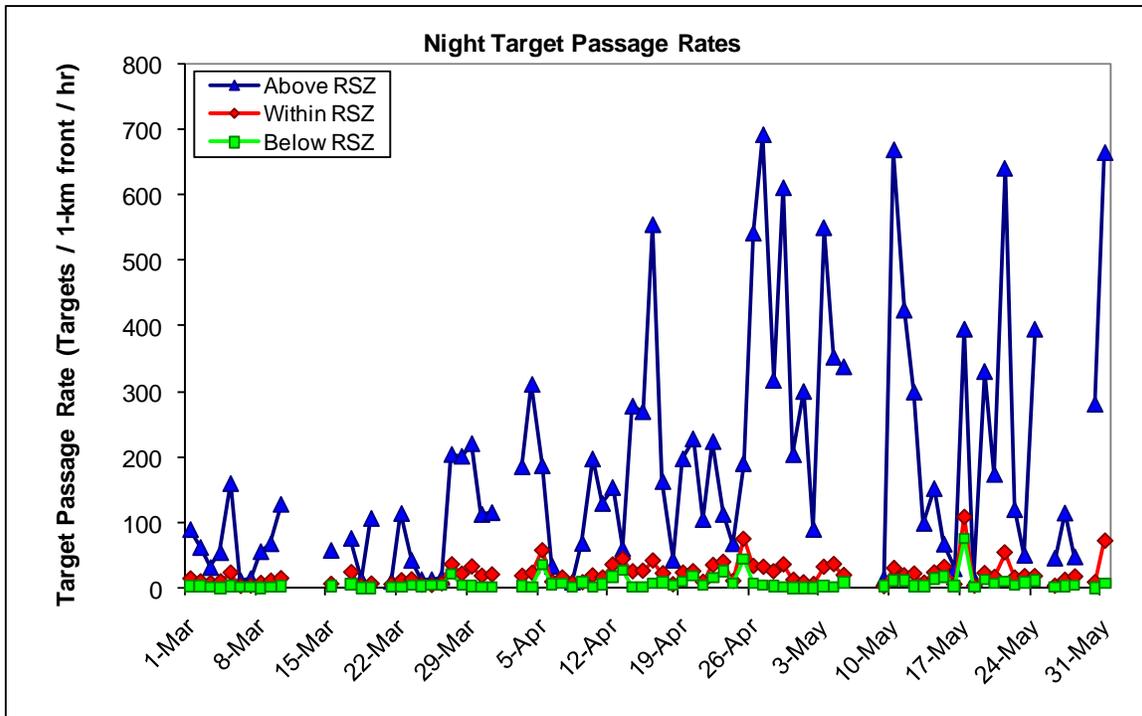


Figure 6-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the spring 2011 season.

6.2 Horizontal Radar Data

The Horizontal Surveillance Radar (HSR) was used to determine directional movements of targets during dawns, days, dusks, and nights of the spring 2011 season.

6.2.1 Target Directions

The average flight direction of all targets during the spring 2011 season was 201° (south), and averaged 201° (south) during dawns, 198° (south) during days, 188° (south) during dusks, and 205° (southwest) during nights. Target movements were predominantly south and southwest during all time periods. The distribution of average target movements during the four biological periods are displayed in figures 6-13 and 6-14 and the individual values for average target bearing and angular concentration (r) are presented in table 6-5. Target directions were moderately concentrated, with dawns averaging the greatest angular concentration (average r = 0.46) and day the least (average r = 0.11).

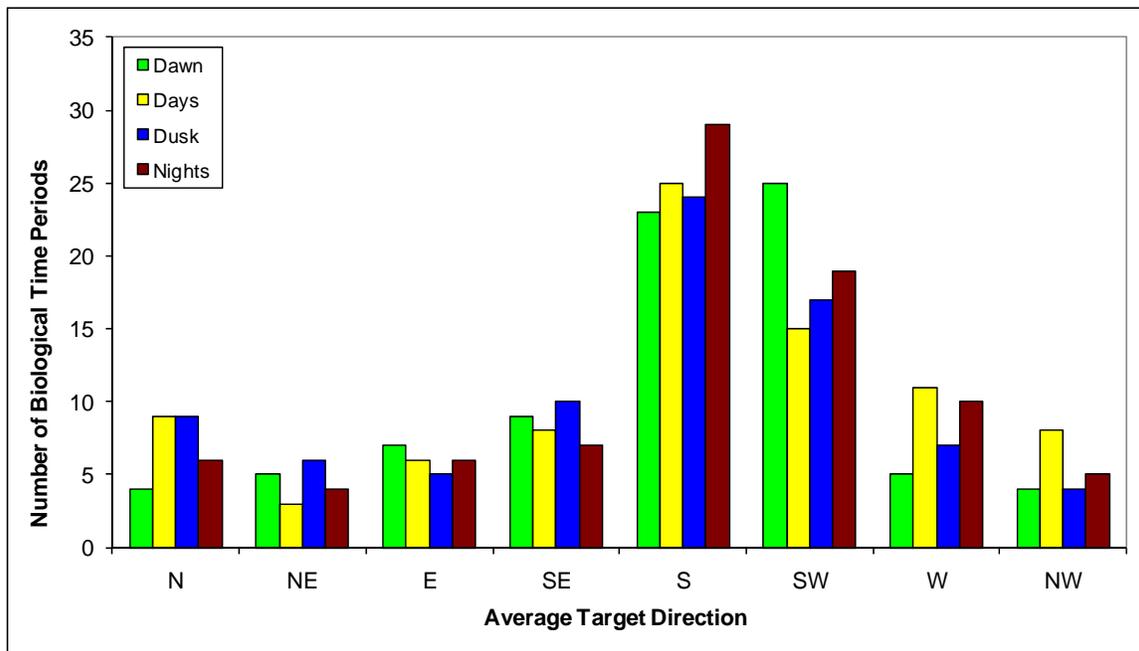


Figure 6-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the spring 2011 season.

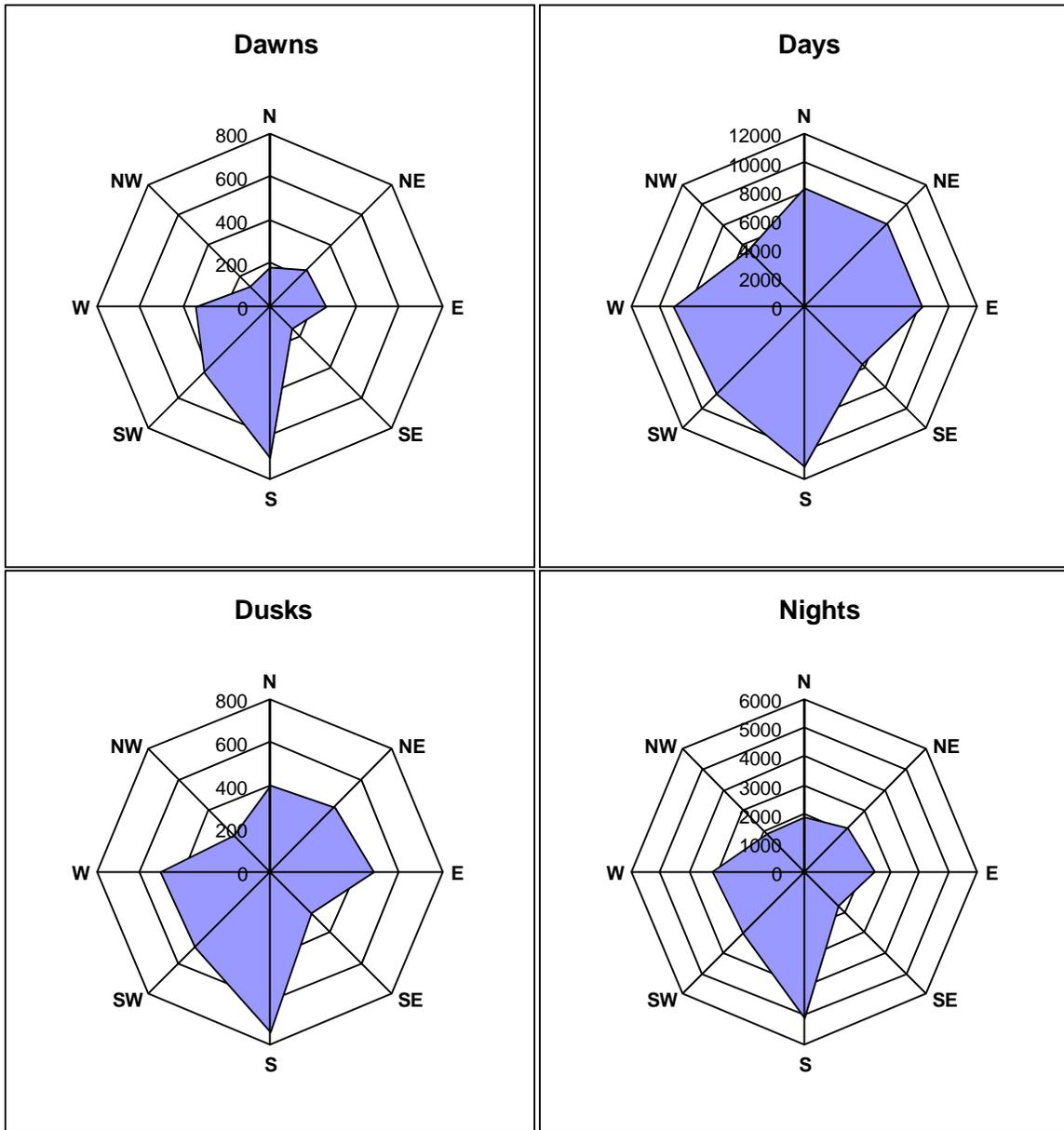


Figure 6-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the spring 2011 season.



Table 6-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during the spring 2011 season.

Date	Dawn			Day			Dusk			Night		
	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)
March 1, 2011	62.3	NE	1.00	116.3	SE	0.13	337.6	N	0.16	294.4	NW	0.30
March 2, 2011	91.3	E	0.94	323.6	NW	0.08	71.8	E	0.45	235.6	SW	0.45
March 3, 2011	279.3	W	0.66	209.2	SW	0.10						
March 4, 2011				94.1	E	0.11	250.8	W	0.38	262.3	W	0.27
March 5, 2011				248.4	W	0.05	122.4	SE	0.43	359.0	N	0.50
March 6, 2011	282.8	W	0.93	103.2	E	0.04	105.6	E	0.05	257.9	W	0.08
March 7, 2011	11.2	N	0.11	279.7	W	0.08	207.2	SW	0.17	205.5	SW	0.06
March 8, 2011	262.2	W	0.83	17.3	N	0.02	17.8	N	0.50	215.6	SW	0.54
March 9, 2011	208.9	SW	1.00	276.3	W	0.13	254.2	W	0.64	306.8	NW	0.19
March 10, 2011				13.4	N	0.11	6.4	N	0.19	117.3	SE	0.24
March 11, 2011	224.7	SW	1.00	349.4	N	0.05	138.0	SE	0.11	237.9	SW	0.10
March 12, 2011	267.0	W	1.00	295.0	NW	0.20	158.3	S	0.14	195.7	S	0.02
March 13, 2011	68.0	E	0.43	47.8	NE	0.06	62.7	NE	0.25	80.5	E	0.24
March 14, 2011	314.8	NW	0.65	246.1	SW	0.12	69.6	E	0.57	5.7	N	0.49
March 15, 2011	209.4	SW	0.16	330.0	NW	0.20	45.8	NE	0.06	12.8	N	0.14
March 16, 2011	8.7	N	0.98	199.3	S	0.05	17.1	N	0.52	105.6	E	0.39
March 17, 2011	181.5	S	1.00	343.5	N	0.10	325.0	NW	0.18	139.7	SE	0.07
March 18, 2011	271.7	W	0.92	210.8	SW	0.09				88.1	E	0.02
March 19, 2011	152.9	SE	0.11	70.3	E	0.01						
March 20, 2011										20.3	N	0.04
March 21, 2011	46.2	NE	0.24	57.7	NE	0.12	321.4	NW	0.26	139.9	SE	0.10
March 22, 2011	330.5	NW	0.62	355.4	N	0.10	115.6	SE	0.59	260.6	W	0.07
March 23, 2011	128.5	SE	0.31	290.1	W	0.25						
March 24, 2011				325.5	NW	0.05	336.3	NW	0.29	120.6	SE	0.12
March 25, 2011	115.0	SE	0.23	181.8	S	0.04	255.1	W	0.06	348.6	N	0.05
March 26, 2011	311.5	NW	0.09	236.9	SW	0.04	225.7	SW	0.15	248.0	W	0.11
March 27, 2011				354.7	N	0.10	216.9	SW	0.42	32.2	NE	0.27
March 28, 2011	64.9	NE	0.21	273.5	W	0.10	168.6	S	0.27	313.0	NW	0.29
March 29, 2011	354.5	N	0.95	231.9	SW	0.19	166.5	S	0.97	181.0	S	0.46
March 30, 2011	110.3	E	0.16	256.5	W	0.10	66.3	NE	0.89	266.0	W	0.22
March 31, 2011	109.5	E	0.98	227.8	SW	0.24	115.1	SE	0.32	258.1	W	0.37
April 1, 2011	200.3	S	0.36	262.6	W	0.10	340.1	N	0.18	280.0	W	0.02
April 2, 2011	43.0	NE	0.16	14.0	N	0.06	338.9	N	0.21	333.7	NW	0.07
April 3, 2011	145.1	SE	0.23	31.8	NE	0.07	352.6	N	0.03	104.9	E	0.10
April 4, 2011				254.3	W	0.13				40.0	NE	0.49
April 5, 2011	121.3	SE	0.40	88.0	E	0.02	57.7	NE	0.11	25.0	NE	0.04
April 6, 2011	246.4	SW	0.25	302.1	NW	0.56	189.2	S	0.09	308.8	NW	0.07
April 7, 2011	107.9	E	0.14	222.5	SW	0.02	89.1	E	0.18	348.7	N	0.20
April 8, 2011	36.1	NE	0.21	324.8	NW	0.05	120.4	SE	0.04	178.8	S	0.04
April 9, 2011	226.5	SW	0.36	283.5	W	0.09	185.3	S	0.20	78.1	E	0.14
April 10, 2011	138.4	SE	0.02	281.7	W	0.12	304.4	NW	0.47	141.5	SE	0.13
April 11, 2011	78.9	E	0.37	8.5	N	0.13	357.1	N	0.52	237.2	SW	0.07
April 12, 2011	330.2	NW	0.39	300.2	NW	0.03	33.0	NE	0.24	32.1	NE	0.07
April 13, 2011	129.9	SE	0.17	193.8	S	0.12	172.1	S	0.23	249.9	W	0.34
April 14, 2011	189.2	S	0.20	161.5	S	0.14	189.0	S	0.26	196.6	S	0.43
April 15, 2011	188.3	S	0.31	181.7	S	0.09	230.8	SW	0.34	150.0	SE	0.27
April 16, 2011	160.7	S	0.29	174.5	S	0.05	103.9	E	0.17	232.3	SW	0.13
April 17, 2011	83.7	E	0.51	173.9	S	0.10	225.9	SW	0.24	217.7	SW	0.37
April 18, 2011	187.1	S	0.32	199.0	S	0.18	197.9	S	0.25	202.2	S	0.35
April 19, 2011	218.6	SW	0.43	89.5	E	0.04	189.7	S	0.09	211.8	SW	0.19
April 20, 2011	218.4	SW	0.23	176.0	S	0.04	127.4	SE	0.19	232.6	SW	0.46
April 21, 2011	219.1	SW	0.45	216.2	SW	0.20	225.2	SW	0.52	226.4	SW	0.36
April 22, 2011	226.9	SW	0.49	225.9	SW	0.17	273.7	W	0.32	199.3	S	0.33
April 23, 2011	221.1	SW	0.73	188.9	S	0.10	159.4	S	0.43	263.0	W	0.20
April 24, 2011	194.8	S	0.82	172.5	S	0.24	199.9	S	0.07	220.3	SW	0.31
April 25, 2011	204.9	SW	0.65	192.4	S	0.10	204.1	SW	0.20	69.6	E	0.01
April 26, 2011	198.1	S	0.51	197.8	S	0.27	176.8	S	0.26	208.2	SW	0.44
April 27, 2011	212.5	SW	0.87	210.3	SW	0.21	215.2	SW	0.30	201.1	S	0.39
April 28, 2011	195.1	S	0.54	195.8	S	0.34	173.5	S	0.60	207.8	SW	0.42
April 29, 2011	200.8	S	0.67	222.7	SW	0.28	252.7	W	0.17	229.9	SW	0.36
April 30, 2011	162.0	S	0.46	136.1	SE	0.25	134.9	SE	0.46	192.2	S	0.20
May 1, 2011	148.5	SE	0.44	151.1	SE	0.17	256.1	W	0.14	188.8	S	0.53
May 2, 2011	197.1	S	0.46	179.7	S	0.27	178.3	S	0.26	194.9	S	0.50
May 3, 2011	208.1	SW	0.64	196.6	S	0.15	161.2	S	0.25	205.7	SW	0.50
May 4, 2011	184.0	S	0.51	213.0	SW	0.24	201.5	S	0.56	200.8	S	0.58
May 5, 2011	202.0	S	0.85	207.2	SW	0.37	216.5	SW	0.40	214.2	SW	0.55
May 6, 2011	215.4	SW	0.72	204.1	SW	0.29						
May 7, 2011												
May 8, 2011												
May 9, 2011				180.0	S	0.06	134.3	SE	0.21	201.9	S	0.27
May 10, 2011	222.3	SW	0.36	160.4	S	0.09	186.1	S	0.26	192.0	S	0.36
May 11, 2011	188.0	S	0.30	121.2	SE	0.07	190.6	S	0.21	187.4	S	0.46
May 12, 2011	174.1	S	0.37	132.0	SE	0.04	166.2	S	0.14	185.8	S	0.47
May 13, 2011	210.3	SW	0.35	200.1	S	0.06	204.9	SW	0.16	193.2	S	0.11
May 14, 2011	209.6	SW	0.25	279.5	W	0.04	164.0	S	0.17	195.3	S	0.12
May 15, 2011	223.8	SW	0.37	273.5	W	0.09	184.4	S	0.08	189.5	S	0.18
May 16, 2011	213.2	SW	0.29	181.6	S	0.10	179.6	S	0.12	198.3	S	0.22
May 17, 2011	201.5	S	0.34	206.7	SW	0.06	224.1	SW	0.13	194.3	S	0.35
May 18, 2011	192.9	S	0.44	199.3	S	0.06	121.9	SE	0.21	199.6	S	0.39
May 19, 2011	182.3	S	0.36	199.9	S	0.11	214.8	SW	0.10	192.7	S	0.39
May 20, 2011	218.8	SW	0.37	101.0	E	0.05	171.4	S	0.20	196.7	S	0.21
May 21, 2011	145.5	SE	0.45	73.2	E	0.05	201.3	S	0.19	208.0	SW	0.24
May 22, 2011	176.5	S	0.25	207.6	SW	0.06	244.0	SW	0.17	209.7	SW	0.21
May 23, 2011	239.4	SW	0.12	197.0	S	0.08	250.6	W	0.06	182.4	S	0.12
May 24, 2011	206.0	SW	0.51	171.4	S	0.06	199.7	S	0.47	185.9	S	0.35
May 25, 2011	179.5	S	0.40	160.8	S	0.04	151.2	SE	0.20	196.4	S	0.26
May 26, 2011	195.4	S	0.41	209.2	SW	0.03	210.9	SW	0.14	258.1	W	0.15
May 27, 2011	344.6	N	0.11	292.5	NW	0.01	5.3	N	0.09	210.7	SW	0.13
May 28, 2011	208.7	SW	0.09	4.6	N	0.05	207.1	SW	0.07	147.3	SE	0.07
May 29, 2011	204.5	SW	0.40	114.2	SE	0.04	42.5	NE	0.15	176.8	S	0.14
May 30, 2011	229.0	SW	0.36	125.8	SE	0.03	232.3	SW	0.05	193.2	S	0.20
May 31, 2011	193.4	S	0.28	129.2	SE	0.04	210.0	SW	0.15	181.5	S	0.29

*Periods with <50% of time recorded by radar are excluded from analysis

6.3 Weather Data

6.3.1 Weather Information

Table 6-6 presents nightly averages of wind speed, temperature and wind direction from an on-site meteorological tower, total minutes of precipitation as detected by the vertical radar, and the presence of low visibility conditions at two nearby airports. At a height of 60 m, nightly wind speeds averaged 8.6 m/s (19.2 mph). Average nightly wind directions were predominantly west (Figure 6-15). Temperatures averaged 19.3° C (66.7° F) during nights. During the 93-day spring 2011 season, rain occurred on portions of 10 nights (11%).

Low visibility potentially resulting in bird strike risk to nocturnal migrants is generally defined as less than 0.5 miles during nighttime. Visibility records were accessed from two nearby airports: El Centro Naval Air Facility (NJK, ~ 24 miles east) and Imperial County Airport (IPL, ~ 29 miles east). During the 93-day spring 2011 season, no records of low visibility occurred at either airport.

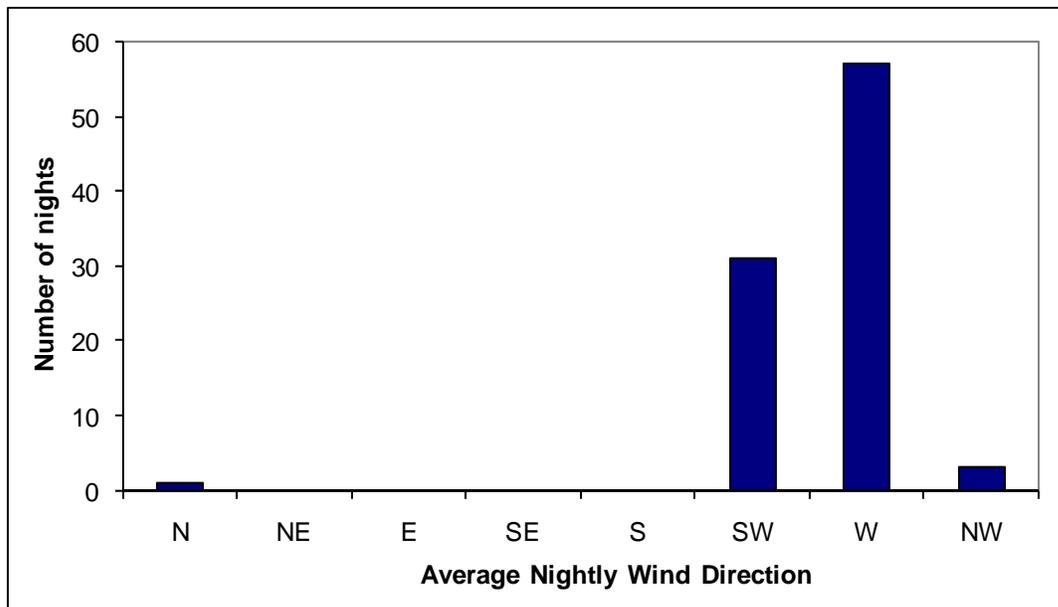


Figure 6-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the spring 2011 season.



Table 6-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the spring 2011 season.

Date	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
							NJK	IPL
1-Mar-11	1.8	10.7	297.3	NW	0.82	0		
2-Mar-11	6.1	16.6	214.1	SW	0.88	0		
3-Mar-11	7.7	19.7	267.8	W	0.85	0		
4-Mar-11	4.7	17.1	260.7	W	0.89	0		
5-Mar-11	2.2	17.4	292.3	W	0.79	0		
6-Mar-11	3.5	19.8	274.4	W	0.60	0		
7-Mar-11	15.1	17.1	272.0	W	0.93	0		
8-Mar-11	10.0	13.9	248.7	W	0.92	0		
9-Mar-11	2.0	15.7	277.6	W	0.94	0		
10-Mar-11	2.4	19.0	276.1	W	0.94	0		
11-Mar-11	5.2	21.0	251.4	W	0.93	0		
12-Mar-11	12.1	21.2	252.5	W	0.99	0		
13-Mar-11	5.2	20.8	243.0	SW	0.83	0		
14-Mar-11	3.6	21.1	254.2	W	0.81	0		
15-Mar-11	3.8	22.0	265.1	W	0.80	0		
16-Mar-11	10.9	25.2	250.6	W	0.96	0		
17-Mar-11	8.2	23.4	254.1	W	0.81	0		
18-Mar-11	5.6	19.9	273.3	W	0.91	0		
19-Mar-11	7.5	15.2	255.5	W	0.71	0		
20-Mar-11	12.0	15.0	229.1	SW	0.99	329		
21-Mar-11	11.4	14.7	224.7	SW	0.78	3		
22-Mar-11	5.4	11.3	279.7	W	0.81	0		
23-Mar-11	4.5	12.8	240.8	SW	0.87	120		
24-Mar-11	6.8	12.8	273.0	W	0.83	0		
25-Mar-11	10.8	13.4	264.5	W	0.97	0		
26-Mar-11	12.7	13.3	250.3	W	0.99	0		
27-Mar-11	12.4	14.0	261.9	W	0.99	0		
28-Mar-11	6.9	16.9	235.3	SW	0.88	0		
29-Mar-11	4.3	18.8	257.0	W	0.89	0		
30-Mar-11	2.6	21.1	287.4	W	0.70	0		
31-Mar-11	2.7	23.7	274.2	W	0.86	0		
1-Apr-11	3.8	26.5	266.1	W	0.94	0		
2-Apr-11	10.1	27.6	257.6	W	0.85	0		
3-Apr-11	14.3	18.3	257.2	W	0.99	0		
4-Apr-11	7.0	19.9	264.7	W	0.68	0		
5-Apr-11	1.9	19.8	243.4	SW	0.66	0		
6-Apr-11	8.0	22.5	270.2	W	0.83	22		
7-Apr-11	13.2	17.8	245.8	SW	0.98	90		
8-Apr-11	11.5	12.8	281.9	W	0.98	0		
9-Apr-11	9.6	9.2	262.6	W	0.97	0		
10-Apr-11	7.9	11.0	235.2	SW	0.98	0		
11-Apr-11	2.7	15.3	251.4	W	0.63	0		
12-Apr-11	6.4	18.5	242.3	SW	0.92	0		
13-Apr-11	11.6	17.8	244.1	SW	0.99	0		
14-Apr-11	7.2	16.0	263.4	W	0.83	0		
15-Apr-11	2.5	18.8	273.9	W	0.83	0		



Table 6-6 continued. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the spring 2011 season.

Date	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
							NJK	IPL
16-Apr-11	3.6	22.0	254.2	W	0.95	0		
17-Apr-11	6.1	27.4	252.4	W	0.84	44		
18-Apr-11	13.4	24.9	243.2	SW	0.99	0		
19-Apr-11	15.6	19.6	239.9	SW	1.00	0		
20-Apr-11	14.5	19.4	237.3	SW	1.00	0		
21-Apr-11	11.5	22.7	250.3	W	0.98	0		
22-Apr-11	14.0	20.1	246.7	SW	0.99	60		
23-Apr-11	13.7	19.9	246.7	SW	0.99	0		
24-Apr-11	11.3	19.3	263.1	W	0.98	0		
25-Apr-11	15.1	17.1	240.1	SW	0.98	0		
26-Apr-11	16.4	22.1	267.2	W	0.92	0		
27-Apr-11	4.2	21.4	259.3	W	0.81	0		
28-Apr-11	2.0	23.1	269.8	W	0.58	0		
29-Apr-11	11.2	22.5	264.8	W	0.92	0		
30-Apr-11	6.6	20.6	227.3	SW	0.30	0		
1-May-11	2.5	17.6	330.6	NW	0.86	0		
2-May-11	2.6	19.8	2.6	N	0.91	0		
3-May-11	2.0	21.0	312.3	NW	0.91	0		
4-May-11	1.9	24.1	283.8	W	0.62	0		
5-May-11	4.4	27.3	256.1	W	0.85	0		
6-May-11	8.3	28.2	239.2	SW	0.98	0		
7-May-11	10.9	26.5	243.2	SW	0.99	0		
8-May-11	9.6	22.5	258.0	W	0.91	0		
9-May-11	18.8	15.5	261.6	W	1.00	0		
10-May-11	13.4	13.7	253.0	W	1.00	0		
11-May-11	8.7	18.1	231.5	SW	0.99	0		
12-May-11	5.3	22.2	242.8	SW	0.92	0		
13-May-11	6.0	25.7	237.2	SW	0.95	0		
14-May-11	15.1	22.4	239.6	SW	1.00	210		
15-May-11	14.5	17.9	256.6	W	0.97	75		
16-May-11	9.7	14.0	276.3	W	0.98	0		
17-May-11	15.3	14.8	250.3	W	0.98	0		
18-May-11	9.6	16.0	263.3	W	0.95	0		
19-May-11	12.7	14.6	245.6	SW	0.98	0		
20-May-11	8.2	17.7	236.2	SW	0.97	0		
21-May-11	5.9	23.7	249.0	W	0.94	0		
22-May-11	10.8	24.3	238.4	SW	1.00	0		
23-May-11	14.5	19.5	245.0	SW	0.97	0		
24-May-11	13.1	16.7	253.5	W	0.96	0		
25-May-11	7.1	23.0	240.1	SW	0.96	15		
26-May-11	15.6	25.2	241.0	SW	0.95	0		
27-May-11	14.2	25.4	237.7	SW	1.00	0		
28-May-11	14.8	26.8	251.3	W	0.98	0		
29-May-11	14.3	18.9	267.7	W	0.93	0		
30-May-11	7.7	15.8	259.7	W	0.96	0		
31-May-11	3.0	22.2	269.1	W	0.54	0		

6.3.2. Target Passage Rates and Weather Associations

Table 6-7. Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the spring 2011 season.

Date	Nightly Target Passage Rate (targets/1-km front/hr)	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
								NJK	IPL
31-May-11	742.7	3.0	22.2	269.1	W	0.54	0		
27-Apr-11	726.8	4.2	21.4	259.3	W	0.81	0		
10-May-11	709.1	13.4	13.7	253.0	W	1.00	0		
21-May-11	702.5	5.9	23.7	249.0	W	0.94	0		
29-Apr-11	646.5	11.2	22.5	264.8	W	0.92	0		
16-Apr-11	602.8	3.6	22.0	254.2	W	0.95	0		
3-May-11	584.0	2.0	21.0	312.3	NW	0.91	0		
26-Apr-11	581.6	16.4	22.1	267.2	W	0.92	0		
17-May-11	579.2	15.3	14.8	250.3	W	0.98	0		
11-May-11	453.7	8.7	18.1	231.5	SW	0.99	0		
24-May-11	424.0	13.1	16.7	253.5	W	0.96	0		
4-May-11	390.7	1.9	24.1	283.8	W	0.62	0		
19-May-11	365.5	12.7	14.6	245.6	SW	0.98	0		
5-May-11	364.9	4.4	27.3	256.1	W	0.85	0		
28-Apr-11	344.9	2.0	23.1	269.8	W	0.58	0		
4-Apr-11	335.2	7.0	19.9	264.7	W	0.68	0		
12-May-11	323.0	5.3	22.2	242.8	SW	0.92	0		
25-Apr-11	308.8	15.1	17.1	240.1	SW	0.98	0		
1-May-11	308.2	2.5	17.6	330.6	NW	0.86	0		
14-Apr-11	304.2	7.2	16.0	263.4	W	0.83	0		
15-Apr-11	296.1	2.5	18.8	273.9	W	0.83	0		
30-May-11	289.4	7.7	15.8	259.7	W	0.96	0		
5-Apr-11	280.2	1.9	19.8	243.4	SW	0.66	0		
22-Apr-11	274.0	14.0	20.1	246.7	SW	0.99	60		
20-Apr-11	271.3	14.5	19.4	237.3	SW	1.00	0		
27-Mar-11	260.7	12.4	14.0	261.9	W	0.99	0		
29-Mar-11	256.1	4.3	18.8	257.0	W	0.89	0		
19-Apr-11	231.5	15.6	19.6	239.9	SW	1.00	0		
28-Mar-11	226.4	6.9	16.9	235.3	SW	0.88	0		
10-Apr-11	218.1	7.9	11.0	235.2	SW	0.98	0		
30-Apr-11	215.9	6.6	20.6	227.3	SW	0.30	0		
3-Apr-11	206.4	14.3	18.3	257.2	W	0.99	0		
12-Apr-11	206.3	6.4	18.5	242.3	SW	0.92	0		
20-May-11	196.5	8.2	17.7	236.2	SW	0.97	0		
17-Apr-11	193.4	6.1	27.4	252.4	W	0.84	44		
14-May-11	189.4	15.1	22.4	239.6	SW	1.00	210		
5-Mar-11	186.2	2.2	17.4	292.3	W	0.79	0		
23-Apr-11	178.7	13.7	19.9	246.7	SW	0.99	0		
11-Apr-11	150.5	2.7	15.3	251.4	W	0.63	0		
10-Mar-11	145.9	2.4	19.0	276.1	W	0.94	0		
22-May-11	139.4	10.8	24.3	238.4	SW	1.00	0		
31-Mar-11	138.1	2.7	23.7	274.2	W	0.86	0		
30-Mar-11	132.5	2.6	21.1	287.4	W	0.70	0		
13-Apr-11	132.0	11.6	17.8	244.1	SW	0.99	0		
27-May-11	129.3	14.2	25.4	237.7	SW	1.00	0		
22-Mar-11	127.3	5.4	11.3	279.7	W	0.81	0		



Table 6-7 continued. Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the spring 2011 season.

Date	Nightly Target Passage Rate (targets/1-km front/hr)	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
								NJK	IPL
21-Apr-11	118.5	11.5	22.7	250.3	W	0.98	0		
15-May-11	117.0	14.5	17.9	256.6	W	0.97	75		
19-Mar-11	113.4	7.5	15.2	255.5	W	0.71	0		
13-May-11	109.6	6.0	25.7	237.2	SW	0.95	0		
17-Mar-11	106.4	8.2	23.4	254.1	W	0.81	0		
1-Mar-11	106.3	1.8	10.7	297.3	NW	0.82	0		
2-May-11	95.7	2.6	19.8	2.6	N	0.91	0		
24-Apr-11	86.3	11.3	19.3	263.1	W	0.98	0		
9-Apr-11	85.6	9.6	9.2	262.6	W	0.97	0		
9-Mar-11	79.8	2.0	15.7	277.6	W	0.94	0		
23-May-11	76.6	14.5	19.5	245.0	SW	0.97	0		
2-Mar-11	75.0	6.1	16.6	214.1	SW	0.88	0		
28-May-11	70.2	14.8	26.8	251.3	W	0.98	0		
15-Mar-11	66.6	3.8	22.0	265.1	W	0.80	0		
4-Mar-11	65.0	4.7	17.1	260.7	W	0.89	0		
8-Mar-11	63.7	10.0	13.9	248.7	W	0.92	0		
23-Mar-11	60.3	4.5	12.8	240.8	SW	0.87	120		
18-Apr-11	52.1	13.4	24.9	243.2	SW	0.99	0		
26-May-11	50.9	15.6	25.2	241.0	SW	0.95	0		
6-Apr-11	48.2	8.0	22.5	270.2	W	0.83	22		
3-Mar-11	40.0	7.7	19.7	267.8	W	0.85	0		
16-May-11	38.8	9.7	14.0	276.3	W	0.98	0		
7-Apr-11	38.2	13.2	17.8	245.8	SW	0.98	90		
26-Mar-11	28.5	12.7	13.3	250.3	W	0.99	0		
25-Mar-11	21.5	10.8	13.4	264.5	W	0.97	0		
24-Mar-11	20.5	6.8	12.8	273.0	W	0.83	0		
9-May-11	20.3	18.8	15.5	261.6	W	1.00	0		
7-Mar-11	19.3	15.1	17.1	272.0	W	0.93	0		
8-Apr-11	19.3	11.5	12.8	281.9	W	0.98	0		
21-Mar-11	18.0	11.4	14.7	224.7	SW	0.78	3		
18-May-11	17.9	9.6	16.0	263.3	W	0.95	0		
18-Mar-11	17.3	5.6	19.9	273.3	W	0.91	0		
6-Mar-11	14.7	3.5	19.8	274.4	W	0.60	0		
11-Mar-11		5.2	21.0	251.4	W	0.93	0		
12-Mar-11		12.1	21.2	252.5	W	0.99	0		
13-Mar-11		5.2	20.8	243.0	SW	0.83	0		
14-Mar-11		3.6	21.1	254.2	W	0.81	0		
16-Mar-11		10.9	25.2	250.6	W	0.96	0		
20-Mar-11		12.0	15.0	229.1	SW	0.99	329		
1-Apr-11		3.8	26.5	266.1	W	0.94	0		
2-Apr-11		10.1	27.6	257.6	W	0.85	0		
6-May-11		8.3	28.2	239.2	SW	0.98	0		
7-May-11		10.9	26.5	243.2	SW	0.99	0		
8-May-11		9.6	22.5	258.0	W	0.91	0		
25-May-11		7.1	23.0	240.1	SW	0.96	15		
29-May-11		14.3	18.9	267.7	W	0.93	0		

7. RESULTS for June 1 – July 9, 2011

The MERLIN Avian Radar System operated continuously (24 hours a day) during the summer 2011 season, June 1 – July 9, 2011. Of the 936.1 hours available during the summer season, 815.2 hours of vertical radar (87.1% of available time) and 837.9 hours of horizontal radar (89.5% of available time) were collected (Table 7-1). Weather can make some of this radar data unusable because precipitation can block the radar wavelength so few if any targets are discernable. This is more prevalent among X-band radars than S-band because the longer wavelength of the S-band radar allows almost all targets to be detected in rain with the help of digital processing.

Therefore, of the 815.2 hours of vertical radar data, 4.7 hours were removed because rain prevented the collection of radar data (0.6% of radar time). This left 810.5 hours of useable vertical radar data (99.4% of radar time, 86.6% of the summer 2011 season; Table 7-1). A total of 120.3 hours of horizontal radar data were removed because of rain or rain-type events (14.4% of radar time), leaving 717.6 hours of useable horizontal radar data (85.6% of radar time, 76.7% of the summer 2011 season; Table 7-1).

Table 7-1. Amount of radar monitoring at the proposed Ocotillo Wind Project site during the summer 2011 season.

	Time in Spring 2010 season	Time radar collected data	Radar downtime	Radar data with rain or interference	Useable radar data
Vertical Radar (hrs)	936.1	815.2	121.0	4.7	810.5
Horizontal Radar (hrs)	936.1	837.9	98.2	120.3	717.6

7.1 Vertical Radar Data

Data collected from the vertical scanning radar (VSR) was used to quantify target movements through the project area. Data is presented as total number of targets / 1-km front / hr. This rate is also used when quantifying targets above (up to ~2,800 m AGL), below, and at the height of the rotor swept zone for the summer 2011 season

7.1.1. Targets Passage Rates Over Time

Target passage rates during summer 2011 season were variable throughout the season (Figure 7-1) and among the four biological periods, but averaged the greatest during days and nights, followed by dawns and dusks (Figure 7-2). Summary statistics of the target passage rates for each of the four biological

periods are presented in table 7-2. (All target counts and target passage rates for each biological period are presented in Appendix C).

