THE ECOLOGICAL NEEDS AND ECONOMIC BENEFITS OF BALD EAGLES WINTERING IN SOUTH CENTRAL WISCONSIN

by

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Chapter 1: The Ecological Needs and Economic Benefits of Bald Eagles Wintering in South Central Wisconsin: Introduction

Background

In recent years the bald eagle (*Haliaeetus leucocepalus)* has been touted as a success story for the Endangered Species Act of 1973 (United States Fish and Wildlife Service 1973). Prior to the 1940s eagle populations experienced steady declines throughout their range and the decrease was related to a lessened availability of prey species, direct killing and loss of suitable habitat (United States Fish and Wildlife Service 2005). In 1940, Congress passed the Bald and Golden Eagle Protection Act, making it illegal to kill, harvest or harm eagles in an attempt to reverse this negative population trend. Though enforcement was weak, eagle populations remained stable until the 1950s when the wide spread use of pesticides such as DDT became common. High levels of pesticides directly affected bald eagle reproductive success and dramatically reduced the population nationwide. The major turning points in bald eagle population recovery occurred in 1972 with the federal banning of the use of organochlorine and organophosphate pesticides, such as DDT in the U.S., and in 1973 with the creation of the federal Endangered Species Act. Though bald eagle numbers were initially slow to recover, the number of eagles breeding in Wisconsin has increased from 82 pairs in 1970 to 850 pairs in 2003 (Wisconsin Department of Natural Resources 2003).

Bald eagle populations have surpassed recovery goals in many states and eagles are again becoming a common sight. Bald eagles are now listed as threatened, nationwide, under the Endangered Species Act and have been de-listed altogether in Wisconsin. Laws such as the Migratory Bird Treaty of 1916, the Bald and Golden Eagle Protection Act of 1940, and the Wildlife Act of 1976 (Birds of Prey Regulations 1984)

remain in place to protect bald eagles and other wildlife against the various factors that continue to affect their survival, such as poaching, poisoning and electrocution. Unfortunately, less progress has been made in combating habitat loss, which remains a major concern for bald eagles.

One of the main issues related to habitat loss is increased development and landscape alteration by an expanding human population. Though human-wildlife interactions can be positive, they are commonly expressed in terms of conflict. Land use conflicts between people and wildlife are common and often overlooked because the repercussions are not immediately recognized. Human development, encroaching on wildlife habitat, can negatively impact wildlife, and in many cases displaces populations, increases stress and mortality, while decreasing reproductive success and overall habitat quality.

Effects of rural development and disturbance on bald eagles

Habitat loss is well-known as the primary reason for the decline of bald eagles. The more subtle influences of development and habitat disturbance on eagle ecology, however, are less well known. Several studies have examined the influence of human activities on bald eagle behavior, breeding success and survivability. Brown and Stevens (1997) found that distribution and foraging behavior can be altered by unmanaged human recreational activities such as hiking, fishing and boating. Frequent human activity can also disrupt nest site behavior and attentiveness. This, in turn, alters feeding patterns and reduces the rate of prey delivery to the nest, reducing reproductive success (McKay et al. 1996). Similar responses to human activity have been found with wintering bald eagles

(Brown and Stevens 1997). Many factors contribute to the degree to which human recreational activities disturb wintering eagles, such as overall health of the bird, age, experience level, group size, food accessibility and eagle abundance. If an eagle is in poor health and starving, it may not have the energy to respond to human disturbance as well as it would otherwise (Stalmaster 1987). Excessive human disturbance could be detrimental to wintering eagles by directly affecting their foraging success and energy conservation. Inactivity appears to be an important survival strategy in winter (Stalmaster and Gessaman 1984). Even mating success can be indirectly affected by disturbance as courtship and the breeding cycle begin as early as February while eagles are still in their wintering areas (McKay et. al. 1996).

Conversely, studies also suggest that eagles show an increased ability to tolerate some levels of human disturbance. It is possible that as eagle populations continue to grow, birds will adapt to human presence and begin to return to areas from which they have previously been displaced (McKay 1996). Expanding eagle populations in Wisconsin (Wisconsin Department of Natural Resources 2003) may exemplify this phenomenon. It is important to note that human presence causes temporary displacement, whereas, physical development (i.e. buildings) within eagle habitat may have a more permanent effect on eagles, resulting in complete abandonment of an area (Buehler et. al. 1991). Data from Buehler (1991) showed no evidence of eagles adapting to buildings at the river's edge and concluded that once shoreline habitat is lost to building development it is considered irreversible. In contrast, some types of physical development have actually enhanced bald eagle habitat. Man-made dams for example, can have a positive affect on eagle foraging success. Dams maintain an area of open water below their spillways in

winter providing eagles with access to fish in a season where they would otherwise be unavailable due to ice cover (Stalmaster 1987).

Conflict Resolution

Predicting the amount of development or human activity that would be detrimental to eagle habitat is difficult. Eagles can respond positively or negatively to various aspects of development and a large variation in response of individual eagles can occur (Grub and King 1991, Thompson and McGarigal 2002). Typically the only way to recognize the impacts of development on wildlife or wildlife habitat is in retrospect, when it is too late and the habitat is permanently lost. The question then becomes, how do you identify habitat changes that are likely to be important to eagles before these changes occur? The success at making this prediction, and then acting appropriately on it, is critical to preserving important eagle habitat while contending with the pressure of imminent physical and economic development. Simply saying 'no' to land use changes will not suffice for long in the absence of compelling reason, even when the resource (in this case eagles) is highly valued.

When faced with this type of land use conflict, the integration of ecological and economic information can foster an equitable compromise that may fulfill both the needs of eagles and the desires of area residents. Ecologically sound information can be used to guide development decisions to avoid the irreversible loss of important habitat features such as undeveloped shore lines and the forested bluffs (VanKonigsveld et al. 1994).

We examined the ecological needs of wintering bald eagles in south central Wisconsin through radio telemetry during the winters of 2001-2004 (Chapter 2).

Currently there are few, if any, broad-scale, holistic, bald eagle winter ecology studies that adequately describe the ecological needs of wintering bald eagles on a landscape scale. Most studies investigate specific needs of wintering eagles based on physiological requirements (Stalmaster and Gessaman1984), foraging behavior (Knight and Knight 1984) or specific perch tree dynamics (Buehler et al 1992). All of which are important aspects of eagle habitat selection in winter but neglect habitat selection on a broader scale. The goal of this study was to determine bald eagle habitat requirements on a landscape scale necessary to generate a broader view of habitat needs for eagles and deal with issues like habitat loss, increased development and human induced landscape alterations.

Additionally, we investigated the economic benefits of wintering bald eagles in south central Wisconsin through an economic survey conducted in the winter of 2004 (Chapter 3). We suggest eco-tourism as an applicable tool that should be employed when dealing with the complex issues such as weighing the costs and benefits of development in a rural community. Eagle tourism, as reported on here, is one mechanism that the community can use to engage themselves with the tangible and intrinsic values of their unique areas natural resources. Through this recognition, communities can begin learning more about the ecological resource, identifying and protecting critical land cover types by working eagle habitat conservation into land use plans. Identifying an economic benefit of having unique natural amenities in an area provides a tangible incentive for area residents to protect eagle habitat while still allowing for additional guided development to occur.

The incorporation of ecology and economics is one approach toward successful habitat conservation. Applying a monetary use value to a non-market good can aid in

habitat preservation with the integration of economics and wildlife biology (Bishop 1987). Knowing the specific habitat needs of wintering eagles is a necessary prerequisite to eagle habitat protection. The key to successful application is in identifying workable incentives that relate and include the community in land-use conservation decisions.

Chapter 2: Habitat Selection by Bald Eagles During Winter in South Central Wisconsin

Abstract

We measured the habitat selection by bald eagles (*Haliaeetus leucocephalus)* wintering in south central Wisconsin from 2001 to 2004. Using a combination of site-specific and landscape-level analyses, we found that habitat selection neither varied among years nor or individual birds. Eagles selected forested wetland (the forested river floodplain) and open water (the Wisconsin River) more than expected during the day. Eagles chose evening roosting sites in forest- wetland combinations, broad leaf deciduous, oak and mixed conifer habitats more than expected. Roosting sites were generally in closer proximity to daytime foraging habitats than would be expected at random. On a landscape level, eagles selected forested wetland and urban habitats during the day and open water, forested wetland, broad leaf deciduous forest, and urban areas at night. The inclusion of urban areas in this analysis is considered a spurious correlation due to people and eagles being attracted to the same resources (i.e. forested bluffs and the river). Distance to the river and distance to elevated, forested bluffs were also significant factors in eagle habitat selection. Agriculture was an important habitat for daytime foraging (possibly because of the availability of agricultural carrion) only in relation to forest oak, a habitat type found commonly in roosting areas. Land use decisions aimed at conserving wintering habitat for bald eagles in South Central Wisconsin should consider not only specific habitat suitability, but the juxtaposition of those habitat types in relation to one another.

Introduction

Habitat selection by wintering bald eagles (*Haliaeetus leucocepalus)* has previously been studied throughout their range and has focused on autecological needs at the local scale. Physiological requirements (Stalmaster and Gessaman1984), perch tree requirements (Buehler et al. 1992) and foraging behavior (Knight and Knight 1986, Stalmaster and Plettner 1992) have all been examined to characterize features of specific winter habitat. Though these studies indicate that requirements of eagles in winter revolve around energy conservation, shelter and food, they provide little information on how eagles select habitat at a larger scale. We would predict that a highly mobile species, such as an eagle, would respond to changes in land use and land cover at multiple geographic or temporal scales (Johnson 1980), given their ability to travel long distances to meet their resource needs. We would also predict that habitat selection may be mediated by their social behavior, unique to the winter months (Knight and Knight 1984). This study focuses on understanding how key landscape-level features affect eagle behavior on a wintering range in central Wisconsin. Wintering eagles are characterized as social and non-territorial during the winter (Stalmster 1987). Bald eagles in winter are generally less active and more gregarious than they are during the summer nesting season. Based on 38 days of monitoring four radio tagged sub-adult bald eagles, Stalmaster and Gessaman (1984) determined that wintering eagles engage in a minimal amount of costly activities such as flight and 92.9% of their daily time budget is spent perching. Perching habitat during the day and evening roost habitat are generally located in forested /undeveloped areas and are composed of larger than randomly chosen trees.

Eagles in south central Wisconsin and elsewhere frequently roost communally in winter (Yackel et al. 2000). Communal roosts are generally composed of uneven-aged trees with a multi-layered canopy, often located on leeward hillsides or in valleys (Watson and Rodrick 2001). A high degree of site fidelity exists to the traditional communal roosts which are also characterized by trees that are older and larger than average trees in the stand (Yackel et al. 2000). Such characteristics create favorable microclimates providing protection from harsh weather conditions and enabling eagles to conserve energy throughout the night (Stalmaster and Gessaman 1984). Other studies indicate communal roosting provides social benefits, acting as an information source that may enhance food-finding in nearby foraging areas (Knight and Knight 1984).

Because bald eagles are non-territorial in winter, available food is the primary resource attracting eagles to a specific wintering area (Stalmaster 1987). Eagles rely heavily on fish in winter, as well as, waterfowl and available carrion (Stalmaster 1987, Stalmaster and Plettner 1992). As energy conservation is of primary importance to over-wintering eagle survivability, sit-and wait-hunting, opportunistic feeding on carrion and kleptoparasitism (i.e. stealing food) are the most efficient means of foraging (Stalmaster and Gessaman 1984). Wintering eagles spend approximately 86% of their foraging time actively hunting, about 9% pirating food from other eagles or from other species such as crows and 4% scavenging carrion (Stalmaster and Plettner 1992, Brown 1993). Social congregation is required to take advantage of these energy conserving foraging techniques.

Eagles have been congregating in south central Wisconsin in winter since the construction and operation of the Prairie du Sac dam was completed in 1913. Dams

maintain an area of open water below their spillways in winter providing eagles with access to fish in a season where they would otherwise be unavailable due to ice cover (Stalmaster 1987). Interestingly, there are 25 dams available along the Wisconsin River (WI Valley Improvement Company 2004). Despite this seemingly ample amount of available foraging habitat in winter, the Prairie du Sac Dam remains the single most highly utilized area by wintering eagles in the State (Martell et al. 1991). This suggests that not all dams provide desirable wintering habitat and factors other than open water influence eagle choices of wintering habitat.

Objectives

In this study, we examine the landscape features surrounding the Prairie du Sac Dam to better understand why this area provides a unique wintering habitat for bald eagles. This area provides a combination of appropriate available day time perch sites, juxtaposition of night time roosts, and available food resources that suit the needs of wintering eagles. We do not know the relative importance of surrounding land use and land cover composition influences on the choice of perching sites, night time roosts and available food resources. Our study objectives were to: 1) determine if eagles use land cover types in proportion to their availability in area surrounding Prairie du Sac Dam in Sauk Prairie, WI; 2) determine if the habitat composition surrounding day and night time eagle locations differs from the habitat composition of random locations; and 3) determine if a relationship exists between daytime foraging locations and night time roost locations.

Methods

Study Area

This study was conducted in a 3,986 km^2 area located in Sauk County, with portions extending into Dane, Columbia and Richland counties (Fig 1). Dominant landscape features in the area are the Wisconsin River, forested rock bluffs, and agricultural fields, creating a dynamic mosaic of hills and cultivated valleys. This area is known as a primary eagle wintering site in Wisconsin and supported a maximum of 118-372 eagles during the period of my research (Ferry Bluff Eagle Council, unpublished data). The average winter (November- March) temperature for the duration of the study was -2^{0}C (27^{0}F), whereas, average snowfall ranged from 6.3 - 12.7cm (2.5 -5 in) per winter (Midwestern Regional Climate Center, Ed Hopkins, personal communication 2005).

Study site boundaries were established using limits of radio transmitter signal detectability. Specified waypoints were routinely checked for presence or absence of birds. Transmitters emitted a detectable signal within a minimum 16 km (10 mile) radius of each waypoint. If a bird was detected from any waypoint, its precise location was obtained via triangulation or observation. Areas within the study area that did not contain eagle locations represent areas that were checked daily for eagle presence and had none found. Boundaries were re-established each time a bird was relocated during the first field season. The boundaries of the study area were thus defined at the end of the season, based on the cumulative relocations buffered by a 16 km radius. Eagles not detected within the primary study area were searched by air weekly.

Habitat types were defined using a modification of WISCLAND (Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data) satellite imagery data (Wisconsin Department of Natural Resources 1998). WISCLAND identifies 40 distinct land cover types. We re-defined 8 habitat categories by combining the land cover types of similar land uses: agriculture, open water, wetland, urban/developed, forested wetland, and three types of forest cover: broad leaved deciduous, oak, and conifer other.

Trapping and Tracking

We trapped and tracked bald eagles in south central Wisconsin from the winter of 2001-2002 through the winter of 2003-2004. Following protocols approved by both the USGS Bird Banding Laboratory (2003) and the University of Wisconsin-Madison Animal Care and Use protocols (2003), we captured eagles using either a cannon or rocket net (Bub 1991) in agricultural fields approximately 1.6 km apart. Eagles were baited to the net sites with road-killed deer. Once captured, the eagles were taken to a local veterinary clinic (Sauk Prairie Small Animal Clinic, Prairie du Sac, WI.) for processing.

Processing consisted of marking each eagle with a U.S. Fish and Wildlife Service leg band, as well as a backpack-mounted radio transmitter (Communications Specialists INC. Orange, CA). A break-away, 'X' configuration harness was applied (Buehler et al. 1995) using Teflon ribbon (Bally Ribbon Co. Bally, PA). The harness ends were attached with a cotton thread so as to decay after two or three years. To improve visual identification in the field, 6 eagles were implanted with a tail feather of the opposite color. In eagles, the implanted feather molts within 1 to 2 years. Each eagle was aged by

plumage (Wheeler and Clark 1996) and sex was determined according to size and blood analysis. An overall health inspection was conducted and a blood sample collected from the brachial or femoral artery. Processing time lasted approximately one hour, after which they were returned to the capture site and released.