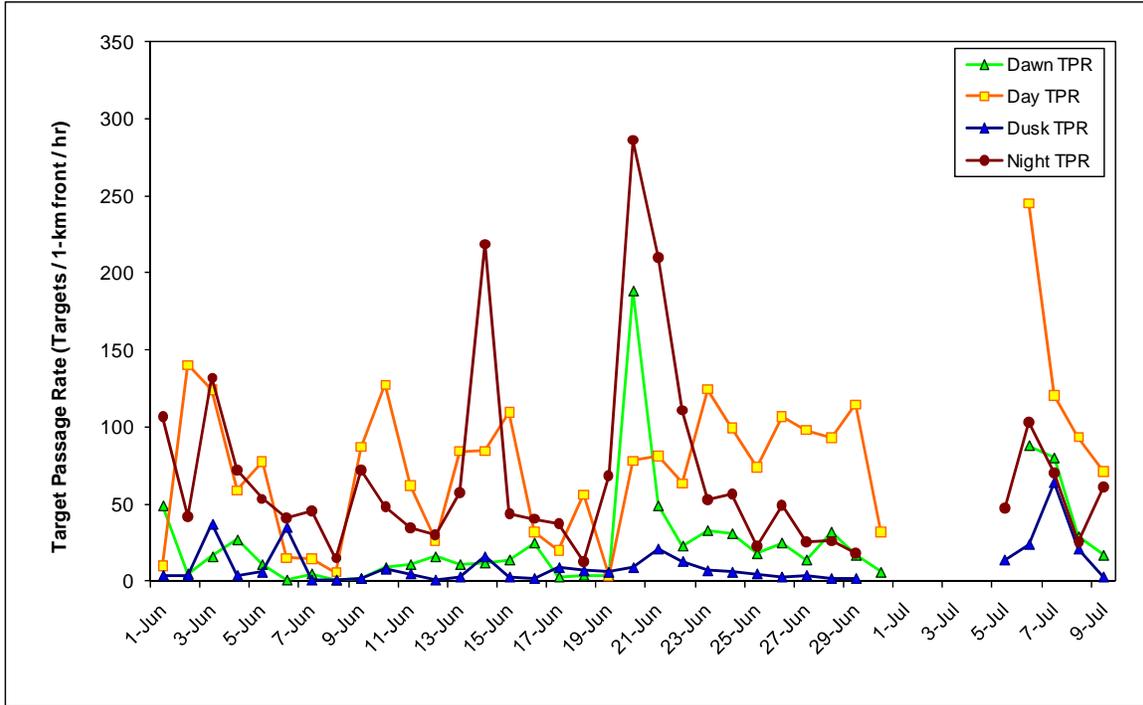


Figure 7-1. Target passage rates at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.

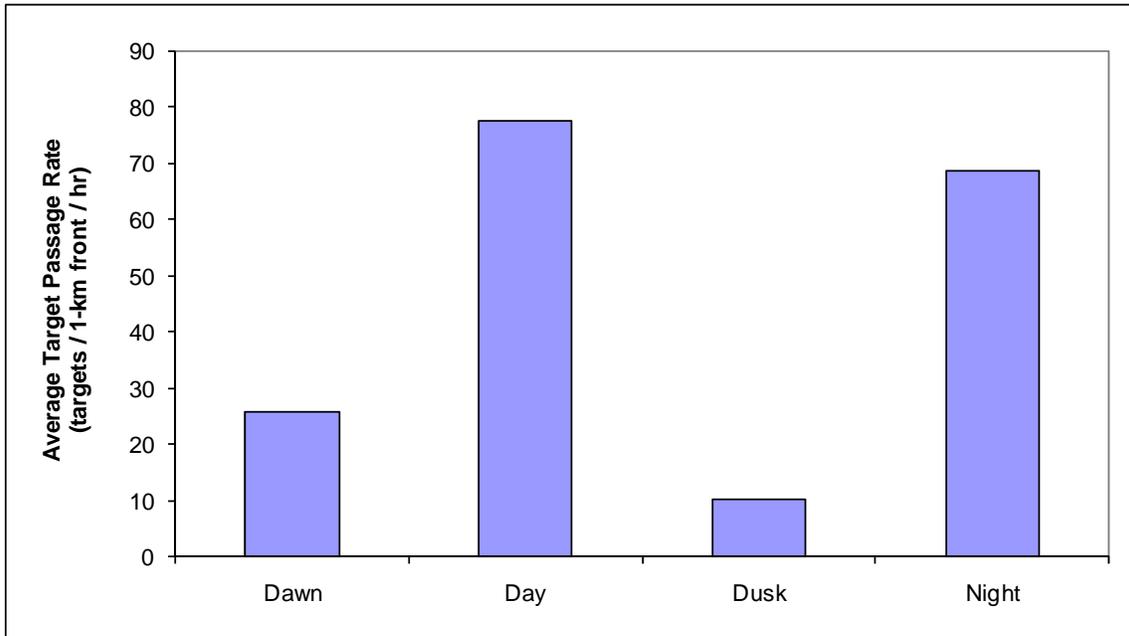


Figure 7-2. Average target passage rates for four biological periods at the proposed Ocotillo Wind Project site during the summer 2011 season.

Table 7-2. Summary statistics for target passage rates (number targets / 1-km front / hour) for four biological periods during the summer 2011 season.

	Dawn	Day	Dusk	Night
Average	25.8	77.5	10.4	68.7
Standard Deviation	35.1	49.2	13.2	61.2
Median	16.0	79.6	5.5	48.8
Minimum	1.0	3.6	1.0	12.6
Maximum	188.0	245.0	64.0	286.1
Range	187.0	241.4	63.0	273.4

Average target passage rates differed hourly throughout the summer 2011 season (Figure 7-3) and were greatest midday (hours 9-12, 9am-noon) with a secondary peak in the evening (hours 19 and 20). Target passage rates were greatest above the rotor swept zone compared to within and below the rotor swept zone.

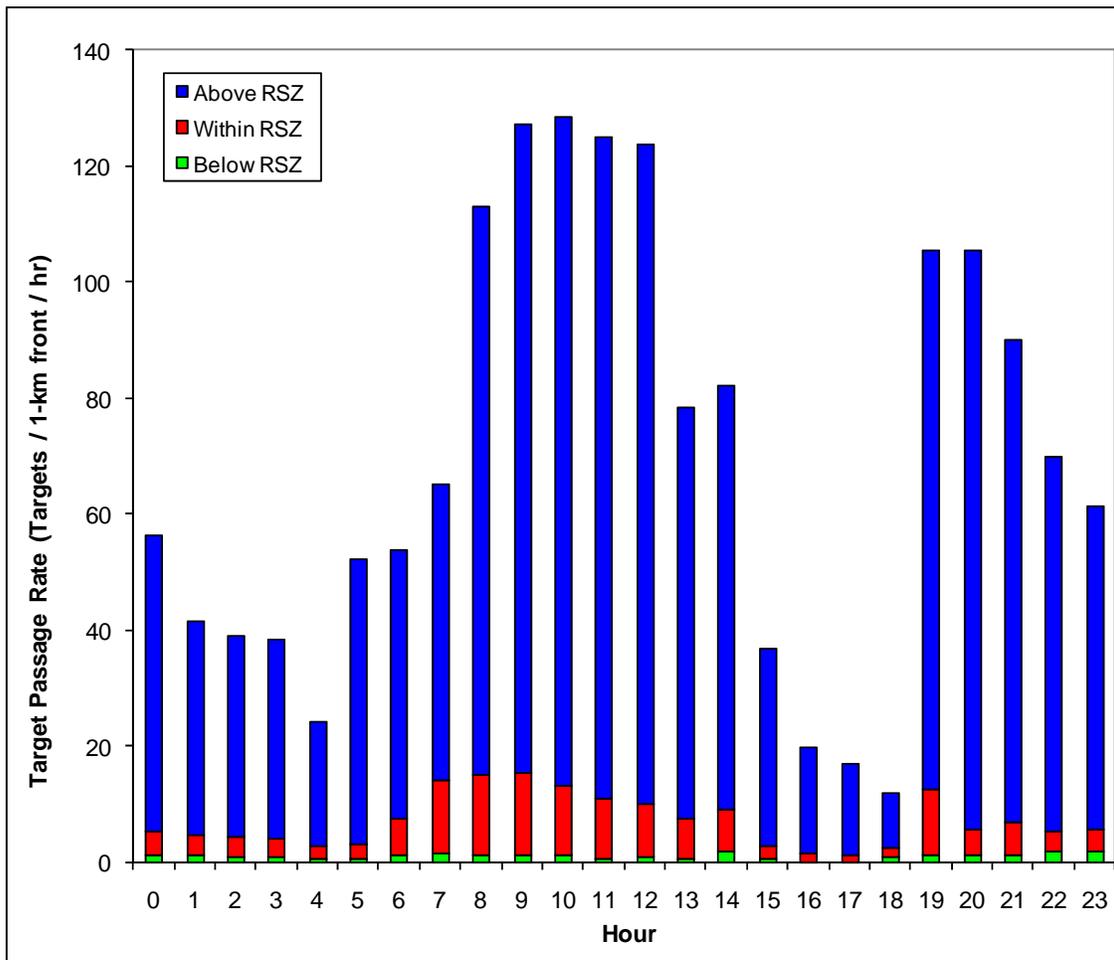


Figure 7-3. Hourly activity (average target passage rates) below, at, and above the rotor swept zone at the proposed Ocotillo Wind Project site during the summer 2011 season.

7.1.2. Altitudinal Distribution of Targets

Average hourly target heights varied slightly, ranging between 270.8 m during hour 7 and 474.4 m during hour 5 (Figure 7-4).

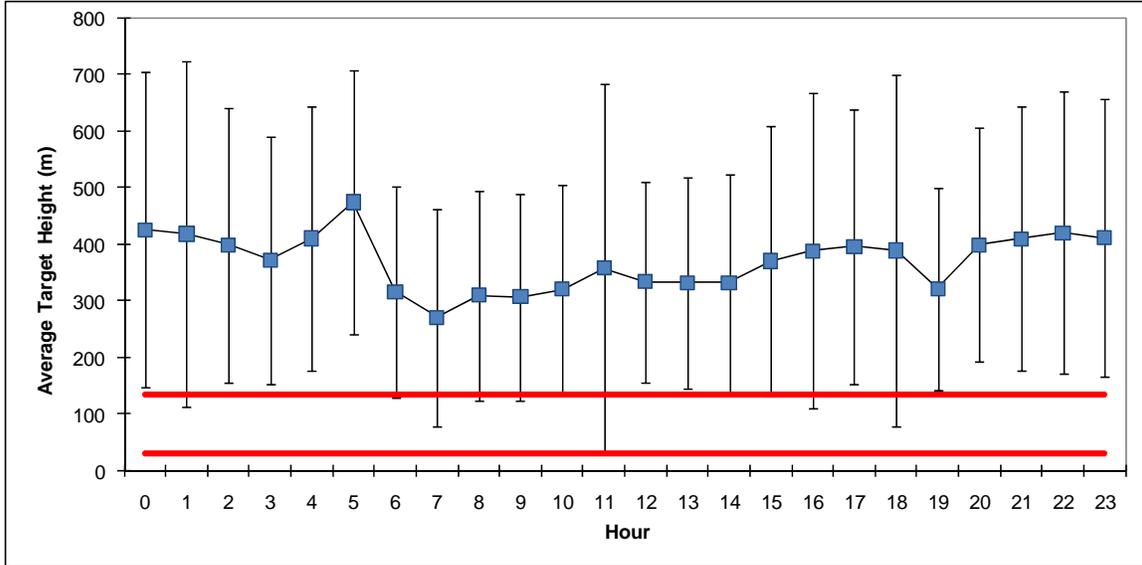


Figure 7-4. Average hourly target heights AGL at the proposed Ocotillo Wind Project site during the summer 2011 season. Error bars represent the standard deviation for each hour and red lines represent the top and bottom of the rotor swept zone (29.9 – 133.8 m AGL).

Mean target heights detected during the summer 2011 season were generally above the maximum RSZ height of 133.8 m AGL except during 8 dusks (24%) (Figure 7-5). Median target heights were lower than the means but were still generally above the RSZ except during 13 dusks (38%) (Figure 7-6).

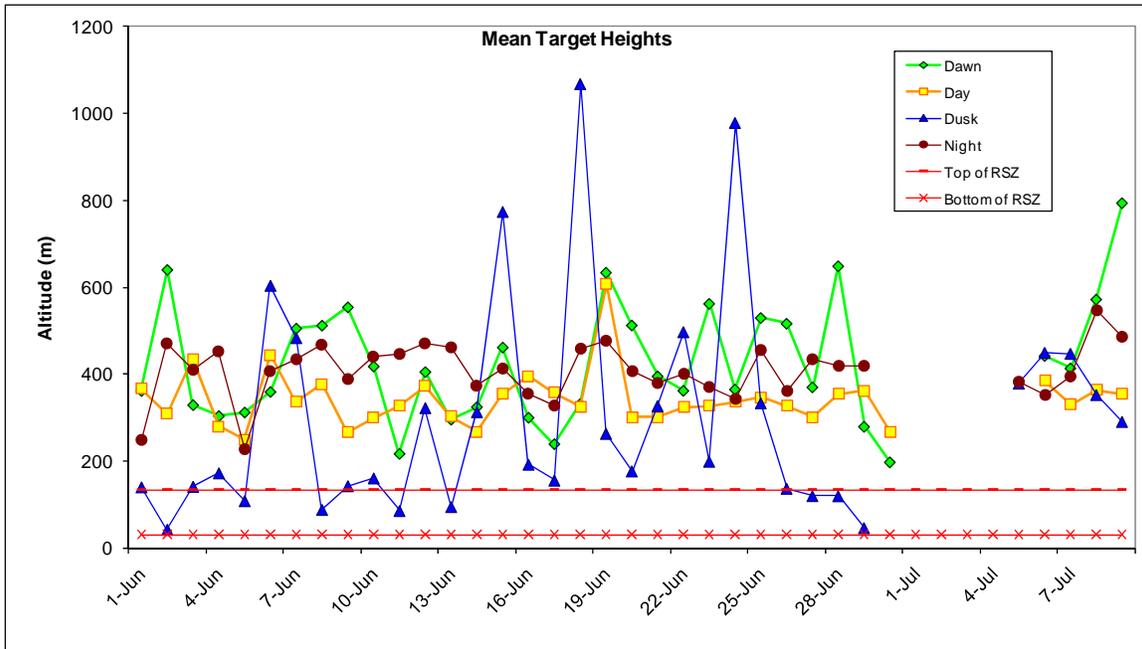


Figure 7-5. Mean target heights at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.

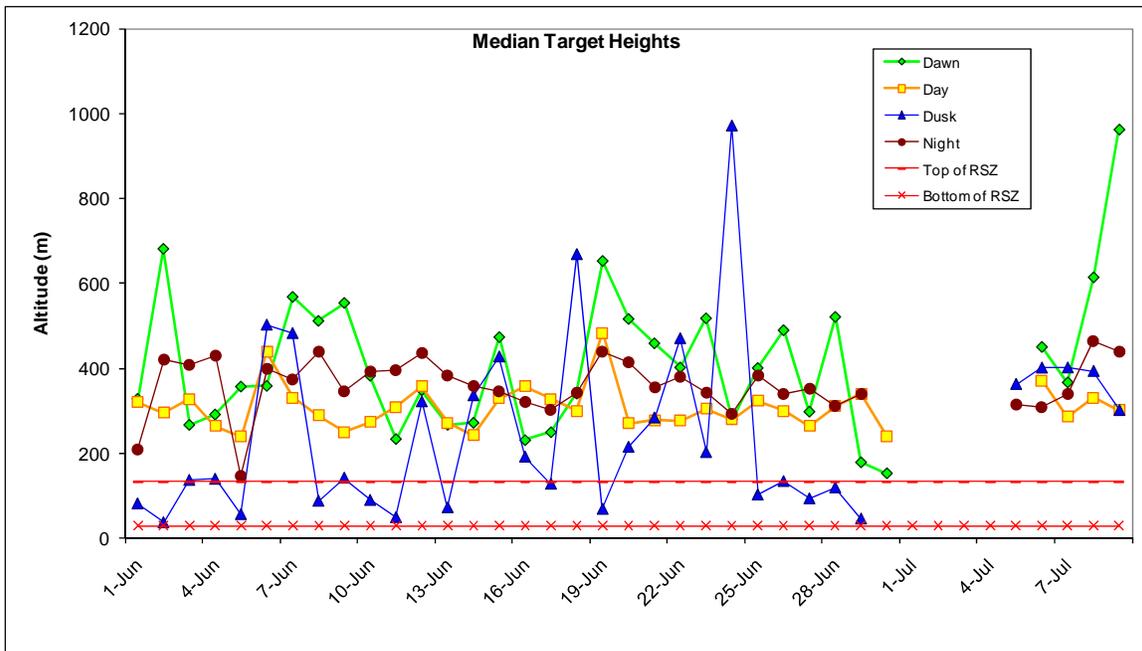


Figure 7-6. Median target heights at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.

The mean and median target heights during each biological period were calculated for all dates with $\geq 50\%$ data for that time period, averaged, and presented in Table 7-3. (All mean and median target height values for each

biological period can be found in Appendix C.) Table 7-3 also shows the overall mean and median for each biological period when all targets were combined (regardless of date). These overall means and medians are illustrated in Figure 7-7.

Table 7-3. Summary of mean and median target heights at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
Target data calculated for each date				
Average mean target height	425.2	342.4	299.8	408.1
Average median target height	411.5	308.9	250.9	361.2
All targets for season combined				
Mean target height	446.1	333.5	362.8	392.8
Median target height	422.1	301.1	320.8	361.8

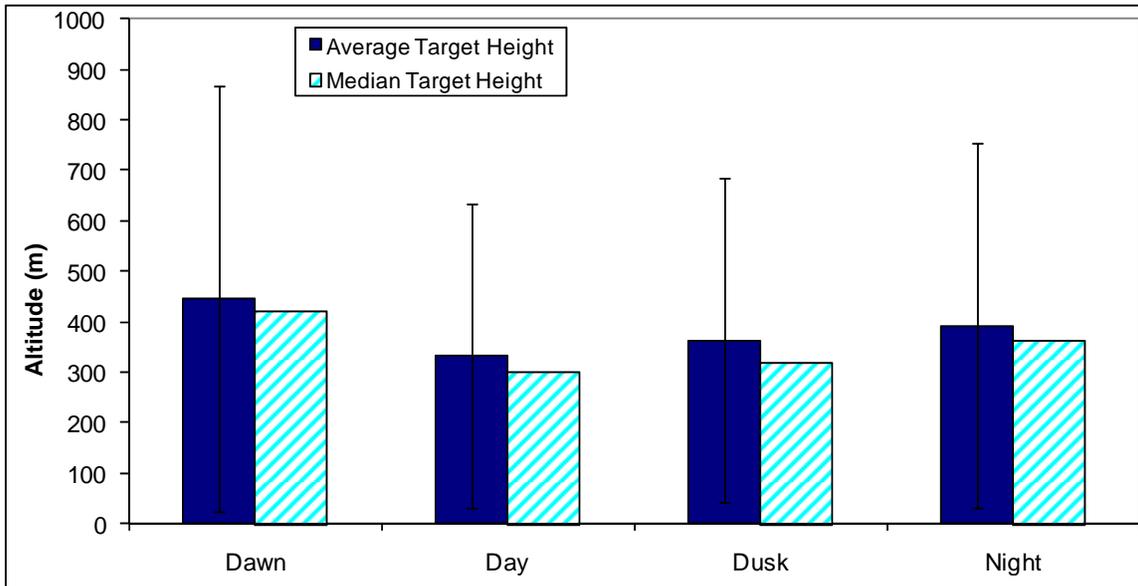


Figure 7-7. Average mean and median target heights at the proposed Ocotillo Wind Project site for four biological periods of the summer 2011 season. Error bars represent one standard deviation.

The distribution of targets in 50-meter increments was greatest above the rotor swept zone although targets also occurred within the rotor swept zone during the summer 2011 season (Figure 7-8).

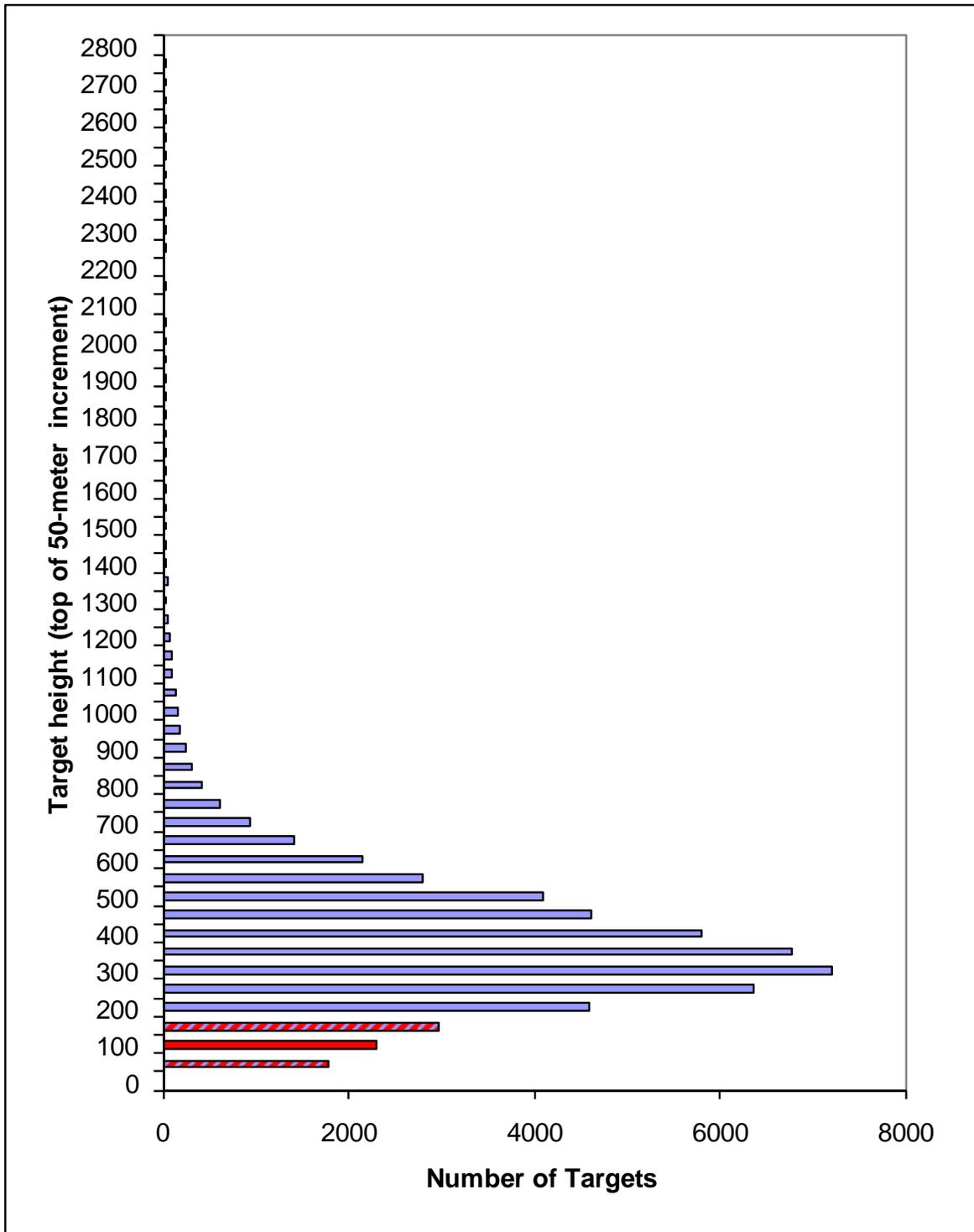


Figure 7-8. Number of targets occurring in each 50-meter increment at the proposed Ocotillo Wind Project site during the summer 2011 season. Red indicates rotor swept heights, and red-blue hashed indicates altitudes partially within rotor swept heights. Note: the height of the radar unit on this figure is 0 m. The location of the radar unit occasionally allows detection of targets flying below the radar, and those are noted in the 0 to -50 m band.

Targets were detected up to 2,800 m AGL by the vertical radar. When all targets detected during the summer 2011 season were combined together, the majority of targets were recorded above the rotor swept zone (RSZ) of 29.9 – 133.8 m AGL and the least below the RSZ (Table 7-4). Within the RSZ, percents of targets were the greatest during dusks (19.6%) followed by days (9.8%), nights (6.8%) and finally dawns (6.5%) (Table 7-4).

When percent targets in the RSZ were calculated for each date, dusks again averaged the greatest (30.9%), followed by days (9.8%), dawns (7.9%) and nights had the lowest average percent of targets in the RSZ (7.4%). Average target passage rates above, within, and below the RSZ were the greatest above the RSZ during all time periods. Averages are presented in Table 7-4 and individual target passage rates are illustrated in figure 7-9 (dawns), figure 7-10 (days), figure 7-11 (dusks), and figure 7-12 (nights). All target counts, passage rates, and percents in RSZ for each biological period can be found in Appendix C.

Table 7-4. Summary of target passage rates and percent of targets above, within and below the RSZ at the proposed Ocotillo Wind Project site during four biological periods of the summer 2011 season.

	<u>Dawn</u>	<u>Day</u>	<u>Dusk</u>	<u>Night</u>
All targets for season combined				
% targets above RSZ	91.6%	89.1%	72.2%	91.3%
% targets within RSZ	6.5%	9.8%	19.6%	6.8%
% targets below RSZ	1.9%	1.2%	8.2%	1.9%
% targets below turbine height	8.4%	10.9%	27.8%	8.7%
Target data calculated for each date				
Average % of targets in RSZ	7.9%	9.8%	30.9%	7.4%
Min target percentage within RSZ	0.0%	2.3%	0.0%	0.7%
Max target percentage within RSZ	36.4%	20.8%	100.0%	29.6%
Average target passage rate above RSZ	23.6	69.0	7.5	62.8
Average target passage rate within RSZ	1.7	7.6	2.0	4.6
Average target passage rate below RSZ	0.5	0.9	0.9	1.3

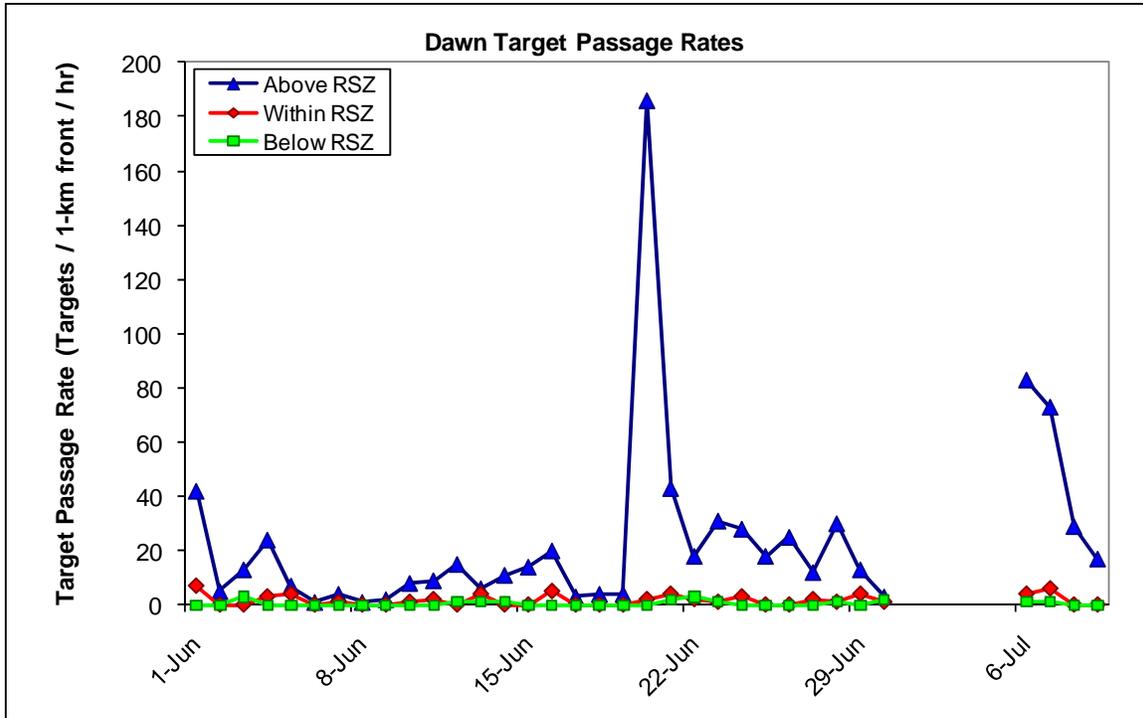


Figure 7-9. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dawns of the summer 2011 season.

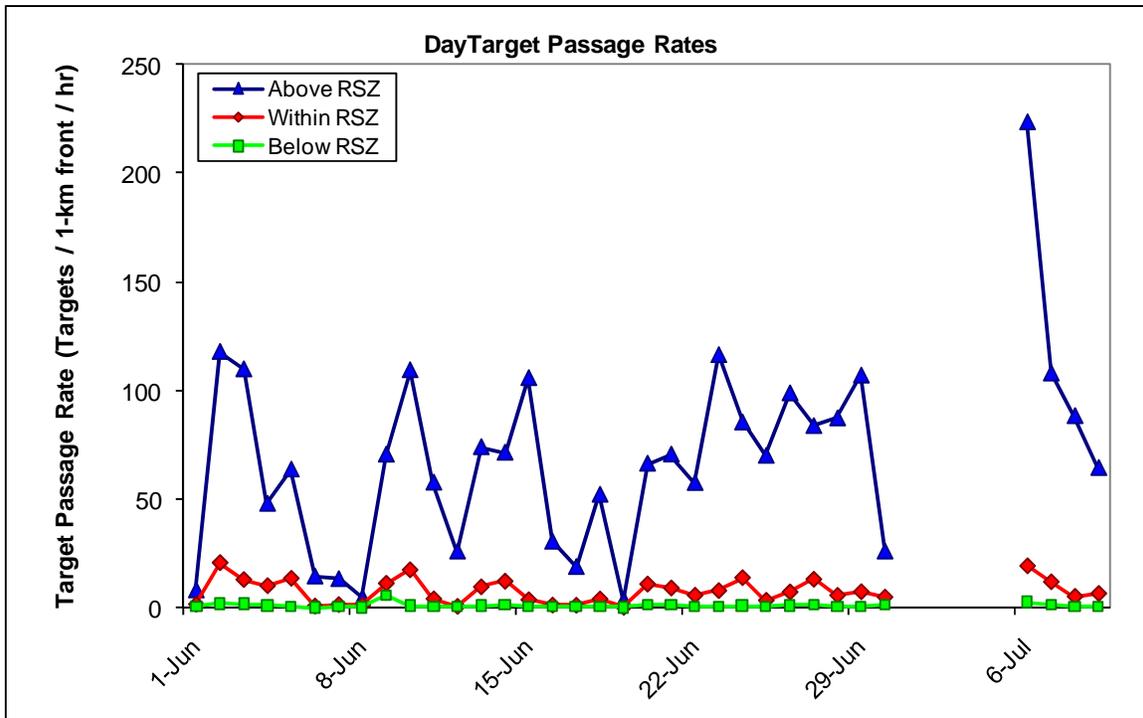


Figure 7-10. Target passage rates below, at, and above the rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during days of the summer 2011 season.

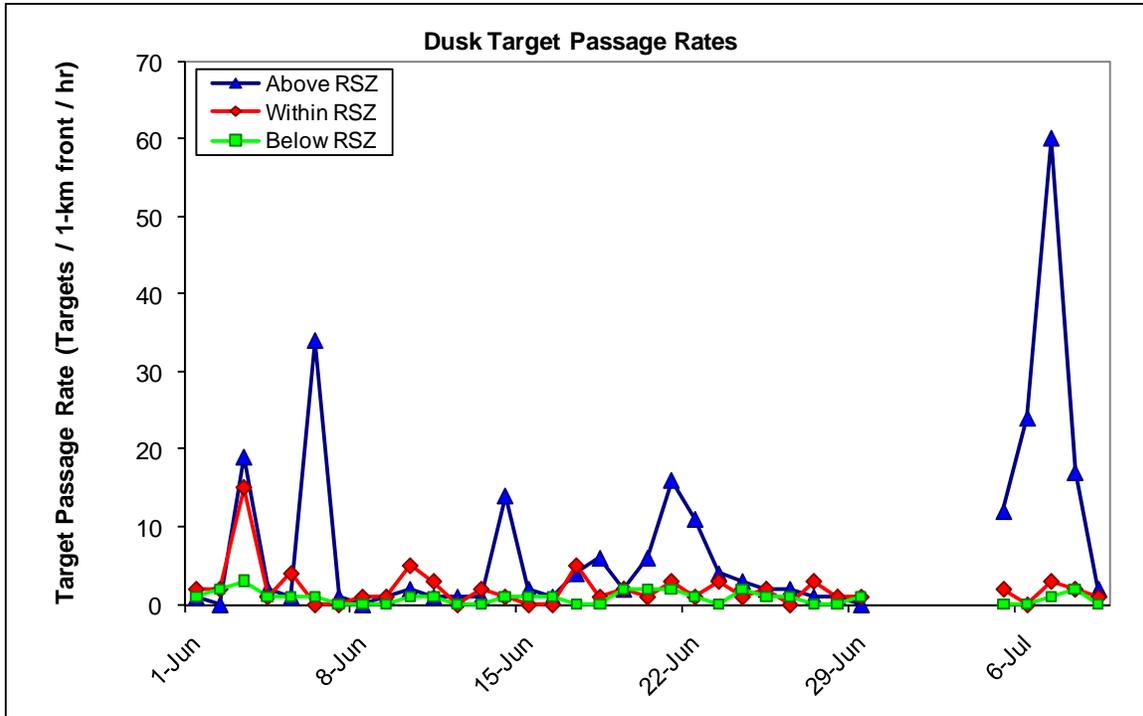


Figure 7-11. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during dusks of the summer 2011 season.

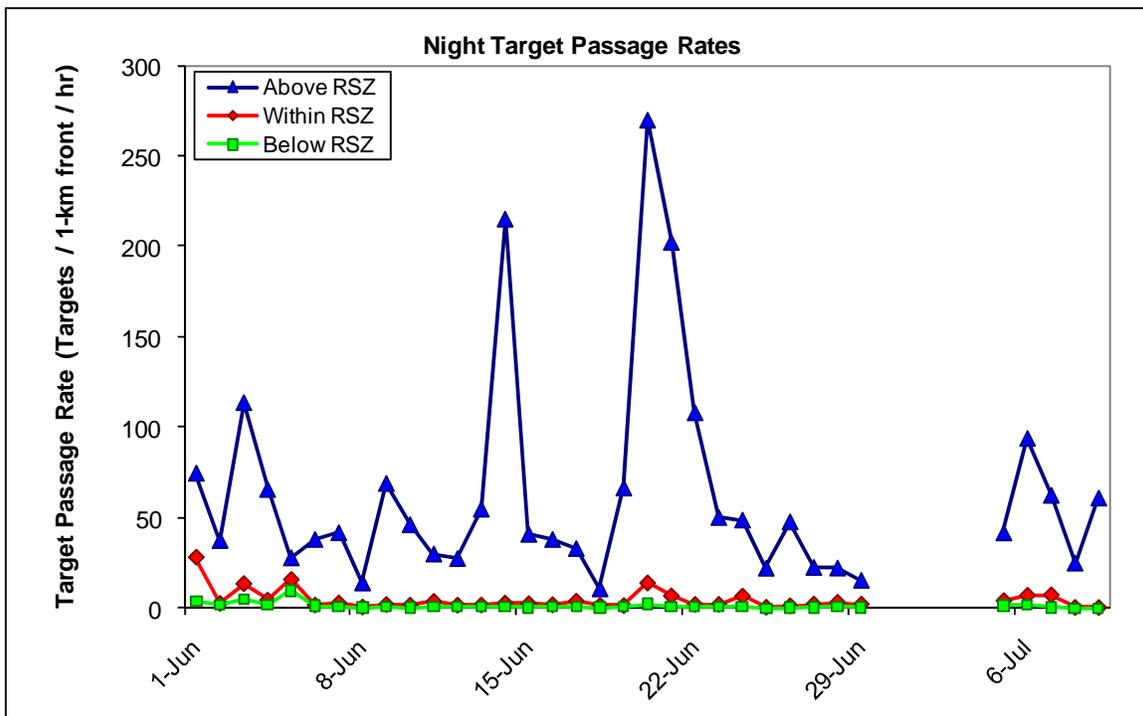


Figure 7-12. Target passage rates below, at, and above the proposed rotor swept zone (RSZ) at the proposed Ocotillo Wind Project site during nights of the summer 2011 season.

7.2 Horizontal Radar Data

The Horizontal Surveillance Radar (HSR) was used to determine directional movements of targets during dawns, days, dusks, and nights of the summer 2011 season.

7.2.1 Target Directions

The average flight direction of all targets during the summer 2011 season was 58° (northeast), and averaged 46° (northeast) during dawns, 49° (northeast) during days, 58° (northeast) during dusks, and 136° (southeast) during nights. The distribution of average target movements during the four biological periods are displayed in figures 7-13 and 7-14 and the individual values for average target bearing and angular concentration (r) are presented in table 7-5. Target movements were quite varied during the summer 2011 season lacked any prominent directions or concentration of direction. Target directions were poorly concentrated, with dawns averaging the greatest angular concentration (average $r = 0.21$) and days the least (average $r = 0.06$).

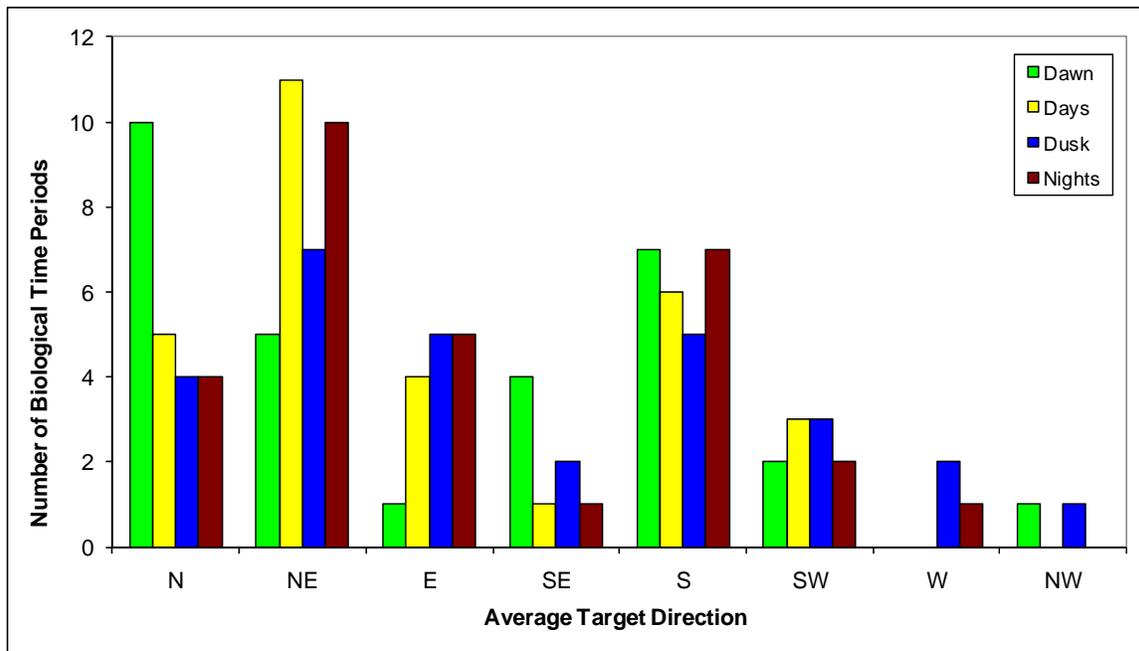


Figure 7-13. Distribution of average target movements among eight directions during four biological periods at the proposed Ocotillo Wind Project site during the summer 2011 season.

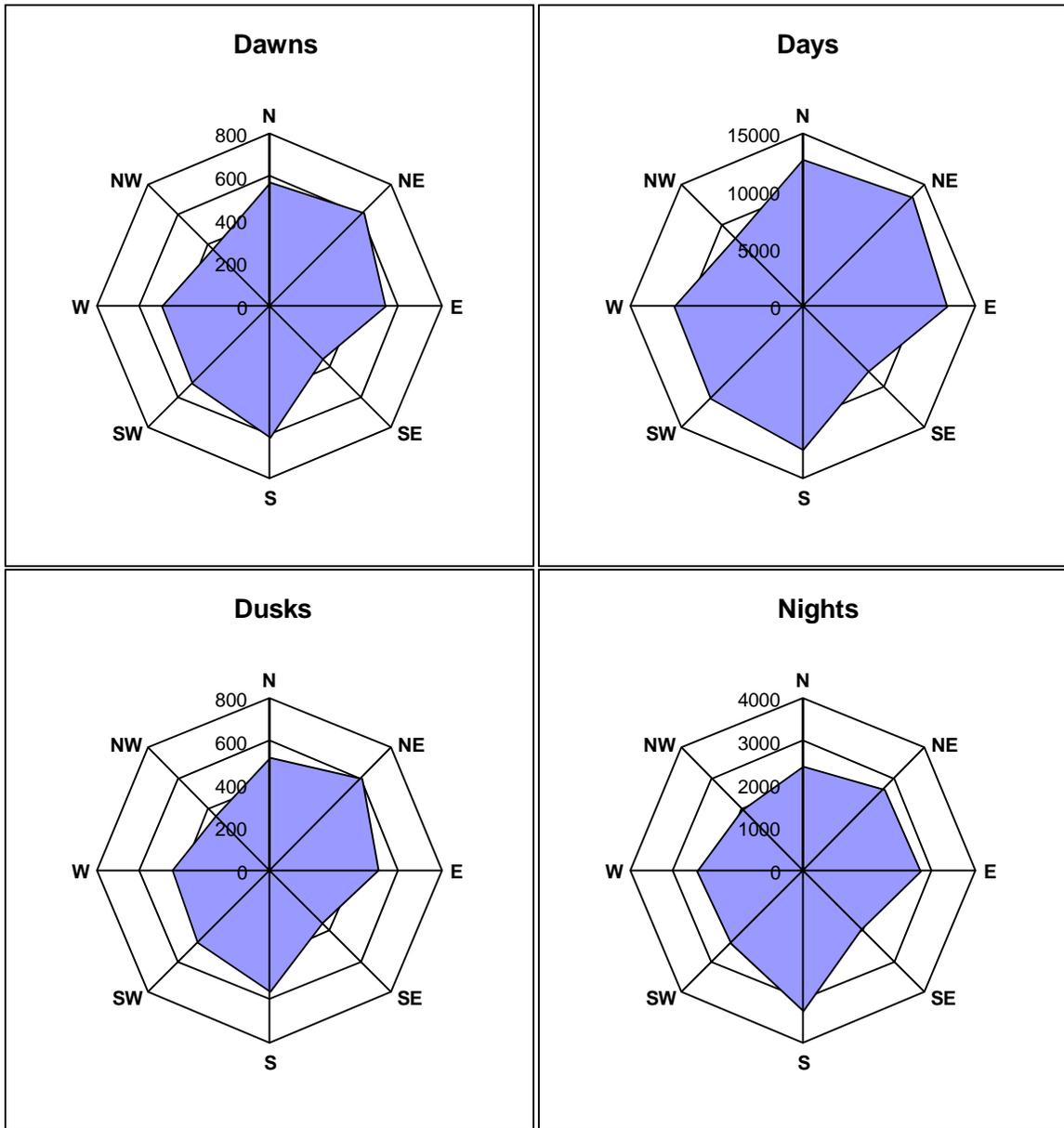


Figure 7-14. Cumulative target direction of all targets during four biological periods at the proposed Ocotillo Wind Project site during the summer 2011 season.



Table 7-5. Average direction and concentration of targets at the proposed Ocotillo Wind Project site during the summer 2011 season.

Date	Dawn			Day			Dusk			Night		
	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)	Average Bearing (Degrees)	Direction	Angular Concentration (r)
June 1, 2011	185.6	S	0.49	165.9	S	0.07	213.4	SW	0.07	194.7	S	0.35
June 2, 2011	184.6	S	0.39	160.3	S	0.07	264.0	W	0.05	195.1	S	0.28
June 3, 2011	182.5	S	0.36	240.0	SW	0.02	165.4	S	0.07	174.5	S	0.15
June 4, 2011	117.6	SE	0.14	128.0	SE	0.03	156.0	SE	0.10	200.8	S	0.27
June 5, 2011	174.3	S	0.29	199.0	S	0.01	188.0	S	0.14	196.0	S	0.37
June 6, 2011	199.8	S	0.38	204.2	SW	0.08	130.4	SE	0.20	202.7	SW	0.33
June 7, 2011	206.6	SW	0.37	162.0	S	0.08	175.5	S	0.22	194.3	S	0.29
June 8, 2011	187.5	S	0.32	183.1	S	0.08	173.2	S	0.28	204.9	SW	0.29
June 9, 2011	205.5	SW	0.37	208.1	SW	0.05	212.5	SW	0.18	201.0	S	0.29
June 10, 2011	201.1	S	0.26	178.6	S	0.05						
June 11, 2011												
June 12, 2011												
June 13, 2011				42.9	NE	0.08				354.3	N	0.05
June 14, 2011	58.9	NE	0.13	59.7	NE	0.04						
June 15, 2011				91.1	E	0.06	21.5	N	0.10	63.4	NE	0.02
June 16, 2011	31.4	NE	0.17	348.5	N	0.03						
June 17, 2011	304.5	NW	0.08	40.9	NE	0.06	197.4	S	0.03	31.6	NE	0.09
June 18, 2011	56.0	NE	0.13	20.5	N	0.06	95.5	E	0.03	103.0	E	0.04
June 19, 2011							23.6	NE	0.26	50.2	NE	0.04
June 20, 2011	13.6	N	0.05	32.1	NE	0.08	212.8	SW	0.08	95.9	E	0.09
June 21, 2011	90.4	E	0.23	24.0	NE	0.04	45.9	NE	0.49	251.1	W	0.55
June 22, 2011	147.0	SE	0.48	82.9	E	0.03	72.9	E	0.05	100.2	E	0.18
June 23, 2011	358.0	N	0.03	51.4	NE	0.05	43.3	NE	0.07	4.6	N	0.04
June 24, 2011	7.5	N	0.16	46.9	NE	0.05	107.6	E	0.07	22.1	N	0.15
June 25, 2011	142.9	SE	0.17	79.2	E	0.07	23.9	NE	0.16	34.9	NE	0.06
June 26, 2011	153.5	SE	0.15	61.2	NE	0.09	68.9	E	0.08	38.6	NE	0.05
June 27, 2011	353.2	N	0.03	93.8	E	0.03	25.4	NE	0.01	104.9	E	0.04
June 28, 2011	358.8	N	0.04	19.6	N	0.03	270.4	W	0.04	47.7	NE	0.11
June 29, 2011	58.1	NE	0.07	20.5	N	0.07	31.7	NE	0.10	53.2	NE	0.09
June 30, 2011	43.9	NE	0.15	41.3	NE	0.06	19.8	N	0.12	29.8	NE	0.17
July 1, 2011	356.3	N	0.09	22.1	N	0.07	19.6	N	0.10	36.8	NE	0.06
July 2, 2011	306.8	NW	0.12	23.0	NE	0.09						
July 3, 2011												
July 4, 2011												
July 5, 2011				350.3	N	0.02	44.6	NE	0.10	15.2	N	0.10
July 6, 2011	9.8	N	0.25	26.5	NE	0.08	322.5	NW	0.05	22.2	N	0.14
July 7, 2011	352.9	N	0.24	16.0	N	0.06	6.6	N	0.06	36.4	NE	0.11
July 8, 2011	358.4	N	0.17	64.7	NE	0.05	51.8	NE	0.34	118.9	SE	0.15
July 9, 2011	351.2	N	0.18	88.0	E	0.01	87.7	E	0.25	92.2	E	0.09

*Periods with <50% of time recorded by radar are excluded from analysis

7.3 Weather Data

7.3.1 Weather Information

Table 7-6 presents nightly averages of wind speed, temperature and wind direction from an on-site meteorological tower, total minutes of precipitation as detected by the vertical radar, and the presence of low visibility conditions at two nearby airports. At a height of 60 m, nightly wind speeds averaged 9.3 m/s (20.8 mph). Average nightly wind directions were predominantly southwest (Figure 7-15). Temperatures averaged 28.3° C (82.9° F) during nights. During the 39-day summer 2011 season, no rain occurred during nights of this season.

Low visibility potentially resulting in bird strike risk to nocturnal migrants is generally defined as less than 0.5 miles during nighttime. Visibility records were accessed from two nearby airports: El Centro Naval Air Facility (NJK, ~ 24 miles east) and Imperial County Airport (IPL, ~ 29 miles east). During the 39-day summer 2011 season, no records of low visibility were recorded at either airport.

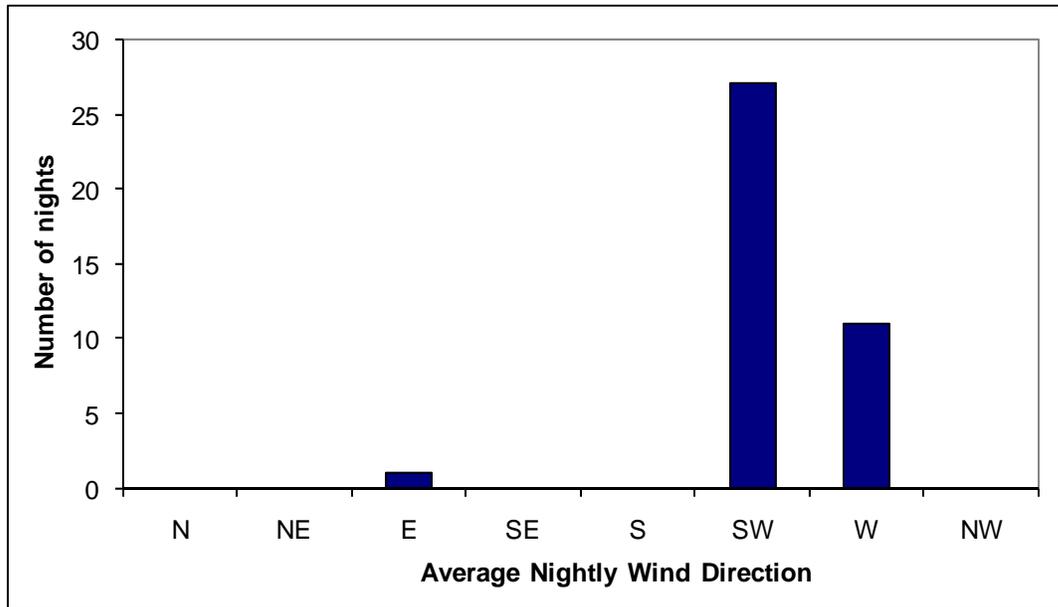


Figure 7-15. Distribution of wind directions at the proposed Ocotillo Wind Project site during nights of the summer 2011 season.



Table 7-6. Average nightly weather conditions at the proposed Ocotillo Wind Project site during the summer 2011 season.

Date	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
							NJK	IPL
1-Jun-11	5.5	25.2	262.1	W	0.96	0		
2-Jun-11	12.4	20.9	254.1	W	0.99	0		
3-Jun-11	8.7	22.2	247.5	SW	0.98	0		
4-Jun-11	7.5	22.3	251.4	W	0.90	0		
5-Jun-11	10.4	23.7	224.2	SW	0.99	0		
6-Jun-11	12.1	20.5	261.7	W	0.99	0		
7-Jun-11	8.3	21.8	245.5	SW	0.96	0		
8-Jun-11	11.0	21.6	247.4	SW	0.98	0		
9-Jun-11	12.9	22.3	227.4	SW	1.00	0		
10-Jun-11	9.1	26.3	231.2	SW	1.00	0		
11-Jun-11	12.2	25.5	239.1	SW	0.99	0		
12-Jun-11	10.6	24.8	258.4	W	0.77	0		
13-Jun-11	10.3	25.1	240.3	SW	0.97	0		
14-Jun-11	9.4	27.5	234.3	SW	0.98	0		
15-Jun-11	8.8	30.9	230.0	SW	0.99	0		
16-Jun-11	15.2	28.1	244.6	SW	0.99	0		
17-Jun-11	12.7	26.9	245.2	SW	0.99	0		
18-Jun-11	11.0	26.3	268.7	W	0.98	0		
19-Jun-11	14.9	25.7	253.6	W	0.98	0		
20-Jun-11	8.7	28.1	238.4	SW	0.97	0		
21-Jun-11	4.2	31.8	247.3	SW	0.90	0		
22-Jun-11	6.0	33.6	242.1	SW	0.96	0		
23-Jun-11	7.9	34.1	246.7	SW	0.99	0		
24-Jun-11	12.7	30.8	246.2	SW	0.98	0		
25-Jun-11	5.8	31.1	277.8	W	0.83	0		
26-Jun-11	12.8	31.3	253.5	W	0.99	0		
27-Jun-11	11.0	33.1	239.3	SW	0.98	0		
28-Jun-11	9.8	34.6	264.7	W	0.90	0		
29-Jun-11	4.7	31.3	236.9	SW	0.72	0		
30-Jun-11	9.3	25.4	256.9	W	0.97	0		
1-Jul-11	6.4	30.5	243.3	SW	0.90	0		
2-Jul-11	7.3	34.4	239.7	SW	0.96	0		
3-Jul-11	9.0	35.7	232.7	SW	0.35	0		
4-Jul-11	4.2	32.6	102.5	E	0.44	0		
5-Jul-11	8.1	33.0	228.4	SW	0.99	0		
6-Jul-11	5.9	29.6	204.1	SW	0.39	0		
7-Jul-11	4.7	31.1	242.5	SW	0.80	0		
8-Jul-11	10.5	32.1	228.7	SW	0.99	0		
9-Jul-11	11.6	31.9	237.8	SW	0.99	0		

7.3.2. Target Passage Rates and Weather Associations

Table 7-7 . Average weather values at the proposed Ocotillo Wind Project site sorted by target passage rate during nights of the summer 2011 season.

Date	Nightly Target Passage Rate (targets/1-km front/hr)	Average Wind Speed (m/s)	Average Temperature (°C)	Average Wind Bearing	Corresponding Direction	Wind Concentration	Minutes of Rain detected on Vertical Radar	Low Visibility Noted	
								NJK	IPL
20-Jun-11	286.1	8.7	28.1	238.4	SW	0.97	0		
14-Jun-11	218.7	9.4	27.5	234.3	SW	0.98	0		
21-Jun-11	209.8	4.2	31.8	247.3	SW	0.90	0		
3-Jun-11	131.9	8.7	22.2	247.5	SW	0.98	0		
22-Jun-11	110.8	6.0	33.6	242.1	SW	0.96	0		
1-Jun-11	106.8	5.5	25.2	262.1	W	0.96	0		
6-Jul-11	103.0	5.9	29.6	204.1	SW	0.39	0		
9-Jun-11	72.2	12.9	22.3	227.4	SW	1.00	0		
4-Jun-11	72.2	7.5	22.3	251.4	W	0.90	0		
7-Jul-11	70.2	4.7	31.1	242.5	SW	0.80	0		
19-Jun-11	68.6	14.9	25.7	253.6	W	0.98	0		
9-Jul-11	61.3	11.6	31.9	237.8	SW	0.99	0		
13-Jun-11	57.6	10.3	25.1	240.3	SW	0.97	0		
24-Jun-11	56.5	12.7	30.8	246.2	SW	0.98	0		
5-Jun-11	53.5	10.4	23.7	224.2	SW	0.99	0		
23-Jun-11	53.1	7.9	34.1	246.7	SW	0.99	0		
26-Jun-11	49.3	12.8	31.3	253.5	W	0.99	0		
10-Jun-11	48.2	9.1	26.3	231.2	SW	1.00	0		
5-Jul-11	47.3	8.1	33.0	228.4	SW	0.99	0		
7-Jun-11	45.5	8.3	21.8	245.5	SW	0.96	0		
15-Jun-11	43.8	8.8	30.9	230.0	SW	0.99	0		
2-Jun-11	42.0	12.4	20.9	254.1	W	0.99	0		
6-Jun-11	41.1	12.1	20.5	261.7	W	0.99	0		
16-Jun-11	40.5	15.2	28.1	244.6	SW	0.99	0		
17-Jun-11	37.5	12.7	26.9	245.2	SW	0.99	0		
11-Jun-11	34.5	12.2	25.5	239.1	SW	0.99	0		
12-Jun-11	30.1	10.6	24.8	258.4	W	0.77	0		
28-Jun-11	26.1	9.8	34.6	264.7	W	0.90	0		
8-Jul-11	25.5	10.5	32.1	228.7	SW	0.99	0		
27-Jun-11	25.3	11.0	33.1	239.3	SW	0.98	0		
25-Jun-11	22.8	5.8	31.1	277.8	W	0.83	0		
29-Jun-11	18.2	4.7	31.3	236.9	SW	0.72	0		
8-Jun-11	15.0	11.0	21.6	247.4	SW	0.98	0		
18-Jun-11	12.6	11.0	26.3	268.7	W	0.98	0		
30-Jun-11		9.3	25.4	256.9	W	0.97	0		
1-Jul-11		6.4	30.5	243.3	SW	0.90	0		
2-Jul-11		7.3	34.4	239.7	SW	0.96	0		
3-Jul-11		9.0	35.7	232.7	SW	0.35	0		
4-Jul-11		4.2	32.6	102.5	E	0.44	0		

8. CONCLUSIONS

This radar survey collected near-continuous data from the proposed Ocotillo Wind Project site during year 1 (September 15, 2010 through July 9, 2011). Radar data was collected during 88.8% of available time for the vertical radar and 92.3% of available time for the horizontal radar. Rain obscuration and other interference made some of this radar data unusable, decreasing useable data during year 1 to 85.0% and 89.9% of available time for the vertical and horizontal radars, respectively.

Target passage rates varied considerably throughout each season, but also by biological period. Average target passage rates were greatest during the fall 2010 season and lowest during the summer 2011 season (Table 8-1). Day time target passage rates averaged the greatest, and were much greater than the other three biological periods during the fall and winter seasons. During the spring and summer seasons, night time target passage rates were similar to day time target passage rates, but dawn and dusk rates stayed relatively low. Figure 8-1 illustrates average target passage rate during all four time periods broken down further into half-monthly periods across year 1,

Table 8-1. Average target passage rates during four biological periods and four seasons at the proposed Ocotillo Wind Project site.

	Dawn	Day	Dusk	Night
Fall 2010	241.8	556.7	205.6	253.3
Winter 2010-11	21.2	218.8	23.6	41.6
Spring 2011	62.5	222.4	26.4	215.6
Summer 2011	25.8	77.5	10.4	68.7

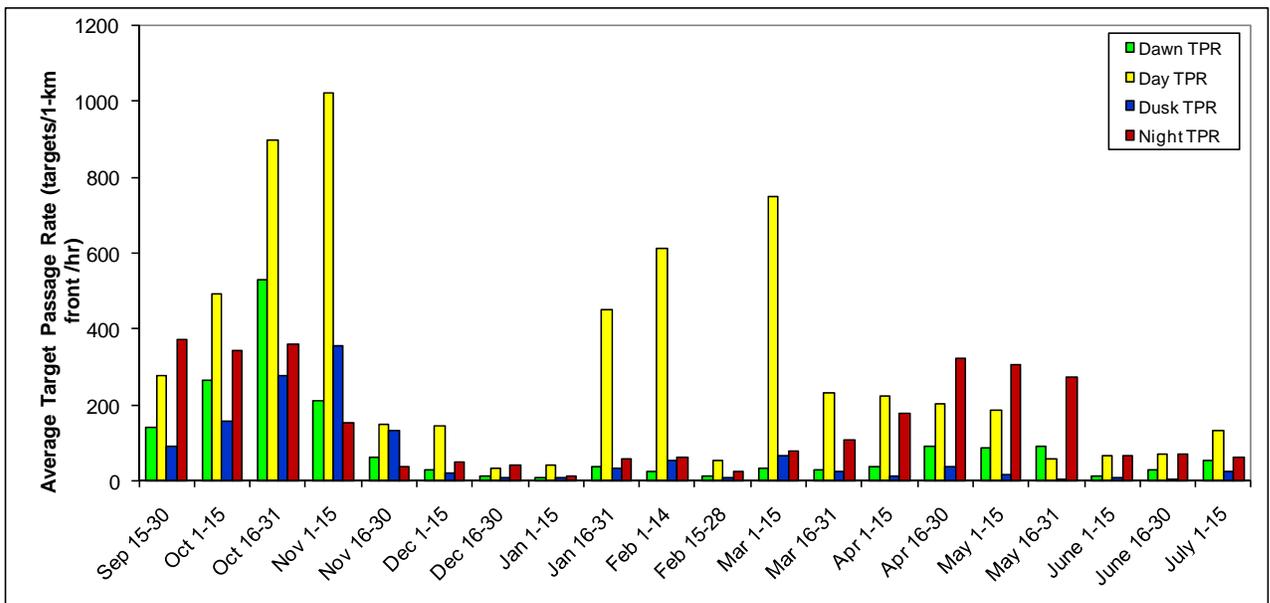


Figure 8-1. Average target passage rates during four biological time periods of half-monthly periods for year 1 at the proposed Ocotillo Wind Project site.

Hourly target passages rates support the greater target passage rates observed during days. Daytime target passage rates typically peaked between 10am and 1pm all season. The spring and summer seasons also had secondary target activity peaks during early night, between hours 19 and 22.

Before target passage rates can be compared with those from other proposed wind energy sites, it is important to recognize the variation in radar systems and methods among studies and the possible affects these differences may have on target counts and the related target passage rates. Although some radar study results such as average target directions and temporal magnitudes of nocturnal migration are fairly robust and resistant to differences in radar systems and methods, numerical target counts and related target passage rates are more influenced by these differences. Therefore, great care much be taken when comparing these types of numbers, and a full understanding of both the radar systems and methods used to derive these numbers are needed before making comparisons.

Due to the difficulty of comparing target passage rates from other radar systems, it is preferable to compare target passage rates at the proposed Ocotillo Wind Project site to other studies using DeTect avian radar systems. Table 8-2 presents target passage rates from both the Gulf Wind I windfarm on the southeast coast of Texas, and from the proposed Ripley-Westfield Wind Farm in western New York. Although is it difficult to determine the degree that region and local topography or habitat may have influenced these target passage rates, they do provide target passage rates calculated the same way using data from the same DeTect vertical radars.

Table 8-2. Average target passage rates from the proposed Ocotillo Wind Project site, CA compared to the Gulf Wind I Windfarm, TX and the proposed Ripley-Westfield Wind Farm, NY.

Site	Season	Dawn	Day	Dusk	Night
Proposed Ripley-Westfield Wind Farm, New York					
	Spring 2008	na	249.7	na	1061.7
	Fall 2008	na	568.9	na	774.2
Gulf Wind I Wind Farm, Texas					
	Fall 2009	2022.5	1467.9	1440.1	1346.0
	Winter 2009-10	385.0	707.5	408.2	722.8
	Spring 2010	563.2	573.6	144.7	1346.0
Proposed Ocotillo Wind Project, California					
	Fall 2010	241.8	556.7	205.6	253.3
	Winter 2010-11	21.2	218.8	23.6	41.6
	Spring 2011	62.5	222.4	26.4	215.6
	Summer 2011	25.8	77.5	10.4	68.7

The nightly target passage rates observed at the proposed Ocotillo Wind Project site during all seasons of year 1 were less than those observed at the other two sites. Daytime target passage rates at the proposed Ocotillo Wind Project site were similar to those from the proposed Ripley-Westfield Wind Farm site, but

much lower than Gulf Wind I Wind Farm site, during similar seasons. Dawn and dusk target passage rates were not calculated at the proposed Ripley-Westfield Wind Farm, but the target passage rates calculated at Gulf Wind I during these time periods were greater than at the proposed Ocotillo Wind Project site during each respective season.

When targets were combined by season at the proposed Ocotillo Wind Project site, the majority passed above the rotor swept zone (RSZ) of 29.9 – 133.8 m during year 1. At least 80% of targets passed above the RSZ during all time periods of each season except for dawns and dusks of winter and dusks of summer, which averaged lower percentages (Figure 8-2). Mean and median target heights were typically above the rotor swept zone of 29.9 – 133.8 m, although means, and especially median target heights which averaged lower, occurred more frequently below 133.8 m starting in November 2010 and tapering off during spring 2011.

Although the majority of targets were above the rotor swept zone for all seasons, the frequency of low visibility conditions during nocturnal migration could be a more important indicator of turbine collision risk. Atmospheric conditions affect both flight direction and height of migrating passerines (Kerlinger and Moore, 1989), and inclement weather has been identified as an important factor in avian collisions with other tall structures such as power lines, buildings, and particularly communication towers (Manville, 2005). It is thought that inclement weather such as low visibility and low cloud ceilings force migrating birds to lower altitudes, increasing their collision risk with tall structures, including wind turbines (Morrison, 2006). Accordingly, avian collision risk analysis for wind farms typically focuses on time periods when low visibility occurs at night.

The level of avoidance of birds to obstacles under conditions of low visibility at night is not well understood, however, and some avoidance is likely even under these conditions. For the purpose of this study, low visibility potentially resulting in bird strike risk is defined as visibility less than 0.5 mile based on the National Weather Service's lowest visibility threat level for humans. Observation records from two nearby airports (El Centro Naval Air Facility (NJK) and Imperial County Airport (IPL) showed very infrequent low visibility. During year 1 (Sep 15, 2010 – July 9, 2011) NJK only had 2 records of low visibility during October 2, 2010 and 3 records of low visibility on January 30, totaling less than 0.1% of the hourly observations during year 1. The October records were associated with snow while fog was noted during the January observations. IPL also recorded fog during January 30, 2011 as well as during December 19, 2010. The infrequent low visibility at the nearby airports is one indicator that low visibility conditions were likely infrequent in the area during all seasons. However, both airports were greater than 20 miles east of the site and may have different climatic influences. For example, both airports are in the heart of the irrigated Imperial valley, while the proposed Ocotillo Wind Project site is in the desert at the foot of mountain topography.

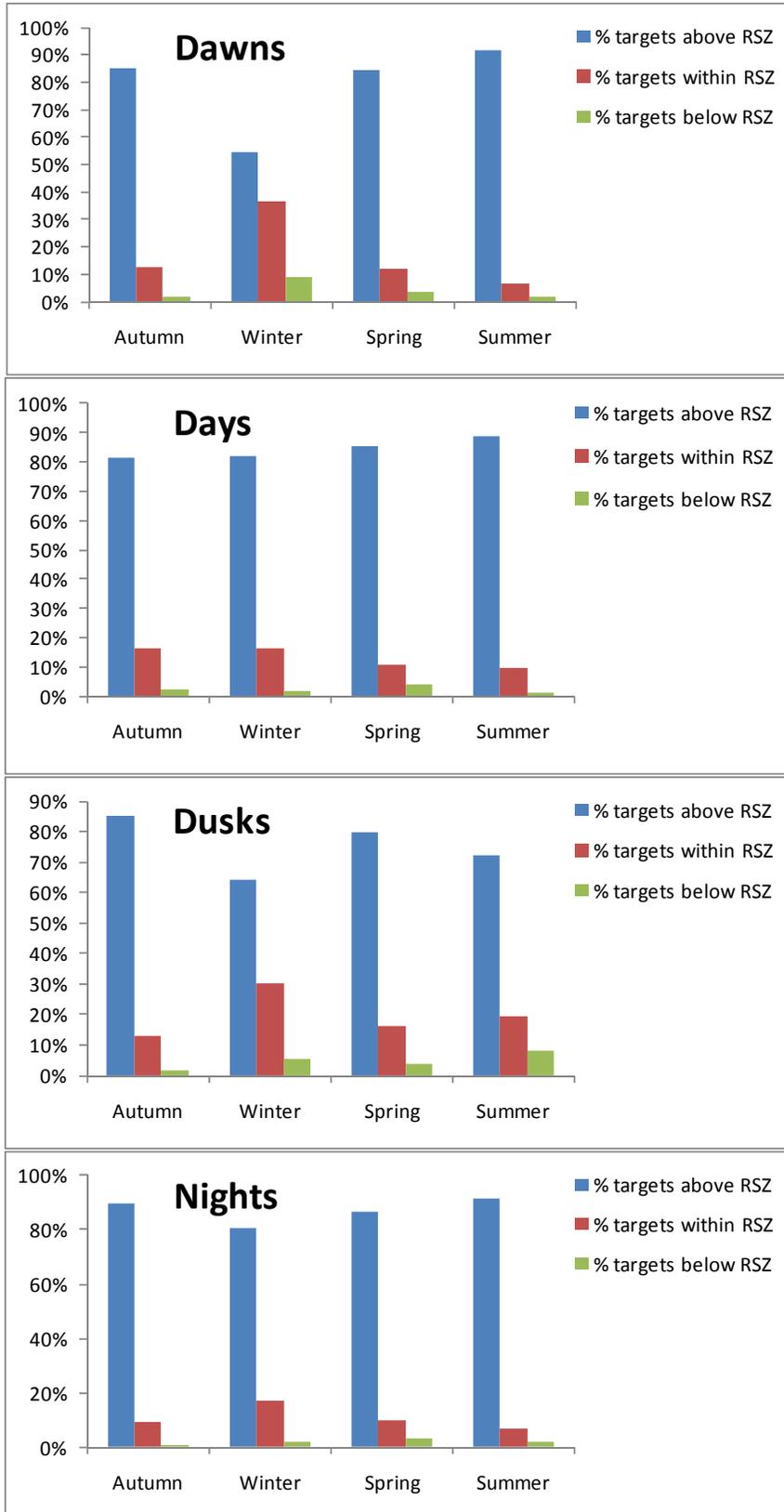


Figure 8-2. Seasonal comparisons of percent targets above, within, and below the RSZ for four biological period.

Target movement patterns also varied by season and by biological period. The fall 2010 season showed most targets moving southeast and east (Figure 4-14), likely indicative of fall nocturnal migration. Days and dusks during fall were relatively dispersed, but dawns showed an east / northeast movement trend. The winter 2010-11 season had relatively lower targets than the other seasons, both in number and altitude, and had variable movement patterns (east / northeast during dawns, northwest during days, west during dusks, and northwest during nights, Figure 5-14). During the spring 2011 season, a northerly target movement was expected because of spring nocturnal migration (at least during nights) however, this was not the case as all time periods showed southerly movements (Figure 6-14). The summer 2011 season had target movements that were relatively dispersed, and lacked a prominent target movement pattern during any of the four time periods (Figure 7-14).

Regarding the unexpected southerly movements during the spring 2011 seasons, it is worth noting that the radar settings for the horizontal radar (from which target directional information is derived) were optimized for tracking bighorn sheep during year 1 of this study (see Methods section 3.1.1.). Although still capable of also tracking bird targets well, the sheep-optimized settings on the horizontal radar likely captured somewhat different targets and target information than radar settings that are optimized specifically for small birds. It is also important to note that the sheep-optimized horizontal radar settings would have only affected target direction information, and not target counts or passage rates which are derived only from the vertical radar data. The vertical radar was NOT optimized for tracking sheep, but was rather fully configured for detecting and tracking bird activity. Thus, target counts and passage rates presented in this report were not affected by the study efforts to track bighorn sheep with the horizontal radar.

Concerns have also been raised with this project with respect to Swainson's Hawks (*Buteo swainsoni*). The current scientific knowledge of Swainson's hawks is that this species is a daytime migratory species, and it is highly unlikely that they would migrate at night as this species soars on thermals and updrafts for an energy efficient migration strategy (Fuller et al., 1998). If Swainson's Hawks commonly resorted to night migration this would have been detected in satellite telemetry studies such as Fuller et al., 1998. Therefore, although not noted in this standard report, any detection of Swainson's Hawk activity by radar would be during the daylight hours.

Literature Cited

- Cooper, B. A., R. H. Day, R. J. Ritchie, and C. L. Cranor. 1991. An improved marine radar system for studies of bird migration. *Journal of Field Ornithology* 62: 367-377.
- Fuller, M. R., Seegar, W. S. and Schueck, L. S. 1998. Routes and travel rates of migrating Peregrine Falcons *Falco peregrines* and Swainson's Hawks *Buteo swainsoni* in the Western Hemisphere. *Journal of Avian Biology* 29: 433-440.
- Harmata, A. R., K. M. Podruzny, J. R. Zelenak, and M. L. Morrison. 1999. Using marine surveillance radar to study bird movements and impact assessment. *Wildlife Society Bulletin* 27:44-52.
- Kerlinger, P. and F. R. Moore. 1989. Atmospheric structure and avian migration. Pages 109 – 141 *in* D. M. Power editor. *Current Ornithology*, Vol. 6. Plenum Press, New York, USA.
- Manville, A. M. II. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science – next steps towards mitigation. *Bird Conservation Implementation in the Americas: Proceedings of the third International Partners in Flight Conference 2002*, C.J. Ralph and T.D. Rich, editors. U.S.D.A., Forest Service General Technical Report GTR-PSW-191.
- Morrison, M. L. 2006. Bird movements and behaviors in the Gulf Coast Region: relation to potential wind-energy developments. NREL/SR-500-39572. Golden, Colorado, USA.
- U.S. Environmental Protection Agency (USEPA), 2002. Primary distinguishing characteristics of Level III ecoregions of the continental United States, (draft). Available online at ftp://ftp.epa.gov/wed/ecoregions/us/useco_desc.doc.
- Zar, J. H. 1999. *Biostatistical Analysis*. Fourth edition. Prentice-Hall, Englewood Cliffs, New Jersey, USA.

Appendix A - Glossary

1-km Front – Area extending 0.5 km on either side of the VSR, or 1 km on one side of the VSR, forming a 1 km² area through which target passage rates are quantified. This area occurs entirely within the radar scanned zone.

Dawn – 30 minutes before sunrise to 30 minutes after sunrise.

Day – 30 minutes after sunrise to 30 minutes before sunset.

Dusk – 30 minutes before sunset to 30 minutes after sunset.

Night – 30 minutes after sunset to 30 minutes before sunrise the next day.

Rotor Swept Area (RSA) - The circular area “swept” by the blades during operation of a wind turbine, specific to type of wind turbine.

Rotor Swept Zone (RSZ) – The 1-km wide band within the 1-km front that encompasses the lowest and highest points swept by a wind turbine’s blades (RSA). Specific to each project and calculated using the manufacturer’s specifications for the wind turbine proposed for the project.

Plot – A single scan of a target or other objects.

Target Passage Rate – Number of specified targets passing through a 1-km wide front during 1 hour. This rate is standardized for effort, or the proportion of minutes radar data was recorded during a given time period.

Target - Object detected by MERLIN Radar and identified by MERLIN software as a biological object (e.g. bird, bat, insect) based on scanned size, speed, and other characteristics.

Track – The entire sequence of target plots that are recorded as long as an object still fits the definition of a target.

Tracking – The MERLIN software begins to track a target after it has met the criteria of a biological target for three scans. The target continues to be tracked until either the target is lost, or target fails to meet the criteria for three of the last four scans.

Appendix B - Abbreviations

AGL – Above Ground Level

HSR – Horizontal Surveillance Radar

km – kilometer

m – meter

mi – mile

nm – Nautical miles (approximately 1.15 miles)

RSA – Rotor Swept Area

RSZ – Rotor Swept Zone

VSR – Vertical Scanning Radar

Appendix C – Target Counts, Passage Rates, Mean and Median Heights during four biological periods of Year 1, September 15, 2010 – July 9, 2011



Table 9-1. Target counts, passage rates, and mean and median target heights during dawns of the fall 2010 season.

Sunrise - 30 minutes	Sunrise + 30 minutes	Minutes in Dawn n	Minutes Radar On	Minutes with Rain	Total Dawn n Minutes	% Dawn n with Data	Dawn n Count Below RSZ	Dawn n Count at RSZ	Dawn n Count Above RSZ	Total Dawn n Count	Dawn n TPR Below RSZ	Dawn n TPR at RSZ	Dawn n TPR Above RSZ	Dawn n TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
9/15/10 4:57	9/15/10 5:57	60	60	0	60	100.0%	11	14	113	138	11.0	14.0	113.0	138.0	10.1%	393.3	359.8
9/16/10 4:58	9/16/10 5:58	60	60	0	60	100.0%	1	5	98	104	1.0	5.0	98.0	104.0	4.8%	584.4	559.0
9/17/10 4:59	9/17/10 5:59	60	60	0	60	100.0%	4	20	119	143	4.0	20.0	119.0	143.0	14.0%	440.2	392.9
9/18/10 4:59	9/18/10 5:59	60	60	0	60	100.0%	3	10	87	100	3.0	10.0	87.0	100.0	10.0%	491.4	498.0
9/19/10 5:00	9/19/10 6:00	60	60	0	60	100.0%	12	41	262	315	12.0	41.0	262.0	315.0	13.0%	354.3	346.6
9/20/10 5:01	9/20/10 6:01	60	60	0	60	100.0%	1	2	52	55	1.0	2.0	52.0	55.0	3.6%	499.0	477.0
9/21/10 5:01	9/21/10 6:01	60	60	0	60	100.0%	8	23	82	113	8.0	23.0	82.0	113.0	20.4%	330.0	260.3
9/22/10 5:02	9/22/10 6:02	60	60	0	60	100.0%	1	2	99	102	1.0	2.0	99.0	102.0	2.0%	606.7	613.1
9/23/10 5:02	9/23/10 6:02	60	60	0	60	100.0%	0	2	51	53	0.0	2.0	51.0	53.0	3.8%	512.3	483.4
9/24/10 5:03	9/24/10 6:03	60	47	0	47	78.3%	2	9	59	70	2.6	11.5	75.3	89.4	12.9%	338.7	254.2
9/25/10 5:04	9/25/10 6:04	60	60	0	60	100.0%	2	12	57	71	2.0	12.0	57.0	71.0	16.9%	279.8	279.8
9/26/10 5:04	9/26/10 6:04	60	60	0	60	100.0%	0	15	150	165	0.0	15.0	150.0	165.0	9.1%	390.9	358.7
9/27/10 5:05	9/27/10 6:05	60	60	0	60	100.0%	3	22	116	141	3.0	22.0	116.0	141.0	15.6%	360.5	332.5
9/28/10 5:06	9/28/10 6:06	60	60	0	60	100.0%	3	20	87	110	3.0	20.0	87.0	110.0	18.2%	312.6	251.3
9/29/10 5:06	9/29/10 6:06	60	60	0	60	100.0%	4	20	205	229	4.0	20.0	205.0	229.0	8.7%	372.9	324.0
9/30/10 5:07	9/30/10 6:07	60	60	0	60	100.0%	0	72	267	339	0.0	72.0	267.0	339.0	21.2%	263.2	234.4
10/1/10 5:08	10/1/10 6:08	60	60	0	60	100.0%	3	15	78	96	3.0	15.0	78.0	96.0	15.6%	320.0	279.7
10/2/10 5:08	10/2/10 6:08	60	60	54	6	10.0%	0	2	8	10	0.0	20.0	80.0	100.0	20.0%	228.2	189.3
10/3/10 5:09	10/3/10 6:09	60	60	0	60	100.0%	8	79	523	610	8.0	79.0	523.0	610.0	13.0%	302.4	293.5
10/4/10 5:10	10/4/10 6:10	60	60	0	60	100.0%	11	60	394	465	11.0	60.0	394.0	465.0	12.9%	312.8	276.5
10/5/10 5:11	10/5/10 6:11	60	60	0	60	100.0%	0	2	4	6	0.0	2.0	4.0	6.0	33.3%	414.7	480.2
10/6/10 5:11	10/6/10 6:11	60	60	0	60	100.0%	0	1	6	7	0.0	1.0	6.0	7.0	14.3%	383.7	397.8
10/7/10 5:12	10/7/10 6:12	60	60	0	60	100.0%	1	1	2	4	1.0	1.0	2.0	4.0	25.0%	362.5	330.6
10/8/10 5:13	10/8/10 6:13	60	60	0	60	100.0%	6	15	120	141	6.0	15.0	120.0	141.0	10.6%	335.7	274.6
10/9/10 5:13	10/9/10 6:13	60	60	0	60	100.0%	2	41	189	232	2.0	41.0	189.0	232.0	17.7%	324.5	256.2
10/10/10 5:14	10/10/10 6:14	60	60	0	60	100.0%	8	17	182	207	8.0	17.0	182.0	207.0	8.2%	396.0	404.2
10/11/10 5:15	10/11/10 6:15	60	60	0	60	100.0%	8	52	157	217	8.0	52.0	157.0	217.0	24.0%	278.8	257.9
10/12/10 5:16	10/12/10 6:16	60	60	0	60	100.0%	11	43	300	354	11.0	43.0	300.0	354.0	12.1%	302.7	303.4
10/13/10 5:16	10/13/10 6:16	60	60	0	60	100.0%	7	97	346	450	7.0	97.0	346.0	450.0	21.6%	350.5	277.4
10/14/10 5:17	10/14/10 6:17	60	60	0	60	100.0%	9	53	445	507	9.0	53.0	445.0	507.0	10.5%	397.1	411.2
10/15/10 5:18	10/15/10 6:18	60	60	0	60	100.0%	6	19	418	443	6.0	19.0	418.0	443.0	4.3%	358.0	352.0
10/16/10 5:19	10/16/10 6:19	60	60	0	60	100.0%	3	31	643	677	3.0	31.0	643.0	677.0	4.6%	479.7	529.1
10/17/10 5:19	10/17/10 6:19	60	60	0	60	100.0%	18	223	2841	3082	18.0	223.0	2841.0	3082.0	7.2%	368.0	370.3
10/18/10 5:20	10/18/10 6:20	60	60	0	60	100.0%	2	2	461	465	2.0	2.0	461.0	465.0	0.4%	472.1	466.6
10/19/10 5:21	10/19/10 6:21	60	60	0	60	100.0%	5	36	197	238	5.0	36.0	197.0	238.0	15.1%	278.1	262.9
10/20/10 5:22	10/20/10 6:22	60	60	7	53	88.3%	1	0	3	4	1.1	0.0	3.4	4.5	0.0%	270.1	309.4
10/21/10 5:22	10/21/10 6:22	60	0	0	0	0.0%											
10/22/10 5:23	10/22/10 6:23	60	60	0	60	100.0%	2	8	42	52	2.0	8.0	42.0	52.0	15.4%	409.3	410.6
10/23/10 5:24	10/23/10 6:24	60	60	0	60	100.0%	2	11	39	52	2.0	11.0	39.0	52.0	21.2%	336.5	320.0
10/24/10 5:25	10/24/10 6:25	60	60	0	60	100.0%	10	39	152	201	10.0	39.0	152.0	201.0	19.4%	299.5	275.5
10/25/10 5:26	10/25/10 6:26	60	60	0	60	100.0%	0	7	67	74	0.0	7.0	67.0	74.0	9.5%	469.9	451.6
10/26/10 5:26	10/26/10 6:26	60	60	0	60	100.0%	8	25	99	132	8.0	25.0	99.0	132.0	18.9%	355.3	306.6
10/27/10 5:27	10/27/10 6:27	60	60	0	60	100.0%	17	81	783	881	17.0	81.0	783.0	881.0	9.2%	373.9	348.1
10/28/10 5:28	10/28/10 6:28	60	60	0	60	100.0%	10	71	196	277	10.0	71.0	196.0	277.0	25.6%	281.4	250.2
10/29/10 5:29	10/29/10 6:29	60	60	0	60	100.0%	20	49	315	384	20.0	49.0	315.0	384.0	12.8%	379.6	409.2
10/30/10 5:30	10/30/10 6:30	60	60	0	60	100.0%	4	89	1275	1368	4.0	89.0	1275.0	1368.0	6.5%	376.9	362.6

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-1 continued. Target counts, passage rates, and mean and median target heights during dawns of the fall 2010 season.