At least one day and one night location was obtained for every bird in the study area daily from mid- November through to mid- March, 2002-2004. Tracking was done by triangulation primarily on the ground using a three element Yagi antenna (Advanced Telemetry Systems, Isanti, MN). Only locations where all bearings were collected within 20 minutes of each other were included in further analyses. Daytime locations were taken between 6:00 am-6:00 pm; night roosting locations were taken any time after dusk or before dawn. While tracking, each observer recorded temperature, wind speed and direction, precipitation, snow cover, time of day, duration of each location, and a general description of habitat type. We relocated birds that left the primary study area via air, on a weekly basis. Eagles tracked by air were either pinpointed by sight or by signal. Locations of birds outside of the primary study area were not included in habitat analyses.

Habitat Selection

We used ANOVA to determine what main effects can be combined within the over all analysis (i.e. season, bird ID, age, sex). We then used the spatial statistical L-test to compare point-to-point nearest neighbor distances for eagle radio tracking data to complete spatial randomness (SPLUS 6.1, 2001). This test indicates whether the distribution patterns of eagle locations were random, regular (uniform) or clustered.

Preliminary, qualitative analysis was conducted using Jacobs Preference Index (Jacobs 1974) to determine habitat selection. Jacobs Preference Index is as follows:

$$\mathbf{D = (r-p)/(r+p-2rp)}$$

where **r** is the proportion of habitat use and **p** is the relative proportion of habitat availability. D ranges between negative 1 and positive 1, and is analyzed for deviation from 0 (Hernandez 1995). We then used Chi- square goodness-of-fit calculations (Neu et al. 1974, Aldridge and Ratti 1992) to statistically test the null hypothesis that each habitat type was used in proportion to availability. Availability was determined using the WISCLAND satellite imagery data, taking the number of grid cells (each cell= 30x30m on the ground) of each habitat type and dividing by the total number of grids in the study area projection. Statistical significance was accepted at $P<0.05$. If habitat types were not used in proportion to availability, the null hypothesis was rejected, and a Bonferroni Z test was conducted to determine which specific habitat type was used more or less than the proportion of its availability.

Habitat Composition:

To examine landscape variables that influence habitat selection, we examined the daily travel distance of eagles and the habitat configuration surrounding eagle re-locations. We conducted a Chi-square-goodness-to-fit test on paired, daily travel distance measurements. These were measured between day foraging locations and night roosting locations of the same bird, taken within a 24 hour period, to determine if there was a spatial relationship between foraging sites and roost areas.

Habitat configuration in the landscape was determined by analyzing the proportion of habitat types surrounding an eagle location. We calculated the average daily distance an eagle moved, using only paired location distances as described above, and used it as a radius to compose buffers around each eagle location, and an equal number of computer-generated random locations (ArcView 3.2 Spatial Analyst, Environmental Systems Research Institute, Redlands CA 1999). The average daily distance moved was selected as a buffer size within which to analyze habitat proximity. This buffer size was chosen because we felt it represented daily movements of eagles in this area. The percent habitat type available within each of the designated buffers was determined using FragStats (McGarigal et al. 2002).

Distance

To assess the role that distance between specific habitat types, daytime foraging areas and night time roosting areas plays in habitat selection, we first calculated the distance between each relocation and the nearest specified habitat type (i.e. river, row crop agriculture, or forested bluffs; using the Euclidian Distance Function in the Spatial Analyst Extension;ArcGIS9 Environmental Systems Research Institute, Redlands CA 2004). The distance traveled between random locations, nighttime roosting locations and daytime foraging locations (Beyer 2004) were also calculated. We evaluated all habitat composition data using stepwise logistic regression (Manley et al. 2002, Keating and Cherry 2004) with the proportion of habitat type, distance to specific habitat types and distance between day and roost locations as our independent variables. We used the

LOGISTIC procedure in the SAS statistical program (version 9.1) for all logistic regression modeling (SAS Institute 1989).

Results

Land Cover

Land cover in the study area consists of 51% agricultural fields, 42% mixed forests, 6% wetland or open water (mostly the Wisconsin River) and 1% urban/developed land (WDNR 1998; Figure 1). Agriculture includes cultivated row crops, forage crops, grassland and barren fields (Table 1). All agricultural practices in the area were combined, as they were all seasonally out of production and/or snow covered. The distinct difference among agricultural practices, with respect to eagle foraging behavior, is the availability of agricultural carrion through manure spreading on the fields. Though important, manure spreading was not qualified here because the practice is sporadic and inconsistently located. Row crop agriculture was isolated for distance analysis because it is the predominant agricultural land use where manure is spread. Otherwise all agricultural fields were considered the same.

Captures, Re-locations and Movements

We trapped and released 19 bald eagles, 13 in the winter of 2001-2002 and 6 in the winter of 2002-2003. Of the 19 eagles trapped, we placed radio transmitters on 17. The radio tagged population consisted of 41% females and 59% males (Table 2). The total number of relocations for all eagles was 1,530 with an average of 91 ($\pm$ 88)

locations per bird (Appendix 1). Only 2 of the 17 birds tracked in the study area were located < 20 times.

Eagles in the study moved on average 4.48 km per day, based on distances between paired foraging and roosting locations within the same 24 hour period (n = 553). Even though some birds were present in the study area more consistently than others, we compared the proportion of habitat used among all birds, over all three years of the study to assess habitat use on an individual basis. We found no difference in the proportion of habitat types used among individual eagles among years (Table 3). Examining differences between individual birds over all three seasons also indicates that eagle age class and gender were not significant. These data, therefore, were pooled for further analysis.

Habitat Selection

The most prominent foraging area for over-wintering eagles was the Wisconsin River (Figure 2). The Prairie du Sac Alliant Energy Dam (Figure 1) maintains an area of open water throughout the winter providing eagles access to fish even in the coldest periods that occurred during this study. The change in average temperature during the study did not differ ($F=0.10$, $p=0.76$) and there was no interaction between month and season ($F=0.24$, $p=0.63$), but monthly changes were detected ($F= 5.87$, $p=.027$). In general, temperatures cooled progressively through February and then began to warm.

Eagle use of the study area appeared clustered (Figure 2). Both day and night locations of eagles were concentrated along the Wisconsin River and in upland areas just

to the north of the river as opposed to both sides of the river. Overall eagle use of the study area is clumped (Figure 3).

To examine selection we used a qualitative preference index (PI) which varies between negative 1 (maximum negative selection) and positive 1 (maximum positive selection). Of the eight defined habitat types, forest broad leaved deciduous (PI= 0.06 day, 0.65 night) and forested wetland (PI=0.61 day, 0.42 night) were used more than expected based on availability for both day and night (Figure 4). Other habitat types that were used more than expected were open water (PI = 0.65) for daytime use, while forest mixed conifer (PI = 0.19) and forest oak (PI = 0.23) were used more than expected during the night. Habitat types not selected for in the day were agriculture, forested oak, forested conifer and urban. Agriculture, wetland and open water habitats were used less than expected based on availability during the night.

Eagles neither used day habitats (X^2 =519.8, p<0.001, df = 7) nor night habitats (X^2 = 815.6, p<0.001, df = 7) in proportion to availability. Forested wetland and open water were used more than expected in the daytime (Table 4), while forest broad leaf deciduous, forest oak, forest wetland and forest conifer other were used more than expected in the nighttime (Table 5).

Habitat Composition

To examine how eagles use habitat types in relation to one another, we compared the distances between paired locations to distances between randomly paired locations within the study area. Based on Chi-squared analysis, we found that eagles use habitat types in relatively close (closer than would be expected if use was random) proximity to

one another ($X^2 = 559.02$, $p<0.003$, df = 1) within a 24 hr period, suggesting that eagles choose roosting sites that are close to their daytime feeding sites.

Habitat configuration in the landscape was examined by analyzing the proportion of habitat types found within 4.48 km (average daily distance moved by an eagle in the study) of each eagle location and comparing this to the habitat composition to an equal number of computer-generated random locations, each having a radius of 4.48 km. Stepwise logistic regression resulted in a model that correctly classified eagle daytime locations with 77.3% accuracy and 71.4% accuracy for night. Eagles selected forested wetland and urban during the day (Table 6). Forested broad leaf deciduous, forested wetland and urban are selected for by eagles during the night (Table 7).

A more comprehensive approach to this analysis was to allow habitat types to be analyzed in combination with one another rather than on an individual basis. Stepwise logistic regression models, allowing for interaction between habitat type variables, increased the explanatory basis of the model to 84.7% for day analysis and 80.3% for roosting analysis. Eagles selected forested wetland and urban habitats, and combinations of agriculture*forest oak, wetland*forest oak, and agriculture*forest oak*urban during the day (Table 8). Forested wetland, open water*forested wetland, open water*urban, forested wetland*urban habitat types were selected for at night (Table 9).

Distance

We also investigated whether distance of day foraging locations to specific habitat types was an important aspect in eagle habitat use. Specific variables measured for each location were distance to river, elevated forest (above 80.2 meters), row crop agriculture,

and nearest known roosting (or daytime) location. Using stepwise logistic regression, eagle day locations were accurately predicted 90% of the time and were best explained by distance to the river and distance to nearest known roost location (Table 10). In other words, eagles selected day locations closer to the Wisconsin River and night roost sites than random locations. For night locations the model correctly identified an eagle location 82.2% of the time with eagles selecting for significantly shorter distances to elevated forest, the river and known day locations (Table 11).

Discussion

In this study, we examined habitat selection by wintering bald eagles in south central Wisconsin, as well as the landscape features surrounding the Prairie du Sac dam, to better understand why this area provides a unique wintering habitat. We hypothesized that this area provides a combination of appropriate available day time perch sites, juxtaposition of night time roosts, and available food resources that better suit the needs of wintering eagles. A nesting study conducted by Marzluff (1997) indicates that golden eagles adjust their ranging and foraging behavior to take advantage of the types and configuration of prey habitat found within the vicinity of their nests, suggesting that golden eagles use combination of site specific and landscape factors in habitat selection. We found that wintering bald eagle habitat selection followed patterns previously described by Stalmaster (1987) and Yackel et al. (2000). However, our data also suggest that landscape factors play a significant role and that surrounding land use and land cover composition are as important as the quality of perching sites, night time roosts and available food resources.

Habitat Selection

Energy conservation, food and shelter are the three main needs of wintering eagles (Stalmaster and Gessaman1984, Knight and Knight 1986, Stalmaster and Plettner 1992, Buehler et al. 1992). These three factors influence both foraging and roost site selection at the local and landscape levels. Eagle distribution in our study area is highly clustered and eagles are selecting specific habitat types to meet their energetic needs in winter. The most important wintering habitats included forested wetland, which, in this area, indicates river shoreline, open water (i.e. the river) and various combinations of forested habitats found on the bluffs surrounding the river (forested oak, forested broad leaf deciduous and forest conifer other; Figure 2). Forested wetland and open water are key areas where eagles commonly forage in winter. The most intensively used area was below the Prairie du Sac Dam where the water remains open and fish are available throughout the winter. These habitats are primarily associated with the bluffs located near the river and provide suitable nightly roosting areas as well as protection from harsh weather.

Habitat Composition

Our findings of habitat selection on a landscape scale indicate that the needs of wintering eagles are quite complex and can not be adequately explained looking solely at site-specific factors. Some studies have suggested that eagles roost near food sources (Chester et al. 1990). Upon examining daily travel distances, eagle day locations were much closer to night locations than were randomly paired locations within the study area.

The shorter distance traveled between foraging and roosting areas suggests that eagles may select areas based on habitat composition rather than on a single site specific factors. Therefore, we examined habitat composition within a buffer surrounding day and night eagle locations with respect to proximity to food supply, suitable roosts, perch sites and alternate food sources. First, we examined the difference between the proportions of each habitat type surrounding actual eagle location against random locations. Our results parallel the habitat selection analysis above, where eagles selected for forested wetland (river shoreline), open water (the river) in both the day and night analysis, and forested broad leaf deciduous (forested bluffs) at night (Tables 6 and 7). This model explained 77% of the variation for day locations and 71% of the variation for night locations. Previous studies of eagle habitat selection in winter have emphasized the importance of night roost characteristics (Knight and Knight 1986, Yackel et al. 2002,) and day time foraging characteristics (Buehler et al. 1992). However, none have demonstrated a relationship between day and night habitat types.

Similar to the findings of previous studies (Buelher et al. 1992, Chandler et al. 1995), eagles were not closely associated with urban habitats for either foraging or roosting according to the use verses availability analyses. Only 5 (.003%) of our 1550 locations actually occurred in urban areas. However, when looking at a landscape scale, we found a correlation to urban areas. Urban areas were defined in the WISCLAND database as any developed area with greater than 50% (high intensity) or lower than 50% (low intensity) impervious cover of synthetic materials (Lillesand et al. 1998). For this study all urban areas (high and low intensity) were combined because they collectively represented only 1.14% of the land-cover within the study area.

We believe the relationship to urban areas at the landscape scale, is likely spurious and due to people (i.e. urban areas) and eagles being attracted to the same landscape such as the river, bluffs and the Prairie du Sac Dam. Stalmaster and Gesserman (1994) previously identified the dam as an isolated feature enhancing wintering eagle habitat. In each of the four river towns in our study area that were associated with most eagle locations (Prairie du Sac, Sauk City, Spring Green and Lone Rock, Figure 1), development occurs primarily on one side of the river while the opposite side of the river remains undeveloped and suitable for daytime perch sites (Figure 5 a and b). Our study documents that within 5 km of the dam and river towns are three heavily-used communal roosts. Large clusters of eagle locations are located near urban areas (Figure 3), not because of the development itself but because of the available foraging and roost habitat near by. One key question that remains, and is unlikely to be resolved, is whether this area provided suitable wintering habitat prior to the establishment of the dam. It is also unclear whether the communal roosts were established prior to the dam or following construction, when eagles began using the area for foraging during the winter.

Eagles tended to prefer forested wetlands and open water over all other habitat combinations. Forested wetland is predominantly located at the river's edge and represents the undeveloped shore line identified by Buehler (1992) and Chandler et al. (1995). However, Chandler et al. (1995) state that marshes along rivers in Chesapeake Bay region were not selected for because perch trees were scarce and trees were far from the shore. Forested wetland in our study area is dominated by perennial woody plants, with a canopy cover greater than 10%, and trees reaching a mature height of at least 1.8 meters (Lillesand et al. 1998). In our study area forested wetland also represents the

forested river floodplain that would otherwise be characterized as mature, broad-leaf deciduous trees,were it not for the association with the wetlands of the river.

Eagles also selected for combinations of agriculture and forested oak during the day (Table 8). Agriculture is the dominant land use type in the study area (51%). Eagles are known to scavenge in the agricultural fields, eating agricultural carrion such as pig and cattle carcasses (Harper 1988). The forested oak habitat type is commonly present in identified communal roosts (Figure 2). The association between agriculture and forested oak suggests that eagles may not be obligate foragers in the river and also use agricultural areas located close to suitable roosting habitat. However, this relationship occurs only if agricultural carrion (live stock carcasses disposed of by farmers) is available. The practice of using agricultural carrion in manure to fertilize fields is common in this area, but occurs intermittently and only for certain field types.

Not all agricultural areas within the study area serve as foraging habitat for eagles. Many inland areas have good bluffs for roosting and available agricultural fields near these roosts but were unused by eagles (Fig. 2). Disuse of an area may imply unsuitability for eagles. It may also reflect relatively low eagle densities, allowing good habitat to go unused. Eagle numbers are still recovering from their nadir in the early 1970's (Wisconsin Department of Natural Resources 2002) and their population may well be below their wintering carrying capacity.