Sunrise - 30 minutes	Sunrise + 30 minutes	Minutes in Dawn	Minutes Radar On	Minutes with Rain	Total Dawn Minutes	% Dawn with Data	Dawn Count Below RSZ	Dawn Count at RSZ	Dawn Count Above RSZ	Total Dawn Count	Dawn TPR Below RSZ	Dawn TPR at RSZ	Dawn TPR Above RSZ	Dawn TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
10/31/10 5:31	10/31/10 6:31	60	60	0	60	100.0%	5	23	26	54	5.0	23.0	26.0	54.0	42.6%	238.9	123.0
11/1/10 5:31	11/1/10 6:31	60	60	0	60	100.0%	4	41	111	156	4.0	41.0	111.0	156.0	26.3%	340.6	264.7
11/2/10 5:32	11/2/10 6:32	60	60	0	60	100.0%	14	46	234	294	14.0	46.0	234.0	294.0	15.6%	453.0	534.5
11/3/10 5:33	11/3/10 6:33	60	60	0	60	100.0%	10	70	242	322	10.0	70.0	242.0	322.0	21.7%	329.5	285.4
11/4/10 5:34	11/4/10 6:34	60	60	0	60	100.0%	16	57	235	308	16.0	57.0	235.0	308.0	18.5%	407.2	410.9
11/5/10 5:35	11/5/10 6:35	60	60	0	60	100.0%	7	60	253	320	7.0	60.0	253.0	320.0	18.8%	350.0	317.4
11/6/10 5:36	11/6/10 6:36	60	60	0	60	100.0%	15	174	970	1159	15.0	174.0	970.0	1159.0	15.0%	356.4	316.4
11/7/10 5:37	11/7/10 6:37	60	60	0	60	100.0%	2	2	22	26	2.0	2.0	22.0	26.0	7.7%	508.2	550.5
11/8/10 5:38	11/8/10 6:38	60	60	0	60	100.0%	1	1	10	12	1.0	1.0	10.0	12.0	8.3%	705.4	717.0
11/9/10 5:38	11/9/10 6:38	60	60	0	60	100.0%	6	15	12	33	6.0	15.0	12.0	33.0	45.5%	189.3	101.8
11/10/10 5:39	11/10/10 6:39	60	0	0	0	0.0%											
11/11/10 5:40	11/11/10 6:40	60	60	0	60	100.0%	7	22	20	49	7.0	22.0	20.0	49.0	44.9%	183.8	81.7
11/12/10 5:41	11/12/10 6:41	60	60	0	60	100.0%	5	16	15	36	5.0	16.0	15.0	36.0	44.4%	226.8	65.2
11/13/10 5:42	11/13/10 6:42	60	60	0	60	100.0%	5	11	15	31	5.0	11.0	15.0	31.0	35.5%	273.6	126.8
11/14/10 5:43	11/14/10 6:43	60	60	0	60	100.0%	4	18	34	56	4.0	18.0	34.0	56.0	32.1%	412.8	243.4
11/15/10 5:44	11/15/10 6:44	60	60	0	60	100.0%	4	43	129	176	4.0	43.0	129.0	176.0	24.4%	261.5	205.7
11/16/10 5:45	11/16/10 6:45	60	60	0	60	100.0%	5	67	408	480	5.0	67.0	408.0	480.0	14.0%	323.0	300.8
11/17/10 5:46	11/17/10 6:46	60	60	0	60	100.0%	6	12	81	99	6.0	12.0	81.0	99.0	12.1%	428.5	310.0
11/18/10 5:47	11/18/10 6:47	60	60	0	60	100.0%	1	20	53	74	1.0	20.0	53.0	74.0	27.0%	321.0	348.7
11/19/10 5:47	11/19/10 6:47	60	60	0	60	100.0%	2	18	112	132	2.0	18.0	112.0	132.0	13.6%	347.4	342.3
11/20/10 5:48	11/20/10 6:48	60	60	0	60	100.0%	1	2	2	5	1.0	2.0	2.0	5.0	40.0%	100.3	72.2
11/21/10 5:49	11/21/10 6:49	60	60	0	60	100.0%	2	18	21	41	2.0	18.0	21.0	41.0	43.9%	286.8	134.4
11/22/10 5:50	11/22/10 6:50	60	60	0	60	100.0%	1	3	0	4	1.0	3.0	0.0	4.0	75.0%	51.6	62.5
11/23/10 5:51	11/23/10 6:51	60	60	0	60	100.0%	1	8	8	17	1.0	8.0	8.0	17.0	47.1%	249.6	98.8
11/24/10 5:52	11/24/10 6:52	60	60	0	60	100.0%	1	11	2	14	1.0	11.0	2.0	14.0	78.6%	93.5	71.3
11/25/10 5:53	11/25/10 6:53	60	60	0	60	100.0%	4	19	9	32	4.0	19.0	9.0	32.0	59.4%	126.7	58.7
11/26/10 5:54	11/26/10 6:54	60	60	0	60	100.0%	3	6	2	11	3.0	6.0	2.0	11.0	54.5%	70.4	67.4
11/27/10 5:55	11/27/10 6:55	60	60	0	60	100.0%	5	8	10	23	5.0	8.0	10.0	23.0	34.8%	327.7	103.6
11/28/10 5:55	11/28/10 6:55	60	60	0	60	100.0%	0	4	2	6	0.0	4.0	2.0	6.0	66.7%	338.4	68.6
11/29/10 5:56	11/29/10 6:56	60	60	0	60	100.0%	3	13	2	18	3.0	13.0	2.0	18.0	72.2%	85.8	59.3
11/30/10 5:57	11/30/10 6:57	60	60	0	60	100.0%	2	7	1	10	2.0	7.0	1.0	10.0	70.0%	83.1	62.5

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-2. Target counts, passage rates, and mean and median target heights during days of the fall 2010 season.

Sunrise + 30 minutes	Sunset -30 minutes	Minutes in Day	Minutes Radar On	Minutes with Rain	Total Day Minutes	% Day with Data	Day Count Below RSZ	Day Count at RSZ	Day Count Above RSZ	Total Day Count	Day TPR Below RSZ	Day TPR at RSZ	Day TPR Above RSZ	Day TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
9/15/10 5:57	9/15/10 17:20	683	544	0	544	79.6%	74	217	1033	1324	8.2	23.9	113.9	146.0	16.4%	329.2	291.1
9/16/10 5:58	9/16/10 17:19	681	617	0	617	90.6%	64	233	1537	1834	6.2	22.7	149.5	178.3	12.7%	356.9	332.2
9/17/10 5:59	9/17/10 17:17	678	678	0	678	100.0%	16	160	1947	2123	1.4	14.2	172.3	187.9	7.5%	435.7	402.9
9/18/10 5:59	9/18/10 17:16	677	677	0	677	100.0%	176	808	5215	6199	15.6	71.6	462.2	549.4	13.0%	376.0	338.0
9/19/10 6:00	9/19/10 17:15	675	263	0	263	39.0%	43	312	1297	1652	9.8	71.2	295.9	376.9	18.9%	318.0	287.6
9/20/10 6:01	9/20/10 17:13	672	672	0	672	100.0%	24	165	1432	1621	2.1	14.7	127.9	144.7	10.2%	396.6	363.3
9/21/10 6:01	9/21/10 17:12	671	631	0	631	94.0%	45	139	1031	1215	4.3	13.2	98.0	115.5	11.4%	359.8	332.2
9/22/10 6:02	9/22/10 17:11	669	575	0	575	85.9%	9	21	394	424	0.9	2.2	41.1	44.2	5.0%	512.6	487.4
9/23/10 6:02	9/23/10 17:09	667	639	0	639	95.8%	17	71	696	784	1.6	6.7	65.4	73.6	9.1%	348.7	319.9
9/24/10 6:03	9/24/10 17:08	665	665	0	665	100.0%	13	145	1411	1569	1.2	13.1	127.3	141.6	9.2%	334.2	303.9
9/25/10 6:04	9/25/10 17:07	663	663	0	663	100.0%	24	267	2621	2912	2.2	24.2	237.2	263.5	9.2%	339.5	314.2
9/26/10 6:04	9/26/10 17:05	661	661	0	661	100.0%	21	200	2349	2570	1.9	18.2	213.2	233.3	7.8%	371.0	344.1
9/27/10 6:05	9/27/10 17:04	659	659	0	659	100.0%	19	231	2622	2872	1.7	21.0	238.7	261.5	8.0%	330.9	320.8
9/28/10 6:06	9/28/10 17:03	657	657	19	638	97.1%	24	285	3096	3405	2.3	26.8	291.2	320.2	8.4%	323.8	303.9
9/29/10 6:06	9/29/10 17:01	655	655	0	655	100.0%	77	761	4805	5643	7.1	69.7	440.2	516.9	13.5%	295.3	271.9
9/30/10 6:07	9/30/10 17:00	653	653	75	578	88.5%	70	1361	8119	9550	7.3	141.3	842.8	991.3	14.3%	291.6	271.0
10/1/10 6:08	10/1/10 16:59	651	651	270	381	58.5%	86	825	4322	5233	13.5	129.9	680.6	824.1	15.8%	258.3	248.1
10/2/10 6:08	10/2/10 16:57	649	649	186	463	71.3%	44	213	1400	1657	5.7	27.6	181.4	214.7	12.9%	330.6	279.5
10/3/10 6:09	10/3/10 16:56	647	647	0	647	100.0%	72	399	3786	4257	6.7	37.0	351.1	394.8	9.4%	310.3	297.2
10/4/10 6:10	10/4/10 16:55	645	645	0	645	100.0%	10	147	1186	1343	0.9	13.7	110.3	124.9	10.9%	307.1	285.6
10/5/10 6:11	10/5/10 16:53	642	642	0	642	100.0%	4	10	118	132	0.4	0.9	11.0	12.3	7.6%	430.4	366.4
10/6/10 6:11	10/6/10 16:52	641	641	0	641	100.0%	5	14	114	133	0.5	1.3	10.7	12.4	10.5%	385.2	368.2
10/7/10 6:12	10/7/10 16:51	639	639	0	639	100.0%	13	129	1075	1217	1.2	12.1	100.9	114.3	10.6%	320.7	302.4
10/8/10 6:13	10/8/10 16:50	637	637	0	637	100.0%	53	346	2173	2572	5.0	32.6	204.7	242.3	13.5%	303.7	274.0
10/9/10 6:13	10/9/10 16:48	635	635	0	635	100.0%	64	482	2517	3063	6.0	45.5	237.8	289.4	15.7%	304.6	270.1
10/10/10 6:14	10/10/10 16:47	633	633	0	633	100.0%	51	345	2484	2880	4.8	32.7	235.5	273.0	12.0%	339.4	309.4
10/11/10 6:15	10/11/10 16:46	631	631	0	631	100.0%	97	860	6486	7443	9.2	81.8	616.7	707.7	11.6%	320.1	302.4
10/12/10 6:16	10/12/10 16:45	629	629	0	629	100.0%	138	1080	6209	7427	13.2	103.0	592.3	708.5	14.5%	305.7	279.8
10/13/10 6:16	10/13/10 16:43	627	567	0	567	90.4%	53	541	5930	6524	5.6	57.2	627.5	690.4	8.3%	323.0	307.5
10/14/10 6:17	10/14/10 16:42	625	625	60	565	90.4%	113	1002	12829	13944	12.0	106.4	1362.4	1480.8	7.2%	318.9	303.3
10/15/10 6:18	10/15/10 16:41	623	623	15	608	97.6%	91	1449	11363	12903	9.0	143.0	1121.3	1273.3	11.2%	310.6	285.0
10/16/10 6:19	10/16/10 16:40	621	621	0	621	100.0%	144	1464	9863	11471	13.9	141.4	952.9	1108.3	12.8%	329.7	303.0
10/17/10 6:19	10/17/10 16:39	620	620	0	620	100.0%	155	2460	13244	15859	15.0	238.1	1281.7	1534.7	15.5%	285.4	264.6
10/18/10 6:20	10/18/10 16:37	617	617	0	617	100.0%	25	643	7260	7928	2.4	62.5	706.0	771.0	8.1%	370.0	356.0
10/19/10 6:21	10/19/10 16:36	615	615	367	248	40.3%	36	73	178	287	8.7	17.7	43.1	69.4	25.4%	330.2	162.5
10/20/10 6:22	10/20/10 16:35	613	613	105	508	82.9%	14	102	253	369	1.7	12.0	29.9	43.6	27.6%	228.5	200.6
10/21/10 6:22	10/21/10 16:34	612	286	0	286	46.7%	19	105	690	814	4.0	22.0	144.8	170.8	12.9%	327.2	325.5
10/22/10 6:23	10/22/10 16:33	610	610	0	610	100.0%	21	83	1120	1224	2.1	8.2	110.2	120.4	6.8%	415.8	409.7
10/23/10 6:24	10/23/10 16:32	608	608	0	608	100.0%	89	558	2784	3431	8.8	55.1	274.7	338.6	16.3%	299.5	277.7
10/24/10 6:25	10/24/10 16:31	606	606	0	606	100.0%	172	1495	7432	9099	17.0	148.0	735.8	900.9	16.4%	271.2	256.3
10/25/10 6:26	10/25/10 16:30	604	604	0	604	100.0%	20	133	430	583	2.0	13.2	42.7	57.9	22.8%	311.9	265.8
10/26/10 6:26	10/26/10 16:29	603	603	0	603	100.0%	414	2778	9911	13103	41.2	276.4	986.2	1303.8	21.2%	272.7	242.6
10/27/10 6:27	10/27/10 16:28	601	601	0	601	100.0%	285	2517	17953	20755	28.5	251.3	1792.3	2072.0	12.1%	326.6	322.5
10/28/10 6:28	10/28/10 16:27	599	599	0	599	100.0%	621	3478	11313	15412	62.2	348.4	1133.2	1543.8	22.6%	254.6	233.9
10/29/10 6:29	10/29/10 16:26	597	597	0	597	100.0%	533	3495	16098	20126	53.6	351.3	1617.9	2022.7	17.4%	289.7	282.5
10/30/10 6:30	10/30/10 16:25	595	595	0	595	100.0%	27	286	1906	2219	2.7	28.8	192.2	223.8	12.9%	348.2	314.2

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level
**Periods with <50% of time recorded by radar are excluded from analyses*
**Insects noted in trackplot images during these time periods.*



Table 9-2 continued. Target counts, passage rates, and mean and median target heights during days of the fall 2010 season.

Sunrise + 30 minutes	Sunset -30 minutes	Minutes in Day	Minutes Radar On	Minutes with Rain	Total Day Minutes	% Day with Data	Day Count Below RSZ	Day Count at RSZ	Day Count Above RSZ	Total Day Count	Day TPR Below RSZ	Day TPR at RSZ	Day TPR Above RSZ	Day TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
10/31/10 6:31	10/31/10 16:24	593	593	0	593	100.0%	228	1564	3467	5259	23.1	158.2	350.8	532.1	29.7%	227.5	194.2
11/1/10 6:31	11/1/10 16:23	592	592	0	592	100.0%	308	1721	5013	7042	31.2	174.4	508.1	713.7	24.4%	254.6	227.2
11/2/10 6:32	11/2/10 16:22	590	590	0	590	100.0%	449	2427	19226	22102	45.7	246.8	1955.2	2247.7	11.0%	316.3	303.9
11/3/10 6:33	11/3/10 16:21	588	588	0	588	100.0%	423	2613	17180	20216	43.2	266.6	1753.1	2062.9	12.9%	289.7	284.1
11/4/10 6:34	11/4/10 16:20	586	586	0	586	100.0%	359	2369	14973	17701	36.8	242.6	1533.1	1812.4	13.4%	287.5	274.6
11/5/10 6:35	11/5/10 16:20	585	585	0	585	100.0%	533	3319	15016	18868	54.7	340.4	1540.1	1935.2	17.6%	269.6	256.9
11/6/10 6:36	11/6/10 16:19	583	583	0	583	100.0%	685	3643	10818	15146	70.5	374.9	1113.3	1558.8	24.1%	262.4	239.6
11/7/10 6:37	11/7/10 16:18	581	581	0	581	100.0%	449	2411	4852	7712	46.4	249.0	501.1	796.4	31.3%	221.7	186.2
11/8/10 6:38	11/8/10 16:17	579	579	60	519	89.6%	3	12	68	83	0.3	1.4	7.9	9.6	14.5%	460.6	411.5
11/9/10 6:38	11/9/10 16:17	579	241	0	241	41.6%	76	226	312	614	18.9	56.3	77.7	152.9	36.8%	174.1	136.9
11/10/10 6:39	11/10/10 16:16	577	375	0	375	65.0%	15	106	393	514	2.4	17.0	62.9	82.2	20.6%	300.4	270.1
11/11/10 6:40	11/11/10 16:15	575	575	0	575	100.0%	61	295	1486	1842	6.4	30.8	155.1	192.2	16.0%	298.7	285.6
11/12/10 6:41	11/12/10 16:14	573	573	0	573	100.0%	149	824	2587	3560	15.6	86.3	270.9	372.8	23.1%	252.1	245.7
11/13/10 6:42	11/13/10 16:14	572	572	0	572	100.0%	173	1076	2981	4230	18.1	112.9	312.7	443.7	25.4%	239.3	227.5
11/14/10 6:43	11/14/10 16:13	570	570	0	570	100.0%	179	1427	3885	5491	18.8	150.2	408.9	578.0	26.0%	234.3	217.9
11/15/10 6:44	11/15/10 16:13	569	569	0	569	100.0%	469	2876	10851	14196	49.5	303.3	1144.2	1496.9	20.3%	263.5	252.7
11/16/10 6:45	11/16/10 16:12	567	567	0	567	100.0%	645	1982	4262	6889	68.3	209.7	451.0	729.0	28.8%	220.1	189.0
11/17/10 6:46	11/17/10 16:12	566	566	0	566	100.0%	186	1357	3171	4714	19.7	143.9	336.1	499.7	28.8%	240.8	209.7
11/18/10 6:47	11/18/10 16:11	564	564	0	564	100.0%	209	1232	2979	4420	22.2	131.1	316.9	470.2	27.9%	248.5	213.7
11/19/10 6:47	11/19/10 16:11	564	564	0	564	100.0%	130	627	1726	2483	13.8	66.7	183.6	264.1	25.3%	260.0	236.8
11/20/10 6:48	11/20/10 16:10	562	562	0	562	100.0%	13	78	41	132	1.4	8.3	4.4	14.1	59.1%	134.1	102.0
11/21/10 6:49	11/21/10 16:10	561	561	30	531	94.7%	16	56	62	134	1.8	6.3	7.0	15.1	41.8%	238.9	121.9
11/22/10 6:50	11/22/10 16:10	559	559	0	559	100.0%	16	54	64	134	1.7	5.8	6.9	14.4	40.3%	228.2	105.3
11/23/10 6:51	11/23/10 16:09	558	558	75	483	86.6%	18	65	67	150	2.2	8.1	8.3	18.6	43.3%	222.9	109.6
11/24/10 6:52	11/24/10 16:09	557	557	0	557	100.0%	5	28	12	45	0.5	3.0	1.3	4.8	62.2%	183.8	71.6
11/25/10 6:53	11/25/10 16:09	556	556	0	556	100.0%	25	142	159	326	2.7	15.3	17.2	35.2	43.6%	202.4	130.9
11/26/10 6:54	11/26/10 16:08	554	554	0	554	100.0%	48	120	219	387	5.2	13.0	23.7	41.9	31.0%	200.5	163.4
11/27/10 6:55	11/27/10 16:08	553	553	0	553	100.0%	47	236	311	594	5.1	25.6	33.7	64.4	39.7%	178.8	141.1
11/28/10 6:55	11/28/10 16:08	553	553	0	553	100.0%	8	11	15	34	0.9	1.2	1.6	3.7	32.4%	227.4	96.9
11/29/10 6:56	11/29/10 16:08	552	552	0	552	100.0%	18	106	150	274	2.0	11.5	16.3	29.8	38.7%	223.1	159.4
11/30/10 6:57	11/30/10 16:08	551	551	0	551	100.0%	12	98	106	216	1.3	10.7	11.5	23.5	45.4%	216.5	124.5

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level
**Periods with <50% of time recorded by radar are excluded from analyses*
**Insects noted in trackplot images during these time periods.*



Table 9-3. Target counts, passage rates, and mean and median target heights during dusks of the fall 2010 season.

Sunset - 30 minutes	Sunset + 30 minutes	Minutes in Dusk	Minutes Radar On	Minutes w with Rain	Total Dusk Minutes	% Dusk with Data	Dusk Count Below RSZ	Dusk Count at RSZ	Dusk Count Above RSZ	Total Dusk Count	Dusk TPR Below RSZ	Dusk TPR at RSZ	Dusk TPR Above RSZ	Dusk TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
9/15/10 17:20	9/15/10 18:20	60	60	0	60	100.0%	1	3	6	10	1.0	3.0	6.0	10.0	30.0%	272.1	216.0
9/16/10 17:19	9/16/10 18:19	60	60	0	60	100.0%	6	35	98	139	6.0	35.0	98.0	139.0	25.2%	312.9	285.0
9/17/10 17:17	9/17/10 18:17	60	60	0	60	100.0%	0	1	17	18	0.0	1.0	17.0	18.0	5.6%	450.4	457.4
9/18/10 17:16	9/18/10 18:16	60	60	0	60	100.0%	69	107	289	465	69.0	107.0	289.0	465.0	23.0%	276.7	225.9
9/19/10 17:15	9/19/10 18:15	60	0	0	0	0.0%											
9/20/10 17:13	9/20/10 18:13	60	60	0	60	100.0%	0	0	8	8	0.0	0.0	8.0	8.0	0.0%	483.2	489.4
9/21/10 17:12	9/21/10 18:12	60	60	0	60	100.0%	1	1	11	13	1.0	1.0	11.0	13.0	7.7%	340.7	354.2
9/22/10 17:11	9/22/10 18:11	60	60	0	60	100.0%	0	0	17	17	0.0	0.0	17.0	17.0	0.0%	559.4	576.4
9/23/10 17:09	9/23/10 18:09	60	0	0	0	0.0%											
9/24/10 17:08	9/24/10 18:08	60	60	0	60	100.0%	0	4	9	13	0.0	4.0	9.0	13.0	30.8%	284.3	238.4
9/25/10 17:07	9/25/10 18:07	60	60	0	60	100.0%	0	15	109	124	0.0	15.0	109.0	124.0	12.1%	373.0	365.3
9/26/10 17:05	9/26/10 18:05	60	60	0	60	100.0%	0	3	77	80	0.0	3.0	77.0	80.0	3.8%	356.0	319.6
9/27/10 17:04	9/27/10 18:04	60	60	0	60	100.0%	0	6	82	88	0.0	6.0	82.0	88.0	6.8%	295.2	289.7
9/28/10 17:03	9/28/10 18:03	60	60	41	19	31.7%	0	2	13	15	0.0	6.3	41.1	47.4	13.3%	317.8	313.9
9/29/10 17:01	9/29/10 18:01	60	60	0	60	100.0%	2	12	68	82	2.0	12.0	68.0	82.0	14.6%	300.2	298.6
9/30/10 17:00	9/30/10 18:00	60	60	15	45	75.0%	0	5	109	114	0.0	6.7	145.3	152.0	4.4%	302.8	281.8
10/1/10 16:59	10/1/10 17:59	60	60	0	60	100.0%	2	30	37	69	2.0	30.0	37.0	69.0	43.5%	172.4	139.9
10/2/10 16:57	10/2/10 17:57	60	60	0	60	100.0%	23	135	527	685	23.0	135.0	527.0	685.0	19.7%	228.1	216.4
10/3/10 16:56	10/3/10 17:56	60	60	0	60	100.0%	13	68	217	298	13.0	68.0	217.0	298.0	22.8%	230.2	222.2
10/4/10 16:55	10/4/10 17:55	60	60	0	60	100.0%	0	1	24	25	0.0	1.0	24.0	25.0	4.0%	304.6	279.2
10/5/10 16:53	10/5/10 17:53	60	60	0	60	100.0%	1	0	7	8	1.0	0.0	7.0	8.0	0.0%	253.2	232.0
10/6/10 16:52	10/6/10 17:52	60	60	0	60	100.0%	1	0	14	15	1.0	0.0	14.0	15.0	0.0%	318.9	346.3
10/7/10 16:51	10/7/10 17:51	60	60	0	60	100.0%	0	1	21	22	0.0	1.0	21.0	22.0	4.5%	323.4	305.0
10/8/10 16:50	10/8/10 17:50	60	60	0	60	100.0%	7	9	14	30	7.0	9.0	14.0	30.0	30.0%	224.4	104.5
10/9/10 16:48	10/9/10 17:48	60	60	0	60	100.0%	0	3	40	43	0.0	3.0	40.0	43.0	7.0%	391.3	297.8
10/10/10 16:47	10/10/10 17:47	60	60	0	60	100.0%	2	7	61	70	2.0	7.0	61.0	70.0	10.0%	417.4	369.6
10/11/10 16:46	10/11/10 17:46	60	60	0	60	100.0%	2	11	87	100	2.0	11.0	87.0	100.0	11.0%	367.3	303.7
10/12/10 16:45	10/12/10 17:45	60	60	0	60	100.0%	0	25	225	250	0.0	25.0	225.0	250.0	10.0%	301.5	295.4
10/13/10 16:43	10/13/10 17:43	60	0	0	0	0.0%											
10/14/10 16:42	10/14/10 17:42	60	60	0	60	100.0%	2	65	236	303	2.0	65.0	236.0	303.0	21.5%	239.1	206.7
10/15/10 16:41	10/15/10 17:41	60	60	0	60	100.0%	5	58	224	287	5.0	58.0	224.0	287.0	20.2%	260.4	252.1
10/16/10 16:40	10/16/10 17:40	60	60	0	60	100.0%	3	69	713	785	3.0	69.0	713.0	785.0	8.8%	255.2	237.4
10/17/10 16:39	10/17/10 17:39	60	60	0	60	100.0%	0	2	217	219	0.0	2.0	217.0	219.0	0.9%	309.3	299.6
10/18/10 16:37	10/18/10 17:37	60	60	0	60	100.0%	0	6	69	75	0.0	6.0	69.0	75.0	8.0%	246.9	244.8
10/19/10 16:36	10/19/10 17:36	60	60	60	0	0.0%											
10/20/10 16:35	10/20/10 17:35	60	40	0	40	66.7%	0	1	7	8	0.0	1.5	10.5	12.0	12.5%	311.5	238.8
10/21/10 16:34	10/21/10 17:34	60	60	0	60	100.0%	4	22	185	211	4.0	22.0	185.0	211.0	10.4%	335.3	318.2
10/22/10 16:33	10/22/10 17:33	60	60	0	60	100.0%	1	17	144	162	1.0	17.0	144.0	162.0	10.5%	425.8	357.2
10/23/10 16:32	10/23/10 17:32	60	60	0	60	100.0%	2	8	104	114	2.0	8.0	104.0	114.0	7.0%	305.0	257.7
10/24/10 16:31	10/24/10 17:31	60	60	0	60	100.0%	2	40	383	425	2.0	40.0	383.0	425.0	9.4%	302.5	285.0
10/25/10 16:30	10/25/10 17:30	60	60	0	60	100.0%	4	17	138	159	4.0	17.0	138.0	159.0	10.7%	340.7	312.1
10/26/10 16:29	10/26/10 17:29	60	60	0	60	100.0%	7	69	372	448	7.0	69.0	372.0	448.0	15.4%	319.5	292.3
10/27/10 16:28	10/27/10 17:28	60	60	0	60	100.0%	2	73	517	592	2.0	73.0	517.0	592.0	12.3%	272.0	271.6
10/28/10 16:27	10/28/10 17:27	60	60	0	60	100.0%	4	101	356	461	4.0	101.0	356.0	461.0	21.9%	235.8	220.4
10/29/10 16:26	10/29/10 17:26	60	60	0	60	100.0%	1	71	290	362	1.0	71.0	290.0	362.0	19.6%	242.6	230.7
10/30/10 16:25	10/30/10 17:25	60	60	0	60	100.0%	4	3	75	82	4.0	3.0	75.0	82.0	3.7%	448.5	304.2

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-3 continued. Target counts, passage rates, and mean and median target heights during dusks of the fall 2010 season.

Sunset - 30 minutes	Sunset + 30 minutes	Minutes in Dusk	Minutes Radar On	Minutes with Rain	Total Dusk Minutes	% Dusk with Data	Dusk Count Below RSZ	Dusk Count at RSZ	Dusk Count Above RSZ	Total Dusk Count	Dusk TPR Below RSZ	Dusk TPR at RSZ	Dusk TPR Above RSZ	Dusk TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
10/31/10 16:24	10/31/10 17:24	60	60	0	60	100.0%	4	24	39	67	4.0	24.0	39.0	67.0	35.8%	246.0	185.6
11/1/10 16:23	11/1/10 17:23	60	60	0	60	100.0%	9	34	220	263	9.0	34.0	220.0	263.0	12.9%	261.9	261.5
11/2/10 16:22	11/2/10 17:22	60	60	0	60	100.0%	8	145	1649	1802	8.0	145.0	1649.0	1802.0	8.0%	301.3	287.7
11/3/10 16:21	11/3/10 17:21	60	60	0	60	100.0%	9	110	1391	1510	9.0	110.0	1391.0	1510.0	7.3%	293.6	285.4
11/4/10 16:20	11/4/10 17:20	60	60	0	60	100.0%	6	39	206	251	6.0	39.0	206.0	251.0	15.5%	260.0	248.4
11/5/10 16:20	11/5/10 17:20	60	60	0	60	100.0%	6	82	286	374	6.0	82.0	286.0	374.0	21.9%	283.7	244.1
11/6/10 16:19	11/6/10 17:19	60	60	0	60	100.0%	5	25	158	188	5.0	25.0	158.0	188.0	13.3%	299.9	309.5
11/7/10 16:18	11/7/10 17:18	60	60	0	60	100.0%	1	7	111	119	1.0	7.0	111.0	119.0	5.9%	389.3	352.7
11/8/10 16:17	11/8/10 17:17	60	60	0	60	100.0%	1	8	69	78	1.0	8.0	69.0	78.0	10.3%	343.1	278.7
11/9/10 16:17	11/9/10 17:17	60	0	0	0	0.0%											
11/10/10 16:16	11/10/10 17:16	60	60	0	60	100.0%	0	3	14	17	0.0	3.0	14.0	17.0	17.6%	310.5	318.8
11/11/10 16:15	11/11/10 17:15	60	60	0	60	100.0%	1	9	40	50	1.0	9.0	40.0	50.0	18.0%	245.8	235.3
11/12/10 16:14	11/12/10 17:14	60	60	0	60	100.0%	3	17	10	30	3.0	17.0	10.0	30.0	56.7%	146.4	81.8
11/13/10 16:14	11/13/10 17:14	60	60	0	60	100.0%	2	18	16	36	2.0	18.0	16.0	36.0	50.0%	174.9	118.9
11/14/10 16:13	11/14/10 17:13	60	60	0	60	100.0%	2	29	25	56	2.0	29.0	25.0	56.0	51.8%	184.3	118.7
11/15/10 16:13	11/15/10 17:13	60	60	0	60	100.0%	8	42	186	236	8.0	42.0	186.0	236.0	17.8%	284.2	273.4
11/16/10 16:12	11/16/10 17:12	60	60	0	60	100.0%	4	2	24	30	4.0	2.0	24.0	30.0	6.7%	313.9	317.4
11/17/10 16:12	11/17/10 17:12	60	60	0	60	100.0%	1	16	29	46	1.0	16.0	29.0	46.0	34.8%	212.2	182.4
11/18/10 16:11	11/18/10 17:11	60	60	0	60	100.0%	0	19	44	63	0.0	19.0	44.0	63.0	30.2%	253.6	257.3
11/19/10 16:11	11/19/10 17:11	60	60	0	60	100.0%	2	4	64	70	2.0	4.0	64.0	70.0	5.7%	320.9	345.9
11/20/10 16:10	11/20/10 17:10	60	60	0	60	100.0%	5	24	30	59	5.0	24.0	30.0	59.0	40.7%	170.5	134.1
11/21/10 16:10	11/21/10 17:10	60	60	0	60	100.0%	3	5	1	9	3.0	5.0	1.0	9.0	55.6%	61.6	45.1
11/22/10 16:10	11/22/10 17:10	60	60	0	60	100.0%	1	2	2	5	1.0	2.0	2.0	5.0	40.0%	561.1	67.7
11/23/10 16:09	11/23/10 17:09	60	60	0	60	100.0%	2	1	3	6	2.0	1.0	3.0	6.0	16.7%	286.1	215.0
11/24/10 16:09	11/24/10 17:09	60	60	0	60	100.0%	1	2	1	4	1.0	2.0	1.0	4.0	50.0%	170.5	67.4
11/25/10 16:09	11/25/10 17:09	60	60	0	60	100.0%	0	3	2	5	0.0	3.0	2.0	5.0	60.0%	123.4	103.3
11/26/10 16:08	11/26/10 17:08	60	60	0	60	100.0%	2	4	3	9	2.0	4.0	3.0	9.0	44.4%	279.1	69.8
11/27/10 16:08	11/27/10 17:08	60	60	0	60	100.0%	3	4	3	10	3.0	4.0	3.0	10.0	40.0%	349.3	85.8
11/28/10 16:08	11/28/10 17:08	60	60	0	60	100.0%	7	5	3	15	7.0	5.0	3.0	15.0	33.3%	69.9	31.7
11/29/10 16:08	11/29/10 17:08	60	60	0	60	100.0%	5	73	1576	1654	5.0	73.0	1576.0	1654.0	4.4%	402.1	386.8
11/30/10 16:08	11/30/10 17:08	60	60	0	60	100.0%	0	14	1	15	0.0	14.0	1.0	15.0	93.3%	69.9	73.5

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-4. Target counts, passage rates, and mean and median target heights during nights of the fall 2010 season.

Sunset + 30 minutes	Sunrise next day - 30 minutes	Minutes in Night	Minutes Radar On	Minutes with Rain	Total Night Minutes	% Night with Data	Night Count Below RSZ	Night Count at RSZ	Night Count Above RSZ	Total Night Count	Night TPR Below RSZ	Night TPR at RSZ	Night TPR Above RSZ	Night TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
9/15/10 18:20	9/16/10 4:58	638	638	0	638	100.0%	49	282	4372	4703	4.6	26.5	411.2	442.3	6.0%	514.5	469.1
9/16/10 18:19	9/17/10 4:59	640	640	0	640	100.0%	53	295	3316	3664	5.0	27.7	310.9	343.5	8.1%	496.4	433.3
9/17/10 18:17	9/18/10 4:59	642	642	0	642	100.0%	15	132	4727	4874	1.4	12.3	441.8	455.5	2.7%	541.1	500.6
9/18/10 18:16	9/19/10 5:00	644	642	0	642	99.7%	51	271	3690	4012	4.8	25.3	344.9	375.0	6.8%	489.2	440.7
9/19/10 18:15	9/20/10 5:01	646	557	0	557	86.2%	46	125	2436	2607	5.0	13.5	262.4	280.8	4.8%	494.6	469.1
9/20/10 18:13	9/21/10 5:01	648	648	0	648	100.0%	69	482	7278	7829	6.4	44.6	673.9	724.9	6.2%	483.8	480.4
9/21/10 18:12	9/22/10 5:02	650	650	0	650	100.0%	140	769	4890	5799	12.9	71.0	451.4	535.3	13.3%	369.9	341.1
9/22/10 18:11	9/23/10 5:02	651	639	0	639	98.2%	10	42	1761	1813	0.9	3.9	165.4	170.2	2.3%	563.4	552.9
9/23/10 18:09	9/24/10 5:03	654	0	0	0	0.0%											
9/24/10 18:08	9/25/10 5:04	656	655	0	655	99.8%	15	198	1490	1703	1.4	18.1	136.5	156.0	11.6%	382.9	332.2
9/25/10 18:07	9/26/10 5:04	657	657	0	657	100.0%	11	188	2950	3153	1.0	17.2	269.8	287.9	6.0%	413.3	365.2
9/26/10 18:05	9/27/10 5:05	660	660	0	660	100.0%	21	289	2975	3285	1.9	26.3	270.5	298.6	8.8%	416.7	405.4
9/27/10 18:04	9/28/10 5:06	662	661	30	631	95.3%	50	446	4126	4622	4.8	42.4	392.3	439.5	9.6%	389.9	375.5
9/28/10 18:03	9/29/10 5:06	663	663	0	663	100.0%	28	362	4195	4585	2.5	32.8	379.6	414.9	7.9%	367.2	325.2
9/29/10 18:01	9/30/10 5:07	666	665	30	635	95.3%	13	264	4199	4476	1.2	24.9	396.8	422.9	5.9%	439.4	417.0
9/30/10 18:00	10/1/10 5:08	668	666	180	486	72.8%	16	171	1908	2095	2.0	21.1	235.6	258.6	8.2%	408.7	318.8
10/1/10 17:59	10/2/10 5:08	669	666	90	576	86.1%	33	304	2884	3221	3.4	31.7	300.4	335.5	9.4%	344.7	309.1
10/2/10 17:57	10/3/10 5:09	672	670	208	462	68.8%	72	494	3267	3833	9.4	64.2	424.3	497.8	12.9%	366.6	328.0
10/3/10 17:56	10/4/10 5:10	674	673	0	673	99.9%	96	553	3408	4057	8.6	49.3	303.8	361.7	13.6%	358.7	313.0
10/4/10 17:55	10/5/10 5:11	676	675	0	675	99.9%	20	62	1382	1464	1.8	5.5	122.8	130.1	4.2%	537.8	519.4
10/5/10 17:53	10/6/10 5:11	678	677	0	677	99.9%	12	81	729	822	1.1	7.2	64.6	72.9	9.9%	449.5	401.6
10/6/10 17:52	10/7/10 5:12	680	680	0	680	100.0%	13	118	1205	1336	1.1	10.4	106.3	117.9	8.8%	418.4	385.0
10/7/10 17:51	10/8/10 5:13	682	682	0	682	100.0%	47	271	2492	2810	4.1	23.8	219.2	247.2	9.6%	384.3	324.5
10/8/10 17:50	10/9/10 5:13	683	683	0	683	100.0%	29	279	2412	2720	2.5	24.5	211.9	238.9	10.3%	400.4	343.5
10/9/10 17:48	10/10/10 5:14	686	321	0	321	46.8%	21	188	1124	1333	3.9	35.1	210.1	249.2	14.1%	375.1	335.6
10/10/10 17:47	10/11/10 5:15	688	688	0	688	100.0%	37	223	2218	2478	3.2	19.4	193.4	216.1	9.0%	433.6	381.6
10/11/10 17:46	10/12/10 5:16	690	690	0	690	100.0%	36	299	2199	2534	3.1	26.0	191.2	220.3	11.8%	382.7	343.1
10/12/10 17:45	10/13/10 5:16	691	689	135	554	80.2%	38	218	1210	1466	4.1	23.6	131.0	158.8	14.9%	365.3	317.6
10/13/10 17:43	10/14/10 5:17	694	664	0	664	95.7%	45	648	10219	10912	4.1	58.6	923.4	986.0	5.9%	374.5	364.2
10/14/10 17:42	10/15/10 5:18	696	694	0	694	99.7%	44	577	8976	9597	3.8	49.9	776.0	829.7	6.0%	386.4	373.4
10/15/10 17:41	10/16/10 5:19	698	695	0	695	99.6%	26	434	4184	4644	2.2	37.5	361.2	400.9	9.3%	380.8	339.1
10/16/10 17:40	10/17/10 5:19	699	698	0	698	99.9%	25	427	3716	4168	2.1	36.7	319.4	358.3	10.2%	322.1	285.6
10/17/10 17:39	10/18/10 5:20	701	699	0	699	99.7%	6	77	3682	3765	0.5	6.6	316.1	323.2	2.0%	393.1	369.4
10/18/10 17:37	10/19/10 5:21	704	703	45	658	93.5%	20	368	4785	5173	1.8	33.6	436.3	471.7	7.1%	319.1	292.9
10/19/10 17:36	10/20/10 5:22	706	703	463	240	34.0%	3	12	196	211	0.8	3.0	49.0	52.8	5.7%	376.1	357.8
10/20/10 17:35	10/21/10 5:22	707	0	0	0	0.0%											
10/21/10 17:34	10/22/10 5:23	709	708	0	708	99.9%	56	581	7621	8258	4.7	49.2	645.8	699.8	7.0%	373.2	344.4
10/22/10 17:33	10/23/10 5:24	711	710	0	710	99.9%	39	221	3165	3425	3.3	18.7	267.5	289.4	6.5%	457.5	405.1
10/23/10 17:32	10/24/10 5:25	713	713	0	713	100.0%	58	534	4037	4629	4.9	44.9	339.7	389.5	11.5%	387.8	331.6
10/24/10 17:31	10/25/10 5:26	715	715	0	715	100.0%	50	569	4618	5237	4.2	47.7	387.5	439.5	10.9%	350.8	328.0
10/25/10 17:30	10/26/10 5:26	716	715	0	715	99.9%	55	370	3069	3494	4.6	31.0	257.5	293.2	10.6%	421.9	368.0
10/26/10 17:29	10/27/10 5:27	718	717	0	717	99.9%	76	689	4090	4855	6.4	57.7	342.3	406.3	14.2%	370.2	310.6
10/27/10 17:28	10/28/10 5:28	720	718	0	718	99.7%	35	364	2007	2406	2.9	30.4	167.7	201.1	15.1%	340.4	298.7
10/28/10 17:27	10/29/10 5:29	722	721	0	721	99.9%	73	1050	4182	5305	6.1	87.4	348.0	441.5	19.8%	276.0	235.3
10/29/10 17:26	10/30/10 5:30	724	723	0	723	99.9%	99	786	5326	6211	8.2	65.2	442.0	515.4	12.7%	326.8	304.8
10/30/10 17:25	10/31/10 5:31	726	726	0	726	100.0%	15	73	906	994	1.2	6.0	74.9	82.1	7.3%	491.8	451.1

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-4 continued. Target counts, passage rates, and mean and median target heights during nights of the fall 2010 season.

Sunset + 30 minutes	Sunrise next day - 30 minutes	Minutes in Night	Minutes Radar On	Minutes with Rain	Total Night Minutes	% Night with Data	Night Count Below RSZ	Night Count at RSZ	Night Count Above RSZ	Total Night Count	Night TPR Below RSZ	Night TPR at RSZ	Night TPR Above RSZ	Night TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
10/31/10 17:24	11/1/10 5:31	727	726	0	726	99.9%	31	238	1217	1486	2.6	19.7	100.6	122.8	16.0%	366.6	274.6
11/1/10 17:23	11/2/10 5:32	729	728	0	728	99.9%	29	265	1775	2069	2.4	21.8	146.3	170.5	12.8%	359.0	336.2
11/2/10 17:22	11/3/10 5:33	731	729	0	729	99.7%	74	499	8660	9233	6.1	41.1	712.8	759.9	5.4%	436.8	419.7
11/3/10 17:21	11/4/10 5:34	733	732	0	732	99.9%	49	244	1320	1613	4.0	20.0	108.2	132.2	15.1%	335.1	302.1
11/4/10 17:20	11/5/10 5:35	735	734	0	734	99.9%	33	239	1289	1561	2.7	19.5	105.4	127.6	15.3%	344.9	289.6
11/5/10 17:20	11/6/10 5:36	736	734	0	734	99.7%	69	426	2888	3383	5.6	34.8	236.1	276.5	12.6%	334.0	298.4
11/6/10 17:19	11/7/10 5:37	738	737	15	722	97.8%	18	196	1414	1628	1.5	16.3	117.5	135.3	12.0%	328.1	294.0
11/7/10 17:18	11/8/10 5:38	740	740	0	740	100.0%	13	76	1586	1675	1.1	6.2	128.6	135.8	4.5%	493.3	473.4
11/8/10 17:17	11/9/10 5:38	741	740	0	740	99.9%	7	63	508	578	0.6	5.1	41.2	46.9	10.9%	444.5	397.3
11/9/10 17:17	11/10/10 5:39	742	0	0	0	0.0%											
11/10/10 17:16	11/11/10 5:40	744	744	0	744	100.0%	19	190	907	1116	1.5	15.3	73.1	90.0	17.0%	309.6	285.8
11/11/10 17:15	11/12/10 5:41	746	746	0	746	100.0%	13	149	714	876	1.0	12.0	57.4	70.5	17.0%	329.1	290.6
11/12/10 17:14	11/13/10 5:42	748	748	0	748	100.0%	9	61	304	374	0.7	4.9	24.4	30.0	16.3%	372.5	303.7
11/13/10 17:14	11/14/10 5:43	749	749	0	749	100.0%	4	89	486	579	0.3	7.1	38.9	46.4	15.4%	383.6	310.0
11/14/10 17:13	11/15/10 5:44	751	750	0	750	99.9%	15	139	615	769	1.2	11.1	49.2	61.5	18.1%	349.1	300.5
11/15/10 17:13	11/16/10 5:45	752	752	0	752	100.0%	27	187	1007	1221	2.2	14.9	80.3	97.4	15.3%	353.1	316.1
11/16/10 17:12	11/17/10 5:46	754	754	0	754	100.0%	21	212	1071	1304	1.7	16.9	85.2	103.8	16.3%	325.1	284.7
11/17/10 17:12	11/18/10 5:47	755	755	0	755	100.0%	15	166	765	946	1.2	13.2	60.8	75.2	17.5%	306.9	259.8
11/18/10 17:11	11/19/10 5:47	756	756	0	756	100.0%	13	283	1432	1728	1.0	22.5	113.7	137.1	16.4%	314.9	280.9
11/19/10 17:11	11/20/10 5:48	757	756	0	756	99.9%	8	82	336	426	0.6	6.5	26.7	33.8	19.2%	305.4	288.8
11/20/10 17:10	11/21/10 5:49	759	758	45	713	93.9%	10	111	290	411	0.8	9.3	24.4	34.6	27.0%	264.4	235.0
11/21/10 17:10	11/22/10 5:50	760	760	0	760	100.0%	3	30	59	92	0.2	2.4	4.7	7.3	32.6%	391.3	232.7
11/22/10 17:10	11/23/10 5:51	762	761	0	761	99.9%	8	42	157	207	0.6	3.3	12.4	16.3	20.3%	466.2	407.2
11/23/10 17:09	11/24/10 5:52	763	762	0	762	99.9%	5	53	66	124	0.4	4.2	5.2	9.8	42.7%	379.7	192.8
11/24/10 17:09	11/25/10 5:53	764	764	0	764	100.0%	10	61	290	361	0.8	4.8	22.8	28.4	16.9%	378.5	324.9
11/25/10 17:09	11/26/10 5:54	765	765	0	765	100.0%	5	34	285	324	0.4	2.7	22.4	25.4	10.5%	462.6	456.3
11/26/10 17:08	11/27/10 5:55	767	766	0	766	99.9%	6	42	201	249	0.5	3.3	15.7	19.5	16.9%	382.8	314.6
11/27/10 17:08	11/28/10 5:55	767	767	135	632	82.4%	16	66	137	219	1.5	6.3	13.0	20.8	30.1%	341.8	239.6
11/28/10 17:08	11/29/10 5:56	768	768	0	768	100.0%	7	42	133	182	0.5	3.3	10.4	14.2	23.1%	373.6	314.1
11/29/10 17:08	11/30/10 5:57	769	769	0	769	100.0%	3	58	763	824	0.2	4.5	59.5	64.3	7.0%	393.8	372.5
11/30/10 17:08	12/1/10 5:58	770	411	0	411	53.4%	0	9	65	74	0.0	1.3	9.5	10.8	12.2%	429.0	320.2

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Swept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-5. Target counts, passage rates, and mean and median target heights during dawns of the winter 2010-11 season.



Sunrise - 30 minutes	Sunrise + 30 minutes	Minutes in Daw n	Minutes Radar On	Minutes w ith Rain	Total Daw n Minutes	% Daw n w ith Data	Daw n Count Below RSZ	Daw n Count at RSZ	Daw n Count Above RSZ	Total Daw n Count	Daw n TPR Below RSZ	Daw n TPR at RSZ	Daw n TPR Above RSZ	Daw n TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
12/1/10 5:58	12/1/10 6:58	60	60	0	60	100.0%	2	8	6	16	2.0	8.0	6.0	16.0	50.0%	180.2	80.6
12/2/10 5:59	12/2/10 6:59	60	60	0	60	100.0%	4	12	4	20	4.0	12.0	4.0	20.0	60.0%	104.9	72.7
12/3/10 6:00	12/3/10 7:00	60	60	0	60	100.0%	1	8	15	24	1.0	8.0	15.0	24.0	33.3%	207.6	169.5
12/4/10 6:01	12/4/10 7:01	60	60	0	60	100.0%	2	16	8	26	2.0	16.0	8.0	26.0	61.5%	173.7	109.7
12/5/10 6:01	12/5/10 7:01	60	60	0	60	100.0%	3	18	4	25	3.0	18.0	4.0	25.0	72.0%	130.1	78.0
12/6/10 6:02	12/6/10 7:02	60	60	0	60	100.0%	0	18	5	23	0.0	18.0	5.0	23.0	78.3%	126.7	86.9
12/7/10 6:03	12/7/10 7:03	60	60	0	60	100.0%	1	21	5	27	1.0	21.0	5.0	27.0	77.8%	117.7	64.6
12/8/10 6:04	12/8/10 7:04	60	60	0	60	100.0%	0	12	14	26	0.0	12.0	14.0	26.0	46.2%	250.9	146.2
12/9/10 6:04	12/9/10 7:04	60	60	0	60	100.0%	1	14	17	32	1.0	14.0	17.0	32.0	43.8%	259.3	145.2
12/10/10 6:05	12/10/10 7:05	60	60	0	60	100.0%	0	16	15	31	0.0	16.0	15.0	31.0	51.6%	297.7	130.1
12/11/10 6:06	12/11/10 7:06	60	60	0	60	100.0%	0	11	75	86	0.0	11.0	75.0	86.0	12.8%	588.9	627.4
12/12/10 6:07	12/12/10 7:07	60	60	0	60	100.0%	0	10	12	22	0.0	10.0	12.0	22.0	45.5%	360.9	160.5
12/13/10 6:07	12/13/10 7:07	60	60	0	60	100.0%	0	8	11	19	0.0	8.0	11.0	19.0	42.1%	229.5	194.8
12/14/10 6:08	12/14/10 7:08	60	60	0	60	100.0%	3	19	48	70	3.0	19.0	48.0	70.0	27.1%	303.4	303.7
12/15/10 6:09	12/15/10 7:09	60	60	0	60	100.0%	1	2	0	3	1.0	2.0	0.0	3.0	66.7%	43.5	43.9
12/16/10 6:09	12/16/10 7:09	60	60	0	60	100.0%	0	3	0	3	0.0	3.0	0.0	3.0	100.0%	91.2	84.1
12/17/10 6:10	12/17/10 7:10	60	60	0	60	100.0%	0	2	7	9	0.0	2.0	7.0	9.0	22.2%	260.1	224.0
12/18/10 6:11	12/18/10 7:11	60	60	0	60	100.0%	1	1	3	5	1.0	1.0	3.0	5.0	20.0%	135.7	144.8
12/19/10 6:11	12/19/10 7:11	60	60	0	60	100.0%	3	18	5	26	3.0	18.0	5.0	26.0	69.2%	128.4	102.9
12/20/10 6:12	12/20/10 7:12	60	60	17	43	71.7%	1	9	1	11	1.4	12.6	1.4	15.3	81.8%	89.3	79.2
12/21/10 6:12	12/21/10 7:12	60	60	0	60	100.0%	5	9	2	16	5.0	9.0	2.0	16.0	56.3%	74.8	57.8
12/22/10 6:13	12/22/10 7:13	60	60	60	0	0.0%											
12/23/10 6:13	12/23/10 7:13	60	60	0	60	100.0%	3	7	2	12	3.0	7.0	2.0	12.0	58.3%	116.2	73.9
12/24/10 6:14	12/24/10 7:14	60	60	0	60	100.0%	0	4	10	14	0.0	4.0	10.0	14.0	28.6%	400.2	232.9
12/25/10 6:14	12/25/10 7:14	60	60	0	60	100.0%	0	16	8	26	2.0	16.0	8.0	26.0	61.5%	103.4	79.7
12/26/10 6:14	12/26/10 7:14	60	60	0	60	100.0%	2	1	1	2	0.0	1.0	1.0	2.0	50.0%	421.1	421.1
12/27/10 6:15	12/27/10 7:15	60	60	0	60	100.0%	0	12	9	21	0.0	12.0	9.0	21.0	57.1%	134.7	91.4
12/28/10 6:15	12/28/10 7:15	60	60	0	60	100.0%	1	4	12	17	1.0	4.0	12.0	17.0	23.5%	228.7	157.6
12/29/10 6:15	12/29/10 7:15	60	60	0	60	100.0%	0	9	4	13	0.0	9.0	4.0	13.0	69.2%	128.2	93.0
12/30/10 6:16	12/30/10 7:16	60	60	0	60	100.0%	1	2	1	4	1.0	2.0	1.0	4.0	50.0%	290.5	39.5
12/31/10 6:16	12/31/10 7:16	60	60	0	60	100.0%	1	4	2	7	1.0	4.0	2.0	7.0	57.1%	290.4	88.4
1/1/11 6:16	1/1/11 7:16	60	60	0	60	100.0%	2	14	1	17	2.0	14.0	1.0	17.0	82.4%	78.1	58.2
1/2/11 6:17	1/2/11 7:17	60	60	0	60	100.0%	1	7	4	12	1.0	7.0	4.0	12.0	58.3%	117.0	119.6
1/3/11 6:17	1/3/11 7:17	60	60	0	60	100.0%	1	4	4	9	1.0	4.0	4.0	9.0	44.4%	159.8	110.0
1/4/11 6:17	1/4/11 7:17	60	60	0	60	100.0%	1	4	4	9	1.0	4.0	4.0	9.0	44.4%	143.5	107.6
1/5/11 6:17	1/5/11 7:17	60	60	0	60	100.0%	2	6	7	15	2.0	6.0	7.0	15.0	40.0%	150.1	124.4
1/6/11 6:17	1/6/11 7:17	60	60	0	60	100.0%	1	10	2	13	1.0	10.0	2.0	13.0	76.9%	124.1	112.8
1/7/11 6:17	1/7/11 7:17	60	60	0	60	100.0%	1	6	7	14	1.0	6.0	7.0	14.0	42.9%	177.2	133.2
1/8/11 6:17	1/8/11 7:17	60	60	0	60	100.0%	0	2	1	3	0.0	2.0	1.0	3.0	66.7%	117.2	127.1
1/9/11 6:17	1/9/11 7:17	60	60	0	60	100.0%	0	7	6	13	0.0	7.0	6.0	13.0	53.8%	167.2	130.5
1/10/11 6:17	1/10/11 7:17	60	60	0	60	100.0%	1	9	2	12	1.0	9.0	2.0	12.0	75.0%	87.8	75.7
1/11/11 6:17	1/11/11 7:17	60	60	0	60	100.0%	0	3	1	4	0.0	3.0	1.0	4.0	75.0%	166.0	120.9
1/12/11 6:17	1/12/11 7:17	60	60	0	60	100.0%	1	3	4	8	1.0	3.0	4.0	8.0	37.5%	193.2	148.0
1/13/11 6:17	1/13/11 7:17	60	60	0	60	100.0%	0	3	2	5	0.0	3.0	2.0	5.0	60.0%	108.4	76.2
1/14/11 6:17	1/14/11 7:17	60	60	0	60	100.0%	0	2	8	10	0.0	2.0	8.0	10.0	20.0%	494.0	232.0
1/15/11 6:16	1/15/11 7:16	60	60	0	60	100.0%	1	2	6	9	1.0	2.0	6.0	9.0	22.2%	275.4	290.5

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-5 continued. Target counts, passage rates, and mean and median target heights during dawns of the winter 2010-11 season.

Sunrise - 30 minutes	Sunrise + 30 minutes	Minutes in Dawn	Minutes Radar On	Minutes with Rain	Total Dawn Minutes	% Dawn with Data	Dawn Count Below RSZ	Dawn Count at RSZ	Dawn Count Above RSZ	Total Dawn Count	Dawn TPR Below RSZ	Dawn TPR at RSZ	Dawn TPR Above RSZ	Dawn TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
1/16/11 6:16	1/16/11 7:16	60	60	0	60	100.0%	1	7	13	21	1.0	7.0	13.0	21.0	33.3%	275.8	226.5
1/17/11 6:16	1/17/11 7:16	60	60	0	60	100.0%	1	13	138	152	1.0	13.0	138.0	152.0	8.6%	254.1	257.1
1/18/11 6:16	1/18/11 7:16	60	60	0	60	100.0%	1	5	34	40	1.0	5.0	34.0	40.0	12.5%	258.9	194.2
1/19/11 6:15	1/19/11 7:15	60	0	0	0	0.0%											
1/20/11 6:15	1/20/11 7:15	60	0	0	0	0.0%											
1/21/11 6:15	1/21/11 7:15	60	0	0	0	0.0%											
1/22/11 6:14	1/22/11 7:14	60	0	0	0	0.0%											
1/23/11 6:14	1/23/11 7:14	60	0	0	0	0.0%											
1/24/11 6:13	1/24/11 7:13	60	0	0	0	0.0%											
1/25/11 6:13	1/25/11 7:13	60	60	0	60	100.0%	0	2	2	4	0.0	2.0	2.0	4.0	50.0%	142.8	135.6
1/26/11 6:12	1/26/11 7:12	60	60	0	60	100.0%	4	7	63	74	4.0	7.0	63.0	74.0	9.5%	479.2	525.8
1/27/11 6:12	1/27/11 7:12	60	0	0	0	0.0%											
1/28/11 6:11	1/28/11 7:11	60	0	0	0	0.0%											
1/29/11 6:11	1/29/11 7:11	60	0	0	0	0.0%											
1/30/11 6:10	1/30/11 7:10	60	60	0	60	100.0%	2	6	3	11	2.0	6.0	3.0	11.0	54.5%	126.5	97.5
1/31/11 6:10	1/31/11 7:10	60	60	0	60	100.0%	0	1	1	2	0.0	1.0	1.0	2.0	50.0%	110.5	110.5
2/1/11 6:09	2/1/11 7:09	60	60	0	60	100.0%	4	4	3	11	4.0	4.0	3.0	11.0	36.4%	118.3	58.5
2/2/11 6:08	2/2/11 7:08	60	60	0	60	100.0%	4	8	40	52	4.0	8.0	40.0	52.0	15.4%	276.3	276.0
2/3/11 6:07	2/3/11 7:07	60	60	0	60	100.0%	1	2	1	4	1.0	2.0	1.0	4.0	50.0%	132.8	93.4
2/4/11 6:07	2/4/11 7:07	60	60	0	60	100.0%	3	2	1	6	3.0	2.0	1.0	6.0	33.3%	75.4	57.3
2/5/11 6:06	2/5/11 7:06	60	60	0	60	100.0%	7	8	4	19	7.0	8.0	4.0	19.0	42.1%	87.0	58.5
2/6/11 6:05	2/6/11 7:05	60	60	0	60	100.0%	5	6	19	30	5.0	6.0	19.0	30.0	20.0%	256.7	163.8
2/7/11 6:04	2/7/11 7:04	60	60	0	60	100.0%	3	12	13	28	3.0	12.0	13.0	28.0	42.9%	272.4	125.4
2/8/11 6:04	2/8/11 7:04	60	60	0	60	100.0%	10	29	30	69	10.0	29.0	30.0	69.0	42.0%	233.5	112.8
2/9/11 6:03	2/9/11 7:03	60	34	0	34	56.7%	4	3	2	9	7.1	5.3	3.5	15.9	33.3%	74.8	43.3
2/10/11 6:02	2/10/11 7:02	60	60	0	60	100.0%	2	4	56	62	2.0	4.0	56.0	62.0	6.5%	351.5	375.1
2/11/11 6:01	2/11/11 7:01	60	60	0	60	100.0%	1	4	4	9	1.0	4.0	4.0	9.0	44.4%	175.2	124.1
2/12/11 6:00	2/12/11 7:00	60	60	0	60	100.0%	2	9	8	19	2.0	9.0	8.0	19.0	47.4%	219.0	62.8
2/13/11 5:59	2/13/11 6:59	60	60	0	60	100.0%	4	6	10	20	4.0	6.0	10.0	20.0	30.0%	224.6	144.6
2/14/11 5:58	2/14/11 6:58	60	60	0	60	100.0%	6	13	17	36	6.0	13.0	17.0	36.0	36.1%	209.9	117.2
2/15/11 5:57	2/15/11 6:57	60	60	0	60	100.0%	2	8	8	18	2.0	8.0	8.0	18.0	44.4%	326.3	95.7
2/16/11 5:56	2/16/11 6:56	60	60	0	60	100.0%	6	12	8	26	6.0	12.0	8.0	26.0	46.2%	123.3	110.5
2/17/11 5:55	2/17/11 6:55	60	60	0	60	100.0%	3	3	2	8	3.0	3.0	2.0	8.0	37.5%	97.1	75.0
2/18/11 5:54	2/18/11 6:54	60	60	0	60	100.0%	2	12	14	28	2.0	12.0	14.0	28.0	42.9%	324.0	169.2
2/19/11 5:53	2/19/11 6:53	60	60	60	0	0.0%											
2/20/11 5:52	2/20/11 6:52	60	60	7	53	88.3%	4	2	0	6	4.5	2.3	0.0	6.8	33.3%	36.9	16.3
2/21/11 5:51	2/21/11 6:51	60	0	0	0	0.0%											
2/22/11 5:50	2/22/11 6:50	60	0	0	0	0.0%											
2/23/11 5:49	2/23/11 6:49	60	0	0	0	0.0%											
2/24/11 5:48	2/24/11 6:48	60	60	0	60	100.0%	4	5	0	9	4.0	5.0	0.0	9.0	55.6%	32.1	30.2
2/25/11 5:47	2/25/11 6:47	60	60	0	60	100.0%	1	3	4	8	1.0	3.0	4.0	8.0	37.5%	311.8	123.6
2/26/11 5:45	2/26/11 6:45	60	60	0	60	100.0%	2	2	0	4	2.0	2.0	0.0	4.0	50.0%	53.1	52.9
2/27/11 5:44	2/27/11 6:44	60	60	0	60	100.0%	3	5	0	8	3.0	5.0	0.0	8.0	62.5%	49.1	48.3
2/28/11 5:43	2/28/11 6:43	60	60	0	60	100.0%	1	5	9	15	1.0	5.0	9.0	15.0	33.3%	301.9	270.4

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Swept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-6. Target counts, passage rates, and mean and median target heights during days of the winter 2010-11 season.

Sunrise + 30 minutes	Sunset -30 minutes	Minutes in Day	Minutes Radar On	Minutes with Rain	Total Day Minutes	% Day with Data	Day Count Below RSZ	Day Count at RSZ	Day Count Above RSZ	Total Day Count	Day TPR Below RSZ	Day TPR at RSZ	Day TPR Above RSZ	Day TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
12/1/10 6:58	12/1/10 16:07	549	549	0	549	100.0%	41	284	288	613	4.5	31.0	31.5	67.0	46.3%	192.3	124.1
12/2/10 6:59	12/2/10 16:07	548	548	0	548	100.0%	59	361	794	1214	6.5	39.5	86.9	132.9	29.7%	248.5	198.0
12/3/10 7:00	12/3/10 16:07	547	547	0	547	100.0%	29	278	614	921	3.2	30.5	67.3	101.0	30.2%	264.1	197.8
12/4/10 7:01	12/4/10 16:07	546	546	0	546	100.0%	14	77	215	306	1.5	8.5	23.6	33.6	25.2%	248.8	198.6
12/5/10 7:01	12/5/10 16:07	546	546	38	508	93.0%	46	271	456	773	5.4	32.0	53.9	91.3	35.1%	223.7	168.9
12/6/10 7:02	12/6/10 16:07	545	545	0	545	100.0%	63	425	1110	1598	6.9	46.8	122.2	175.9	26.6%	234.3	204.4
12/7/10 7:03	12/7/10 16:08	545	545	0	545	100.0%	63	438	665	1166	6.9	48.2	73.2	128.4	37.6%	195.0	161.2
12/8/10 7:04	12/8/10 16:08	544	544	0	544	100.0%	112	578	864	1554	12.4	63.8	95.3	171.4	37.2%	194.0	153.9
12/9/10 7:04	12/9/10 16:08	544	544	0	544	100.0%	102	629	1149	1880	11.3	69.4	126.7	207.4	33.5%	202.5	171.1
12/10/10 7:05	12/10/10 16:08	543	543	0	543	100.0%	104	764	1422	2290	11.5	84.4	157.1	253.0	33.4%	199.7	176.8
12/11/10 7:06	12/11/10 16:08	542	542	0	542	100.0%	73	641	1119	1833	8.1	71.0	123.9	202.9	35.0%	205.6	165.5
12/12/10 7:07	12/12/10 16:08	541	541	0	541	100.0%	86	408	857	1351	9.5	45.2	95.0	149.8	30.2%	209.6	181.1
12/13/10 7:07	12/13/10 16:09	542	542	0	542	100.0%	42	389	786	1217	4.6	43.1	87.0	134.7	32.0%	219.4	182.0
12/14/10 7:08	12/14/10 16:09	541	541	0	541	100.0%	86	742	1986	2814	9.5	82.3	220.3	312.1	26.4%	235.5	206.5
12/15/10 7:09	12/15/10 16:09	540	540	0	540	100.0%	3	10	19	32	0.3	1.1	2.1	3.6	31.3%	289.5	204.1
12/16/10 7:09	12/16/10 16:10	541	541	0	541	100.0%	1	11	7	19	0.1	1.2	0.8	2.1	57.9%	148.0	95.4
12/17/10 7:10	12/17/10 16:10	540	498	0	498	92.2%	15	71	144	230	1.8	8.6	17.3	27.7	30.9%	250.6	187.8
12/18/10 7:11	12/18/10 16:10	540	540	0	540	100.0%	6	23	8	37	0.7	2.6	0.9	4.1	62.2%	112.9	88.1
12/19/10 7:11	12/19/10 16:11	540	540	0	540	100.0%	11	116	104	231	1.2	12.9	11.6	25.7	50.2%	179.5	120.1
12/20/10 7:12	12/20/10 16:11	539	539	222	317	58.8%	6	42	36	84	1.1	7.9	6.8	15.9	50.0%	170.2	114.8
12/21/10 7:12	12/21/10 16:12	540	540	328	212	39.3%	6	22	19	47	1.7	6.2	5.4	13.3	46.8%	185.2	101.5
12/22/10 7:13	12/22/10 16:12	539	539	524	15	2.8%	0	1	0	1	0.0	4.0	0.0	4.0	100.0%	80.5	80.5
12/23/10 7:13	12/23/10 16:13	540	540	0	540	100.0%	16	98	197	311	1.8	10.9	21.9	34.6	31.5%	213.4	178.0
12/24/10 7:14	12/24/10 16:13	539	539	0	539	100.0%	47	318	291	656	5.2	35.4	32.4	73.0	48.5%	171.3	110.0
12/25/10 7:14	12/25/10 16:14	540	540	0	540	100.0%	32	176	309	517	3.6	19.6	34.3	57.4	34.0%	216.1	175.0
12/26/10 7:14	12/26/10 16:15	541	541	0	541	100.0%	9	29	16	54	1.0	3.2	1.8	6.0	53.7%	151.6	74.5
12/27/10 7:15	12/27/10 16:15	540	540	0	540	100.0%	25	144	183	352	2.8	16.0	20.3	39.1	40.9%	197.9	141.3
12/28/10 7:15	12/28/10 16:16	541	541	0	541	100.0%	47	366	1103	1516	5.2	40.6	122.3	168.1	24.1%	248.2	214.6
12/29/10 7:15	12/29/10 16:16	541	541	272	269	49.7%	10	68	31	109	2.2	15.2	6.9	24.3	62.4%	111.7	101.2
12/30/10 7:16	12/30/10 16:17	541	541	0	541	100.0%	5	25	14	44	0.6	2.8	1.6	4.9	56.8%	275.8	79.6
12/31/10 7:16	12/31/10 16:18	542	542	0	542	100.0%	8	41	30	79	0.9	4.5	3.3	8.7	51.9%	188.8	104.9
1/1/11 7:16	1/1/11 16:19	543	543	0	543	100.0%	21	27	21	69	2.3	3.0	2.3	7.6	39.1%	110.7	79.2
1/2/11 7:17	1/2/11 16:20	543	543	0	543	100.0%	20	27	24	71	2.2	3.0	2.7	7.8	38.0%	134.0	93.0
1/3/11 7:17	1/3/11 16:20	543	543	240	303	55.8%	3	7	3	13	0.6	1.4	0.6	2.6	53.8%	240.8	64.9
1/4/11 7:17	1/4/11 16:21	544	544	0	544	100.0%	15	55	80	150	1.7	6.1	8.8	16.5	36.7%	206.4	157.6
1/5/11 7:17	1/5/11 16:22	545	545	0	545	100.0%	9	43	66	118	1.0	4.7	7.3	13.0	36.4%	245.1	155.0
1/6/11 7:17	1/6/11 16:23	546	546	30	516	94.5%	31	111	125	267	3.6	12.9	14.5	31.0	41.6%	160.3	118.3
1/7/11 7:17	1/7/11 16:24	547	547	0	547	100.0%	25	210	238	473	2.7	23.0	26.1	51.9	44.4%	180.7	133.8
1/8/11 7:17	1/8/11 16:24	547	547	0	547	100.0%	11	46	102	159	1.2	5.0	11.2	17.4	28.9%	224.5	192.6
1/9/11 7:17	1/9/11 16:25	548	548	0	548	100.0%	11	21	29	61	1.2	2.3	3.2	6.7	34.4%	273.6	121.0
1/10/11 7:17	1/10/11 16:26	549	549	45	504	91.8%	17	90	245	352	2.0	10.7	29.2	41.9	25.6%	291.7	226.5
1/11/11 7:17	1/11/11 16:27	550	550	0	550	100.0%	11	41	42	94	1.2	4.5	4.6	10.3	43.6%	211.6	112.5
1/12/11 7:17	1/12/11 16:28	551	551	0	551	100.0%	27	105	315	447	2.9	11.4	34.3	48.7	23.5%	273.1	244.8
1/13/11 7:17	1/13/11 16:29	552	552	0	552	100.0%	43	307	914	1264	4.7	33.4	99.3	137.4	24.3%	233.7	210.0
1/14/11 7:17	1/14/11 16:30	553	553	0	553	100.0%	39	215	464	718	4.2	23.3	50.3	77.9	29.9%	224.2	194.2
1/15/11 7:16	1/15/11 16:31	555	555	0	555	100.0%	35	399	1090	1524	3.8	43.1	117.8	164.8	26.2%	231.6	207.3

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-6 continued. Target counts, passage rates, and mean and median target heights during days of the winter 2010-11 season.

Sunrise + 30 minutes	Sunset -30 minutes	Minutes in Day	Minutes Radar On	Minutes w ith Rain	Total Day Minutes	% Day w ith Data	Day Count Below RSZ	Day Count at RSZ	Day Count Above RSZ	Total Day Count	Day TPR Below RSZ	Day TPR at RSZ	Day TPR Above RSZ	Day TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
1/16/11 7:16	1/16/11 16:31	555	555	15	540	97.3%	66	1191	3326	4583	7.3	132.3	369.6	509.2	26.0%	211.3	188.7
1/17/11 7:16	1/17/11 16:32	556	556	0	556	100.0%	102	1631	7750	9483	11.0	176.0	836.3	1023.3	17.2%	241.1	231.6
1/18/11 7:16	1/18/11 16:33	557	369	0	369	66.2%	41	1288	6001	7330	6.7	209.4	975.8	1191.9	17.6%	253.2	233.8
1/19/11 7:15	1/19/11 16:34	559	0	0	0	0.0%											
1/20/11 7:15	1/20/11 16:35	560	0	0	0	0.0%											
1/21/11 7:15	1/21/11 16:36	561	0	0	0	0.0%											
1/22/11 7:14	1/22/11 16:37	563	0	0	0	0.0%											
1/23/11 7:14	1/23/11 16:38	564	0	0	0	0.0%											
1/24/11 7:13	1/24/11 16:39	566	341	0	341	60.2%	22	541	3104	3667	3.9	95.2	546.2	645.2	14.8%	240.9	228.9
1/25/11 7:13	1/25/11 16:40	567	567	0	567	100.0%	20	396	2886	3302	2.1	41.9	305.4	349.4	12.0%	269.0	258.0
1/26/11 7:12	1/26/11 16:41	569	569	75	494	86.8%	18	122	782	922	2.2	14.8	95.0	112.0	13.2%	290.0	276.9
1/27/11 7:12	1/27/11 16:42	570	0	0	0	0.0%											
1/28/11 7:11	1/28/11 16:43	572	0	0	0	0.0%											
1/29/11 7:11	1/29/11 16:44	573	288	123	165	28.8%	1	3	48	52	0.4	1.1	17.5	18.9	5.8%	421.3	363.3
1/30/11 7:10	1/30/11 16:45	575	575	0	575	100.0%	8	62	68	138	0.8	6.5	7.1	14.4	44.9%	190.0	128.0
1/31/11 7:10	1/31/11 16:46	576	576	0	576	100.0%	21	86	324	431	2.2	9.0	33.8	44.9	20.0%	261.4	255.7
2/1/11 7:09	2/1/11 16:47	578	578	0	578	100.0%	26	316	2916	3258	2.7	32.8	302.7	338.2	9.7%	326.9	308.9
2/2/11 7:08	2/2/11 16:47	579	579	0	579	100.0%	30	125	714	869	3.1	13.0	74.0	90.1	14.4%	356.7	360.0
2/3/11 7:07	2/3/11 16:48	581	581	0	581	100.0%	25	47	160	232	2.6	4.9	16.5	24.0	20.3%	277.1	258.9
2/4/11 7:07	2/4/11 16:49	582	582	0	582	100.0%	11	72	312	395	1.1	7.4	32.2	40.7	18.2%	236.0	242.0
2/5/11 7:06	2/5/11 16:50	584	360	0	360	61.6%	25	1273	3686	4984	4.2	212.2	614.3	830.7	25.5%	222.7	191.3
2/6/11 7:05	2/6/11 16:51	586	586	120	466	79.5%	33	407	3148	3588	4.2	52.4	405.3	462.0	11.3%	308.5	298.4
2/7/11 7:04	2/7/11 16:52	588	588	0	588	100.0%	49	1510	16899	18458	5.0	154.1	1724.4	1883.5	8.2%	299.9	287.1
2/8/11 7:04	2/8/11 16:53	589	589	120	469	79.6%	44	384	3808	4236	5.6	49.1	487.2	541.9	9.1%	322.3	304.3
2/9/11 7:03	2/9/11 16:54	591	591	60	531	89.8%	26	132	647	805	2.9	14.9	73.1	91.0	16.4%	298.4	289.3
2/10/11 7:02	2/10/11 16:55	593	593	0	593	100.0%	24	146	614	784	2.4	14.8	62.1	79.3	18.6%	287.2	271.3
2/11/11 7:01	2/11/11 16:56	595	595	90	505	84.9%	17	254	2859	3130	2.0	30.2	339.7	371.9	8.1%	319.1	309.5
2/12/11 7:00	2/12/11 16:57	597	597	0	597	100.0%	46	1151	14737	15934	4.6	115.7	1481.1	1601.4	7.2%	300.1	291.7
2/13/11 6:59	2/13/11 16:58	599	599	0	599	100.0%	55	1895	18563	20513	5.5	189.8	1859.4	2054.7	9.2%	295.5	282.9
2/14/11 6:58	2/14/11 16:58	600	600	180	420	70.0%	14	135	849	998	2.0	19.3	121.3	142.6	13.5%	305.8	289.1
2/15/11 6:57	2/15/11 16:59	602	602	0	602	100.0%	21	184	1492	1697	2.1	18.3	148.7	169.1	10.8%	290.8	281.9
2/16/11 6:56	2/16/11 17:00	604	604	225	379	62.7%	19	95	117	231	3.0	15.0	18.5	36.6	41.1%	203.0	136.9
2/17/11 6:55	2/17/11 17:01	606	606	0	606	100.0%	20	34	45	99	2.0	3.4	4.5	9.8	34.3%	238.4	113.4
2/18/11 6:54	2/18/11 17:02	608	608	168	440	72.4%	30	186	1274	1490	4.1	25.4	173.7	203.2	12.5%	307.2	305.4
2/19/11 6:53	2/19/11 17:03	610	610	261	349	57.2%	8	25	8	41	1.4	4.3	1.4	7.0	61.0%	103.8	73.8
2/20/11 6:52	2/20/11 17:04	612	184	0	184	30.1%	3	23	5	31	1.0	7.5	1.6	10.1	74.2%	86.3	59.1
2/21/11 6:51	2/21/11 17:04	613	0	0	0	0.0%											
2/22/11 6:50	2/22/11 17:05	615	0	0	0	0.0%											
2/23/11 6:49	2/23/11 17:06	617	103	45	58	9.4%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	2004.4	2004.4
2/24/11 6:48	2/24/11 17:07	619	395	0	395	63.8%	0	8	8	16	0.0	1.2	1.2	2.4	50.0%	183.1	157.4
2/25/11 6:47	2/25/11 17:08	621	621	0	621	100.0%	9	7	4	20	0.9	0.7	0.4	1.9	35.0%	165.7	51.8
2/26/11 6:45	2/26/11 17:09	624	624	465	159	25.5%	5	2	6	13	1.9	0.8	2.3	4.9	15.4%	163.9	129.2
2/27/11 6:44	2/27/11 17:09	625	625	0	625	100.0%	11	26	55	92	1.1	2.5	5.3	8.8	28.3%	291.5	195.2
2/28/11 6:43	2/28/11 17:10	627	627	0	627	100.0%	15	59	340	414	1.4	5.6	32.5	39.6	14.3%	262.4	251.8

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-7. Target counts, passage rates, and mean and median target heights during dusks of the winter 2010-11 season.