The relationship to urban/developed areas was again significant in both day and night habitat proximity analysis (Tables 8 and 9) and can be explained as a spurious correlation as stated above. Investigating the relationships of habitat types and their proximity to one another shows the complexity of how eagles use this area, but the

application of models with many variables affecting a response can lead to spurious results (*sensu* Chandler et al. 1995). Using smaller buffers may have avoided this misrepresentation, but smaller buffers would also have missed the relationship between roosting and foraging habitat types because eagles move relatively larger distances when flying between night roost and day foraging locations.

Distance

Examining the distance between key habitat types was as important in explaining eagle movements as was comparing use versus availability or random locations. Eagles are foraging in areas that are in close proximity to suitable roosting areas and roosting in areas that are located near suitable foraging areas. These results are consistent with other studies suggesting suitable communal roosts are located as close as possible to food sources (Keister and Anthony 1983, Chester et al. 1990). The association of night roosts and day foraging locations can be seen in Figure 2. Eagle use was specifically clustered around areas where forested bluffs (FBL and FOK) are located close to the river and near agriculture. Lone Rock, Wisconsin exemplifies the close proximity of all three habitat types and is used heavily by eagles early in the season (Figure 5b). In our logistic regression, a relatively simple model of distance to the river and elevated forest explained day eagle foraging locations (90%) and night roost locations (82%).

The combination of site-specific habitat selection, habitat composition and distance data, knowing that eagles routinely travel relatively short distances between roost sites and foraging areas, highlights the need to focus eagle wintering habitat conservation on a complex interspersion of multiple habitat types in close proximity to

one another, rather than solely by specific, individual land cover types. This trend has also been found for other, more far ranging, species such as crows, jays and woodpeckers (McFaden and Capen 2002).

Management Implications

On a landscape scale, the models discussed can aid in pinpointing areas of high value to wintering eagles and identify areas of high conservation priority. Knowledge of the specific habitat needs of wintering eagles is a necessary prerequisite to habitat conservation; the key to the successful application of conservation measures is in relating those habitat types within the landscape. Conservation efforts need to concentrate on areas that provide both foraging and roosting requirements in close proximity. Many areas in our study site constitute a suitable roosting area, but without a nearby food source these areas are not used extensively by eagles. Areas like Portage, WI for example, have extensive wetland forest but little daytime eagle use because potential roosting bluffs are located relatively far away (Figure 2). Likewise, available food alone does not predict eagle use very well. The Wisconsin River has many dams, yet the Prairie du Sac Dam is the only one that attracts wintering eagles in consistent numbers. The relationship and location of habitat types in the landscape is critical. Therefore, areas of high concern are undeveloped, forested river shoreline situated adjacent to water that remains open in winter near suitable roost sites.

Wintering eagles readily concentrated near human developments in this study but only where developed areas were located near undeveloped regions of suitable habitat. As communities like Sauk City and Prairie du Sac grow, eagle use of these areas will

depend upon how future growth is directed (Brown and Stevens 1997, Buehler 1991). Permanent changes in the habitat structure of the roosts and shore line in this area should be avoided. Human disturbance in undeveloped eagle habitat during winter should also be avoided. Proactive steps that can be taken to guide future development include working in cooperation with private land owners, as well as city planners, toward guided development and restricted activity in these areas. Identifying areas of common interests and developing feasible incentives for protecting eagle habitat is crucial for successful conservation. Eagles are a charismatic species, and people can be motivated to include conservation goals in planning or development activities.

Conclusion

While our study has examined eagle habitat use over space, we have not addressed habitat use over time. Seasonality clearly affects the availability of foraging habitats for wintering eagles. Access to fish and agricultural carrion is limited by ice and snow, forcing eagles to either diversify their diet or move to an area with open water and less snow cover. Because the availability of agricultural carrion is sporadic, and difficult to quantify, effects of the change in food availability can best be shown by investigating eagle use of the river. Roost count information from the Ferry Bluff Eagle Council (unpublished data) suggest that eagles are far more spread out along the Wisconsin River in the beginning and end of the winter and only begin to congregate around the Prairie du Sac Dam as the river freezes. Our telemetry data corroborates this: eagles have been observed to shift from downstream to upstream around the dam as ice cover increases downriver. Habitat surrounding the dam, therefore, becomes more critical to eagle

survival during some parts of the winter. Further study is needed to determine how this change in availability affects eagle behavior and habitat use.

Eagles wintering in south central Wisconsin require ample forging habitat (open water and agricultural fields), undeveloped shorelines and suitable roosting sites to survive the winter. Additionally, eagles are selecting these required habitat types in close proximity to one another. Though eagles are non-territorial in winter, they are still limited by habitat availability and location. Foraging success and energy conservation are the main limitations to the winter survivability of eagles (Stalmaster and Gessaman 1984, Stalmaster and Plentner 1992). Foraging success relies on an accessible food source as well as available, undisturbed perch sites from which to hunt (Buehler et al. 1992). Eagles conserve energy by roosting in sheltered areas, as well as limiting flight time (Stalmaster and Gessaman 1984). Our study suggests that the close proximity of required habitat types aids in limiting flight time between roosting locations and foraging areas therefore enhancing energy conservation. The spatial relationship of habitat types identified in this study indicates that habitat selection of wintering eagles may be more complex than initially presumed.

Chapter 3: The Economic Benefits of Bald Eagles Wintering in Sauk Prairie, Wisconsin 1994 - 2004.

Abstract

We repeated a 1994 survey of eagle tourism in Prairie du Sac, Wisconsin (VanKonigsveld et al. 1994) in January of 2004 to understand the non-consumptive use values of bald eagles and examine how these values can be used as an incentive for wintering eagle habitat conservation. The focus of the survey was to determine where eagle watchers come from, what they did while in town, and how much they spent in the local economy. Surveys were analyzed using cost travel analysis and applied to the distance decay function (Schaefer et al. 2004). Combining actual use value (travel cost estimates) with existence (intrinsic) value information can give a better estimation of the net economic value of wildlife (La Roche 2001), therefore we included two intrinsic valuation questions at the end of the 2004 survey. The majority of eagle watchers surveyed were from Wisconsin, many were repeat visitors and all respondents would recommend the trip to others, suggesting a sustainable tourist base. Eagle tourism has maintained its appeal between the 1994 and 2004 with a 21% increase in income over the past 10 years. Travel cost estimates income to Sauk Prairie from eagle watching at >$1,000,000.00 in January and February 2004. Increasing travel costs were correlated with increasing distance away from Prairie du Sac, while the number of trips taken to see eagles was inversely correlated with distance. Identifying an economic benefit of having eagles co-exist with people provides one tangible incentive to protect eagle habitat by using ecological information to guide future development.

Introduction

In 2002, The U.S. Department of Transportation and the Wisconsin State Highway commission began the implementation of a plan to expand Federal Highway 12, from Madison to the Wisconsin Dells. While an Environmental Impact Statement (EIS) was completed, it found that the highway construction project was not likely to jeopardize any federally threatened or endangered species in the area (Wisconsin Department of Transportation EIS Report 1996). Though the EIS report examines a variety of primary environmental effects of construction, their evaluation did not examine secondary effects of highway expansion, such as increased traffic, improved transit times to a major metropolitan area (i.e. Madison), better access to previously undeveloped areas, increased recreation and possible land use changes such as new housing developments. The Sauk City and Prairie du Sac area, located in between Madison and the Wisconsin Dells, constitutes a major wintering ground for the federally threatened bald eagle (*Haliaeetus leucocephalus*). Secondary effects of the highway expansion project in relation to this wintering area were not addressed.

Bald eagles routinely winter along a small stretch of the Wisconsin River near the neighboring towns of Sauk City and Prairie du Sac, Wisconsin (hereafter Sauk Prairie). Increasing and undirected development, following the expansion of Hwy 12 could negatively affect this traditional bald eagle winter habitat. Eagles wintering in south central Wisconsin require the combination of specific habitat characteristics such as open water, forested bluffs, agricultural fields and undeveloped river shorelines (Chapter 2). Not surprisingly, people are also attracted to the natural amenities associated with this landscape which provides a rural atmosphere and attractive conditions for second homes

and recreational opportunities (Green 2001). Capital improvements, such as a new sewer or water line, or a new road are often the essential prerequisites which enable developers to construct new projects (Deutsch 1978). The Highway 12 expansion project is currently underway, and increased development is already occurring in Sauk Prairie. Unmanaged, development is likely to reduce the quality of winter habitat available to bald eagles.

Potential effects of increased development on bald eagles

Many studies have sought to determine the influence of human activities on wildlife behavior, breeding success and survivability. Current literature suggests that eagle behavior is influenced by various human activities. Eagle distribution and foraging behavior can be negatively affected by unmanaged human recreational activities such as hiking, fishing and boating (Brown and Stevens 1997). Physical development (i.e. buildings) within eagle habitat can also displace eagles and sometimes result in complete abandonment of an area (Buehler 1991). Frequent human activity may disrupt nest site behavior and attentiveness, altering feeding patterns, including prey delivery to the nest, thereby, producing a negative impact on bald eagle reproductive success (McKay et al. 1996). Similar responses to human activity have been found by researchers studying bald eagles in winter (Brown and Stevens 1997). Eagle sensitivity to human activities in winter may ultimately be linked to bald eagle survivorship year round. Human disturbance to wintering eagles may also affect mating because courtship and the breeding cycle begins as early as February while eagles are still in their wintering areas (McKay et al. 1996).

Predicting the impact of development on eagles, however, is not straight forward. Some studies suggest that eagles tolerate higher levels of recreational disturbance than once thought (McKay et al. 1996). In some instances development may even enhance eagle habitat. Dams, for example, maintain an area of open water below their spillways in winter and provide eagles with access to fish in a season where they would otherwise be unavailable due to ice cover (Stalmaster 1987). Eagles also forage in agricultural fields, eating agricultural carrion such as pig and cattle carcasses (Harper 1988), which suggests eagles can tolerate certain types of development. It is possible that, as eagle populations grow, birds will adapt to human presence and return to areas where they once were abundant. In contrast, data from Buehler et al. (1991) showed no evidence that such an adaptation was underway in response to permanent building developments along river-ways and concluded that once shoreline habitat is lost, it is irreversible.

Forecasting the amount of development or human activity that would be detrimental to eagle habitat is difficult. Typically, biologists assess impacts by evaluating changes in either the population size or changes in reproductive rates. Often these types of demographic changes are preceded by behavioral changes. Not surprisingly, without intensive and continual monitoring, these changes are missed altogether until it is too late and the habitat is permanently lost.

Using ecotourism for land use conflict resolution

Prior to the initiation of the highway expansion project, the Ferry Bluff Eagle Council (FBEC) in collaboration with the University of Wisconsin-Extension, conducted an economic survey focused specifically on eagle tourism in Prairie du Sac during the

winter of 1993-1994 (Van Konigsveld et al. 1994). This study concluded that eagles provided a unique tourist attraction to out of town visitors, generating at least $618,000 into this rural winter economy. The survey documented costs associated with eagle viewing to estimate the monetary value a tourist places on watching eagles. It focused on tourists' origin, length of stay and the amount of money spent locally. Multiplier effects such as the expenditures of birding, money spent on binoculars in a store or on a sandwich in a deli, have a ripple affect on the local economy (La Rouche 2001).

Ecotourism is defined as the responsible travel to natural areas that conserves the environment and sustains the well-being of local people (Maclaren 2003). Though ecotourism is not the answer for all types of human wildlife conflicts, used in conjunction with ecological information, it can be a beneficial tool for habitat preservation in developed areas. The U.S. Fish and Wildlife Service reports, that birders in 2001, spent an estimated $32 billion dollars, nationwide (La Rouche 2001). This estimate includes money spent for optics, field guides, bird food, bird houses, camping gear, boats, and travel/ lodging expenses. The survey also identifies that non-consumptive wildlife watching activities include more than just birding and are a thriving industry. In fact, one in four people in the United States consider themselves birdwatchers (Farrar 2004).

Objectives

In this study, we repeated VanKonigsveld et al.'s 1994 eco-tourism survey in January of 2004 to: 1) understand the non-consumptive use values of bald eagles in Sauk Prairie and how these values can be used as incentive for wintering eagle habitat conservation, and 2) examine the 10-year trend of the economic viability of eagle tourism.

Methods

To estimate non-market values of eagle tourism and its contribution to the local economy we repeated the FBEC economic survey that was conducted in 1994 (Van Konigsveld et al. 1994). The questions and conduct of survey remained the same (Appendix 2) to facilitate comparison between years. The focus of the survey was to determine where eagle watchers come from, what they did while in town, and how much they spent in the local economy on services such as gas, food, lodging, shopping or other miscellaneous activities.

Each survey was conducted verbally with visitors who lived at least 5 miles outside of Sauk Prairie. The survey focused on non-resident visitors to determine the incomming economic benefits to Sauk Prairie. Surveys were conducted using stratified random sampling (VanHouten 1987) to avoid sampling bias. In addition, to avoid surveyor selection bias, volunteers conducting the interviews were asked to interview people every 10 minutes. All interviews were conducted at the FBEC Overlook, a popular eagle viewing location in Prairie du Sac (Figure 1). A survey sample size goal of at least 100 was established, providing a level of precision of $\pm$ 8 percentage points at a 90% confidence interval which is usually adequate for most citizen surveys (VanHouten 1987).

An estimate of the entire population of eagle watchers in Sauk Prairie was made by combining survey results with traffic count data collected during the same time period. A traffic counter was placed at the entrance to the Alliant Energy Dam in Prairie du Sac to provide a daily index of eagle watching visitors. The dam is a popular eagle viewing area

that does not experience very much extraneous traffic aside from four dam employees (which were subtracted from the daily talley). Other areas that are popular viewing sites are also used for other purposes (such as fishing) and would inflate any measure of eagle tourism. Only the traffic that crossed the counter between the hours of 0600 through 1800 was included because eagles are active only in this period.

Valuation Analysis: Travel Costs

Direct costs, represented as travel costs, were used to estimate the monetary value of eagle tourism. This method is a market based approach used to measure benefits associated with recreational resources. We related the differences in travel costs to differences in consumption to create a demand curve for the eagle resource (i.e. eagles: Goodstein 2005). Distance is also a determinant in amount eagle watchers will pay for this non-market resource. The distance decay function (Shaffer et al. 2004), when applied to tourism, predicts that the number of visits to a destination decreases as travel distance increases. Concurrently, as travel distance increases, costs of getting to the destination also increase. We ran a linear regression with the dependent variable of distance traveled and the independent variable = cost/ trip (SAS Institute 1998). The survey given by FBEC did not inquire about individual incomes and therefore assumed equal incomes for this analysis.

Intrinsic Value

Intrinsic values are the indirect costs associated with eagle tourism. Intrinsic or existence values are based on the personal perception of an action, or the dollar amount

people are willing to pay over and above what they actually pay to watch wildlife (La Roche 2001). To estimate the net economic value of bald eagles both direct and indirect costs needed consideration. Two intrinsic value questions, therefore, were added to the end of the 2004 survey; 1) Would you recommend this trip to others? and 2) How would you rate the importance of protecting eagle habitat (the river, shorelines, bluffs and agriculture) in this area (a) highly important, (b) important (c) not sure or (d) not important?

Survey Comparison

Finally, we compared the results of the 2004 survey to those of 10 years ago to estimate the current trend in eagle tourism in the community as a way of assessing the economic viability of eagle tourism as a conservation tool. Comparisons were adjusted by the rate of inflation to provide a comparison in constant dollars (United States Department of Labor Price Index 2005).

Results

Demographics and traffic counter estimates

All surveys were conducted from January 16, 2004 to February 29, 2004. Of the 151 interviews, 92% were from within the State of Wisconsin with the largest percentage coming from Madison (26%). Out of state visitors came from Illinois (6%), Michigan, Minnesota and California (2% collectively). On average, there were 3 people per car, with 0.46 people under the age of 16. Over 78% of eagle watchers surveyed stated that eagle watching was the primary reason to visit the area. The remaining 21.2% came to

Sauk Prairie for other reasons such as visiting family (2.6%), passing through on their way to other tourist attractions like the Wisconsin Dells or Ho-Chunk Casino (10%), attending local high school sporting events (2%) or other reasons (6.6%). Most eagle viewers came to Sauk Prairie on a day trip (99.1%) with an average length of stay of 2.5 hours. Only 0.9% of those surveyed stayed overnight with trips lasting an average of 1.5 days. Average weekday eagle watching traffic, excluding holidays and Eagle Days (a weekend event specifically for eagle watchers) equaled 379 cars. Weekend traffic averaged 760 cars per day at the Prairie du Sac Dam. The most popular eagle viewing days were Saturdays (25.5%) and Sundays (24.6%).

Travel Expenditures

To investigate eagle watching visitation during Eagle Days separately from the rest of the season, the 2004 survey expenditure results were divided into three time periods: Eagle Days (Jan 17 – 18, 2004), Non Eagle Days (Jan 19 – Feb 29, 2004) and All surveys (Jan 17 – Feb 29, 2004). The total amount of money for all cars was derived estimating an average amount spent per category, per car full of people surveyed, and then correlating it with the corresponding number of cars that went over the traffic counter during each time period (Table 1).

The total eagle watching population (EWP) expenditures for the 2004 survey ($720,750) were conservative because the Alliant Energy Dam, where traffic was counted, is not the only important eagle viewing site. Recognizing this visitation bias, surveyors asked people to indicate which sites they visited to view eagles and in what order. All surveys were conducted at the FBEC Overlook, thus visitation there was 100%.

The Alliant Energy Dam was visited by 63% of people surveyed so the EWP data was corrected; $720,750/.63= $1,144,048. One caveat to these results is that the traffic counter data does not distinguish between out of town visitors and residential eagle viewers.

Valuation Analysis: Travel Costs

We established a demand curve for eagle tourism (Figure 2) by plotting the amount of money people spend to participate in eagle watching (costs) against the number of trips taken to see eagles (consumption; VanKooten 1993) and the distance traveled. Two outliers were excluded in the travel cost analysis in the > 2000 and 176-200 mile distance categories. The single survey recorded in the >2000 miles category was a man who made repeated trips to Sauk Prairie for business and was therefore treated as an exception and not used in this analysis. In the 176-200 mile distance category an outlier of $2050 spent for one survey participant, in town for a hockey tournament, was removed, bringing the average spent in this distance category down to $89.00 rather than the artificially inflated $415.

The demand curve is one way the travel cost method identifies how much people are willing to pay to come to Sauk Prairie and see eagles. In general, people who live more than 150 miles from Sauk Prairie are willing to pay an average of $102 per trip to see eagles (Table 3). People who live closer to Sauk Prairie are prone to spend less per trip, yet they are also inclined to take more trips, spending a minimum of $22/car/trip with a potential maximum of 25 trips taken, equaling $549/car for all trips combined. Number of trips is estimated over an average of 9 years (i.e. those who live closer may

take 25 trips within 9 years, whereas those who live farther away will have only taken one over the same time period).

Data from the travel cost analysis were applied to the distance decay function (Shaffer et al. 2004). Linear regression results show support of the linear relationship between travel distance and cost per trip ($F = 24.62$, $P = 0.0042$; Figure 3). One cautionary note inherent in this analysis is that, as the distance traveled increases, the surveyed sample size within larger distance categories decreases; consequently, our data from outside of Wisconsin may not represent the whole population of visitors accurately (Table 2).

Intrinsic value

Of 151 surveys conducted, 100% would recommend the trip to others. Protecting eagle habitat was also very well received by visitors with 91% specifying that habitat preservation was highly important, followed by 8% responding that it was important. Less than 1% of people surveyed (a single respondent) declared eagle habitat protection was not important. Existence (intrinsic) value is important but less intuitively understood than consumptive value. Though no specific value was derived from the existence value portion of the 2004 survey, there is overall public interest in eagle habitat preservation.

Survey Comparison: 1994 to 2004

Results of the 1994 survey (n=56 interviews) estimated that eagle tourism conservatively provided $618,000 during a similar time period (Van Konigsveld et al.1994) as compared to $720,750 throughout the same time period here (n=151). Taking

dam visitation rates into account, adjusted eagle tourism income was $772,500 in 1994 (80% dam visitation) and $1,144,048 in 2004 (63% dam visitation). Correcting for inflation (22%), income generated, based on the survey responses alone, declined by 4.6% (Table 4). In contrast, the traffic count data suggests that tourism has actually increased, even after adjusting for inflation, because only 63% of those interviewed were represented in the traffic counter tally (indicating that more people visited than were accounted for). When converted to real dollars, this is an increase of $201,598.00 (21%) within the past 10 years.

Discussion

The 1994 and 2004 eagle tourism surveys documented costs associated with eagle viewing to estimate the value a tourist places on watching eagles. Identifying an economic benefit of having eagles co-exist with people provides one tangible incentive to protect eagle habitat by using ecological information to guide future development. Determining the net economic value of eagles and identifying the benefits of tourism to preserve eagle habitat in Sauk Prairie is an essential first step to establishing eagle watching as a viable ecotourism industry. Over time, and with local resident support, it is probable that ecotourism may become influential enough to begin to positively impact either the rate or the direction of local land-use development. Factors affecting local and regional "buy-in" include: 1) eagle watching and birding, in general, appeal to a variety of people and are increasing in popularity nationwide, 2) birding is a location-specific activity and 3) recognizing the economic benefits of having eagles in the area can strengthen local support for actively preserving eagle habitat.

Demographics

Anecdotal information from the 2004 survey suggests that eagles have a resonating public image that goes beyond birding interests alone. Eagles are charismatic, majestic and easily identifiable. The congregation of eagles in winter near an accessible town is a phenomena occurring in the Sauk Prairie area (Thesis Chapter 2) and few other areas. Since birding is usually location specific, people from outside of the region who spend money for birding represents real economic wealth imported into a given community (La Rouche 2001). Although the majority of eagle watchers surveyed were from within Wisconsin and only stayed in Sauk Prairie for a few hours, many were repeat visitors and would recommend the trip to others. This not only indicates a sustainable tourist base but also shows that people enjoy having access to this unique resource.

Valuation Analysis: Travel Costs

Wildlife values can be broken into three categories: consumptive, non-consumptive and intrinsic values (Boyle and Bishop 1986). Consumptive values of wildlife deal mostly with game animals, where the costs of licenses, guns, fishing rods, and other related commodities can be quantified and a precisely estimated value can be determined. Non-consumptive behavior includes activities such as birding, hiking and photography, where contact with wildlife occurs but nothing is directly harvested from the wild. Through surveys, travel expenses are one easy way to determine a monetary expense related to non-consumptive wildlife use. Such surveys become more complex, and perhaps more useful, when travel distance and trip frequency (Tables 2 and 3) analysis is

applied. Travel cost, distance decay function (Figures 2 and 3) and visitation percentage analyses provide a realistic estimation of travel expenses brought forth by eagle watchers.

Intrinsic Value

The *net economic value* of wildlife combines the actual use value with the existence (intrinsic) value (La Roche 2001) to get a more representative overall worth. An independent social survey, conducted one year before our survey, determined that 84.1% of Sauk Prairie residents who responded to the survey (n=664) felt that eagles were important to the future of the community (Vandewalle and Associates 2003). Our survey results corroborate this information with 91% of non-resident eagle watchers identifying eagle habitat preservation as a high priority. Existence values appear to be widely held and may exceed the use values when aggregated over society as a whole even for more popular species such as the bald eagle (Bishop 1987).

Survey Comparison: 1994-2004

Eagle tourism has maintained its appeal between the 1994 and 2004 surveys and people repeatedly take part in this winter activity. Recognizing the direct and indirect local economic benefits of welcoming eagle watchers into the area has helped inform local residents of the importance of having eagles in Sauk Prairie. More importantly, identifying the benefits of eagle tourism in the local economy has a positive effect on the community and builds strong support for eagle habitat preservation. Applying a monetary use value to a non-market good can aid in habitat preservation with the integration of economics and wildlife biology (Bishop 1987).

Limitations to commoditizing non-market natural resources, however, do exist. One argument against promoting eagle tourism in Sauk Prairie is the uncertainty of applying a market-based strategy to the preservation of non-market resources. A feasible argument against using ecotourism as a habitat preservation tool is that income generated from eagle tourism will never surpass that of increased development. It is important to recognize that you can not replace one economy for another (Guglielmino 1998). An appreciation of the economic value of having eagles winter in the area needs to occur in concert with existing economies. Additionally, new housing developments in rural areas are perceived as providing net benefits to small towns, yet there are many unaccounted for costs related to increased development. The comprehensive economic, fiscal, environmental and social impacts that new development creates within rural communities is rarely considered (Marcouiller et al. 2002). Even if the hidden costs of development are taken into account, there are no guarantees that the increased income from development will stay in the local economy. The initial amount of money generated from increased development is likely greater than that generated from eagle tourism, but the costs of losing eagle habitat to development may outweigh the monetary benefits in the long run by destroying the values of town recognition and quality of life standards.

Management Implications

The demand for natural resource amenity attributes is increasing in many rural areas, creating an opportunity to capitalize on available resource endowments (Deller et al. 2001). Eagle tourism in Sauk Prairie exemplifies how rural communities can tangibly and intangibly recognize the benefits of their surrounding natural resources.

Direct economic implications of the survey information enable non-profit conservation groups like the FBEC and the area Chamber of Commerce to focus their education and information outreach by knowing the most popular eagle viewing destinations in Sauk Prairie. Monitoring of the economic benefits of eagle tourism should continue, either by local non-profit organizations, the Department of Natural Resources, Department of Tourism, the Chamber of Commerce or area businesses themselves, as it is one way to highlight the community's positive relationship to eagles. Area businesses can gain from the economic survey by recognizing the value of eagle watchers and welcoming them. The Wollersheim Winery, for example, features an Eagle Wine which is only available in the winter months. This highlights the winery's relationship to their community, as well as attracts eagle enthusiasts to their store. In return, proceeds from this eagle wine go to eagle conservation in the area. These economic linkages extend beyond what our survey can identify.

We continue to be concerned about the unknown effects of increased tourism on the bald eagles themselves. Eagles can be negatively impacted by unmanaged human recreational activities such as ATV's, snowmobiles, hiking, fishing and boating (Brown and Stevens 1997). As long as eagle tourism is managed based in the ecological needs of eagles these concerns should be mitigated.

Conclusion

The purpose of this study was to evaluate one manner of addressing the land use conflict between habitat preservation and development that is becoming ever more prevalent in rural America. Highlighting the economic benefits of natural amenities in

rural areas struggling with increased development can provide an innovative approach to resolving this conflict but should not be the sole strategy used to engage the local populace. Increasing development pressures in Sauk Prairie represent the dynamics of many growing rural towns across North America. New development, such as municipal improvements that include highway expansion projects, can lead to a variety of land use changes. Rural communities undergoing such changes can avoid some of the potential ill-effects from increased development through identifying charismatic or otherwise meaningful natural resources of their communities and linking intrinsic and extrinsic values of these resources to tools such as eco-tourism. Eco-tourism, in turn, should be considered as an economic incentive, a way to recognize the benefits of area natural resources, working toward resource preservation and maintaining town identity.

Eco-tourism, however, is not the only tool that should be employed when dealing with the complex issues such as weighing the costs and benefits of development in a rural community. Eagle tourism, as reported on here, is one mechanism that the community can use to engage themselves with the tangible and intrinsic values of their unique natural resources. Through this recognition, communities can begin to tackle more complicated issues that address the sustainability of ecological resources. Other tools commonly used for conservation, such as the development of conservation plans on private lands, should also be encouraged. Linking these values to local land use policies and land use management tools requires patience and support from a strong constituency.

Economic gains derived from eagle tourism are not likely to replace gains derived from development and eagle tourism should not be thought of as a replacement for growth in more traditional sectors of the local economy. The increase in eagle tourism

over the past 10 years, however, suggests that interest levels are growing and that heightened environmental awareness may indeed lead to changes in people's behavior. Bald eagles are charismatic, representing a spiritual and patriotic symbolism above and beyond birding interests alone. As an endangered species "success" story, we cannot underestimate the good will that this generates at the local, regional and national levels. The surveys reported here are primary steps in recognizing the value of natural amenities such as bald eagles. Future studies should include contingent valuation surveys such as the one conducted by Boyle and Bishop (1986), allowing a better estimation of the *net* economic value of eagles in Sauk Prairie. A comparison in development rates with other growing communities, without eagles, is also needed to assess the full impact of the eagle tourism.

A combination of ecological information (Thesis Chapter 2), economic incentives and progressive policy are the main ingredients for successful habitat conservation in a growing rural area like Sauk Prairie. Unfortunately, a universal solution for habitat preservation does not exist in any particular area. Due to the complexity of the interaction among humans, wildlife and the environment, we (practitioners, as well as the public) will have to remain open to in finding new ways to work toward various land use solutions and compromises when working with complex human/ wildlife issues.

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TABLES: Chapter 2

Table 1. Habitat types defined for bald eagle radio telemetry study using a modification of WISCLAND[a] satellite imagery data, South Central Wisconsin, 2001-2004.

Habitat type	Habitat Code	Definition of habitat type	% habitat available in study area
All Agriculture	AG	corn, forage crops, row crops, grassland, barren	51.38%
Forest: broad leaved deciduous	FBL	mixed broad leaf deciduous	25.91%
Forest: Oak	FOK	Oak	7.78%
Wetland: forested	FWL	all forested wetland, mainly at rivers edge	5.01%
Wetland: emergent/wet meadow	WTL	all non forested wetland	3.90%
Forest: mixed coniferous	FCO	Mixed coniferous, red pine, jack pine, shrub	2.55%
Open water	Ow	all open water	2.34%
Urban/Developed	URB	All urban/developed areas high and low	1.14%

[a] Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data, source data from the Wisconsin Department of Natural Resources (1998).

Table 2. Radio tagged bald eagle; identification number, capture date, weight, sex, and age. Habitat selection study South Central Wisconsin, 2001-2004.

Eagle ID #	Capture Date	capture weight (kg)	Sex[a]	2001-2002 age (yrs)	2001-2002 # locations	2002-2003 age (yrs)	2002-2003 # locations	2003-2004 age (yrs)	2003-2004 # locations
491	2/8/2002	5.95	F	Ad	22	Ad	130	Ad	51
665	2/8/2002	4.28	M	Ad	45	Ad	81	Ad	NT
691	1/31/2002	5.02	F	3-4	15	4-5	23	5	2
714	1/31/2002	5.05	F	4-5	18	5	9	Ad	7
739	1/31/2002	4.62	M	4-5	5	5	10	Ad	97
762	1/10/2002	6.35	F	2-3	22	3-4	NT	4-5	NT
791	1/17/2002	3.63	M	1-2	9	2-3	4	3-4	NT
811	1/17/2002	5.59	F	3-4	13	4-5	NT	5	NT
835	1/17/2002	3.66	M	Ad	97	Ad	58	Ad	185
864	1/17/2002	4.59	M	3-4	10	4-5	4	5	NT
890	1/16/2002	4.22	M	4-5	8	5	25	Ad	7
055	1/24/2003	4.68	F	NA	NA	1-2	33	2-3	NT
163	2/20/2003	3.91	M	NA	NA	1-2	35	2-3	69
364	3/8/2003	3.12	M	NA	NA	1-2	17	2-3	106
384	2/18/2003	6.15	F	NA	NA	Ad	39	Ad	139
935	2/3/2003	3.97	M	NA	NA	1-2	44	2-3	1
989	1/9/2003	4.45	M	NA	NA	Ad	53	Ad	35

[a] Sex determined first by size then confirmed through blood analysis (sex determination correct 88% of the time by size alone). Age is on a per season basis showing how age class changed over years of the study.