Sunset - 30 minutes	Sunset + 30 minutes	Minutes in Dusk	Minutes Radar On	Minutes w with Rain	Total Dusk Minutes	% Dusk with Data	Dusk Count Below RSZ	Dusk Count at RSZ	Dusk Count Above RSZ	Total Dusk Count	Dusk TPR Below RSZ	Dusk TPR at RSZ	Dusk TPR Above RSZ	Dusk TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
12/1/10 16:07	12/1/10 17:07	60	60	0	60	100.0%	1	9	1	11	1.0	9.0	1.0	11.0	81.8%	84.5	64.0
12/2/10 16:07	12/2/10 17:07	60	60	0	60	100.0%	0	6	8	14	0.0	6.0	8.0	14.0	42.9%	189.9	174.5
12/3/10 16:07	12/3/10 17:07	60	60	0	60	100.0%	0	4	7	11	0.0	4.0	7.0	11.0	36.4%	202.6	172.2
12/4/10 16:07	12/4/10 17:07	60	60	0	60	100.0%	0	6	14	20	0.0	6.0	14.0	20.0	30.0%	337.8	220.2
12/5/10 16:07	12/5/10 17:07	60	60	7	53	88.3%	2	3	3	8	2.3	3.4	3.4	9.1	37.5%	267.1	67.7
12/6/10 16:07	12/6/10 17:07	60	60	0	60	100.0%	0	6	7	13	0.0	6.0	7.0	13.0	46.2%	184.7	143.6
12/7/10 16:08	12/7/10 17:08	60	60	0	60	100.0%	0	15	7	22	0.0	15.0	7.0	22.0	68.2%	110.8	98.6
12/8/10 16:08	12/8/10 17:08	60	60	0	60	100.0%	1	15	14	30	1.0	15.0	14.0	30.0	50.0%	179.8	117.0
12/9/10 16:08	12/9/10 17:08	60	60	0	60	100.0%	0	6	14	20	0.0	6.0	14.0	20.0	30.0%	218.0	175.4
12/10/10 16:08	12/10/10 17:08	60	60	0	60	100.0%	1	14	20	35	1.0	14.0	20.0	35.0	40.0%	195.1	175.6
12/11/10 16:08	12/11/10 17:08	60	60	0	60	100.0%	0	8	7	15	0.0	8.0	7.0	15.0	53.3%	147.2	101.2
12/12/10 16:08	12/12/10 17:08	60	60	0	60	100.0%	2	8	7	17	2.0	8.0	7.0	17.0	47.1%	197.2	128.3
12/13/10 16:09	12/13/10 17:09	60	60	0	60	100.0%	1	13	22	36	1.0	13.0	22.0	36.0	36.1%	195.7	185.8
12/14/10 16:09	12/14/10 17:09	60	60	0	60	100.0%	2	15	19	36	2.0	15.0	19.0	36.0	41.7%	161.7	150.0
12/15/10 16:09	12/15/10 17:09	60	60	0	60	100.0%	2	1	5	8	2.0	1.0	5.0	8.0	12.5%	427.9	300.1
12/16/10 16:10	12/16/10 17:10	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	210.2	210.2
12/17/10 16:10	12/17/10 17:10	60	60	0	60	100.0%	3	5	5	13	3.0	5.0	5.0	13.0	38.5%	191.1	118.0
12/18/10 16:10	12/18/10 17:10	60	60	0	60	100.0%	3	11	3	17	3.0	11.0	3.0	17.0	64.7%	87.1	76.2
12/19/10 16:11	12/19/10 17:11	60	60	0	60	100.0%	4	3	3	10	4.0	3.0	3.0	10.0	30.0%	92.6	35.8
12/20/10 16:11	12/20/10 17:11	60	60	33	27	45.0%	1	6	3	10	2.2	13.3	6.7	22.2	60.0%	189.2	108.8
12/21/10 16:12	12/21/10 17:12	60	60	60	0	0.0%											
12/22/10 16:12	12/22/10 17:12	60	60	32	28	46.7%	2	8	0	10	4.3	17.1	0.0	21.4	80.0%	63.4	50.9
12/23/10 16:13	12/23/10 17:13	60	60	0	60	100.0%	1	10	4	15	1.0	10.0	4.0	15.0	66.7%	110.6	103.6
12/24/10 16:13	12/24/10 17:13	60	60	0	60	100.0%	3	12	2	17	3.0	12.0	2.0	17.0	70.6%	81.7	79.6
12/25/10 16:14	12/25/10 17:14	60	60	0	60	100.0%	1	3	4	8	1.0	3.0	4.0	8.0	37.5%	203.0	148.6
12/26/10 16:15	12/26/10 17:15	60	60	0	60	100.0%	1	6	5	12	1.0	6.0	5.0	12.0	50.0%	107.7	74.1
12/27/10 16:15	12/27/10 17:15	60	60	0	60	100.0%	1	7	3	11	1.0	7.0	3.0	11.0	63.6%	109.8	103.0
12/28/10 16:16	12/28/10 17:16	60	60	0	60	100.0%	0	6	8	14	0.0	6.0	8.0	14.0	42.9%	186.8	150.1
12/29/10 16:16	12/29/10 17:16	60	60	28	32	53.3%	0	3	1	4	0.0	5.6	1.9	7.5	75.0%	89.2	85.2
12/30/10 16:17	12/30/10 17:17	60	60	0	60	100.0%	2	0	0	2	2.0	0.0	0.0	2.0	0.0%	16.2	16.2
12/31/10 16:18	12/31/10 17:18	60	60	0	60	100.0%	1	2	2	5	1.0	2.0	2.0	5.0	40.0%	118.8	111.6
1/1/11 16:19	1/1/11 17:19	60	60	0	60	100.0%	2	5	3	10	2.0	5.0	3.0	10.0	50.0%	94.7	56.1
1/2/11 16:20	1/2/11 17:20	60	60	0	60	100.0%	1	4	0	5	1.0	4.0	0.0	5.0	80.0%	51.2	55.5
1/3/11 16:20	1/3/11 17:20	60	60	0	60	100.0%	1	6	2	9	1.0	6.0	2.0	9.0	66.7%	105.8	79.9
1/4/11 16:21	1/4/11 17:21	60	60	0	60	100.0%	0	6	3	9	0.0	6.0	3.0	9.0	66.7%	131.1	101.2
1/5/11 16:22	1/5/11 17:22	60	60	0	60	100.0%	0	9	5	14	0.0	9.0	5.0	14.0	64.3%	126.1	115.2
1/6/11 16:23	1/6/11 17:23	60	60	0	60	100.0%	0	8	5	13	0.0	8.0	5.0	13.0	61.5%	127.7	120.1
1/7/11 16:24	1/7/11 17:24	60	60	0	60	100.0%	5	2	0	7	5.0	2.0	0.0	7.0	28.6%	40.6	19.8
1/8/11 16:24	1/8/11 17:24	60	60	0	60	100.0%	2	1	1	4	2.0	1.0	1.0	4.0	25.0%	112.5	66.9
1/9/11 16:25	1/9/11 17:25	60	60	0	60	100.0%	4	2	11	17	4.0	2.0	11.0	17.0	11.8%	524.0	288.0
1/10/11 16:26	1/10/11 17:26	60	60	0	60	100.0%	1	4	4	9	1.0	4.0	4.0	9.0	44.4%	406.8	129.8
1/11/11 16:27	1/11/11 17:27	60	60	43	17	28.3%	0	2	3	5	0.0	7.1	10.6	17.6	40.0%	322.4	182.3
1/12/11 16:28	1/12/11 17:28	60	60	0	60	100.0%	1	6	2	9	1.0	6.0	2.0	9.0	66.7%	198.4	109.1
1/13/11 16:29	1/13/11 17:29	60	60	0	60	100.0%	2	5	7	14	2.0	5.0	7.0	14.0	35.7%	263.7	132.7
1/14/11 16:30	1/14/11 17:30	60	60	0	60	100.0%	1	3	3	7	1.0	3.0	3.0	7.0	42.9%	246.7	113.4
1/15/11 16:31	1/15/11 17:31	60	60	0	60	100.0%	3	8	12	23	3.0	8.0	12.0	23.0	34.8%	210.4	138.7

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-7 continued. Target counts, passage rates, and mean and median target heights during dusks of the winter 2010-11 season.

Sunset - 30 minutes	Sunset + 30 minutes	Minutes in Dusk	Minutes Radar On	Minutes with Rain	Total Dusk Minutes	% Dusk with Data	Dusk Count Below RSZ	Dusk Count at RSZ	Dusk Count Above RSZ	Total Dusk Count	Dusk TPR Below RSZ	Dusk TPR at RSZ	Dusk TPR Above RSZ	Dusk TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
1/16/11 16:31	1/16/11 17:31	60	60	0	60	100.0%	0	10	129	139	0.0	10.0	129.0	139.0	7.2%	255.8	257.9
1/17/11 16:32	1/17/11 17:32	60	60	0	60	100.0%	0	19	72	91	0.0	19.0	72.0	91.0	20.9%	242.7	238.7
1/18/11 16:33	1/18/11 17:33	60	0	0	0	0.0%											
1/19/11 16:34	1/19/11 17:34	60	0	0	0	0.0%											
1/20/11 16:35	1/20/11 17:35	60	0	0	0	0.0%											
1/21/11 16:36	1/21/11 17:36	60	0	0	0	0.0%											
1/22/11 16:37	1/22/11 17:37	60	0	0	0	0.0%											
1/23/11 16:38	1/23/11 17:38	60	0	0	0	0.0%											
1/24/11 16:39	1/24/11 17:39	60	60	0	60	100.0%	2	5	4	11	2.0	5.0	4.0	11.0	45.5%	129.0	102.1
1/25/11 16:40	1/25/11 17:40	60	60	0	60	100.0%	1	2	4	7	1.0	2.0	4.0	7.0	28.6%	121.3	165.5
1/26/11 16:41	1/26/11 17:41	60	60	0	60	100.0%	2	3	6	11	2.0	3.0	6.0	11.0	27.3%	166.8	134.7
1/27/11 16:42	1/27/11 17:42	60	0	0	0	0.0%											
1/28/11 16:43	1/28/11 17:43	60	0	0	0	0.0%											
1/29/11 16:44	1/29/11 17:44	60	60	0	60	100.0%	1	1	23	25	1.0	1.0	23.0	25.0	4.0%	318.1	310.0
1/30/11 16:45	1/30/11 17:45	60	60	0	60	100.0%	1	2	1	4	1.0	2.0	1.0	4.0	50.0%	106.8	96.2
1/31/11 16:46	1/31/11 17:46	60	60	0	60	100.0%	2	4	3	9	2.0	4.0	3.0	9.0	44.4%	151.2	87.5
2/1/11 16:47	2/1/11 17:47	60	60	0	60	100.0%	1	8	9	18	1.0	8.0	9.0	18.0	44.4%	256.0	150.7
2/2/11 16:47	2/2/11 17:47	60	60	0	60	100.0%	2	1	4	7	2.0	1.0	4.0	7.0	14.3%	235.3	189.9
2/3/11 16:48	2/3/11 17:48	60	60	0	60	100.0%	1	1	2	4	1.0	1.0	2.0	4.0	25.0%	224.2	243.5
2/4/11 16:49	2/4/11 17:49	60	60	0	60	100.0%	3	3	6	12	3.0	3.0	6.0	12.0	25.0%	255.5	116.1
2/5/11 16:50	2/5/11 17:50	60	0	0	0	0.0%											
2/6/11 16:51	2/6/11 17:51	60	60	0	60	100.0%	3	7	31	41	3.0	7.0	31.0	41.0	17.1%	256.2	242.0
2/7/11 16:52	2/7/11 17:52	60	60	0	60	100.0%	1	26	104	131	1.0	26.0	104.0	131.0	19.8%	254.2	235.6
2/8/11 16:53	2/8/11 17:53	60	60	0	60	100.0%	2	8	13	23	2.0	8.0	13.0	23.0	34.8%	185.1	150.0
2/9/11 16:54	2/9/11 17:54	60	60	0	60	100.0%	2	5	9	16	2.0	5.0	9.0	16.0	31.3%	220.2	198.0
2/10/11 16:55	2/10/11 17:55	60	60	0	60	100.0%	1	4	6	11	1.0	4.0	6.0	11.0	36.4%	206.4	159.4
2/11/11 16:56	2/11/11 17:56	60	60	0	60	100.0%	0	8	10	18	0.0	8.0	10.0	18.0	44.4%	178.8	141.0
2/12/11 16:57	2/12/11 17:57	60	60	0	60	100.0%	3	19	37	59	3.0	19.0	37.0	59.0	32.2%	238.0	164.9
2/13/11 16:58	2/13/11 17:58	60	60	0	60	100.0%	2	68	319	389	2.0	68.0	319.0	389.0	17.5%	271.8	256.9
2/14/11 16:58	2/14/11 17:58	60	60	0	60	100.0%	1	1	2	4	1.0	1.0	2.0	4.0	25.0%	175.9	157.6
2/15/11 16:59	2/15/11 17:59	60	60	0	60	100.0%	1	2	3	6	1.0	2.0	3.0	6.0	33.3%	244.8	148.3
2/16/11 17:00	2/16/11 18:00	60	60	0	60	100.0%	3	26	8	37	3.0	26.0	8.0	37.0	70.3%	141.9	97.5
2/17/11 17:01	2/17/11 18:01	60	60	0	60	100.0%	1	6	1	8	1.0	6.0	1.0	8.0	75.0%	109.2	55.8
2/18/11 17:02	2/18/11 18:02	60	60	60	0	0.0%											
2/19/11 17:03	2/19/11 18:03	60	60	4	56	93.3%	3	6	9	18	3.2	6.4	9.6	19.3	33.3%	186.2	120.9
2/20/11 17:04	2/20/11 18:04	60	0	0	0	0.0%											
2/21/11 17:04	2/21/11 18:04	60	0	0	0	0.0%											
2/22/11 17:05	2/22/11 18:05	60	0	0	0	0.0%											
2/23/11 17:06	2/23/11 18:06	60	60	0	60	100.0%	0	1	2	3	0.0	1.0	2.0	3.0	33.3%	677.7	947.3
2/24/11 17:07	2/24/11 18:07	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	288.2	288.2
2/25/11 17:08	2/25/11 18:08	60	60	0	60	100.0%	1	1	1	3	1.0	1.0	1.0	3.0	33.3%	170.9	35.4
2/26/11 17:09	2/26/11 18:09	60	60	0	60	100.0%	0	1	0	1	0.0	1.0	0.0	1.0	100.0%	70.1	70.1
2/27/11 17:09	2/27/11 18:09	60	60	0	60	100.0%	0	4	20	24	0.0	4.0	20.0	24.0	16.7%	298.0	278.7
2/28/11 17:10	2/28/11 18:10	60	60	0	60	100.0%	1	4	2	7	1.0	4.0	2.0	7.0	57.1%	158.8	118.6

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level
**Periods with <50% of time recorded by radar are excluded from analyses*
**Insects noted in trackplot images during these time periods.*



Table 9-8. Target counts, passage rates, and mean and median target heights during nights of the winter 2010-11 season.

Sunset + 30 minutes	Sunrise next day - 30 minutes	Minutes in Night	Minutes Radar On	Minutes with Rain	Total Night Minutes	% Night with Data	Night Count Below RSZ	Night Count at RSZ	Night Count Above RSZ	Total Night Count	Night TPR Below RSZ	Night TPR at RSZ	Night TPR Above RSZ	Night TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
12/1/10 17:07	12/2/10 5:59	772	772	0	772	100.0%	3	53	382	438	0.2	4.1	29.7	34.0	12.1%	350.0	296.0
12/2/10 17:07	12/3/10 6:00	773	772	0	772	99.9%	8	112	556	676	0.6	8.7	43.2	52.5	16.6%	291.2	258.6
12/3/10 17:07	12/4/10 6:01	774	773	0	773	99.9%	7	90	498	595	0.5	7.0	38.7	46.2	15.1%	319.1	287.1
12/4/10 17:07	12/5/10 6:01	774	774	0	774	100.0%	7	79	516	602	0.5	6.1	40.0	46.7	13.1%	284.6	259.8
12/5/10 17:07	12/6/10 6:02	775	775	60	715	92.3%	16	161	743	920	1.3	13.5	62.3	77.2	17.5%	298.7	277.2
12/6/10 17:07	12/7/10 6:03	776	776	0	776	100.0%	12	82	434	528	0.9	6.3	33.6	40.8	15.5%	303.7	255.0
12/7/10 17:08	12/8/10 6:04	776	775	0	775	99.9%	4	49	241	294	0.3	3.8	18.7	22.8	16.7%	331.6	280.7
12/8/10 17:08	12/9/10 6:04	776	775	0	775	99.9%	5	87	487	579	0.4	6.7	37.7	44.8	15.0%	299.4	260.9
12/9/10 17:08	12/10/10 6:05	777	776	0	776	99.9%	5	141	461	607	0.4	10.9	35.6	46.9	23.2%	271.1	226.5
12/10/10 17:08	12/11/10 6:06	778	777	0	777	99.9%	13	116	407	536	1.0	9.0	31.4	41.4	21.6%	250.9	236.8
12/11/10 17:08	12/12/10 6:07	779	778	0	778	99.9%	2	49	159	210	0.2	3.8	12.3	16.2	23.3%	320.2	243.4
12/12/10 17:08	12/13/10 6:07	779	778	0	778	99.9%	3	83	367	453	0.2	6.4	28.3	34.9	18.3%	305.8	254.2
12/13/10 17:09	12/14/10 6:08	779	779	0	779	100.0%	19	266	1889	2174	1.5	20.5	145.5	167.4	12.2%	314.0	288.0
12/14/10 17:09	12/15/10 6:09	780	780	0	780	100.0%	8	104	648	760	0.6	8.0	49.8	58.5	13.7%	325.2	322.6
12/15/10 17:09	12/16/10 6:09	780	780	0	780	100.0%	5	101	253	359	0.4	7.8	19.5	27.6	28.1%	279.3	261.8
12/16/10 17:10	12/17/10 6:10	780	780	0	780	100.0%	10	97	246	353	0.8	7.5	18.9	27.2	27.5%	289.3	245.1
12/17/10 17:10	12/18/10 6:11	780	779	0	779	99.9%	8	98	397	503	0.6	7.5	30.6	38.7	19.5%	279.8	267.0
12/18/10 17:10	12/19/10 6:11	781	781	0	781	100.0%	12	121	668	801	0.9	9.3	51.3	61.5	15.1%	314.3	299.3
12/19/10 17:11	12/20/10 6:12	781	780	163	617	79.0%	27	220	753	1030	2.6	21.4	76.1	100.2	21.4%	619.8	260.5
12/20/10 17:11	12/21/10 6:12	781	781	45	736	94.2%	16	158	587	731	1.3	12.9	45.4	59.6	21.6%	272.9	268.5
12/21/10 17:12	12/22/10 6:13	781	780	316	464	59.4%	7	50	171	228	0.9	6.5	22.1	29.5	21.9%	300.2	302.8
12/22/10 17:12	12/23/10 6:13	781	779	30	749	95.9%	12	92	226	330	1.0	7.4	18.1	26.4	27.9%	281.6	235.6
12/23/10 17:13	12/24/10 6:14	781	781	0	781	100.0%	22	149	488	659	1.7	11.4	37.5	50.6	22.6%	309.3	256.9
12/24/10 17:13	12/25/10 6:14	781	781	0	781	100.0%	31	134	440	605	2.4	10.3	33.8	46.5	22.1%	309.5	233.8
12/25/10 17:14	12/26/10 6:14	780	780	0	780	100.0%	22	162	646	830	1.7	12.5	49.7	63.8	19.5%	305.4	269.0
12/26/10 17:15	12/27/10 6:15	780	779	0	779	99.9%	8	100	380	488	0.6	7.7	29.3	37.6	20.5%	317.1	243.7
12/27/10 17:15	12/28/10 6:15	780	780	0	780	100.0%	5	57	212	274	0.4	4.4	16.3	21.1	20.8%	317.7	253.4
12/28/10 17:16	12/29/10 6:15	779	779	0	779	100.0%	17	229	677	923	1.3	17.6	52.1	71.1	24.8%	284.1	258.2
12/29/10 17:16	12/30/10 6:16	780	779	60	719	92.2%	16	87	116	219	1.3	7.3	9.7	18.3	39.7%	241.0	150.0
12/30/10 17:17	12/31/10 6:16	779	778	0	778	99.9%	6	21	62	89	0.5	1.6	4.8	6.9	23.6%	503.1	471.2
12/31/10 17:18	1/1/11 6:16	778	401	0	401	51.5%	3	10	84	97	0.4	1.5	12.6	14.5	10.3%	375.8	299.8
1/1/11 17:19	1/2/11 6:17	778	778	0	778	100.0%	1	10	29	40	0.1	0.8	2.2	3.1	25.0%	596.2	324.8
1/2/11 17:20	1/3/11 6:17	777	777	315	462	59.5%	2	9	29	40	0.3	1.2	3.8	5.2	22.5%	282.6	241.6
1/3/11 17:20	1/4/11 6:17	777	777	0	777	100.0%	3	23	64	90	0.2	1.8	4.9	6.9	25.6%	274.8	233.9
1/4/11 17:21	1/5/11 6:17	776	776	0	776	100.0%	1	23	77	101	0.1	1.8	6.0	7.8	22.8%	326.0	246.3
1/5/11 17:22	1/6/11 6:17	775	774	0	774	99.9%	2	18	60	80	0.2	1.4	4.7	6.2	22.5%	303.6	229.4
1/6/11 17:23	1/7/11 6:17	774	773	15	758	97.9%	1	57	216	274	0.1	4.5	17.1	21.7	20.8%	316.5	243.7
1/7/11 17:24	1/8/11 6:17	773	773	0	773	100.0%	2	18	199	219	0.2	1.4	15.4	17.0	8.2%	383.6	371.6
1/8/11 17:24	1/9/11 6:17	773	773	0	773	100.0%	3	19	73	95	0.2	1.5	5.7	7.4	20.0%	477.7	374.9
1/9/11 17:25	1/10/11 6:17	772	772	0	772	100.0%	5	19	149	173	0.4	1.5	11.6	13.4	11.0%	358.2	317.0
1/10/11 17:26	1/11/11 6:17	771	771	0	771	100.0%	0	35	98	133	0.0	2.7	7.6	10.4	26.3%	263.4	221.6
1/11/11 17:27	1/12/11 6:17	770	769	107	662	86.0%	3	41	235	279	0.3	3.7	21.3	25.3	14.7%	292.1	255.4
1/12/11 17:28	1/13/11 6:17	769	769	0	769	100.0%	4	44	188	236	0.3	3.4	14.7	18.4	18.6%	295.8	252.5
1/13/11 17:29	1/14/11 6:17	768	767	0	767	99.9%	6	77	271	354	0.5	6.0	21.2	27.7	21.8%	265.7	238.7
1/14/11 17:30	1/15/11 6:16	766	766	0	766	100.0%	8	72	113	193	0.6	5.6	8.9	15.1	37.3%	242.4	179.2
1/15/11 17:31	1/16/11 6:16	765	764	0	764	99.9%	2	91	295	388	0.2	7.1	23.2	30.5	23.5%	257.8	222.2

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Swept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-8 continued. Target counts, passage rates, and mean and median target heights during nights of the winter 2010-11 season.

Sunset + 30 minutes	Sunrise next day - 30 minutes	Minutes in Night	Minutes Radar On	Minutes with Rain	Total Night Minutes	% Night with Data	Night Count Below RSZ	Night Count at RSZ	Night Count Above RSZ	Total Night Count	Night TPR Below RSZ	Night TPR at RSZ	Night TPR Above RSZ	Night TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
1/16/11 17:31	1/17/11 6:16	765	765	0	765	100.0%	21	302	1036	1359	1.6	23.7	81.3	106.6	22.2%	228.7	227.4
1/17/11 17:32	1/18/11 6:16	764	764	0	764	100.0%	20	414	1620	2054	1.6	32.5	127.2	161.3	20.2%	254.9	232.4
1/18/11 17:33	1/19/11 6:15	762	0	0	0	0.0%											
1/19/11 17:34	1/20/11 6:15	761	0	0	0	0.0%											
1/20/11 17:35	1/21/11 6:15	760	0	0	0	0.0%											
1/21/11 17:36	1/22/11 6:14	758	0	0	0	0.0%											
1/22/11 17:37	1/23/11 6:14	757	0	0	0	0.0%											
1/23/11 17:38	1/24/11 6:13	755	0	0	0	0.0%											
1/24/11 17:39	1/25/11 6:13	754	754	0	754	100.0%	8	93	332	433	0.6	7.4	26.4	34.5	21.5%	247.4	217.0
1/25/11 17:40	1/26/11 6:12	752	751	0	751	99.9%	5	76	805	886	0.4	6.1	64.3	70.8	8.6%	404.7	384.5
1/26/11 17:41	1/27/11 6:12	751	493	85	408	54.3%	8	28	98	134	1.2	4.1	14.4	19.7	20.9%	293.9	247.5
1/27/11 17:42	1/28/11 6:11	749	0	0	0	0.0%											
1/28/11 17:43	1/29/11 6:11	748	0	0	0	0.0%											
1/29/11 17:44	1/30/11 6:10	746	746	0	746	100.0%	7	77	750	834	0.6	6.2	60.3	67.1	9.2%	329.4	325.8
1/30/11 17:45	1/31/11 6:10	745	745	0	745	100.0%	7	42	109	158	0.6	3.4	8.8	12.7	26.6%	330.2	241.2
1/31/11 17:46	2/1/11 6:09	743	743	0	743	100.0%	8	29	349	349	0.6	2.3	25.2	28.2	8.3%	326.4	301.8
2/1/11 17:47	2/2/11 6:08	741	741	90	651	87.9%	11	142	1413	1566	1.0	13.1	130.2	144.3	9.1%	352.1	340.6
2/2/11 17:47	2/3/11 6:07	740	740	0	740	100.0%	2	7	23	32	0.2	0.6	1.9	2.6	21.9%	420.2	350.8
2/3/11 17:48	2/4/11 6:07	739	739	0	739	100.0%	3	11	580	594	0.2	0.9	47.1	48.2	1.9%	520.5	537.4
2/4/11 17:49	2/5/11 6:06	737	736	0	736	99.9%	12	48	232	292	1.0	3.9	18.9	23.8	16.4%	281.4	223.9
2/5/11 17:50	2/6/11 6:05	735	42	0	42	5.7%	2	22	89	113	2.9	31.4	127.1	161.4	19.5%	344.9	298.7
2/6/11 17:51	2/7/11 6:04	733	732	0	732	99.9%	5	93	491	589	0.4	7.6	40.2	48.3	15.8%	294.8	268.2
2/7/11 17:52	2/8/11 6:04	732	732	0	732	100.0%	63	393	2279	2735	5.2	32.2	186.8	224.2	14.4%	314.7	317.0
2/8/11 17:53	2/9/11 6:03	730	104	0	104	14.2%	3	36	402	441	1.7	20.8	231.9	254.4	8.2%	329.8	300.5
2/9/11 17:54	2/10/11 6:02	728	728	0	728	100.0%	3	42	143	188	0.2	3.5	11.8	15.5	22.3%	307.6	276.5
2/10/11 17:55	2/11/11 6:01	726	726	0	726	100.0%	5	37	132	174	0.4	3.1	10.9	14.4	21.3%	313.4	257.1
2/11/11 17:56	2/12/11 6:00	724	723	0	723	99.9%	3	55	193	251	0.2	4.6	16.0	20.8	21.9%	321.7	278.6
2/12/11 17:57	2/13/11 5:59	722	719	0	719	99.6%	3	71	391	465	0.3	5.9	32.6	38.8	15.3%	393.0	316.4
2/13/11 17:58	2/14/11 5:58	720	720	0	720	100.0%	40	221	1146	1407	3.3	18.4	95.5	117.3	15.7%	325.1	309.7
2/14/11 17:58	2/15/11 5:57	719	718	0	718	99.9%	11	40	354	405	0.9	3.3	29.6	33.8	9.9%	394.2	337.1
2/15/11 17:59	2/16/11 5:56	717	716	0	716	99.9%	9	45	309	363	0.8	3.8	25.9	30.4	12.4%	343.9	351.7
2/16/11 18:00	2/17/11 5:55	715	714	59	655	91.6%	7	64	170	241	0.6	5.9	15.6	22.1	26.6%	295.3	275.8
2/17/11 18:01	2/18/11 5:54	713	712	0	712	99.9%	13	128	559	700	1.1	10.8	47.1	59.0	18.3%	355.1	307.5
2/18/11 18:02	2/19/11 5:53	711	709	709	0	0.0%											
2/19/11 18:03	2/20/11 5:52	709	706	511	195	27.5%	4	38	36	78	1.2	11.7	11.1	24.0	48.7%	218.7	120.2
2/20/11 18:04	2/21/11 5:51	707	0	0	0	0.0%											
2/21/11 18:04	2/22/11 5:50	706	0	0	0	0.0%											
2/22/11 18:05	2/23/11 5:49	704	0	0	0	0.0%											
2/23/11 18:06	2/24/11 5:48	702	701	0	701	99.9%	4	5	15	24	0.3	0.4	1.3	2.1	20.8%	319.7	295.4
2/24/11 18:07	2/25/11 5:47	700	700	0	700	100.0%	12	48	190	250	1.0	4.1	16.3	21.4	19.2%	370.9	281.3
2/25/11 18:08	2/26/11 5:45	697	697	0	697	100.0%	31	58	124	213	2.7	5.0	10.7	18.3	27.2%	345.7	214.9
2/26/11 18:09	2/27/11 5:44	695	694	75	619	89.1%	9	18	9	36	0.9	1.7	0.9	3.5	50.0%	249.7	81.2
2/27/11 18:09	2/28/11 5:43	694	693	0	693	99.9%	5	36	463	504	0.4	3.1	40.1	43.6	7.1%	411.8	366.2
2/28/11 18:10	3/1/11 5:42	692	349	0	349	50.4%	2	27	207	236	0.3	4.6	35.6	40.6	11.4%	406.1	359.5

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-9. Target counts, passage rates, and mean and median target heights during dawns of the spring 2011 season.

Sunrise - 30 minutes	Sunrise + 30 minutes	Minutes in Dawn n	Minutes Radar On	Minutes w ith Rain	Total Dawn n Minutes	% Dawn n w ith Data	Daw n Count Below RSZ	Daw n Count at RSZ	Daw n Count Above RSZ	Total Dawn n Count	Daw n TPR Below RSZ	Daw n TPR at RSZ	Daw n TPR Above RSZ	Daw n TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
3/1/11 5:42	3/1/11 6:42	60	60	0	60	100.0%	4	10	11	25	4.0	10.0	11.0	25.0	40.0%	259.0	118.6
3/2/11 5:41	3/2/11 6:41	60	60	0	60	100.0%	2	7	34	43	2.0	7.0	34.0	43.0	16.3%	415.4	344.4
3/3/11 5:39	3/3/11 6:39	60	60	0	60	100.0%	3	7	6	16	3.0	7.0	6.0	16.0	43.8%	142.4	88.8
3/4/11 5:38	3/4/11 6:38	60	60	0	60	100.0%	2	9	17	28	2.0	9.0	17.0	28.0	32.1%	331.4	188.1
3/5/11 5:37	3/5/11 6:37	60	60	0	60	100.0%	2	7	15	24	2.0	7.0	15.0	24.0	29.2%	330.3	304.0
3/6/11 5:36	3/6/11 6:36	60	60	0	60	100.0%	6	9	70	85	6.0	9.0	70.0	85.0	10.6%	334.9	298.7
3/7/11 5:35	3/7/11 6:35	60	60	0	60	100.0%	0	1	2	3	0.0	1.0	2.0	3.0	33.3%	190.6	236.5
3/8/11 5:33	3/8/11 6:33	60	60	0	60	100.0%	3	1	8	12	3.0	1.0	8.0	12.0	8.3%	317.4	173.0
3/9/11 5:32	3/9/11 6:32	60	60	0	60	100.0%	4	11	18	33	4.0	11.0	18.0	33.0	33.3%	314.1	244.8
3/10/11 5:31	3/10/11 6:31	60	19	0	19	31.7%	0	2	16	18	0.0	6.3	50.5	56.8	11.1%	445.6	480.8
3/11/11 5:30	3/11/11 6:30	60	60	0	60	100.0%	0	4	48	52	0.0	4.0	48.0	52.0	7.7%	482.7	445.5
3/12/11 5:28	3/12/11 6:28	60	0	0	0	0.0%											
3/13/11 5:27	3/13/11 6:27	60	0	0	0	0.0%											
3/14/11 5:26	3/14/11 6:26	60	0	0	0	0.0%											
3/15/11 5:24	3/15/11 6:24	60	0	0	0	0.0%											
3/16/11 5:23	3/16/11 6:23	60	60	0	60	100.0%	0	2	15	17	0.0	2.0	15.0	17.0	11.8%	359.5	334.7
3/17/11 5:22	3/17/11 6:22	60	47	0	47	78.3%	2	1	13	16	2.6	1.3	16.6	20.4	6.3%	370.0	365.6
3/18/11 5:20	3/18/11 6:20	60	60	0	60	100.0%	3	8	10	21	3.0	8.0	10.0	21.0	38.1%	265.7	93.9
3/19/11 5:19	3/19/11 6:19	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	1074.4	1074.4
3/20/11 5:18	3/20/11 6:18	60	60	0	60	100.0%	1	2	17	20	1.0	2.0	17.0	20.0	10.0%	363.1	399.0
3/21/11 5:17	3/21/11 6:17	60	60	0	60	100.0%	5	11	19	35	5.0	11.0	19.0	35.0	31.4%	245.0	161.2
3/22/11 5:15	3/22/11 6:15	60	60	0	60	100.0%	2	3	3	8	2.0	3.0	3.0	8.0	37.5%	180.7	50.6
3/23/11 5:14	3/23/11 6:14	60	60	0	60	100.0%	2	2	14	18	2.0	2.0	14.0	18.0	11.1%	333.5	278.4
3/24/11 5:13	3/24/11 6:13	60	60	0	60	100.0%	2	7	2	11	2.0	7.0	2.0	11.0	63.6%	247.6	75.9
3/25/11 5:11	3/25/11 6:11	60	60	0	60	100.0%	0	0	0	0	0.0	0.0	0.0	0.0	na		
3/26/11 5:10	3/26/11 6:10	60	60	0	60	100.0%	1	1	0	2	1.0	1.0	0.0	2.0	50.0%	22.4	22.4
3/27/11 5:09	3/27/11 6:09	60	60	0	60	100.0%	3	19	37	59	3.0	19.0	37.0	59.0	32.2%	234.6	183.8
3/28/11 5:07	3/28/11 6:07	60	60	0	60	100.0%	6	11	47	64	6.0	11.0	47.0	64.0	17.2%	408.2	422.1
3/29/11 5:06	3/29/11 6:06	60	60	0	60	100.0%	0	10	44	54	0.0	10.0	44.0	54.0	18.5%	395.9	397.8
3/30/11 5:05	3/30/11 6:05	60	60	0	60	100.0%	4	13	48	65	4.0	13.0	48.0	65.0	20.0%	376.2	226.8
3/31/11 5:03	3/31/11 6:03	60	60	0	60	100.0%	4	8	88	100	4.0	8.0	88.0	100.0	8.0%	300.5	292.3
4/1/11 5:02	4/1/11 6:02	60	60	0	60	100.0%	0	4	69	73	0.0	4.0	69.0	73.0	5.5%	390.1	351.4
4/2/11 5:01	4/2/11 6:01	60	0	0	0	0.0%											
4/3/11 4:59	4/3/11 5:59	60	0	0	0	0.0%											
4/4/11 4:58	4/4/11 5:58	60	60	0	60	100.0%	3	10	46	59	3.0	10.0	46.0	59.0	16.9%	414.4	386.8
4/5/11 4:57	4/5/11 5:57	60	60	0	60	100.0%	3	6	74	83	3.0	6.0	74.0	83.0	7.2%	457.9	450.5
4/6/11 4:56	4/6/11 5:56	60	60	0	60	100.0%	12	30	50	92	12.0	30.0	50.0	92.0	32.6%	238.6	151.0
4/7/11 4:54	4/7/11 5:54	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	1553.3	1553.3
4/8/11 4:53	4/8/11 5:53	60	60	0	60	100.0%	0	2	8	10	0.0	2.0	8.0	10.0	20.0%	539.7	385.6
4/9/11 4:52	4/9/11 5:52	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	186.4	186.4
4/10/11 4:51	4/10/11 5:51	60	60	0	60	100.0%	6	6	16	28	6.0	6.0	16.0	28.0	21.4%	292.0	254.8
4/11/11 4:49	4/11/11 5:49	60	60	0	60	100.0%	0	3	19	22	0.0	3.0	19.0	22.0	13.6%	358.0	374.0
4/12/11 4:48	4/12/11 5:48	60	60	0	60	100.0%	6	15	14	35	6.0	15.0	14.0	35.0	42.9%	234.9	76.2
4/13/11 4:47	4/13/11 5:47	60	60	0	60	100.0%	0	4	7	11	0.0	4.0	7.0	11.0	36.4%	362.2	256.6
4/14/11 4:46	4/14/11 5:46	60	60	0	60	100.0%	2	8	21	31	2.0	8.0	21.0	31.0	25.8%	497.1	289.6
4/15/11 4:44	4/15/11 5:44	60	60	0	60	100.0%	2	3	26	31	2.0	3.0	26.0	31.0	9.7%	364.6	338.6

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods w ith <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-9 continued. Target counts, passage rates, and mean and median target heights during dawns of the spring 2011 season.