Ad = mature birds $\geq$ 6 years old.

NA = Not available, eagle not trapped in season.

NT= not tracked in study area, bird alive location known and confirmed outside by aerial survey.

Table 3. 2-Way analysis of variance comparing bald eagle identification and season as main effects, South Central Wisconsin, 2001-2004.

Habitat type	n	r^2	F	P value
Ag	307	0.04	0.67	0.57
FBL	718	0.06	1.14	0.34
FOK	120	0.05	0.98	0.41
FWL	226	0.04	0.7	0.56
Ow	82	0.04	0.63	0.59
URB	5	0.12	2.26	0.09
WET	47	0.05	0.78	0.51
FCO[a]	45	0.16	3.01	0.04
		Season	1.38	0.25
		Bird ID	2.65	0.11
		Season*Bird ID	4.99	0.03

2-way ANOVA compared the proportion of habitat type use by season and individual bird to determine if all birds used the study area similarly over all three seasons.

[a] Use of forest conifer other (FCO) is identified as significantly different in the bird*season interaction. FCO is not included in any of the logistic regression analysis due to the potential bias created by this single eagle.

Table 4. Bonferroni Z Test results of bald eagle day locations, South Central Wisconsin, 2001-2004.

Habitat Code	Proportion Available Habitat* (Pi_o)	Day Use [a]	Expected Day Use [b]	Chi Sq	Proportion observed (P_i)	Confidence Interval (95%) on (P_i)	Use vs. expected
AG	0.51	239	379	51.83	0.324	$0.277 \leq p \leq 0.367$	U<E
FBL	0.26	210	191	1.84	0.285	$0.239 \leq p \leq 0.330$	U=E
FOK	0.08	24	57	19.46	0.033	$0.015 \leq p \leq 0.050$	U<E
FWL	0.05	133	37	249.44	0.180	$0.141 \leq p \leq 0.129$	**U>E**
WET	0.04	36	29	1.83	0.049	$0.027 \leq p \leq 0.070$	U=E
FCO	0.02	16	19	0.41	0.021	$0.007 \leq p \leq 0.036$	U=E
Ow	0.02	75	17	193.57	0.101	$0.071 \leq p \leq 0.132$	**U>E**
URB	0.01	5	8	1.40	0.068	$0.001 \leq p \leq 0.015$	U=E
Total	1	738	738	519.79			
				P<.001			

*Proportion available habitat represents the proportion of expected observations if eagles used each habitat in exact proportion to availability.

[a] Day and roost use described by number of locations occurring within each specified habitat type.

[b] Calculated by multiplying the proportion expected (Pi_o) by total. (i.e. 0.514 x 738= 379).

Bold identifies habitat types used more than expected.

Table 5. Bonferroni Z Test results of bald eagle roost locations, South Central Wisconsin, 2001-2004.

Habitat Code	Proportion Available Habitat* (Pi_o)	Roost Use [a]	Expected [b] Roost Use	Chi Sq	Proportion observed (P_i)	Confidence Interval (95%) on (P_i)	Use vs. expected
AG	0.51	64	406	288.50	0.081	$0.080 \leq p \leq 0.082$	U<E
FBL	0.26	495	205	410.57	0.626	$0.625 \leq p \leq 0.627$	**U>E**
FOK	0.08	94	62	17.10	0.119	$0.118 \leq p \leq 0.120$	**U>E**
FWL	0.05	91	40	66.61	0.115	$0.114 \leq p \leq 0.115$	**U>E**
WET	0.04	11	31	12.74	0.014	$0.0140 \leq p \leq 0.0143$	U<E
FCO	0.02	29	20	3.90	0.037	$0.036 \leq p \leq 0.037$	**U>E**
Ow	0.02	7	18	7.13	0.009	$0.0085 \leq p \leq 0.009$	U<E
URB	0.01	0	9	9	0.00	$0.00 \leq p \leq 0.00$	U<E
Total	1	791	791	815.55			
				p<.001			

*Proportion of habitat available represents the proportion of expected observations if eagles used each habitat in exact proportion to availability.

[a] Day and roost use described by number of locations occurring within each specified habitat type.

[b] Calculated by multiplying the proportion expected (Pi_o) by n. (i.e. 0.514 x 791= 406).

Bold identifies habitat types used more than expected.

Table 6. Stepwise logistic regression results of habitat proportions surrounding bald eagle day locations, South Central Wisconsin, 2001-2004.

Parameter	DF	Estimate[b]	Standard Error	Wald Chi-Square	Pr[a] > ChiSq
Intercept	1	0.92	0.47	3.95	0.0471
AG	1	-0.01	0.01	6.10	0.0135
FOK	1	-0.15	0.02	47.03	<.0001
FWL	1	0.15	0.02	92.41	<.0001
URB	1	0.16	0.02	60.18	<.0001
WET	1	-0.08	0.02	12.63	0.0004

[a] P <.05 is significant (95% confidence interval) only significant responses qualify for stepwise selection.

[b] Estimate value shows selection for (+) or against (-).

Bold indicates habitat types selected for in this model.

Table 7. Stepwise logistic regression results of habitat proportions surrounding bald eagle roost locations, South Central Wisconsin, 2001-2004.

Parameter	DF	Estimate[b]	Standard Error	Wald Chi-Square	Pr[a] > ChiSq
Intercept	1	-1.26	0.22	32.06	<.0001
Ow	1	0.06	0.01	21.71	<.0001
FBL	1	0.02	0.01	10.15	0.0014
FOK	1	-0.05	0.01	14.46	0.0001
FWL	1	0.13	0.01	136.55	<.0001
URB	1	0.15	0.02	51.24	<.0001

[a] P <.05 is significant (95% confidence interval) only significant responses qualify for stepwise selection.

[b] Estimate value shows selection for (+) or against (-).

Bold indicates habitat types selected for in this model.

Table 8. Stepwise logistic regression results allowing for interaction among habitat proportions surrounding bald eagle day locations, South Central Wisconsin, 2001-2004.

Parameter	DF	Standard Estimate[b]	Wald Error	Chi-Square	Pr[a] > ChiSq
Intercept	1	1.25	1.05	1.42	0.2330
AG	1	-0.04	0.02	6.09	0.0135
FOK	1	-0.65	0.15	18.13	<.0001
AG*FOK	1	0.01	0.003	19.96	<.0001
FWL	1	1.00	0.12	65.88	<.0001
AG*FWL	1	-0.01	0.00	26.28	<.0001
FOK*FWL	1	-0.06	0.01	40.99	<.0001
URB	1	2.48	0.46	28.69	<.0001
AG*URB	1	-0.03	0.01	15.90	<.0001
FOK*URB	1	-0.41	0.10	16.34	<.0001
AG*FOK*URB	1	0.01	0.00	8.29	0.0040
FWL*URB	1	-0.06	0.01	37.72	<.0001
WET	1	-0.27	0.06	16.62	<.0001
FOK*WET	1	0.06	0.01	28.64	<.0001
FWL*WET	1	-0.01	0.004	13.05	0.0003

[a] P <.05 is significant (95% confidence interval) only significant responses qualify for stepwise selection.

[b] Estimate value shows selection for (+) or against (-).

Bold indicates habitat types selected for in this model.

Table 9. Stepwise logistic regression results allowing for interaction among habitat proportions surrounding bald eagle roost locations, South Central Wisconsin, 2001-2004.

Parameter	DF	Estimate[b]	Standard Error	Wald Chi-Square	Pr[a] > ChiSq
Intercept	1	-0.67	0.11	40.35	<.0001
Ow	1	-0.15	0.02	35.74	<.0001
FWL	1	0.02	0.04	0.21	0.6448
Ow*FWL	1	0.04	0.01	20.78	<.0001
URB	1	-0.53	0.09	34.17	<.0001
Ow*URB	1	0.17	0.02	98.29	<.0001
FWL*URB	1	0.03	0.03	1.09	0.2947
Ow*FWL*URB	1	-0.01	0.01	7.19	0.0073

[a] P <.05 is significant (95% confidence interval) only significant responses qualify for stepwise selection.

[b] Estimate value shows selection for (+) or against (-).

Bold indicates habitat types selected for in this model.

Table 10. Stepwise logistic regression results of bald eagle daytime distance data, South Central Wisconsin, 2001-2004.

Parameter	DF	Estimate[b]	Standard Error	Wald Chi-Square	Pr[a] > ChiSq
Intercept	1	1.98	0.14	185.80	<.0001
Row Crop[c]	1	0.00	0.00	13.51	0.0002
RIVER	1	-0.00	0.00	43.00	<.0001
Day_Roost[d]	1	-0.00	0.00	10.44	0.0012

[a] P <.05 is significant (95% confidence interval) only significant responses qualify for stepwise selection.

[b] Estimate value shows selection for (-) or against (+). Distance value signs for positive and negative selection are opposite of sign i.e. as the distance away from specified habitat type increases (+) it is less likely to be an eagle location.

[c] Distance to row crop examined as it is the typically fertilized agricultural type (agricultural carrion).

[d] Day_Roost = distance measured from a day location to the nearest known roost location.

Bold indicates habitat types selected for in this model.

Table 11. Stepwise logistic regression results of bald eagle nighttime distance data, South Central Wisconsin, 2001-2004.

Parameter	DF	Estimate[b]	Standard Error	Wald Chi-Square	Pr[a] > ChiSq
Intercept	1	1.11	0.12	86.07	<.0001
Elevated Forest	1	-0.00	0.00	93.38	<.0001
Row Crop[c]	1	0.00	0.00	51.79	<.0001
RIVER	1	-0.00	0.00	277.15	<.0001
Roost_Day[d]	1	-0.00	0.00	68.44	<.0001

[a] P <.05 is significant (95% confidence interval) only significant responses qualify for stepwise selection.

[b] Estimate value shows selection for (-) or against (+). Distance value signs for positive and negative selection are opposite of sign i.e. as the distance away from specified habitat type increases (+) it is less likely to be an eagle location.

[c] Distance to row crop examined as it is the typically fertilized agricultural type (agricultural carrion).

[d] Roost_Day = distance measured from a roost location to the nearest known day location.

Bold indicates habitat types selected for in this model.

TABLES: Chapter 3

Table 1. Eagle tourism travel expenditures per person surveyed extrapolated over car count index. Prairie du Sac, Wisconsin. January- February 2004.

Expense Category	Eagle Days (n=30)	Non-Eagle days (n=120)	All Surveys (n=151)
Gas	$7.65	$4.44	$5.10
Food	$24.03	$21.81	$22.27
Lodging	$5.55	$12.83	$11.34
Merchandise	$8.93	$7.04	$7.32
Other	$2.65	$3.53	$3.35
Total expenditures/ person surveyed [a]	$48.81	$49.65	$49.38
Number of corrected cars [b]	2,099	12,470	14,596
Total eagle watching population (EWP) expenditures [c]	$102,452.19	$619,135.50	$720,750.48

[a] Total expenditures per oral survey completed.

[b] The daily car count is between 0600 hrs and 1800hrs, minus 4 Alliant Energy Dam employees.

[c] Total eagle watching population expenditures (EWP) = survey extrapolation results (a*b = c, i.e. $4881*2099=$102,452.19).

Table 2. Travel costs analysis data (excluding distance categories with no data). Information from percentage of people surveyed within each distance category (n=151) extrapolated to the eagle watching population (EWP). Prairie du Sac, Wisconsin. January- February 2004

(1) distance category	(2) % surveyed w/in category	(3) Eagle watcher population (EWP) w/in category	(4) average $ spent/ trip	(5) average # times visited	(6) visits/1000 EWP [c]
0-25	0.15	2184.4	$26.18	5.6	12.3
26-50	0.31	4468.2	$21.98	5.7	25.6
51-75	0.13	1886.6	$25.26	3.3	6.2
76-100	0.22	3276.7	$25.74	4.6	14.9
101-125	0.08	1191.5	$58.33	3.1	3.7
126-150	0.05	794.3	$76.75	3.4	2.7
151-175	0.01	198.6	$170.00	1.0	0.2
176-200	0.03	397.2	$89.00[b]	3.7	1.5
226-250	0.01	99.3	$150.00	1.0	0.1
301-350 [a]	0.01	99.3	$0.00	1.0	0.1

[a] The > 2000 miles category excluded form travel cost analysis included one respondent who made repeated business trips to the area.

[b] In Distance category 176-200 miles, one person surveyed traveled to Sauk Prairie for a hockey tournament (spent $2050.00). This outlier was excluded from travel cost analysis.

[c] Visits /1000 EWP estimated the average number of trips taken per 1000 people representing each distance category.

Table 3. Distance decay function (Shaffer et al. 2004) applied to travel cost data, relates distance and cost of eagle watching. Prairie du Sac, Wisconsin. January - February 2004.

average spent/ trip	# trips	Distance category	Distance code [b]
$102.25	1	151-350[a]	7
$76.75	3	126-150	6
$58.33	4	101-125	5
$25.26	6	76-100	4
$26.18	12	51-75	3
$25.74	14	26-50	2
$21.98	25	0-25	1

[a] Distance category of 151-350 miles was created by averaging the average spent / trip of 4 distance categories from column (5) of Table 2.

[b] Distance code designates a single number to represent distance categories.

Table 4. Survey Comparison: 1994 to 2004. Prairie du Sac, Wisconsin.

Year of Survey	Survey raw data results	1994 results corrected for 10 year, 22% inflation rate[a]	Percentage visitation at Prairie du Sac Dam	Corrected for percentage visitation [b]
2004	$720,750.00	$720,750.00	0.63	$1,144,048.00
1994	$618,000.00	$753,960.00	0.80	$942,450.00
difference	$102,750.00	-$33,210.00		$201,598.00

[a] 22% inflation rate over the past 10 years according to the United States Department of Labor (2005)

[b] Adjusted eagle tourism income taking dam visitation rates into account.

FIGURES: Chapter 2

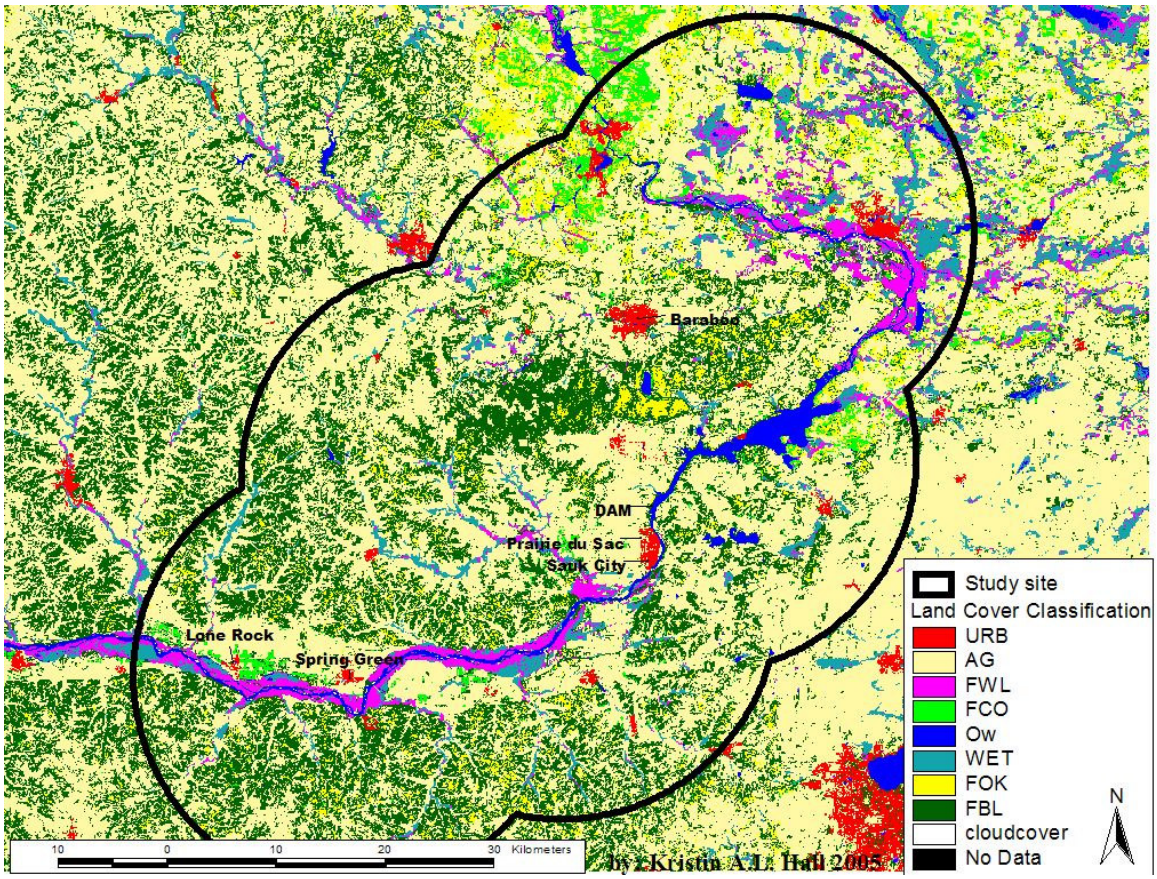

Figure 1. Map of study area for bald eagle habitat selection study in South Central Wisconsin 2001-2004. Categorized habitat types (n=8) and residential areas (n=5) are displayed in legend or labeled.

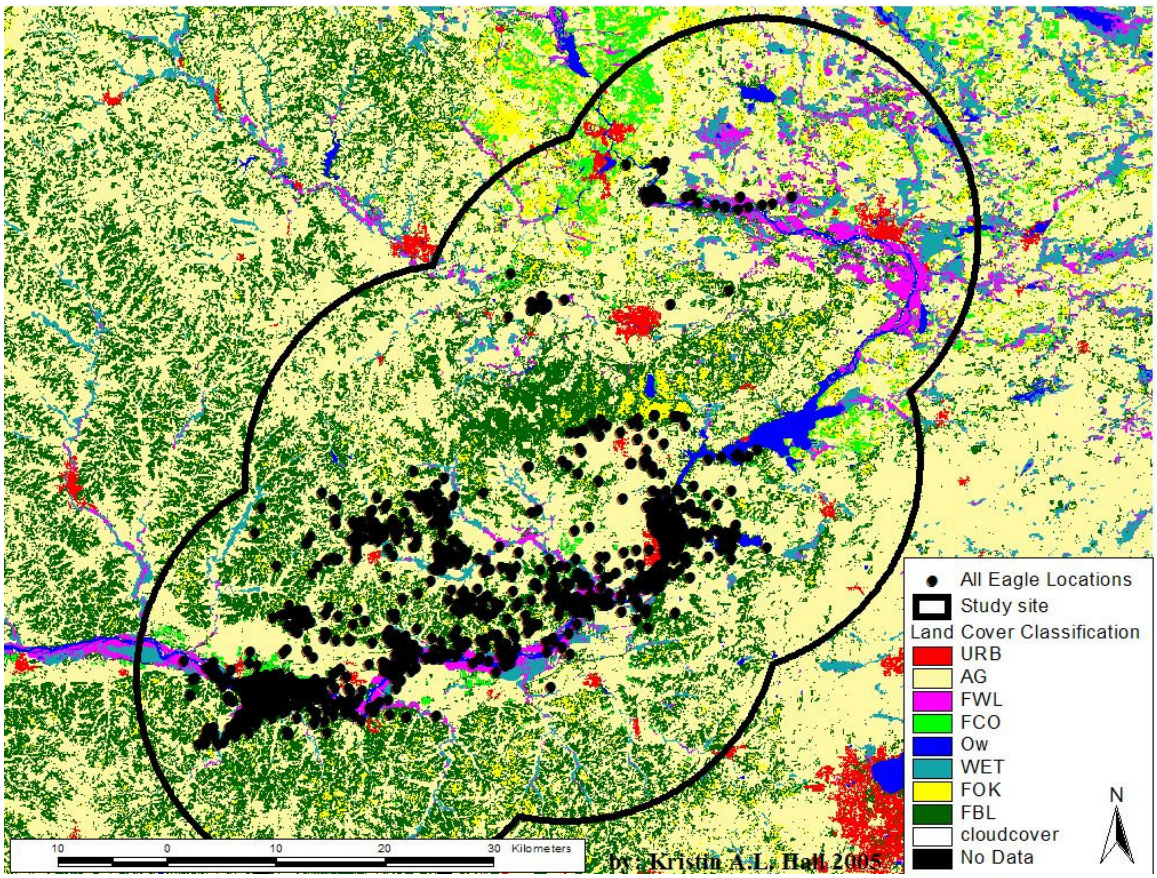

Figure 2. Map of study area for bald eagle habitat selection study in South Central Wisconsin including all eagle locations (n=1550) collected in 2001-2004. Categorized habitat types (n=8) are displayed in legend.

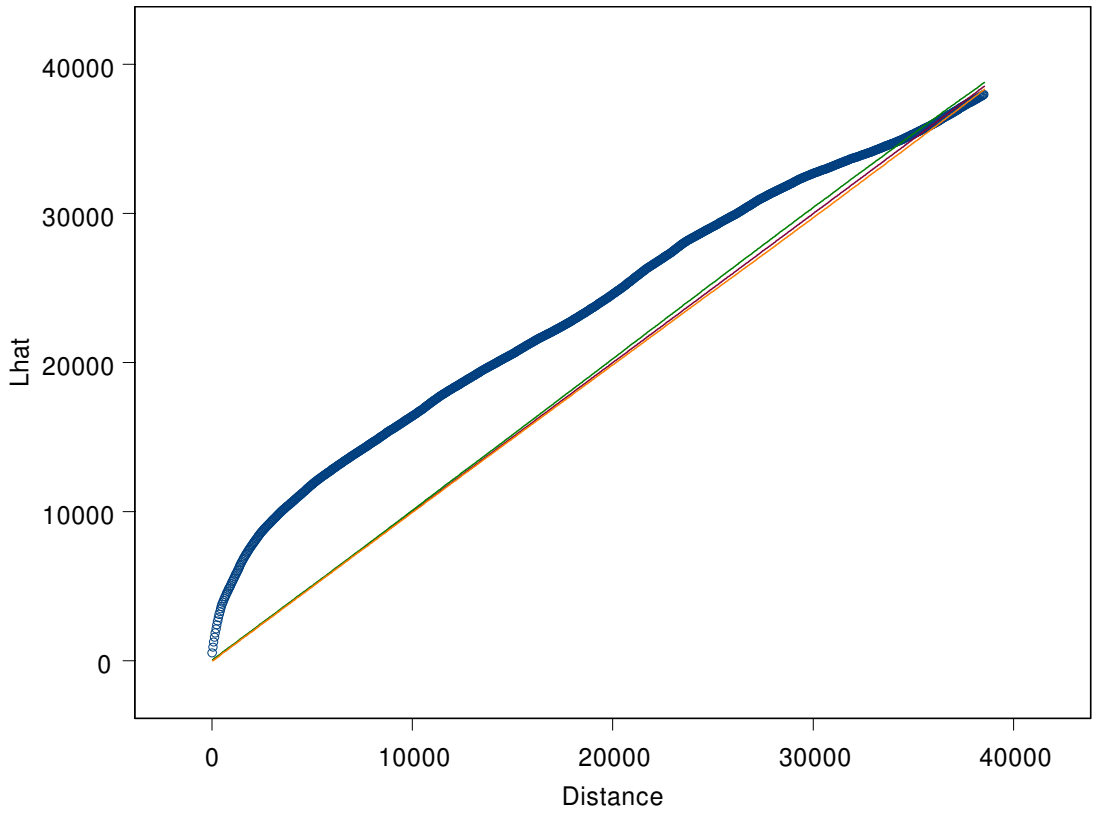

Figure 3. L-test results of bald eagle 2001-2004 locations. ---- = expected values of complete spatial randomness (CSR), blue curve = Lhat values of eagle location data.

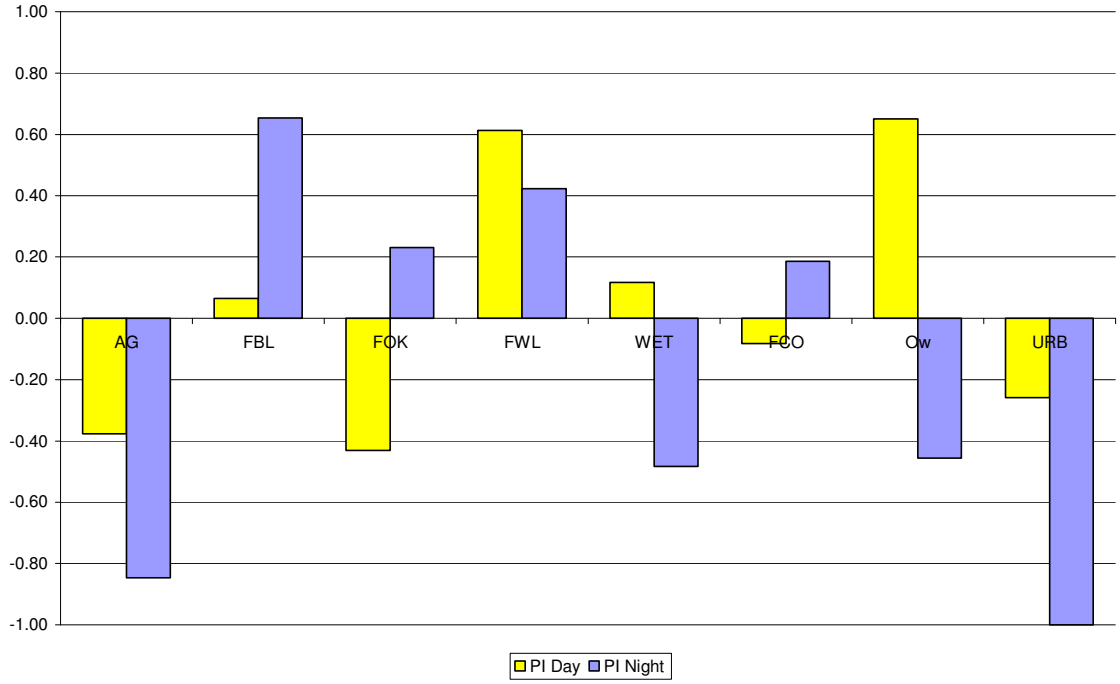

Figure 4. Preference Index of bald eagle habitat selection in South Central Wisconsin 2001-2004. The Jacob's Preference Index (PI: 1974) varies between negative 1 (maximum negative selection) and positive 1 (maximum positive selection) and 0 which is neutral. The Preference index in this study was used on a qualitative basis only.

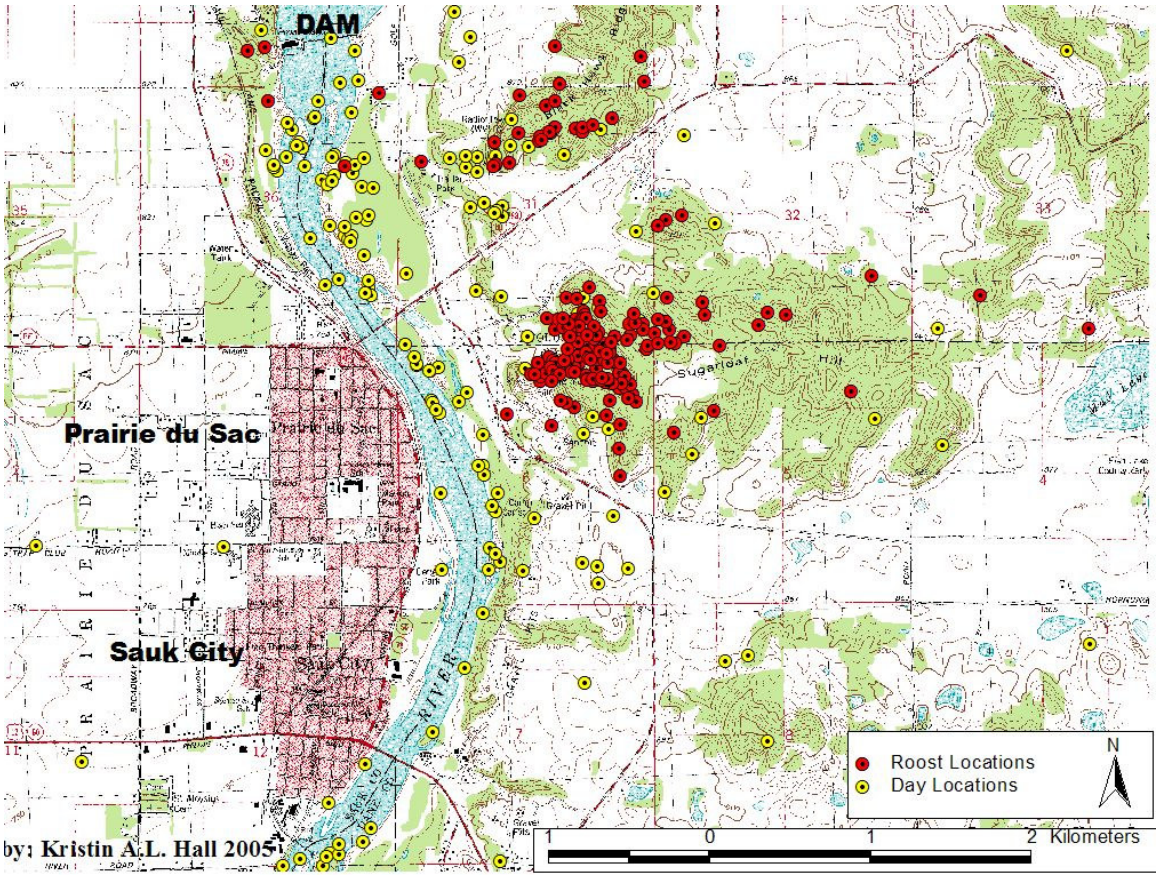

Figure 5a. Map of Sauk City, Wisconsin featuring bald eagle daytime and roosting locations from 2001-2004, in relation to urban development and the Prairie du Sac Dam.