Sunrise - 30 minutes	Sunrise + 30 minutes	Minutes in Dawn n	Minutes Radar On	Minutes with Rain	Total Dawn n Minutes	% Dawn n with Data	Dawn n Count Below RSZ	Dawn n Count at RSZ	Dawn n Count Above RSZ	Total Dawn n Count	Dawn n TPR Below RSZ	Dawn n TPR at RSZ	Dawn n TPR Above RSZ	Dawn n TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
4/16/11 4:43	4/16/11 5:43	60	60	0	60	100.0%	0	5	119	124	0.0	5.0	119.0	124.0	4.0%	457.7	457.2
4/17/11 4:42	4/17/11 5:42	60	60	0	60	100.0%	2	14	164	180	2.0	14.0	164.0	180.0	7.8%	399.3	384.2
4/18/11 4:41	4/18/11 5:41	60	60	0	60	100.0%	0	4	8	12	0.0	4.0	8.0	12.0	33.3%	334.5	368.0
4/19/11 4:40	4/19/11 5:40	60	60	0	60	100.0%	0	3	18	21	0.0	3.0	18.0	21.0	14.3%	444.6	503.8
4/20/11 4:39	4/20/11 5:39	60	60	0	60	100.0%	0	3	13	16	0.0	3.0	13.0	16.0	18.8%	386.0	357.4
4/21/11 4:37	4/21/11 5:37	60	60	0	60	100.0%	4	4	23	31	4.0	4.0	23.0	31.0	12.9%	313.9	247.2
4/22/11 4:36	4/22/11 5:36	60	60	0	60	100.0%	2	0	20	22	2.0	0.0	20.0	22.0	0.0%	454.7	384.7
4/23/11 4:35	4/23/11 5:35	60	60	0	60	100.0%	1	1	17	19	1.0	1.0	17.0	19.0	5.3%	636.1	633.1
4/24/11 4:34	4/24/11 5:34	60	60	0	60	100.0%	0	1	46	47	0.0	1.0	46.0	47.0	2.1%	480.9	485.9
4/25/11 4:33	4/25/11 5:33	60	60	0	60	100.0%	2	10	66	78	2.0	10.0	66.0	78.0	12.8%	477.2	490.0
4/26/11 4:32	4/26/11 5:32	60	60	0	60	100.0%	11	100	277	388	11.0	100.0	277.0	388.0	25.8%	294.3	271.9
4/27/11 4:31	4/27/11 5:31	60	60	0	60	100.0%	3	5	64	72	3.0	5.0	64.0	72.0	6.9%	408.7	434.6
4/28/11 4:30	4/28/11 5:30	60	60	0	60	100.0%	3	15	237	255	3.0	15.0	237.0	255.0	5.9%	432.9	420.9
4/29/11 4:29	4/29/11 5:29	60	60	0	60	100.0%	1	4	16	21	1.0	4.0	16.0	21.0	19.0%	325.0	377.0
4/30/11 4:28	4/30/11 5:28	60	60	0	60	100.0%	2	12	62	76	2.0	12.0	62.0	76.0	15.8%	411.3	433.4
5/1/11 4:27	5/1/11 5:27	60	60	0	60	100.0%	4	4	26	34	4.0	4.0	26.0	34.0	11.8%	369.5	344.6
5/2/11 4:26	5/2/11 5:26	60	60	0	60	100.0%	4	6	32	42	4.0	6.0	32.0	42.0	14.3%	414.0	436.6
5/3/11 4:25	5/3/11 5:25	60	60	0	60	100.0%	0	10	64	74	0.0	10.0	64.0	74.0	13.5%	407.9	408.4
5/4/11 4:24	5/4/11 5:24	60	60	0	60	100.0%	1	19	199	219	1.0	19.0	199.0	219.0	8.7%	506.6	543.5
5/5/11 4:23	5/5/11 5:23	60	60	0	60	100.0%	1	11	133	145	1.0	11.0	133.0	145.0	7.6%	451.9	450.5
5/6/11 4:22	5/6/11 5:22	60	60	0	60	100.0%	11	15	99	125	11.0	15.0	99.0	125.0	12.0%	467.7	537.1
5/7/11 4:21	5/7/11 5:21	60	0	0	0	0.0%											
5/8/11 4:20	5/8/11 5:20	60	0	0	0	0.0%											
5/9/11 4:20	5/9/11 5:20	60	0	0	0	0.0%											
5/10/11 4:19	5/10/11 5:19	60	60	0	60	100.0%	0	0	5	5	0.0	0.0	5.0	5.0	0.0%	524.1	486.8
5/11/11 4:18	5/11/11 5:18	60	60	0	60	100.0%	6	15	253	274	6.0	15.0	253.0	274.0	5.5%	545.1	582.6
5/12/11 4:17	5/12/11 5:17	60	60	0	60	100.0%	2	5	79	86	2.0	5.0	79.0	86.0	5.8%	546.8	506.3
5/13/11 4:17	5/13/11 5:17	60	60	0	60	100.0%	0	1	29	30	0.0	1.0	29.0	30.0	3.3%	457.3	466.8
5/14/11 4:16	5/14/11 5:16	60	60	0	60	100.0%	0	0	11	11	0.0	0.0	11.0	11.0	0.0%	722.5	486.8
5/15/11 4:15	5/15/11 5:15	60	60	0	60	100.0%	1	0	24	25	1.0	0.0	24.0	25.0	0.0%	739.1	611.1
5/16/11 4:14	5/16/11 5:14	60	60	0	60	100.0%	0	1	14	15	0.0	1.0	14.0	15.0	6.7%	566.8	417.0
5/17/11 4:14	5/17/11 5:14	60	60	0	60	100.0%	1	1	7	9	1.0	1.0	7.0	9.0	11.1%	357.2	307.8
5/18/11 4:13	5/18/11 5:13	60	60	29	31	51.7%	5	6	5	16	9.7	11.6	9.7	31.0	37.5%	168.5	60.7
5/19/11 4:12	5/19/11 5:12	60	60	0	60	100.0%	0	2	6	8	0.0	2.0	6.0	8.0	25.0%	406.2	376.9
5/20/11 4:12	5/20/11 5:12	60	60	0	60	100.0%	6	17	221	244	6.0	17.0	221.0	244.0	7.0%	565.3	599.4
5/21/11 4:11	5/21/11 5:11	60	60	0	60	100.0%	4	14	83	101	4.0	14.0	83.0	101.0	13.9%	497.4	535.5
5/22/11 4:11	5/22/11 5:11	60	60	0	60	100.0%	0	2	480	482	0.0	2.0	480.0	482.0	0.4%	549.8	552.5
5/23/11 4:10	5/23/11 5:10	60	60	0	60	100.0%	1	2	41	44	1.0	2.0	41.0	44.0	4.5%	507.2	504.7
5/24/11 4:10	5/24/11 5:10	60	60	0	60	100.0%	2	13	76	91	2.0	13.0	76.0	91.0	14.3%	356.7	332.8
5/25/11 4:09	5/25/11 5:09	60	60	0	60	100.0%	3	19	113	135	3.0	19.0	113.0	135.0	14.1%	417.4	407.8
5/26/11 4:09	5/26/11 5:09	60	0	0	0	0.0%											
5/27/11 4:08	5/27/11 5:08	60	60	0	60	100.0%	0	1	11	12	0.0	1.0	11.0	12.0	8.3%	397.6	432.8
5/28/11 4:08	5/28/11 5:08	60	60	0	60	100.0%	0	1	4	5	0.0	1.0	4.0	5.0	20.0%	564.0	645.3
5/29/11 4:08	5/29/11 5:08	60	60	0	60	100.0%	0	3	13	16	0.0	3.0	13.0	16.0	18.8%	246.2	182.4
5/30/11 4:07	5/30/11 5:07	60	0	0	0	0.0%											
5/31/11 4:07	5/31/11 5:07	60	60	0	60	100.0%	3	2	77	82	3.0	2.0	77.0	82.0	2.4%	345.1	288.6

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Swept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-10. Target counts, passage rates, and mean and median target heights during days of the spring 2011 season.

Sunrise + 30 minutes	Sunset - 30 minutes	Minutes in Day	Minutes Radar On	Minutes with Rain	Total Day Minutes	% Day with Data	Day Count Below RSZ	Day Count at RSZ	Day Count Above RSZ	Total Day Count	Day TPR Below RSZ	Day TPR at RSZ	Day TPR Above RSZ	Day TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
3/1/11 6:42	3/1/11 17:11	629	174	0	174	27.7%	39	114	602	755	13.4	39.3	207.6	260.3	15.1%	231.7	235.6
3/2/11 6:41	3/2/11 17:12	631	631	120	511	81.0%	142	1863	9963	11968	16.7	218.7	1169.8	1405.2	15.6%	237.9	235.3
3/3/11 6:39	3/3/11 17:13	634	259	0	259	40.9%	7	55	360	422	1.6	12.7	83.4	97.8	13.0%	263.0	253.3
3/4/11 6:38	3/4/11 17:13	635	635	435	200	31.5%	12	85	522	619	3.6	25.5	156.6	185.7	13.7%	260.7	246.9
3/5/11 6:37	3/5/11 17:14	637	637	0	637	100.0%	40	1618	16040	17698	3.8	152.4	1510.8	1667.0	9.1%	267.7	260.0
3/6/11 6:36	3/6/11 17:15	639	639	285	354	55.4%	18	31	66	115	3.1	5.3	11.2	19.5	27.0%	217.0	181.4
3/7/11 6:35	3/7/11 17:16	641	641	0	641	100.0%	6	15	25	46	0.6	1.4	2.3	4.3	32.6%	312.3	168.2
3/8/11 6:33	3/8/11 17:16	643	643	150	493	76.7%	21	146	2053	2220	2.6	17.8	249.9	270.2	6.6%	293.3	280.1
3/9/11 6:32	3/9/11 17:17	645	645	510	135	20.9%	6	55	300	361	2.7	24.4	133.3	160.4	15.2%	253.5	235.9
3/10/11 6:31	3/10/11 17:18	647	358	324	34	5.3%	2	63	345	410	3.5	111.2	608.8	723.5	15.4%	254.0	238.2
3/11/11 6:30	3/11/11 17:19	649	580	360	220	33.9%	2	18	158	178	0.5	4.9	43.1	48.5	10.1%	344.1	341.5
3/12/11 6:28	3/12/11 17:20	652	0	0	0	0.0%											
3/13/11 6:27	3/13/11 17:20	653	0	0	0	0.0%											
3/14/11 6:26	3/14/11 17:21	655	0	0	0	0.0%											
3/15/11 6:24	3/15/11 17:22	658	436	0	436	66.3%	36	1026	7154	8216	5.0	141.2	984.5	1130.6	12.5%	273.7	264.0
3/16/11 6:23	3/16/11 17:22	659	542	0	542	82.2%	7	52	820	879	0.8	5.8	90.8	97.3	5.9%	321.1	319.7
3/17/11 6:22	3/17/11 17:23	661	661	0	661	100.0%	41	221	1522	1784	3.7	20.1	138.2	161.9	12.4%	284.1	269.3
3/18/11 6:20	3/18/11 17:24	664	664	150	514	77.4%	35	88	243	366	4.1	10.3	28.4	42.7	24.0%	270.4	241.9
3/19/11 6:19	3/19/11 17:25	666	666	0	666	100.0%	3	9	16	28	0.3	0.8	1.4	2.5	32.1%	333.2	227.5
3/20/11 6:18	3/20/11 17:25	667	667	75	592	88.8%	38	104	510	652	3.9	10.5	51.7	66.1	16.0%	302.9	271.9
3/21/11 6:17	3/21/11 17:26	670	670	300	370	55.2%	12	29	15	56	1.9	4.7	2.4	9.1	51.8%	176.1	86.9
3/22/11 6:15	3/22/11 17:27	672	672	0	672	100.0%	18	83	198	299	1.6	7.4	17.7	26.7	27.8%	277.1	224.0
3/23/11 6:14	3/23/11 17:27	673	673	45	628	93.3%	56	493	6223	6772	5.4	47.1	594.6	647.0	7.3%	304.4	299.6
3/24/11 6:13	3/24/11 17:28	675	675	0	675	100.0%	6	15	51	72	0.5	1.3	4.5	6.4	20.8%	391.8	320.6
3/25/11 6:11	3/25/11 17:29	678	678	15	663	97.8%	8	20	30	58	0.7	1.8	2.7	5.2	34.5%	248.6	157.3
3/26/11 6:10	3/26/11 17:30	680	680	0	680	100.0%	5	21	55	81	0.4	1.9	4.9	7.1	25.9%	366.2	227.4
3/27/11 6:09	3/27/11 17:30	681	681	120	561	82.4%	28	133	426	587	3.0	14.2	45.6	62.8	22.7%	276.2	239.9
3/28/11 6:07	3/28/11 17:31	684	684	120	564	82.5%	73	950	9224	10247	7.8	101.1	981.3	1090.1	9.3%	280.6	273.4
3/29/11 6:06	3/29/11 17:32	686	686	45	641	93.4%	77	822	6910	7809	7.2	76.9	646.8	731.0	10.5%	290.0	279.2
3/30/11 6:05	3/30/11 17:32	687	687	225	462	67.2%	40	197	2217	2454	5.2	25.6	287.9	318.7	8.0%	296.5	284.1
3/31/11 6:03	3/31/11 17:33	690	690	0	690	100.0%	69	460	4850	5379	6.0	40.0	421.7	467.7	8.6%	291.0	281.0
4/1/11 6:02	4/1/11 17:34	692	71	0	71	10.3%	7	11	205	223	5.9	9.3	173.2	188.5	4.9%	395.6	374.3
4/2/11 6:01	4/2/11 17:35	694	0	0	0	0.0%											
4/3/11 5:59	4/3/11 17:35	696	2	0	2	0.3%	0	0	0	0	0.0	0.0	0.0	0.0	na	na	na
4/4/11 5:58	4/4/11 17:36	698	698	0	698	100.0%	88	495	8709	9292	7.6	42.6	748.6	798.7	5.3%	319.0	311.8
4/5/11 5:57	4/5/11 17:37	700	700	0	700	100.0%	89	560	9595	10244	7.6	48.0	822.4	878.1	5.5%	328.4	320.3
4/6/11 5:56	4/6/11 17:37	701	701	53	648	92.4%	29	192	1120	1341	2.7	17.8	103.7	124.2	14.3%	283.0	265.5
4/7/11 5:54	4/7/11 17:38	704	704	45	659	93.6%	6	9	55	70	0.5	0.8	5.0	6.4	12.9%	390.4	347.2
4/8/11 5:53	4/8/11 17:39	706	706	225	481	68.1%	9	26	81	116	1.1	3.2	10.1	14.5	22.4%	576.5	356.2
4/9/11 5:52	4/9/11 17:40	708	708	0	708	100.0%	4	16	58	78	0.3	1.4	4.9	6.6	20.5%	361.9	259.8
4/10/11 5:51	4/10/11 17:40	709	709	45	664	93.7%	125	147	882	1154	11.3	13.3	79.7	104.3	12.7%	265.4	261.8
4/11/11 5:49	4/11/11 17:41	712	712	0	712	100.0%	193	197	1828	2218	16.3	16.6	154.0	186.9	8.9%	286.8	284.5
4/12/11 5:48	4/12/11 17:42	714	714	0	714	100.0%	23	75	1864	1962	1.9	6.3	156.6	164.9	3.8%	337.9	333.6
4/13/11 5:47	4/13/11 17:42	715	715	0	715	100.0%	7	15	43	65	0.6	1.3	3.6	5.5	23.1%	318.7	310.0
4/14/11 5:46	4/14/11 17:43	717	717	0	717	100.0%	232	247	2094	2573	19.4	20.7	175.2	215.3	9.6%	276.3	267.9
4/15/11 5:44	4/15/11 17:44	720	720	135	585	81.3%	189	189	1266	1644	19.4	19.4	129.8	168.6	11.5%	276.3	269.9

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level
 *Periods with <50% of time recorded by radar are excluded from analyses
 *Insects noted in trackplot images during these time periods.



Table 9-10 continued. Target counts, passage rates, and mean and median target heights during days of the spring 2011 season.

Sunrise + 30 minutes	Sunset -30 minutes	Minutes in Day	Minutes Radar On	Minutes with Rain	Total Day Minutes	% Day with Data	Day Count Below RSZ	Day Count at RSZ	Day Count Above RSZ	Total Day Count	Day TPR Below RSZ	Day TPR at RSZ	Day TPR Above RSZ	Day TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
4/16/11 5:43	4/16/11 17:45	722	722	0	722	100.0%	292	421	3594	4307	24.3	35.0	298.7	357.9	9.8%	302.3	294.7
4/17/11 5:42	4/17/11 17:45	723	723	465	258	35.7%	14	24	351	389	3.3	5.6	81.6	90.5	6.2%	371.6	345.0
4/18/11 5:41	4/18/11 17:46	725	725	0	725	100.0%	12	13	791	816	1.0	1.1	65.5	67.5	1.6%	358.8	348.7
4/19/11 5:40	4/19/11 17:47	727	727	405	322	44.3%	16	52	344	412	3.0	9.7	64.1	76.8	12.6%	386.7	311.7
4/20/11 5:39	4/20/11 17:47	728	728	75	653	89.7%	66	591	2359	3016	6.1	54.3	216.8	277.1	19.6%	259.0	229.2
4/21/11 5:37	4/21/11 17:48	731	731	0	731	100.0%	29	101	335	465	2.4	8.3	27.5	38.2	21.7%	262.4	245.4
4/22/11 5:36	4/22/11 17:49	733	733	0	733	100.0%	24	83	416	523	2.0	6.8	34.1	42.8	15.9%	289.8	264.6
4/23/11 5:35	4/23/11 17:50	735	735	0	735	100.0%	26	39	137	202	2.1	3.2	11.2	16.5	19.3%	303.9	268.4
4/24/11 5:34	4/24/11 17:50	736	736	0	736	100.0%	24	111	272	407	2.0	9.0	22.2	33.2	27.3%	297.1	224.9
4/25/11 5:33	4/25/11 17:51	738	738	0	738	100.0%	381	441	2029	2851	31.0	35.9	165.0	231.8	15.5%	235.2	216.4
4/26/11 5:32	4/26/11 17:52	740	740	0	740	100.0%	407	372	2608	3387	33.0	30.2	211.5	274.6	11.0%	265.9	260.9
4/27/11 5:31	4/27/11 17:52	741	741	0	741	100.0%	333	720	5848	6901	27.0	58.3	473.5	558.8	10.4%	284.8	276.1
4/28/11 5:30	4/28/11 17:53	743	743	0	743	100.0%	55	694	7381	8130	4.4	56.0	596.0	656.5	8.5%	329.7	327.4
4/29/11 5:29	4/29/11 17:54	745	745	0	745	100.0%	2	9	208	219	0.2	0.7	16.8	17.6	4.1%	380.2	356.9
4/30/11 5:28	4/30/11 17:55	747	747	0	747	100.0%	141	97	388	626	11.3	7.8	31.2	50.3	15.5%	243.0	192.6
5/1/11 5:27	5/1/11 17:55	748	748	15	733	98.0%	109	57	226	392	8.9	4.7	18.5	32.1	14.5%	238.0	213.8
5/2/11 5:26	5/2/11 17:56	750	750	0	750	100.0%	271	313	2929	3513	21.7	25.0	234.3	281.0	8.9%	286.1	278.6
5/3/11 5:25	5/3/11 17:57	752	752	0	752	100.0%	333	552	4155	5040	26.6	44.0	331.5	402.1	11.0%	281.7	280.4
5/4/11 5:24	5/4/11 17:58	754	754	0	754	100.0%	365	456	2898	3719	29.0	36.3	230.6	295.9	12.3%	300.8	274.9
5/5/11 5:23	5/5/11 17:58	755	755	0	755	100.0%	257	459	2759	3475	20.4	36.5	219.3	276.2	13.2%	300.8	271.3
5/6/11 5:22	5/6/11 17:59	757	501	0	501	66.2%	32	511	3645	4188	3.8	61.2	436.5	501.6	12.2%	301.8	281.2
5/7/11 5:21	5/7/11 18:00	759	0	0	0	0.0%											
5/8/11 5:20	5/8/11 18:01	761	0	0	0	0.0%											
5/9/11 5:20	5/9/11 18:01	761	409	0	409	53.7%	1	0	8	9	0.1	0.0	1.2	1.3	0.0%	862.8	640.4
5/10/11 5:19	5/10/11 18:02	763	763	0	763	100.0%	38	182	1732	1952	3.0	14.3	136.2	153.5	9.3%	349.9	341.4
5/11/11 5:18	5/11/11 18:03	765	765	0	765	100.0%	498	279	1113	1890	39.1	21.9	87.3	148.2	14.8%	241.0	199.6
5/12/11 5:17	5/12/11 18:03	766	766	0	766	100.0%	318	306	1265	1889	24.9	24.0	99.1	148.0	16.2%	247.4	222.5
5/13/11 5:17	5/13/11 18:04	768	768	0	768	100.0%	21	234	1805	2060	1.6	18.3	141.0	160.9	11.4%	344.8	292.9
5/14/11 5:16	5/14/11 18:05	769	769	0	769	100.0%	4	13	474	491	0.3	1.0	37.0	38.3	2.6%	373.6	354.8
5/15/11 5:15	5/15/11 18:06	771	771	0	771	100.0%	2	8	22	32	0.2	0.6	1.7	2.5	25.0%	471.5	234.5
5/16/11 5:14	5/16/11 18:06	772	772	0	772	100.0%	3	20	68	91	0.2	1.6	5.3	7.1	22.0%	368.8	306.0
5/17/11 5:14	5/17/11 18:07	773	773	15	758	98.1%	2	18	28	48	0.2	1.4	2.2	3.8	37.5%	281.1	204.7
5/18/11 5:13	5/18/11 18:08	775	775	241	534	68.9%	2	10	14	26	0.2	1.1	1.6	2.9	38.5%	365.0	160.8
5/19/11 5:12	5/19/11 18:08	776	776	0	776	100.0%	3	7	39	49	0.2	0.5	3.0	3.8	14.3%	415.3	363.9
5/20/11 5:12	5/20/11 18:09	777	777	0	777	100.0%	489	204	916	1609	37.8	15.8	70.7	124.2	12.7%	225.9	179.2
5/21/11 5:11	5/21/11 18:10	779	779	0	779	100.0%	288	258	1523	2069	22.2	19.9	117.3	159.4	12.5%	265.8	251.8
5/22/11 5:11	5/22/11 18:10	779	779	0	779	100.0%	2	65	1590	1657	0.2	5.0	122.5	127.6	3.9%	422.5	413.9
5/23/11 5:10	5/23/11 18:11	781	781	0	781	100.0%	2	7	44	53	0.2	0.5	3.4	4.1	13.2%	358.8	333.1
5/24/11 5:10	5/24/11 18:12	782	782	0	782	100.0%	35	193	615	843	2.7	14.8	47.2	64.7	22.9%	247.4	220.4
5/25/11 5:09	5/25/11 18:12	783	783	0	783	100.0%	83	300	1742	2125	6.4	23.0	133.5	162.8	14.1%	296.2	277.4
5/26/11 5:09	5/26/11 18:13	784	477	0	477	60.8%	0	4	108	112	0.0	0.5	13.6	14.1	3.6%	357.5	361.8
5/27/11 5:08	5/27/11 18:14	786	786	0	786	100.0%	5	111	999	1115	0.4	8.5	76.3	85.1	10.0%	311.6	285.6
5/28/11 5:08	5/28/11 18:14	786	786	0	786	100.0%	8	26	139	173	0.6	2.0	10.6	13.2	15.0%	322.5	308.5
5/29/11 5:08	5/29/11 18:15	787	787	75	712	90.5%	2	13	16	31	0.2	1.1	1.3	2.6	41.9%	431.3	150.6
5/30/11 5:07	5/30/11 18:16	789	750	0	750	95.1%	216	86	310	612	17.3	6.9	24.8	49.0	14.1%	192.8	141.0
5/31/11 5:07	5/31/11 18:16	789	789	45	744	94.3%	118	122	971	1211	9.5	9.8	78.3	97.7	10.1%	308.9	278.3

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-11. Target counts, passage rates, and mean and median target heights during dusks of the spring 2011 season.

Sunset - 30 minutes	Sunset + 30 minutes	Minutes in Dusk	Minutes Radar On	Minutes w with Rain	Total Dusk Minutes	% Dusk with Data	Dusk Count Below RSZ	Dusk Count at RSZ	Dusk Count Above RSZ	Total Dusk Count	Dusk TPR Below RSZ	Dusk TPR at RSZ	Dusk TPR Above RSZ	Dusk TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
3/1/11 17:11	3/1/11 18:11	60	60	0	60	100.0%	3	8	20	31	3.0	8.0	20.0	31.0	25.8%	207.0	202.7
3/2/11 17:12	3/2/11 18:12	60	60	0	60	100.0%	2	13	35	50	2.0	13.0	35.0	50.0	26.0%	208.5	169.6
3/3/11 17:13	3/3/11 18:13	60	0	0	0	0.0%											
3/4/11 17:13	3/4/11 18:13	60	60	0	60	100.0%	1	8	58	67	1.0	8.0	58.0	67.0	11.9%	239.3	231.3
3/5/11 17:14	3/5/11 18:14	60	60	0	60	100.0%	0	23	173	196	0.0	23.0	173.0	196.0	11.7%	267.0	248.3
3/6/11 17:15	3/6/11 18:15	60	60	0	60	100.0%	2	1	0	3	2.0	1.0	0.0	3.0	33.3%	25.4	25.3
3/7/11 17:16	3/7/11 18:16	60	60	0	60	100.0%	1	0	1	2	1.0	0.0	1.0	2.0	0.0%	1294.5	1294.5
3/8/11 17:16	3/8/11 18:16	60	60	0	60	100.0%	0	1	8	9	0.0	1.0	8.0	9.0	11.1%	260.3	210.9
3/9/11 17:17	3/9/11 18:17	60	60	0	60	100.0%	1	6	41	48	1.0	6.0	41.0	48.0	12.5%	250.7	253.1
3/10/11 17:18	3/10/11 18:18	60	60	0	60	100.0%	2	27	149	178	2.0	27.0	149.0	178.0	15.2%	266.6	246.3
3/11/11 17:19	3/11/11 18:19	60	0	0	0	0.0%											
3/12/11 17:20	3/12/11 18:20	60	0	0	0	0.0%											
3/13/11 17:20	3/13/11 18:20	60	0	0	0	0.0%											
3/14/11 17:21	3/14/11 18:21	60	0	0	0	0.0%											
3/15/11 17:22	3/15/11 18:22	60	60	0	60	100.0%	1	17	75	93	1.0	17.0	75.0	93.0	18.3%	271.2	275.8
3/16/11 17:22	3/16/11 18:22	60	0	0	0	0.0%											
3/17/11 17:23	3/17/11 18:23	60	60	0	60	100.0%	0	3	4	7	0.0	3.0	4.0	7.0	42.9%	163.0	162.8
3/18/11 17:24	3/18/11 18:24	60	60	0	60	100.0%	3	2	5	10	3.0	2.0	5.0	10.0	20.0%	301.2	140.5
3/19/11 17:25	3/19/11 18:25	60	60	0	60	100.0%	3	1	2	6	3.0	1.0	2.0	6.0	16.7%	93.9	42.4
3/20/11 17:25	3/20/11 18:25	60	60	0	60	100.0%	1	1	1	3	1.0	1.0	1.0	3.0	33.3%	270.7	32.3
3/21/11 17:26	3/21/11 18:26	60	60	57	3	5.0%	0	0	0	0	0.0	0.0	0.0	0.0	na	na	na
3/22/11 17:27	3/22/11 18:27	60	60	0	60	100.0%	2	1	2	5	2.0	1.0	2.0	5.0	20.0%	175.1	96.0
3/23/11 17:27	3/23/11 18:27	60	60	0	60	100.0%	1	3	6	10	1.0	3.0	6.0	10.0	30.0%	206.0	188.8
3/24/11 17:28	3/24/11 18:28	60	60	0	60	100.0%	3	3	4	10	3.0	3.0	4.0	10.0	30.0%	163.7	85.8
3/25/11 17:29	3/25/11 18:29	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	734.9	734.9
3/26/11 17:30	3/26/11 18:30	60	60	0	60	100.0%	0	1	1	2	0.0	1.0	1.0	2.0	50.0%	149.2	149.2
3/27/11 17:30	3/27/11 18:30	60	60	0	60	100.0%	2	1	3	6	2.0	1.0	3.0	6.0	16.7%	132.6	105.6
3/28/11 17:31	3/28/11 18:31	60	60	0	60	100.0%	0	4	28	32	0.0	4.0	28.0	32.0	12.5%	389.1	322.2
3/29/11 17:32	3/29/11 18:32	60	60	0	60	100.0%	0	9	61	70	0.0	9.0	61.0	70.0	12.9%	274.5	246.1
3/30/11 17:32	3/30/11 18:32	60	60	0	60	100.0%	0	17	89	106	0.0	17.0	89.0	106.0	16.0%	229.2	210.5
3/31/11 17:33	3/31/11 18:33	60	60	0	60	100.0%	4	8	65	77	4.0	8.0	65.0	77.0	10.4%	232.0	210.6
4/1/11 17:34	4/1/11 18:34	60	0	0	0	0.0%											
4/2/11 17:35	4/2/11 18:35	60	0	0	0	0.0%											
4/3/11 17:35	4/3/11 18:35	60	60	0	60	100.0%	1	1	2	4	1.0	1.0	2.0	4.0	25.0%	228.8	212.3
4/4/11 17:36	4/4/11 18:36	60	60	0	60	100.0%	5	6	27	38	5.0	6.0	27.0	38.0	15.8%	219.2	208.9
4/5/11 17:37	4/5/11 18:37	60	60	0	60	100.0%	0	3	8	11	0.0	3.0	8.0	11.0	27.3%	287.4	314.2
4/6/11 17:37	4/6/11 18:37	60	60	45	15	25.0%	0	0	0	0	0.0	0.0	0.0	0.0	na	na	na
4/7/11 17:38	4/7/11 18:38	60	60	45	15	25.0%	0	0	5	5	0.0	0.0	20.0	20.0	0.0%	328.6	310.3
4/8/11 17:39	4/8/11 18:39	60	60	0	60	100.0%	3	3	2	8	3.0	3.0	2.0	8.0	37.5%	130.9	49.5
4/9/11 17:40	4/9/11 18:40	60	60	0	60	100.0%	2	0	2	4	2.0	0.0	2.0	4.0	0.0%	342.5	207.0
4/10/11 17:40	4/10/11 18:40	60	60	0	60	100.0%	1	12	24	37	1.0	12.0	24.0	37.0	32.4%	213.4	173.7
4/11/11 17:41	4/11/11 18:41	60	60	0	60	100.0%	1	8	6	15	1.0	8.0	6.0	15.0	53.3%	125.6	117.3
4/12/11 17:42	4/12/11 18:42	60	60	0	60	100.0%	0	1	2	3	0.0	1.0	2.0	3.0	33.3%	970.6	1055.5
4/13/11 17:42	4/13/11 18:42	60	60	0	60	100.0%	2	1	1	4	2.0	1.0	1.0	4.0	25.0%	67.6	31.2
4/14/11 17:43	4/14/11 18:43	60	60	0	60	100.0%	0	3	14	17	0.0	3.0	14.0	17.0	17.6%	264.4	268.8
4/15/11 17:44	4/15/11 18:44	60	60	0	60	100.0%	1	3	23	27	1.0	3.0	23.0	27.0	11.1%	245.4	253.9

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods w ith <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-11 continued. Target counts, passage rates, and mean and median target heights during dusks of the spring 2011 season.

Sunset - 30 minutes	Sunset + 30 minutes	Minutes in Dusk	Minutes Radar On	Minutes w with Rain	Total Dusk Minutes	% Dusk with Data	Dusk Count Below RSZ	Dusk Count at RSZ	Dusk Count Above RSZ	Total Dusk Count	Dusk TPR Below RSZ	Dusk TPR at RSZ	Dusk TPR Above RSZ	Dusk TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
4/16/11 17:45	4/16/11 18:45	60	60	0	60	100.0%	2	28	262	292	2.0	28.0	262.0	292.0	9.6%	317.0	308.8
4/17/11 17:45	4/17/11 18:45	60	60	16	44	73.3%	0	1	4	5	0.0	1.4	5.5	6.8	20.0%	367.2	462.7
4/18/11 17:46	4/18/11 18:46	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	282.7	282.7
4/19/11 17:47	4/19/11 18:47	60	60	0	60	100.0%	0	0	4	4	0.0	0.0	4.0	4.0	0.0%	625.5	318.1
4/20/11 17:47	4/20/11 18:47	60	60	0	60	100.0%	0	1	0	1	0.0	1.0	0.0	1.0	100.0%	119.5	119.5
4/21/11 17:48	4/21/11 18:48	60	60	0	60	100.0%	0	1	1	2	0.0	1.0	1.0	2.0	50.0%	96.2	96.2
4/22/11 17:49	4/22/11 18:49	60	60	0	60	100.0%	0	0	4	4	0.0	0.0	4.0	4.0	0.0%	263.7	263.3
4/23/11 17:50	4/23/11 18:50	60	60	0	60	100.0%	0	1	4	5	0.0	1.0	4.0	5.0	20.0%	795.9	470.6
4/24/11 17:50	4/24/11 18:50	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	251.8	251.8
4/25/11 17:51	4/25/11 18:51	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	373.1	373.1
4/26/11 17:52	4/26/11 18:52	60	60	0	60	100.0%	2	5	29	36	2.0	5.0	29.0	36.0	13.9%	338.0	243.7
4/27/11 17:52	4/27/11 18:52	60	60	0	60	100.0%	4	14	103	121	4.0	14.0	103.0	121.0	11.6%	297.2	267.9
4/28/11 17:53	4/28/11 18:53	60	60	0	60	100.0%	1	2	55	58	1.0	2.0	55.0	58.0	3.4%	335.1	337.7
4/29/11 17:54	4/29/11 18:54	60	60	0	60	100.0%	0	0	7	7	0.0	0.0	7.0	7.0	0.0%	346.1	305.7
4/30/11 17:55	4/30/11 18:55	60	60	0	60	100.0%	4	5	7	16	4.0	5.0	7.0	16.0	31.3%	211.6	48.9
5/1/11 17:55	5/1/11 18:55	60	60	0	60	100.0%	3	3	3	9	3.0	3.0	3.0	9.0	33.3%	595.2	56.1
5/2/11 17:56	5/2/11 18:56	60	60	0	60	100.0%	2	6	10	18	2.0	6.0	10.0	18.0	33.3%	227.4	240.2
5/3/11 17:57	5/3/11 18:57	60	60	0	60	100.0%	1	5	51	57	1.0	5.0	51.0	57.0	8.8%	260.2	244.4
5/4/11 17:58	5/4/11 18:58	60	60	0	60	100.0%	2	7	25	34	2.0	7.0	25.0	34.0	20.6%	251.7	242.8
5/5/11 17:58	5/5/11 18:58	60	60	0	60	100.0%	1	4	8	13	1.0	4.0	8.0	13.0	30.8%	232.9	251.5
5/6/11 17:59	5/6/11 18:59	60	0	0	0	0.0%											
5/7/11 18:00	5/7/11 19:00	60	0	0	0	0.0%											
5/8/11 18:01	5/8/11 19:01	60	0	0	0	0.0%											
5/9/11 18:01	5/9/11 19:01	60	60	0	60	100.0%	0	0	0	0	0.0	0.0	0.0	0.0	na	na	na
5/10/11 18:02	5/10/11 19:02	60	60	0	60	100.0%	0	1	7	8	0.0	1.0	7.0	8.0	12.5%	296.6	308.6
5/11/11 18:03	5/11/11 19:03	60	60	0	60	100.0%	1	1	8	10	1.0	1.0	8.0	10.0	10.0%	224.6	247.5
5/12/11 18:03	5/12/11 19:03	60	60	0	60	100.0%	2	11	53	66	2.0	11.0	53.0	66.0	16.7%	283.7	228.0
5/13/11 18:04	5/13/11 19:04	60	60	0	60	100.0%	0	9	0	9	0.0	9.0	0.0	9.0	100.0%	70.8	60.4
5/14/11 18:05	5/14/11 19:05	60	60	0	60	100.0%	1	3	2	6	1.0	3.0	2.0	6.0	50.0%	97.8	87.9
5/15/11 18:06	5/15/11 19:06	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	175.3	175.3
5/16/11 18:06	5/16/11 19:06	60	60	0	60	100.0%	1	3	4	8	1.0	3.0	4.0	8.0	37.5%	345.2	109.3
5/17/11 18:07	5/17/11 19:07	60	60	0	60	100.0%	0	1	0	1	0.0	1.0	0.0	1.0	100.0%	62.8	62.8
5/18/11 18:08	5/18/11 19:08	60	60	0	60	100.0%	1	0	2	3	1.0	0.0	2.0	3.0	0.0%	189.3	271.0
5/19/11 18:08	5/19/11 19:08	60	60	0	60	100.0%	2	3	1	6	2.0	3.0	1.0	6.0	50.0%	58.4	42.8
5/20/11 18:09	5/20/11 19:09	60	60	0	60	100.0%	1	3	5	9	1.0	3.0	5.0	9.0	33.3%	673.5	145.7
5/21/11 18:10	5/21/11 19:10	60	60	0	60	100.0%	1	2	3	6	1.0	2.0	3.0	6.0	33.3%	174.2	130.8
5/22/11 18:10	5/22/11 19:10	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	1488.5	1488.5
5/23/11 18:11	5/23/11 19:11	60	60	0	60	100.0%	0	0	0	0	0.0	0.0	0.0	0.0	na	na	na
5/24/11 18:12	5/24/11 19:12	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	256.2	256.2
5/25/11 18:12	5/25/11 19:12	60	60	0	60	100.0%	1	1	3	5	1.0	1.0	3.0	5.0	20.0%	836.4	429.2
5/26/11 18:13	5/26/11 19:13	60	60	0	60	100.0%	0	2	2	4	0.0	2.0	2.0	4.0	50.0%	170.5	169.9
5/27/11 18:14	5/27/11 19:14	60	60	0	60	100.0%	0	2	5	7	0.0	2.0	5.0	7.0	28.6%	372.6	149.4
5/28/11 18:14	5/28/11 19:14	60	60	0	60	100.0%	0	1	2	3	0.0	1.0	2.0	3.0	33.3%	596.2	260.3
5/29/11 18:15	5/29/11 19:15	60	60	0	60	100.0%	0	1	2	3	0.0	1.0	2.0	3.0	33.3%	410.9	475.2
5/30/11 18:16	5/30/11 19:16	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	198.1	198.1
5/31/11 18:16	5/31/11 19:16	60	60	0	60	100.0%	1	8	12	21	1.0	8.0	12.0	21.0	38.1%	368.0	190.8

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-12. Target counts, passage rates, and mean and median target heights during nights of the spring 2011 season.