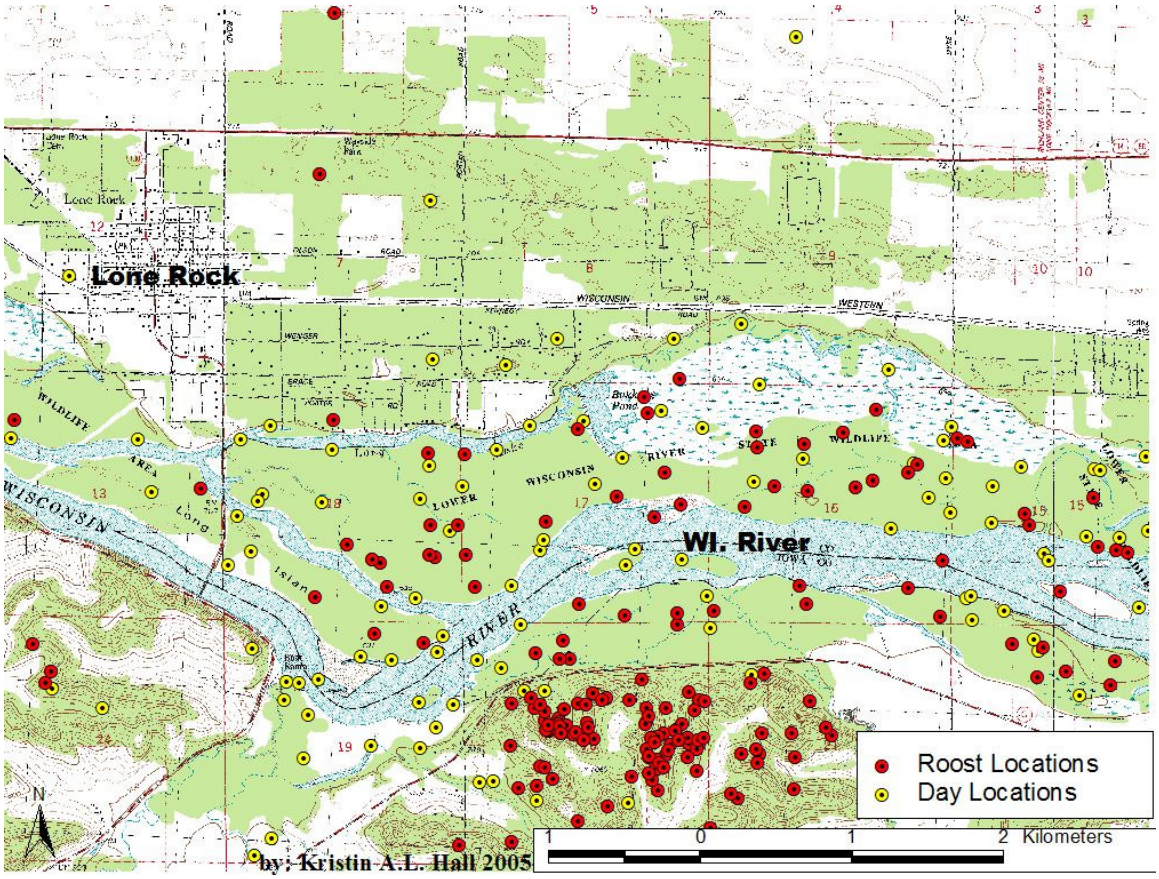

Figure 5b. Map of Lone Rock, Wisconsin featuring bald eagle daytime and roosting locations from 2001-2004, in relation to urban development uninfluenced by the dam.

FIGURES: Chapter 3

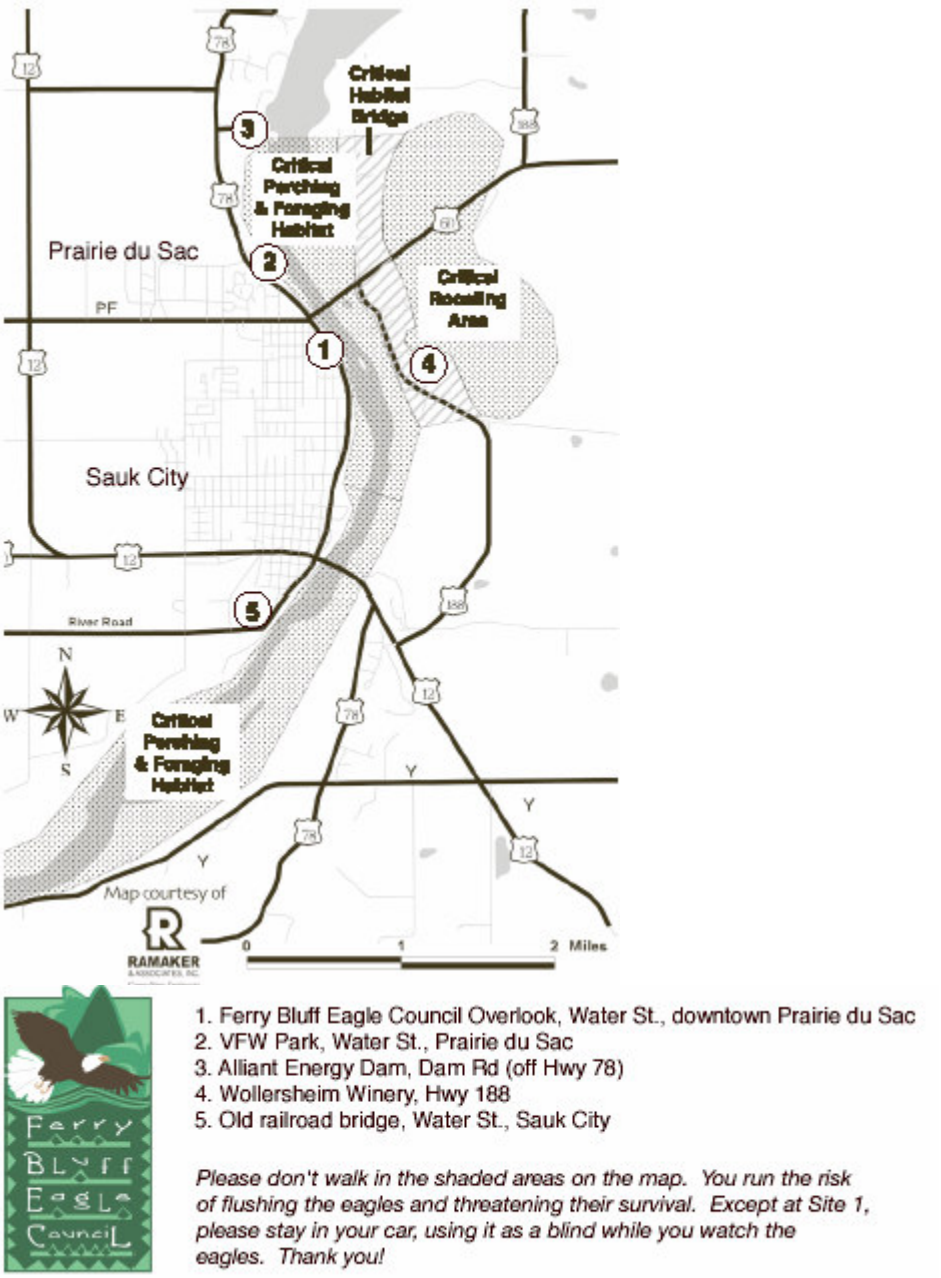

Figure 1. Ferry Bluff Eagle Council map of Prairie Du Sac and Sauk City, Wisconsin bald eagle viewing areas.

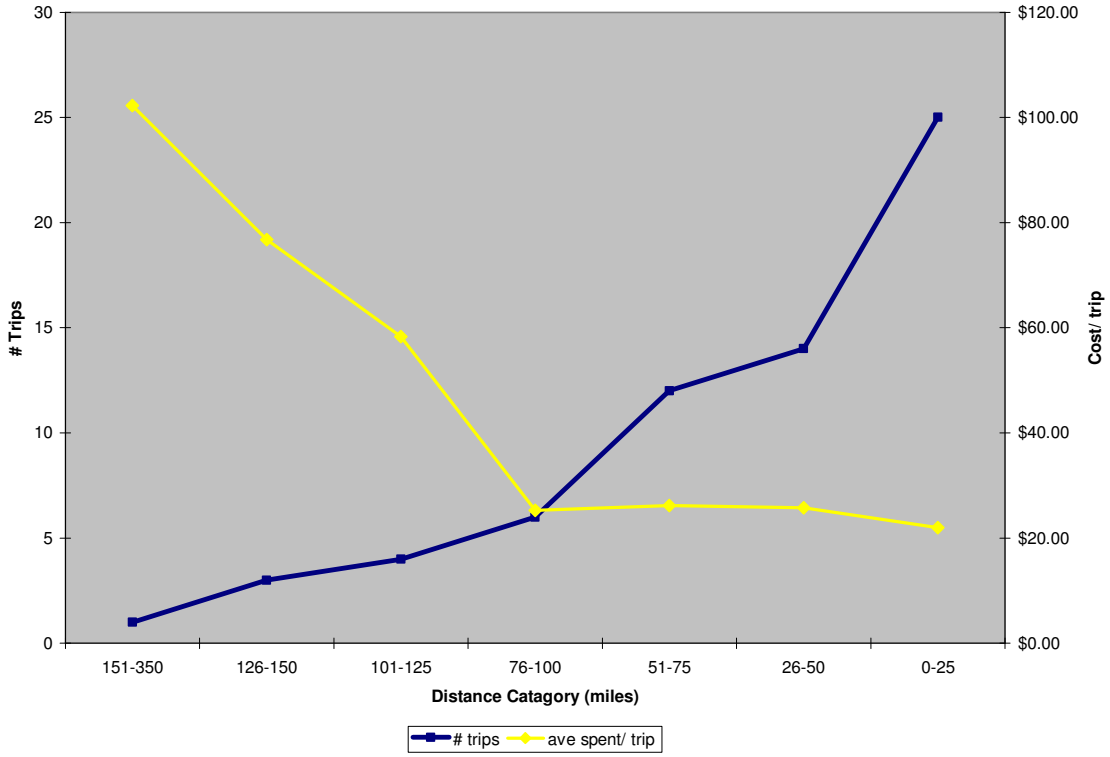

Figure 2. Demand curve for eagle watching in Sauk Prairie, Wisconsin. January – February 2004. As distance increases, cost/ trip increases. As Distance increases frequency of trips decreases. Exemplifies Schaffer's (2002) Distance Decay Theory.

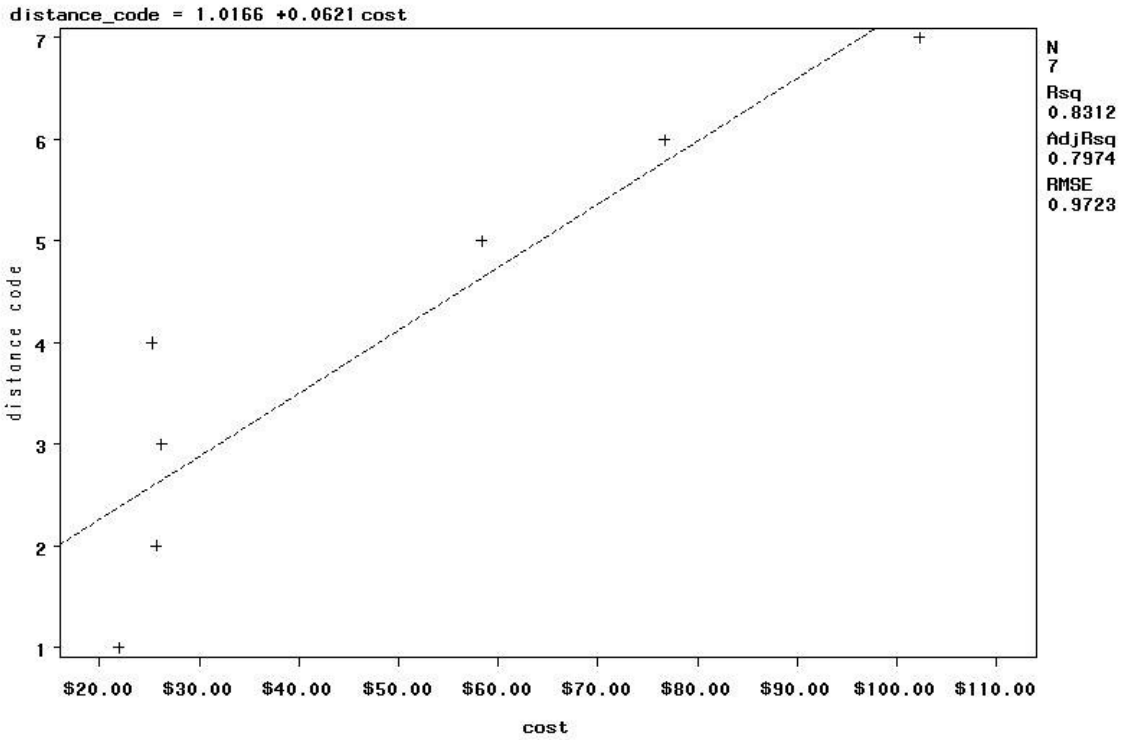

Figure 3. Liner regression of distance decay function for eagle watching in Sauk Prairie, Wisconsin. January – February 2004. Distance codes represent 25 mile distance increments (i.e. 0-25 = distance code 1, 26-50= distance code 2…).

Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code*
148.055	535268.18750	307627.50000	1/24/2003	1758	14	2	FBL
148.055	535033.18750	307803.53125	1/25/2003	1245	22	0	FBL
148.055	534938.87500	307815.34375	1/25/2003	1357	22	0	FBL
148.055	530740.06250	304815.40625	1/25/2003	2012	10	2	FBL
148.055	530549.56250	304549.50000	1/26/2003	1100	1	0	FBL
148.055	530318.93750	306155.28125	1/26/2003	2326	-7	2	AG
148.055	530611.62500	305571.40625	1/27/2003	944	9	0	FBL
148.055	524881.06250	307374.87500	1/27/2003	1156	9	0	FBL
148.055	530556.06250	305486.12500	1/27/2003	1245	14	0	FBL
148.055	526272.81250	306724.15625	1/27/2003	2020	20	2	FOK
148.055	525315.00000	307269.90625	1/28/2003	1409	27	0	FBL
148.055	529481.50000	306977.84375	1/28/2003	2050	25	2	FOK
148.055	527740.18750	306748.34375	1/29/2003	1254	17	0	FBL
148.055	526209.43750	307513.53125	1/29/2003	1815	20	2	AG
148.055	525436.93750	307712.59375	1/30/2003	1516	32	0	AG
148.055	526721.43750	305938.93750	1/30/2003	2040	31	2	FOK
148.055	528643.50000	305895.21875	1/31/2003	1300	33	0	FBL
148.055	526010.12500	306578.43750	1/31/2003	1940	35	2	FBL
148.055	525915.93750	306543.43750	2/1/2003	1100	34	0	FBL
148.055	526073.25000	311352.87500	2/1/2003	1243	34	0	AG
148.055	525879.93750	308591.62500	2/1/2003	1827	28	2	AG
148.055	525317.87500	306891.53125	2/2/2003	1150	33	0	AG
148.055	524707.25000	308402.06250	2/2/2003	2142	34	2	FBL
148.055	529119.25000	304626.71875	2/3/2003	1055	33	0	AG
148.055	525275.18750	307233.68750	2/3/2003	2020	30	2	FBL
148.055	527512.62500	307364.71875	2/4/2003	1526	11	0	FBL
148.055	526450.50000	307087.15625	2/4/2003	2200	7	2	FOK
148.055	528017.31250	307138.37500	2/6/2003	940	15	0	FOK
148.055	525348.87500	307716.25000	2/6/2003	1811	13	2	FBL
148.055	530819.18750	305467.84375	2/7/2003	1335	15	0	FBL
148.055	522702.68750	311409.21875	2/7/2003	1901	10	2	FBL
148.055	524944.06250	306791.65625	2/8/2003	2058	10	2	FBL
148.055	525099.93750	306810.28125	2/9/2003	2133	10	2	FBL
148.163	543084.18750	314549.43750	2/20/2003	1137	43	0	FBL
148.163	543635.50000	313266.90625	2/20/2003	1912	40	2	FBL
148.163	544140.31250	313229.25000	2/21/2003	1848	40	2	FBL
148.163	533393.81250	306195.75000	2/22/2003	1145	23	0	FBL
148.163	543882.81250	313417.12500	2/22/2003	1828	18	2	FBL
148.163	532193.18750	303747.25000	2/23/2003	1233	18	0	WET
148.163	543955.37500	313322.90625	2/23/2003	1913	15	2	FBL
148.163	542468.93750	314833.90625	2/24/2003	1047	10	0	Ow
148.163	544057.50000	313353.21875	2/24/2003	2146	4	2	FOK
148.163	543247.62500	314561.75000	2/25/2003	1524	15	0	FBL
148.163	544533.68750	313444.12500	2/25/2003	2010	11	2	FBL
148.163	542010.25000	314472.37500	2/26/2003	1305	20	0	FBL
148.163	543852.06250	313005.81250	2/26/2003	1853	23	2	FCO
148.163	542146.62500	314649.62500	2/27/2003	900	28	0	Ow
148.163	544202.18750	313449.81250	2/27/2003	1932	20	2	FBL
148.163	544215.06250	313081.21875	3/2/2003	2148	13	2	FBL
148.163	542217.81250	314053.62500	3/3/2003	837	22	0	Ow