Sunset + 30 minutes	Sunrise next day - 30 minutes	Minutes in Night	Minutes Radar On	Minutes with Rain	Total Night Minutes	% Night with Data	Night Count Below RSZ	Night Count at RSZ	Night Count Above RSZ	Total Night Count	Night TPR Below RSZ	Night TPR at RSZ	Night TPR Above RSZ	Night TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
3/1/11 18:11	3/2/11 5:41	690	690	0	690	100.0%	32	158	1032	1222	2.8	13.7	89.7	106.3	12.9%	346.7	314.6
3/2/11 18:12	3/3/11 5:39	687	686	0	686	99.9%	37	106	715	858	3.2	9.3	62.5	75.0	12.4%	300.9	267.9
3/3/11 18:13	3/4/11 5:38	685	647	0	647	94.5%	13	74	344	431	1.2	6.9	31.9	40.0	17.2%	320.6	275.2
3/4/11 18:13	3/5/11 5:37	684	683	0	683	99.9%	9	108	623	740	0.8	9.5	54.7	65.0	14.6%	358.4	322.0
3/5/11 18:14	3/6/11 5:36	682	680	0	680	99.7%	41	260	1809	2110	3.6	22.9	159.6	186.2	12.3%	359.3	319.7
3/6/11 18:15	3/7/11 5:35	680	679	0	679	99.9%	10	26	130	166	0.9	2.3	11.5	14.7	15.7%	507.8	341.1
3/7/11 18:16	3/8/11 5:33	677	676	0	676	99.9%	16	33	169	218	1.4	2.9	15.0	19.3	15.1%	330.0	272.5
3/8/11 18:16	3/9/11 5:32	676	675	0	675	99.9%	9	77	631	717	0.8	6.8	56.1	63.7	10.7%	390.7	338.9
3/9/11 18:17	3/10/11 5:31	674	673	0	673	99.9%	13	117	765	895	1.2	10.4	68.2	79.8	13.1%	420.9	353.6
3/10/11 18:18	3/11/11 5:30	672	671	0	671	99.9%	40	159	1433	1632	3.6	14.2	128.1	145.9	9.7%	407.7	368.8
3/11/11 18:19	3/12/11 5:28	669	0	0	0	0.0%											
3/12/11 18:20	3/13/11 5:27	667	0	0	0	0.0%											
3/13/11 18:20	3/14/11 5:26	666	0	0	0	0.0%											
3/14/11 18:21	3/15/11 5:24	663	0	0	0	0.0%											
3/15/11 18:22	3/16/11 5:23	661	660	0	660	99.8%	35	60	638	733	3.2	5.5	58.0	66.6	8.2%	384.5	334.1
3/16/11 18:22	3/17/11 5:22	660	0	0	0	0.0%											
3/17/11 18:23	3/18/11 5:20	657	657	0	657	100.0%	70	259	836	1165	6.4	23.7	76.3	106.4	22.2%	290.2	242.0
3/18/11 18:24	3/19/11 5:19	655	655	0	655	100.0%	7	33	149	189	0.6	3.0	13.6	17.3	17.5%	339.9	301.8
3/19/11 18:25	3/20/11 5:18	653	653	0	653	100.0%	9	64	1161	1234	0.8	5.9	106.7	113.4	5.2%	379.6	374.0
3/20/11 18:25	3/21/11 5:17	651	650	329	321	49.3%	36	235	488	759	6.7	43.9	91.2	141.9	31.0%	231.7	180.7
3/21/11 18:26	3/22/11 5:15	649	648	3	645	99.4%	24	52	118	194	2.2	4.8	11.0	18.0	26.8%	293.1	213.8
3/22/11 18:27	3/23/11 5:14	647	647	0	647	100.0%	23	119	1231	1373	2.1	11.0	114.2	127.3	8.7%	458.1	442.9
3/23/11 18:27	3/24/11 5:13	646	646	120	526	81.4%	45	109	375	529	5.1	12.4	42.8	20.6%	359.3	274.6	
3/24/11 18:28	3/25/11 5:11	643	643	0	643	100.0%	31	44	145	220	2.9	4.1	13.5	20.5	20.0%	333.1	237.3
3/25/11 18:29	3/26/11 5:10	641	641	0	641	100.0%	44	40	146	230	4.1	3.7	13.7	21.5	17.4%	333.6	270.5
3/26/11 18:30	3/27/11 5:09	639	639	0	639	100.0%	58	67	179	304	5.4	6.3	16.8	28.5	22.0%	259.5	204.7
3/27/11 18:30	3/28/11 5:07	637	637	0	637	100.0%	223	380	2165	2768	21.0	35.8	203.9	260.7	13.7%	482.8	491.9
3/28/11 18:31	3/29/11 5:06	635	635	0	635	100.0%	42	225	2129	2396	4.0	21.3	201.2	226.4	9.4%	429.7	398.5
3/29/11 18:32	3/30/11 5:05	633	633	0	633	100.0%	36	342	2324	2702	3.4	32.4	220.3	256.1	12.7%	376.7	333.9
3/30/11 18:32	3/31/11 5:03	631	631	0	631	100.0%	17	190	1186	1393	1.6	18.1	112.8	132.5	13.6%	341.2	305.4
3/31/11 18:33	4/1/11 5:02	629	628	0	628	99.8%	27	210	1208	1445	2.6	20.1	115.4	138.1	14.5%	339.4	292.6
4/1/11 18:34	4/2/11 5:01	627	0	0	0	0.0%											
4/2/11 18:35	4/3/11 4:59	624	0	0	0	0.0%											
4/3/11 18:35	4/4/11 4:58	623	622	0	622	99.8%	33	187	1920	2140	3.2	18.0	185.2	206.4	8.7%	383.1	353.7
4/4/11 18:36	4/5/11 4:57	621	620	0	620	99.8%	22	234	3208	3464	2.1	22.6	310.5	335.2	6.8%	454.0	434.6
4/5/11 18:37	4/6/11 4:56	619	618	0	618	99.8%	372	592	1922	2886	36.1	57.5	186.6	280.2	20.5%	325.4	261.4
4/6/11 18:37	4/7/11 4:54	617	617	22	595	96.4%	56	86	336	478	5.6	8.7	33.9	48.2	18.0%	351.8	262.4
4/7/11 18:38	4/8/11 4:53	615	614	90	524	85.2%	72	134	128	334	8.2	15.3	14.7	38.2	40.1%	177.6	78.0
4/8/11 18:39	4/9/11 4:52	613	613	0	613	100.0%	28	70	99	197	2.7	6.9	9.7	19.3	35.5%	243.3	134.1
4/9/11 18:40	4/10/11 4:51	611	611	0	611	100.0%	91	81	700	872	8.9	8.0	68.7	85.6	9.3%	482.6	419.9
4/10/11 18:40	4/11/11 4:49	609	608	0	608	99.8%	25	188	1997	2210	2.5	18.6	197.1	218.1	8.5%	469.9	410.7
4/11/11 18:41	4/12/11 4:48	607	607	0	607	100.0%	59	155	1309	1523	5.8	15.3	129.4	150.5	10.2%	410.6	360.9
4/12/11 18:42	4/13/11 4:47	605	605	0	605	100.0%	174	357	1549	2080	17.3	35.4	153.6	206.3	17.2%	362.0	322.3
4/13/11 18:42	4/14/11 4:46	604	603	0	603	99.8%	275	446	606	1327	27.4	44.4	60.3	132.0	33.6%	224.5	97.2
4/14/11 18:43	4/15/11 4:44	601	601	0	601	100.0%	20	250	2777	3047	2.0	25.0	277.2	304.2	8.2%	486.9	473.7
4/15/11 18:44	4/16/11 4:43	599	599	0	599	100.0%	14	258	2684	2956	1.4	25.8	268.8	296.1	8.7%	425.6	369.4

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-12 continued. Target counts, passage rates, and mean and median target heights during nights of the spring 2011 season.

Sunset + 30 minutes	Sunrise next day - 30 minutes	Minutes in Night	Minutes Radar On	Minutes w ith Rain	Total Night Minutes	% Night w ith Data	Night Count Below RSZ	Night Count at RSZ	Night Count Above RSZ	Total Night Count	Night TPR Below RSZ	Night TPR at RSZ	Night TPR Above RSZ	Night TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
4/16/11 18:45	4/17/11 4:42	597	596	0	596	99.8%	80	414	5494	5988	8.1	41.7	553.1	602.8	6.9%	381.2	340.3
4/17/11 18:45	4/18/11 4:41	596	594	44	550	92.3%	80	201	1492	1773	8.7	21.9	162.8	193.4	11.3%	421.8	362.4
4/18/11 18:46	4/19/11 4:40	594	594	0	594	100.0%	41	48	427	516	4.1	4.8	43.1	52.1	9.3%	400.4	371.1
4/19/11 18:47	4/20/11 4:39	592	591	0	591	99.8%	111	226	1943	2280	11.3	22.9	197.3	231.5	9.9%	594.4	622.4
4/20/11 18:47	4/21/11 4:37	590	589	0	589	99.8%	182	246	2235	2663	18.5	25.1	227.7	271.3	9.2%	405.5	365.2
4/21/11 18:48	4/22/11 4:36	588	587	0	587	99.8%	46	85	1028	1159	4.7	8.7	105.1	118.5	7.3%	445.1	398.4
4/22/11 18:49	4/23/11 4:35	586	586	60	526	89.8%	138	305	1959	2402	15.7	34.8	223.5	274.0	12.7%	412.6	371.7
4/23/11 18:50	4/24/11 4:34	584	584	0	584	100.0%	256	385	1098	1739	26.3	39.6	112.8	178.7	22.1%	316.8	259.4
4/24/11 18:50	4/25/11 4:33	583	582	0	582	99.8%	77	99	661	837	7.9	10.2	68.1	86.3	11.8%	399.2	359.7
4/25/11 18:51	4/26/11 4:32	581	581	0	581	100.0%	423	728	1839	2990	43.7	75.2	189.9	308.8	24.3%	291.4	235.6
4/26/11 18:52	4/27/11 4:31	579	579	0	579	100.0%	76	321	5215	5612	7.9	33.3	540.4	581.6	5.7%	550.8	549.6
4/27/11 18:52	4/28/11 4:30	578	577	0	577	99.8%	46	308	6635	6989	4.8	32.0	689.9	726.8	4.4%	494.6	494.1
4/28/11 18:53	4/29/11 4:29	576	575	0	575	99.8%	33	239	3033	3305	3.4	24.9	316.5	344.9	7.2%	388.2	341.4
4/29/11 18:54	4/30/11 4:28	574	573	0	573	99.8%	14	341	5819	6174	1.5	35.7	609.3	646.5	5.5%	351.0	310.1
4/30/11 18:55	5/1/11 4:27	572	571	0	571	99.8%	6	112	1937	2055	0.6	11.8	203.5	215.9	5.5%	443.6	377.6
5/1/11 18:55	5/2/11 4:26	571	571	0	571	100.0%	7	75	2851	2933	0.7	7.9	299.6	308.2	2.6%	522.1	503.8
5/2/11 18:56	5/3/11 4:25	569	568	0	568	99.8%	5	50	851	906	0.5	5.3	89.9	95.7	5.5%	602.7	522.3
5/3/11 18:57	5/4/11 4:24	567	566	0	566	99.8%	33	301	5175	5509	3.5	31.9	548.6	584.0	5.5%	453.7	424.3
5/4/11 18:58	5/5/11 4:23	565	565	0	565	100.0%	26	341	3312	3679	2.8	36.2	351.7	390.7	9.3%	371.3	296.9
5/5/11 18:58	5/6/11 4:22	564	563	0	563	99.8%	80	180	3164	3424	8.5	19.2	337.2	364.9	5.3%	416.6	370.6
5/6/11 18:59	5/7/11 4:21	562	0	0	0	0.0%											
5/7/11 19:00	5/8/11 4:20	560	0	0	0	0.0%											
5/8/11 19:01	5/9/11 4:20	559	0	0	0	0.0%											
5/9/11 19:01	5/10/11 4:19	558	557	0	557	99.8%	31	18	139	188	3.3	1.9	15.0	20.3	9.6%	423.0	347.3
5/10/11 19:02	5/11/11 4:18	556	555	0	555	99.8%	113	277	6169	6559	12.2	29.9	666.9	709.1	4.2%	421.8	405.4
5/11/11 19:03	5/12/11 4:17	554	554	0	554	100.0%	107	174	3908	4189	11.6	18.8	423.2	453.7	4.2%	567.7	580.6
5/12/11 19:03	5/13/11 4:17	553	553	0	553	100.0%	26	198	2753	2977	2.8	21.5	298.7	323.0	6.7%	519.8	520.3
5/13/11 19:04	5/14/11 4:16	552	552	0	552	100.0%	28	68	912	1008	3.0	7.4	99.1	109.6	6.7%	455.6	428.2
5/14/11 19:05	5/15/11 4:15	550	549	210	339	61.6%	80	131	859	1070	14.2	23.2	152.0	189.4	12.2%	428.2	405.8
5/15/11 19:06	5/16/11 4:14	548	548	75	473	86.3%	138	251	533	922	17.5	31.8	67.6	117.0	27.2%	292.2	195.8
5/16/11 19:06	5/17/11 4:14	548	548	0	548	100.0%	33	45	276	354	3.6	4.9	30.2	38.8	12.7%	417.0	410.0
5/17/11 19:07	5/18/11 4:13	546	546	0	546	100.0%	690	993	3588	5271	75.8	109.1	394.3	579.2	18.8%	259.7	246.6
5/18/11 19:08	5/19/11 4:12	544	543	0	543	99.8%	19	25	118	162	2.1	2.8	13.0	17.9	15.4%	426.7	415.6
5/19/11 19:08	5/20/11 4:12	544	544	0	544	100.0%	121	202	2991	3314	13.3	22.3	329.9	365.5	6.1%	562.7	617.7
5/20/11 19:09	5/21/11 4:11	542	541	0	541	99.8%	60	147	1565	1772	6.7	16.3	173.6	196.5	8.3%	469.2	456.3
5/21/11 19:10	5/22/11 4:11	541	541	0	541	100.0%	85	489	5760	6334	9.4	54.2	638.8	702.5	7.7%	367.4	343.2
5/22/11 19:10	5/23/11 4:10	540	540	0	540	100.0%	38	137	1080	1255	4.2	15.2	120.0	139.4	10.9%	451.0	442.0
5/23/11 19:11	5/24/11 4:10	539	539	0	539	100.0%	76	157	455	688	8.5	17.5	50.6	76.6	22.8%	298.3	246.4
5/24/11 19:12	5/25/11 4:09	537	537	0	537	100.0%	109	157	3529	3795	12.2	17.5	394.3	424.0	4.1%	496.7	510.5
5/25/11 19:12	5/26/11 4:09	537	238	15	223	41.5%	46	101	587	734	12.4	27.2	157.9	197.5	13.8%	377.2	350.1
5/26/11 19:13	5/27/11 4:08	535	535	0	535	100.0%	19	23	412	454	2.1	2.6	46.2	50.9	5.1%	385.4	364.2
5/27/11 19:14	5/28/11 4:08	534	533	0	533	99.8%	25	104	1020	1149	2.8	11.7	114.8	129.3	9.1%	344.5	312.1
5/28/11 19:14	5/29/11 4:08	534	534	0	534	100.0%	45	151	429	625	5.1	17.0	48.2	70.2	24.2%	283.8	248.1
5/29/11 19:15	5/30/11 4:07	532	143	0	143	26.9%	2	4	6	12	0.8	1.7	2.5	5.0	33.3%	449.0	149.7
5/30/11 19:16	5/31/11 4:07	531	530	0	530	99.8%	7	72	2477	2556	0.8	8.2	280.4	289.4	2.8%	529.3	543.5
5/31/11 19:16	6/1/11 4:07	531	283	0	283	53.3%	36	341	3126	3503	7.6	72.3	662.8	742.7	9.7%	339.9	323.4

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-13. Target counts, passage rates, and mean and median target heights during dawns of the summer 2011 season.

Sunrise - 30 minutes	Sunrise + 30 minutes	Minutes in Dawn	Minutes Radar On	Minutes with Rain	Total Dawn Minutes	% Dawn with Data	Dawn Count Below RSZ	Dawn Count at RSZ	Dawn Count Above RSZ	Total Dawn Count	Dawn TPR Below RSZ	Dawn TPR at RSZ	Dawn TPR Above RSZ	Dawn TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
6/1/11 4:07	6/1/11 5:07	60	60	0	60	100.0%	0	7	42	49	0.0	7.0	42.0	49.0	14.3%	361.5	328.6
6/2/11 4:06	6/2/11 5:06	60	60	0	60	100.0%	0	0	5	5	0.0	0.0	5.0	5.0	0.0%	640.3	681.5
6/3/11 4:06	6/3/11 5:06	60	60	0	60	100.0%	3	0	13	16	3.0	0.0	13.0	16.0	0.0%	328.8	267.3
6/4/11 4:06	6/4/11 5:06	60	60	0	60	100.0%	0	3	24	27	0.0	3.0	24.0	27.0	11.1%	303.5	291.7
6/5/11 4:06	6/5/11 5:06	60	60	0	60	100.0%	0	4	7	11	0.0	4.0	7.0	11.0	36.4%	311.8	357.5
6/6/11 4:06	6/6/11 5:06	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	359.1	359.1
6/7/11 4:06	6/7/11 5:06	60	60	0	60	100.0%	0	1	4	5	0.0	1.0	4.0	5.0	20.0%	505.2	568.5
6/8/11 4:05	6/8/11 5:05	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	512.1	512.1
6/9/11 4:05	6/9/11 5:05	60	60	0	60	100.0%	0	0	2	2	0.0	0.0	2.0	2.0	0.0%	554.3	554.3
6/10/11 4:05	6/10/11 5:05	60	60	0	60	100.0%	0	1	8	9	0.0	1.0	8.0	9.0	11.1%	417.7	382.8
6/11/11 4:05	6/11/11 5:05	60	60	0	60	100.0%	0	2	9	11	0.0	2.0	9.0	11.0	18.2%	216.5	233.8
6/12/11 4:05	6/12/11 5:05	60	60	0	60	100.0%	1	0	15	16	1.0	0.0	15.0	16.0	0.0%	405.0	349.1
6/13/11 4:05	6/13/11 5:05	60	60	0	60	100.0%	1	4	6	11	1.0	4.0	6.0	11.0	36.4%	295.4	267.3
6/14/11 4:05	6/14/11 5:05	60	60	0	60	100.0%	1	0	11	12	1.0	0.0	11.0	12.0	0.0%	324.3	272.2
6/15/11 4:05	6/15/11 5:05	60	60	0	60	100.0%	0	0	14	14	0.0	0.0	14.0	14.0	0.0%	461.5	474.0
6/16/11 4:05	6/16/11 5:05	60	60	0	60	100.0%	0	5	20	25	0.0	5.0	20.0	25.0	20.0%	299.7	231.3
6/17/11 4:06	6/17/11 5:06	60	60	0	60	100.0%	0	0	3	3	0.0	0.0	3.0	3.0	0.0%	238.9	249.9
6/18/11 4:06	6/18/11 5:06	60	60	0	60	100.0%	0	0	4	4	0.0	0.0	4.0	4.0	0.0%	331.0	340.9
6/19/11 4:06	6/19/11 5:06	60	60	0	60	100.0%	0	0	4	4	0.0	0.0	4.0	4.0	0.0%	634.0	653.0
6/20/11 4:06	6/20/11 5:06	60	60	0	60	100.0%	0	2	186	188	0.0	2.0	186.0	188.0	1.1%	512.5	516.5
6/21/11 4:06	6/21/11 5:06	60	60	0	60	100.0%	2	4	43	49	2.0	4.0	43.0	49.0	8.2%	394.9	459.3
6/22/11 4:06	6/22/11 5:06	60	60	0	60	100.0%	3	2	18	23	3.0	2.0	18.0	23.0	8.7%	361.8	402.3
6/23/11 4:07	6/23/11 5:07	60	60	0	60	100.0%	1	1	31	33	1.0	1.0	31.0	33.0	3.0%	562.1	518.2
6/24/11 4:07	6/24/11 5:07	60	60	0	60	100.0%	0	3	28	31	0.0	3.0	28.0	31.0	9.7%	364.7	280.7
6/25/11 4:07	6/25/11 5:07	60	60	0	60	100.0%	0	0	18	18	0.0	0.0	18.0	18.0	0.0%	529.5	401.3
6/26/11 4:08	6/26/11 5:08	60	60	0	60	100.0%	0	0	25	25	0.0	0.0	25.0	25.0	0.0%	516.3	490.1
6/27/11 4:08	6/27/11 5:08	60	60	0	60	100.0%	0	2	12	14	0.0	2.0	12.0	14.0	14.3%	369.6	298.4
6/28/11 4:08	6/28/11 5:08	60	60	0	60	100.0%	1	1	30	32	1.0	1.0	30.0	32.0	3.1%	649.0	521.4
6/29/11 4:09	6/29/11 5:09	60	60	0	60	100.0%	0	4	13	17	0.0	4.0	13.0	17.0	23.5%	278.7	179.2
6/30/11 4:09	6/30/11 5:09	60	60	0	60	100.0%	2	1	3	6	2.0	1.0	3.0	6.0	16.7%	196.9	153.3
7/1/11 4:09	7/1/11 5:09	60	0	0	0	0.0%											
7/2/11 4:10	7/2/11 5:10	60	0	0	0	0.0%											
7/3/11 4:10	7/3/11 5:10	60	0	0	0	0.0%											
7/4/11 4:11	7/4/11 5:11	60	0	0	0	0.0%											
7/5/11 4:11	7/5/11 5:11	60	0	0	0	0.0%											
7/6/11 4:12	7/6/11 5:12	60	60	0	60	100.0%	1	4	83	88	1.0	4.0	83.0	88.0	4.5%	442.0	450.8
7/7/11 4:12	7/7/11 5:12	60	60	0	60	100.0%	1	6	73	80	1.0	6.0	73.0	80.0	7.5%	413.2	367.3
7/8/11 4:13	7/8/11 5:13	60	60	0	60	100.0%	0	0	29	29	0.0	0.0	29.0	29.0	0.0%	572.1	614.5
7/9/11 4:13	7/9/11 5:13	60	60	0	60	100.0%	0	0	17	17	0.0	0.0	17.0	17.0	0.0%	794.3	962.3

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Swept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-14. Target counts, passage rates, and mean and median target heights during days of the summer 2011 season.

Sunrise + 30 minutes	Sunset -30 minutes	Minutes in Day	Minutes Radar On	Minutes with Rain	Total Day Minutes	% Day with Data	Day Count Below RSZ	Day Count at RSZ	Day Count Above RSZ	Total Day Count	Day TPR Below RSZ	Day TPR at RSZ	Day TPR Above RSZ	Day TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
6/1/11 5:07	6/1/11 18:17	790	790	0	790	100.0%	3	21	105	129	0.2	1.6	8.0	9.8	16.3%	366.0	320.0
6/2/11 5:06	6/2/11 18:17	791	788	0	788	99.6%	25	271	1545	1841	1.9	20.6	117.6	140.2	14.7%	308.1	296.3
6/3/11 5:06	6/3/11 18:18	792	792	0	792	100.0%	23	170	1447	1640	1.7	12.9	109.6	124.2	10.4%	434.0	327.7
6/4/11 5:06	6/4/11 18:18	792	792	0	792	100.0%	13	133	631	777	1.0	10.1	47.8	58.9	17.1%	279.2	264.3
6/5/11 5:06	6/5/11 18:19	793	793	0	793	100.0%	10	178	840	1028	0.8	13.5	63.6	77.8	17.3%	248.8	240.5
6/6/11 5:06	6/6/11 18:19	793	793	0	793	100.0%	0	10	190	200	0.0	0.8	14.4	15.1	5.0%	444.5	439.1
6/7/11 5:06	6/7/11 18:20	794	794	0	794	100.0%	3	19	174	196	0.2	1.4	13.1	14.8	9.7%	336.0	331.9
6/8/11 5:05	6/8/11 18:20	795	795	0	795	100.0%	2	16	59	77	0.2	1.2	4.5	5.8	20.8%	377.5	290.2
6/9/11 5:05	6/9/11 18:21	796	796	0	796	100.0%	74	148	934	1156	5.6	11.2	70.4	87.1	12.8%	265.4	251.0
6/10/11 5:05	6/10/11 18:21	796	796	0	796	100.0%	12	230	1449	1691	0.9	17.3	109.2	127.5	13.6%	299.4	274.0
6/11/11 5:05	6/11/11 18:22	797	797	0	797	100.0%	9	54	764	827	0.7	4.1	57.5	62.3	6.5%	326.8	310.3
6/12/11 5:05	6/12/11 18:22	797	797	0	797	100.0%	3	8	343	354	0.2	0.6	25.8	26.6	2.3%	371.7	357.4
6/13/11 5:05	6/13/11 18:23	798	798	0	798	100.0%	12	127	982	1121	0.9	9.5	73.8	84.3	11.3%	301.9	272.2
6/14/11 5:05	6/14/11 18:23	798	798	0	798	100.0%	15	161	948	1124	1.1	12.1	71.3	84.5	14.3%	267.7	243.5
6/15/11 5:05	6/15/11 18:23	798	798	0	798	100.0%	3	48	1404	1455	0.2	3.6	105.6	109.4	3.3%	353.8	329.8
6/16/11 5:05	6/16/11 18:24	799	799	0	799	100.0%	4	16	404	424	0.3	1.2	30.3	31.8	3.8%	395.0	358.3
6/17/11 5:06	6/17/11 18:24	798	798	0	798	100.0%	5	15	249	269	0.4	1.1	18.7	20.2	5.6%	357.1	327.7
6/18/11 5:06	6/18/11 18:24	798	798	0	798	100.0%	3	53	691	747	0.2	4.0	52.0	56.2	7.1%	325.6	299.9
6/19/11 5:06	6/19/11 18:24	798	798	0	798	100.0%	1	2	45	48	0.1	0.2	3.4	3.6	4.2%	606.6	484.2
6/20/11 5:06	6/20/11 18:25	799	799	0	799	100.0%	15	144	882	1041	1.1	10.8	66.2	78.2	13.8%	301.0	270.7
6/21/11 5:06	6/21/11 18:25	799	799	0	799	100.0%	20	120	938	1078	1.5	9.0	70.4	81.0	11.1%	301.1	278.0
6/22/11 5:06	6/22/11 18:25	799	799	0	799	100.0%	5	76	764	845	0.4	5.7	57.4	63.5	9.0%	323.2	277.1
6/23/11 5:07	6/23/11 18:25	798	798	0	798	100.0%	6	104	1545	1655	0.5	7.8	116.2	124.4	6.3%	327.1	305.4
6/24/11 5:07	6/24/11 18:25	798	798	0	798	100.0%	11	183	1133	1327	0.8	13.8	85.2	99.8	13.8%	336.5	280.4
6/25/11 5:07	6/25/11 18:26	799	799	0	799	100.0%	6	45	930	981	0.5	3.4	69.8	73.7	4.6%	346.6	323.7
6/26/11 5:08	6/26/11 18:26	798	798	0	798	100.0%	13	96	1311	1420	1.0	7.2	98.6	106.8	6.8%	326.0	300.5
6/27/11 5:08	6/27/11 18:26	798	798	15	783	98.1%	20	170	1090	1280	1.5	13.0	83.5	98.1	13.3%	300.2	265.2
6/28/11 5:08	6/28/11 18:26	798	798	0	798	100.0%	4	75	1158	1237	0.3	5.6	87.1	93.0	6.1%	354.0	310.9
6/29/11 5:09	6/29/11 18:26	797	797	0	797	100.0%	8	97	1418	1523	0.6	7.3	106.8	114.7	6.4%	361.3	341.4
6/30/11 5:09	6/30/11 18:26	797	657	0	657	82.4%	13	53	283	349	1.2	4.8	25.8	31.9	15.2%	266.8	239.3
7/1/11 5:09	7/1/11 18:26	797	0	0	0	0.0%											
7/2/11 5:10	7/2/11 18:26	796	0	0	0	0.0%											
7/3/11 5:10	7/3/11 18:26	796	0	0	0	0.0%											
7/4/11 5:11	7/4/11 18:26	795	0	0	0	0.0%											
7/5/11 5:11	7/5/11 18:25	794	351	115	236	29.7%	3	27	294	324	0.8	6.9	74.7	82.4	8.3%	417.4	382.7
7/6/11 5:12	7/6/11 18:25	793	793	60	733	92.4%	32	234	2727	2993	2.6	19.2	223.2	245.0	7.8%	383.9	371.2
7/7/11 5:12	7/7/11 18:25	793	793	75	718	90.5%	13	142	1289	1444	1.1	11.9	107.7	120.7	9.8%	329.2	286.5
7/8/11 5:13	7/8/11 18:25	792	792	15	777	98.1%	3	67	1141	1211	0.2	5.2	88.1	93.5	5.5%	363.3	332.2
7/9/11 5:13	7/9/11 18:25	792	792	0	792	100.0%	9	86	848	943	0.7	6.5	64.2	71.4	9.1%	354.6	302.4

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-15. Target counts, passage rates, and mean and median target heights during dusks of the summer 2011 season.

Sunset - 30 minutes	Sunset + 30 minutes	Minutes in Dusk	Minutes Radar On	Minutes with Rain	Total Dusk Minutes	% Dusk with Data	Dusk Count Below RSZ	Dusk Count at RSZ	Dusk Count Above RSZ	Total Dusk Count	Dusk TPR Below RSZ	Dusk TPR at RSZ	Dusk TPR Above RSZ	Dusk TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
6/1/11 18:17	6/1/11 19:17	60	60	0	60	100.0%	1	2	1	4	1.0	2.0	1.0	4.0	50.0%	139.8	81.8
6/2/11 18:17	6/2/11 19:17	60	60	0	60	100.0%	2	2	0	4	2.0	2.0	0.0	4.0	50.0%	42.4	37.5
6/3/11 18:18	6/3/11 19:18	60	60	0	60	100.0%	3	15	19	37	3.0	15.0	19.0	37.0	40.5%	141.0	137.2
6/4/11 18:18	6/4/11 19:18	60	60	0	60	100.0%	1	1	2	4	1.0	1.0	2.0	4.0	25.0%	172.0	139.8
6/5/11 18:19	6/5/11 19:19	60	60	0	60	100.0%	1	4	1	6	1.0	4.0	1.0	6.0	66.7%	108.3	56.5
6/6/11 18:19	6/6/11 19:19	60	60	0	60	100.0%	1	0	34	35	1.0	0.0	34.0	35.0	0.0%	603.4	502.9
6/7/11 18:20	6/7/11 19:20	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	483.1	483.1
6/8/11 18:20	6/8/11 19:20	60	60	0	60	100.0%	0	1	0	1	0.0	1.0	0.0	1.0	100.0%	88.1	88.1
6/9/11 18:21	6/9/11 19:21	60	60	0	60	100.0%	0	1	1	2	0.0	1.0	1.0	2.0	50.0%	142.5	142.5
6/10/11 18:21	6/10/11 19:21	60	60	0	60	100.0%	1	5	2	8	1.0	5.0	2.0	8.0	62.5%	160.3	89.9
6/11/11 18:22	6/11/11 19:22	60	60	0	60	100.0%	1	3	1	5	1.0	3.0	1.0	5.0	60.0%	85.4	49.4
6/12/11 18:22	6/12/11 19:22	60	60	0	60	100.0%	0	0	1	1	0.0	0.0	1.0	1.0	0.0%	322.2	322.2
6/13/11 18:23	6/13/11 19:23	60	60	0	60	100.0%	0	2	1	3	0.0	2.0	1.0	3.0	66.7%	94.4	72.5
6/14/11 18:23	6/14/11 19:23	60	60	0	60	100.0%	1	1	14	16	1.0	1.0	14.0	16.0	6.3%	312.7	336.5
6/15/11 18:23	6/15/11 19:23	60	60	0	60	100.0%	1	0	2	3	1.0	0.0	2.0	3.0	0.0%	773.2	427.9
6/16/11 18:24	6/16/11 19:24	60	60	0	60	100.0%	1	0	1	2	1.0	0.0	1.0	2.0	0.0%	192.0	192.0
6/17/11 18:24	6/17/11 19:24	60	60	0	60	100.0%	0	5	4	9	0.0	5.0	4.0	9.0	55.6%	155.4	128.3
6/18/11 18:24	6/18/11 19:24	60	60	0	60	100.0%	0	1	6	7	0.0	1.0	6.0	7.0	14.3%	1067.1	669.0
6/19/11 18:24	6/19/11 19:24	60	60	0	60	100.0%	2	2	2	6	2.0	2.0	2.0	6.0	33.3%	262.8	69.0
6/20/11 18:25	6/20/11 19:25	60	60	0	60	100.0%	2	1	6	9	2.0	1.0	6.0	9.0	11.1%	176.6	215.2
6/21/11 18:25	6/21/11 19:25	60	60	0	60	100.0%	2	3	16	21	2.0	3.0	16.0	21.0	14.3%	326.6	284.1
6/22/11 18:25	6/22/11 19:25	60	60	0	60	100.0%	1	1	11	13	1.0	1.0	11.0	13.0	7.7%	496.8	470.9
6/23/11 18:25	6/23/11 19:25	60	60	0	60	100.0%	0	3	4	7	0.0	3.0	4.0	7.0	42.9%	198.8	202.7
6/24/11 18:25	6/24/11 19:25	60	60	0	60	100.0%	2	1	3	6	2.0	1.0	3.0	6.0	16.7%	977.9	971.7
6/25/11 18:26	6/25/11 19:26	60	60	0	60	100.0%	1	2	2	5	1.0	2.0	2.0	5.0	40.0%	333.0	102.7
6/26/11 18:26	6/26/11 19:26	60	60	0	60	100.0%	1	0	2	3	1.0	0.0	2.0	3.0	0.0%	136.7	134.4
6/27/11 18:26	6/27/11 19:26	60	60	0	60	100.0%	0	3	1	4	0.0	3.0	1.0	4.0	75.0%	119.7	93.7
6/28/11 18:26	6/28/11 19:26	60	60	0	60	100.0%	0	1	1	2	0.0	1.0	1.0	2.0	50.0%	119.5	119.5
6/29/11 18:26	6/29/11 19:26	60	60	0	60	100.0%	1	1	0	2	1.0	1.0	0.0	2.0	50.0%	46.0	46.0
6/30/11 18:26	6/30/11 19:26	60	0	0	0	0.0%											
7/1/11 18:26	7/1/11 19:26	60	0	0	0	0.0%											
7/2/11 18:26	7/2/11 19:26	60	0	0	0	0.0%											
7/3/11 18:26	7/3/11 19:26	60	0	0	0	0.0%											
7/4/11 18:26	7/4/11 19:26	60	0	0	0	0.0%											
7/5/11 18:25	7/5/11 19:25	60	60	0	60	100.0%	0	2	12	14	0.0	2.0	12.0	14.0	14.3%	378.5	363.2
7/6/11 18:25	7/6/11 19:25	60	60	0	60	100.0%	0	0	24	24	0.0	0.0	24.0	24.0	0.0%	449.2	401.9
7/7/11 18:25	7/7/11 19:25	60	60	0	60	100.0%	1	3	60	64	1.0	3.0	60.0	64.0	4.7%	447.0	402.0
7/8/11 18:25	7/8/11 19:25	60	60	0	60	100.0%	2	2	17	21	2.0	2.0	17.0	21.0	9.5%	352.0	393.8
7/9/11 18:25	7/9/11 19:25	60	60	0	60	100.0%	0	1	2	3	0.0	1.0	2.0	3.0	33.3%	290.5	301.8

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Swept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.



Table 9-16. Target counts, passage rates, and mean and median target heights during nights of the summer 2011 season.

Sunset + 30 minutes	Sunrise next day - 30 minutes	Minutes in Night	Minutes Radar On	Minutes with Rain	Total Night Minutes	% Night with Data	Night Count Below RSZ	Night Count at RSZ	Night Count Above RSZ	Total Night Count	Night TPR Below RSZ	Night TPR at RSZ	Night TPR Above RSZ	Night TPR	% Targets at RSZ	Mean Target Height AGL (m)	Median Target Height AGL (m)
6/1/11 19:17	6/2/11 4:06	529	529	0	529	100.0%	36	248	658	942	4.1	28.1	74.6	106.8	26.3%	249.1	208.6
6/2/11 19:17	6/3/11 4:06	529	529	0	529	100.0%	16	24	330	370	1.8	2.7	37.4	42.0	6.5%	470.3	421.4
6/3/11 19:18	6/4/11 4:06	528	528	0	528	100.0%	42	119	1000	1161	4.8	13.5	113.6	131.9	10.2%	409.3	409.0
6/4/11 19:18	6/5/11 4:06	528	528	0	528	100.0%	17	40	578	635	1.9	4.5	65.7	72.2	6.3%	453.5	431.6
6/5/11 19:19	6/6/11 4:06	527	526	0	526	99.8%	86	139	244	469	9.8	15.9	27.8	53.5	29.6%	226.0	148.4
6/6/11 19:19	6/7/11 4:06	527	526	0	526	99.8%	11	16	333	360	1.3	1.8	38.0	41.1	4.4%	405.1	399.4
6/7/11 19:20	6/8/11 4:05	525	524	0	524	99.8%	7	26	364	397	0.8	3.0	41.7	45.5	6.5%	432.9	374.3
6/8/11 19:20	6/9/11 4:05	525	525	0	525	100.0%	3	6	122	131	0.3	0.7	13.9	15.0	4.6%	468.1	439.5
6/9/11 19:21	6/10/11 4:05	524	523	0	523	99.8%	10	18	601	629	1.1	2.1	68.9	72.2	2.9%	388.1	347.5
6/10/11 19:21	6/11/11 4:05	524	524	0	524	100.0%	3	15	403	421	0.3	1.7	46.1	48.2	3.6%	440.1	392.6
6/11/11 19:22	6/12/11 4:05	523	523	0	523	100.0%	7	33	261	301	0.8	3.8	29.9	34.5	11.0%	447.7	394.7
6/12/11 19:22	6/13/11 4:05	523	523	0	523	100.0%	8	15	239	262	0.9	1.7	27.4	30.1	5.7%	471.8	437.7
6/13/11 19:23	6/14/11 4:05	522	522	0	522	100.0%	9	16	476	501	1.0	1.8	54.7	57.6	3.2%	460.3	382.8
6/14/11 19:23	6/15/11 4:05	522	521	0	521	99.8%	6	25	1868	1899	0.7	2.9	215.1	218.7	1.3%	373.8	358.1
6/15/11 19:23	6/16/11 4:05	522	522	0	522	100.0%	4	22	355	381	0.5	2.5	40.8	43.8	5.8%	412.4	347.5
6/16/11 19:24	6/17/11 4:06	522	521	0	521	99.8%	5	17	330	352	0.6	2.0	38.0	40.5	4.8%	355.2	320.2
6/17/11 19:24	6/18/11 4:06	522	522	0	522	100.0%	5	34	287	326	0.6	3.9	33.0	37.5	10.4%	328.4	304.0
6/18/11 19:24	6/19/11 4:06	522	522	0	522	100.0%	3	14	93	110	0.3	1.6	10.7	12.6	12.7%	457.6	342.1
6/19/11 19:24	6/20/11 4:06	522	522	0	522	100.0%	6	13	578	597	0.7	1.5	66.4	68.6	2.2%	475.3	440.7
6/20/11 19:25	6/21/11 4:06	521	521	0	521	100.0%	20	121	2343	2484	2.3	13.9	269.8	286.1	4.9%	406.0	415.7
6/21/11 19:25	6/22/11 4:06	521	521	0	521	100.0%	7	59	1756	1822	0.8	6.8	202.2	209.8	3.2%	378.6	356.2
6/22/11 19:25	6/23/11 4:07	522	522	0	522	100.0%	5	19	940	964	0.6	2.2	108.0	110.8	2.0%	400.9	379.3
6/23/11 19:25	6/24/11 4:07	522	522	0	522	100.0%	7	19	436	462	0.8	2.2	50.1	53.1	4.1%	369.6	342.3
6/24/11 19:25	6/25/11 4:07	522	521	0	521	99.8%	10	58	423	491	1.2	6.7	48.7	56.5	11.8%	344.0	292.6
6/25/11 19:26	6/26/11 4:08	522	522	0	522	100.0%	1	5	192	198	0.1	0.6	22.1	22.8	2.5%	453.8	382.7
6/26/11 19:26	6/27/11 4:08	522	522	0	522	100.0%	2	12	415	429	0.2	1.4	47.7	49.3	2.8%	362.2	339.5
6/27/11 19:26	6/28/11 4:08	522	522	0	522	100.0%	4	20	196	220	0.5	2.3	22.5	25.3	9.1%	433.1	352.0
6/28/11 19:26	6/29/11 4:09	523	522	0	522	99.8%	5	29	193	227	0.6	3.3	22.2	26.1	12.8%	420.2	310.9
6/29/11 19:26	6/30/11 4:09	523	522	0	522	99.8%	4	20	134	158	0.5	2.3	15.4	18.2	12.7%	418.1	341.4
6/30/11 19:26	7/1/11 4:09	523	0	0	0	0.0%											
7/1/11 19:26	7/2/11 4:10	524	0	0	0	0.0%											
7/2/11 19:26	7/3/11 4:10	524	0	0	0	0.0%											
7/3/11 19:26	7/4/11 4:11	525	0	0	0	0.0%											
7/4/11 19:26	7/5/11 4:11	525	0	0	0	0.0%											
7/5/11 19:25	7/6/11 4:12	527	526	0	526	99.8%	13	37	365	415	1.5	4.2	41.6	47.3	8.9%	383.7	315.5
7/6/11 19:25	7/7/11 4:12	527	526	0	526	99.8%	17	63	823	903	1.9	7.2	93.9	103.0	7.0%	353.2	309.1
7/7/11 19:25	7/8/11 4:13	528	528	0	528	100.0%	4	65	549	618	0.5	7.4	62.4	70.2	10.5%	393.5	339.5
7/8/11 19:25	7/9/11 4:13	528	528	0	528	100.0%	1	4	219	224	0.1	0.5	24.9	25.5	1.8%	545.4	464.1
7/9/11 19:25	7/10/11 4:14	529	274	0	274	51.8%	0	2	278	280	0.0	0.4	60.9	61.3	0.7%	487.0	440.7

TPR = Target Passage Rate (targets / 1-km front / hr), RSZ = Rotor Sw ept Zone (29.9 - 133.8 m), AGL = Above Ground Level

*Periods with <50% of time recorded by radar are excluded from analyses

*Insects noted in trackplot images during these time periods.