* Habitat Code based on modified WISCLAND Data, refer to table 1 of chapter 2 (Wisconsin Department of Natural resources 1998)

Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.163	542180.18750	314498.25000	3/3/2003	1006	22	0	Ow
148.163	543405.68750	314250.56250	3/3/2003	1245	20	0	FBL
148.163	543296.87500	314274.96875	3/3/2003	1414	20	0	FBL
148.163	543459.25000	314631.25000	3/3/2003	1542	20	0	FBL
148.163	543568.31250	314625.56250	3/3/2003	1706	20	0	FBL
148.163	543367.18750	314505.96875	3/3/2003	1840	16	2	FBL
148.163	543793.31250	314575.93750	3/4/2003	1428	18	0	FBL
148.163	543632.50000	314659.15625	3/4/2003	2001	13	2	FBL
148.163	542389.00000	313797.68750	3/5/2003	1255	27	0	Ow
148.163	543140.56250	315146.78125	3/5/2003	1300	27	0	FBL
148.163	544133.12500	313125.09375	3/5/2003	2125	19	2	FBL
148.163	542282.62500	314413.56250	3/6/2003	925	25	0	Ow
148.163	544477.75000	313398.28125	3/6/2003	2120	20	2	FBL
148.163	542323.37500	314386.96875	3/7/2003	1215	35	0	AG
148.163	544303.18750	313368.37500	3/7/2003	1923	28	2	FBL
148.163	542576.62500	313747.59375	3/8/2003	1108	27	0	AG
148.163	543638.56250	313169.93750	3/8/2003	2055	10	2	FBL
148.163	544444.68750	313486.84375	3/12/2003	1934	32	2	FOK
148.163	543461.00000	314789.59375	1/19/2004	1316	17	0	FBL
148.163	544074.62500	313043.18750	1/19/2004	2015	10	2	FBL
148.163	541940.12500	314598.25000	1/20/2004	1128	16	0	AG
148.163	543701.25000	313313.46875	1/20/2004	2248	5	2	FBL
148.163	541321.93750	306351.59375	1/21/2004	1512	32	0	FBL
148.163	543625.43750	313281.46875	1/21/2004	1833	25	2	FBL
148.163	541825.62500	309849.71875	1/22/2004	959	0	0	WET
148.163	544066.75000	313341.21875	1/22/2004	2110	0	2	FOK
148.163	542337.25000	310236.78125	1/23/2004	1155	15	0	AG
148.163	543911.18750	313601.62500	1/23/2004	1740	14	2	FBL
148.163	542294.62500	310160.15625	1/24/2004	1117	16	0	FBL
148.163	543639.93750	313192.78125	1/24/2004	2045	9	2	FBL
148.163	544414.50000	312481.31250	1/25/2004	1310	10	0	FBL
148.163	544128.06250	312750.56250	1/25/2004	1820	19	2	FCO
148.163	542533.12500	314371.09375	1/26/2004	945	20	0	AG
148.163	542605.00000	314363.37500	1/27/2004	1000	25	0	AG
148.163	543643.68750	314686.37500	1/27/2004	1824	15	2	FBL
148.163	543363.37500	314519.18750	1/28/2004	2026	1	2	FBL
148.163	542366.68750	314572.93750	1/29/2004	955	3	0	AG
148.163	543858.12500	314737.84375	1/29/2004	2029	-10	2	FBL
148.163	542676.25000	315521.09375	1/30/2004	1021	0	0	AG
148.163	543833.00000	313533.53125	1/30/2004	2215	-2	2	FBL
148.163	542043.37500	310159.90625	1/31/2004	933	-5	0	URB
148.163	544240.62500	313039.65625	1/31/2004	2015	12	2	FBL
148.163	542165.75000	314615.93750	2/1/2004	940	15	0	Ow
148.163	544021.18750	313299.37500	2/1/2004	1855	30	2	FBL
148.163	542264.87500	314906.87500	2/2/2004	1247	25	0	Ow
148.163	542426.00000	314501.93750	2/2/2004	2001	30	2	AG
148.163	542235.56250	314797.96875	2/3/2004	1157	17	0	Ow
148.163	543717.43750	313296.09375	2/3/2004	2241	-2	2	FCO
148.163	542437.56250	314525.15625	2/4/2004	1225	17	0	AG
148.163	543933.43750	313196.46875	2/4/2004	1938	20	2	FBL

* Habitat Code based on modified WISCLAND Data, refer to table 1 of chapter 2 (Wisconsin Department of Natural resources 1998)

Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.163	542104.25000	314725.21875	2/5/2004	1306	30	0	FBL
148.163	543861.43750	313549.87500	2/5/2004	2142	25	2	FBL
148.163	543349.18750	314537.62500	2/6/2004	1241	34	0	FBL
148.163	543953.87500	313185.90625	2/6/2004	2107	28	2	FBL
148.163	542515.68750	315031.18750	2/7/2004	1307	23	0	FBL
148.163	543818.43750	313449.90625	2/7/2004	1853	18	2	AG
148.163	543178.68750	314493.28125	2/8/2004	1212	30	0	AG
148.163	543732.50000	315247.43750	2/8/2004	1844	23	2	AG
148.163	542428.93750	314070.40625	2/9/2004	1028	30	0	AG
148.163	544094.75000	313300.46875	2/9/2004	1812	27	2	FOK
148.163	542479.18750	314456.53125	2/10/2004	923	28	0	AG
148.163	543956.00000	313187.93750	2/10/2004	2100	16	2	FBL
148.163	543289.68750	311722.93750	2/11/2004	1135	25	0	Ow
148.163	543866.87500	313229.09375	2/11/2004	1935	27	2	FOK
148.163	542493.12500	314508.84375	2/12/2004	1304	34	0	AG
148.163	543582.37500	313206.18750	2/12/2004	2032	18	2	FBL
148.163	542304.12500	313760.81250	2/13/2004	1325	30	0	URB
148.163	543815.06250	313500.43750	2/13/2004	2050	25	2	FBL
148.163	542563.87500	314169.75000	2/14/2004	937	30	0	AG
148.163	543731.68750	313280.96875	2/14/2004	2004	21	2	FCO
148.163	543010.87500	313254.31250	2/15/2004	1102	21	0	AG
148.163	542311.25000	316360.40625	2/15/2004	2056	10	2	FBL
148.163	541993.68750	316426.90625	2/17/2004	1226	32	0	AG
148.163	541955.62500	319744.62500	2/18/2004	1540	38	0	FBL
148.163	543803.00000	313260.90625	2/18/2004	1847	37	2	FBL
148.163	542452.00000	314045.31250	2/19/2004	1248	39	0	AG
148.163	542593.37500	313697.43750	2/20/2004	930	35	0	AG
148.163	544167.37500	313132.34375	2/20/2004	1930	34	2	FBL
148.163	542361.68750	314444.62500	2/21/2004	1242	39	0	AG
148.163	543934.31250	313384.56250	2/21/2004	1930	28	2	FBL
148.163	542808.81250	313835.84375	2/22/2004	1236	43	0	AG
148.163	544109.43750	313280.62500	2/22/2004	2035	34	2	FOK
148.163	542545.37500	313947.71875	2/23/2004	1025	39	0	AG
148.163	543807.93750	313688.18750	2/23/2004	1854	37	2	FBL
148.163	542334.06250	314135.31250	2/24/2004	1053	336	0	AG
148.163	543899.81250	313552.09375	2/24/2004	1915	34	2	FBL
148.163	544799.50000	316033.71875	2/25/2004	1419	38	0	AG
148.364	543205.50000	314247.75000	3/8/2003	1059	27	0	FBL
148.364	543675.43750	313216.93750	3/8/2003	2053	10	2	FBL
148.364	542876.00000	313266.75000	3/9/2003	1150	2	0	AG
148.364	543680.87500	313560.78125	3/9/2003	1855	5	2	FBL
148.364	542578.00000	313791.65625	3/10/2003	1032	8	0	WET
148.364	543348.12500	314502.62500	3/10/2003	2158	15	2	FBL
148.364	543912.25000	313681.84375	3/11/2003	1325	34	0	FBL
148.364	544091.12500	314802.03125	3/11/2003	1919	34	2	FBL
148.364	544236.43750	314093.53125	3/12/2003	1255	34	0	FBL
148.364	542245.43750	314805.90625	3/13/2003	905	35	0	Ow
148.364	519836.81250	303379.03125	3/13/2003	2102	30	2	FBL
148.364	510100.09375	299838.71875	3/14/2003	1231	40	0	FWL
148.364	508664.15625	300232.37500	3/14/2003	2020	40	2	WET

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.364	509767.62500	299284.81250	3/15/2003	1022	50	0	Ow
148.364	504777.68750	298434.71875	3/16/2003	1031	45	0	FWL
148.364	508441.12500	300079.53125	3/16/2003	2000	45	2	FWL
148.364	506263.43750	299073.81250	3/17/2003	1240	55	0	FCO
148.364	511970.21875	304581.43750	11/17/2003	1401	55	0	AG
148.364	537185.62500	323646.25000	11/17/2003	1650	40	0	FBL
148.364	508485.34375	306215.84375	11/17/2003	1739	40	2	FBL
148.364	506049.09375	297778.65625	11/18/2003	1521	55	0	FBL
148.364	505083.50000	300164.31250	11/18/2003	1742	55	2	FCO
148.364	517423.75000	301007.00000	11/19/2003	1357	50	0	FWL
148.364	513687.71875	298073.53125	11/19/2003	2249	38	2	FWL
148.364	509299.15625	298847.18750	11/20/2003	1023	60	0	FWL
148.364	507880.15625	299984.78125	11/20/2003	2158	50	2	FWL
148.364	506480.93750	298180.03125	11/21/2003	2056	39	2	FBL
148.364	506429.31250	297652.81250	11/22/2003	1247	38	0	FBL
148.364	506423.40625	297753.34375	11/22/2003	2215	40	2	FBL
148.364	511020.56250	300313.56250	11/23/2003	1759	43	2	FBL
148.364	510757.46875	299962.87500	11/24/2003	2140	23	2	FBL
148.364	508787.56250	306322.56250	11/25/2003	1523	35	0	FBL
148.364	502961.87500	300045.78125	11/26/2003	1050	36	0	FBL
148.364	505961.34375	299273.75000	11/26/2003	1903	30	2	FWL
148.364	507012.81250	299205.93750	11/27/2003	1027	35	0	FBL
148.364	505441.15625	299061.00000	11/27/2003	2316	32	2	FWL
148.364	508180.59375	299907.06250	11/28/2003	1320	29	0	FWL
148.364	510096.03125	305887.71875	11/28/2003	2007	23	2	AG
148.364	509729.68750	298642.81250	11/30/2003	1521	50	0	FWL
148.364	509199.50000	300044.75000	11/30/2003	2301	37	2	FWL
148.364	509163.12500	300120.31250	12/1/2003	1600	43	0	WET
148.364	510598.68750	305577.62500	12/2/2003	1610	44	0	AG
148.364	509481.75000	304624.12500	12/2/2003	1743	44	2	AG
148.364	510886.62500	302327.96875	12/3/2003	1327	39	0	AG
148.364	509357.71875	304696.68750	12/3/2003	2255	31	2	AG
148.364	509803.18750	299235.53125	12/4/2003	1131	40	0	AG
148.364	509674.09375	299469.62500	12/4/2003	1957	39	2	FWL
148.364	504388.84375	299203.18750	12/5/2003	1339	30	0	FWL
148.364	508202.25000	298952.87500	12/5/2003	1818	31	2	FWL
148.364	510136.00000	299834.00000	12/6/2003	1415	30	0	FWL
148.364	509762.68750	298665.81250	12/6/2003	2124	30	2	FWL
148.364	508758.00000	299444.18750	12/7/2003	1553	32	0	Ow
148.364	508641.09375	299762.09375	12/7/2003	1753	32	2	FWL
148.364	510000.21875	298346.81250	12/8/2003	1345	33	0	FWL
148.364	510092.15625	299649.31250	12/8/2003	1738	33	2	FWL
148.364	509105.25000	300023.96875	12/9/2003	1513	35	0	WET
148.364	509266.18750	300020.46875	12/9/2003	1737	35	2	FWL
148.364	509703.84375	298715.15625	12/11/2003	1340	15	0	FWL
148.364	506504.62500	298116.21875	12/11/2003	1818	7	2	FOK
148.364	517820.53125	301441.59375	12/12/2003	2123	0	2	FWL
148.364	509425.37500	299486.71875	12/13/2003	1459	10	0	FWL
148.364	509082.18750	298868.81250	12/14/2003	1827	27	2	FWL
148.364	510080.90625	306560.15625	12/15/2003	1421	33	0	AG

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.364	510091.62500	305926.75000	12/15/2003	1930	36	2	FBL
148.364	510051.15625	299392.09375	12/16/2003	1427	27	0	FWL
148.364	519680.06250	303252.87500	12/16/2003	2134	27	2	AG
148.364	510724.40625	298920.87500	12/17/2003	1135	25	0	FWL
148.364	510248.06250	299304.03125	12/17/2003	1948	19	2	FWL
148.364	510728.18750	298579.21875	12/18/2003	1504	22	0	FWL
148.364	508524.81250	299716.37500	12/18/2003	1737	22	2	FWL
148.364	509400.00000	296763.34375	12/19/2003	2223	25	2	FBL
148.364	509429.34375	299723.21875	12/21/2003	1446	45	0	FWL
148.364	507270.50000	299817.15625	12/21/2003	1730	25	2	FWL
148.364	505738.78125	300565.06250	12/22/2003	1140	35	0	FCO
148.364	510459.09375	299429.46875	12/23/2003	1120	30	0	FWL
148.364	511020.56250	298843.21875	12/26/2003	942	30	0	FWL
148.364	510518.50000	298559.56250	12/27/2003	2106	45	2	FWL
148.364	509260.18750	298985.43750	12/28/2003	1324	48	0	FWL
148.364	514234.50000	298442.50000	12/28/2003	2009	45	2	FWL
148.364	512152.28125	295384.53125	12/29/2003	1145	35	0	FBL
148.364	514629.37500	296918.37500	12/30/2003	1205	29	0	FWL
148.364	513920.40625	297606.96875	12/30/2003	2053	39	2	FBL
148.364	507072.68750	299310.43750	12/31/2003	1300	30	0	FWL
148.364	509933.31250	306288.21875	12/31/2003	1858	25	2	FBL
148.364	508452.31250	303013.40625	1/1/2004	1153	20	0	AG
148.364	511427.03125	299868.31250	1/2/2004	47	42	2	FBL
148.364	505724.43750	301609.09375	1/2/2004	955	36	0	FCO
148.364	510048.81250	305584.40625	1/3/2004	1503	29	0	AG
148.364	510014.75000	306228.56250	1/3/2004	1759	23	2	FBL
148.364	510570.00000	299333.53125	1/4/2004	1402	21	0	FWL
148.364	528536.25000	301588.25000	1/5/2004	1522	14	0	FWL
148.364	543679.68750	314880.53125	1/5/2004	1811	8	2	FBL
148.364	539342.93750	311929.59375	1/7/2004	1419	20	0	AG
148.364	543704.43750	314706.46875	1/7/2004	2055	10	2	FBL
148.364	541859.56250	309479.46875	1/8/2004	1030	20	0	FBL
148.364	543907.56250	314715.96875	1/8/2004	2032	21	2	FBL
148.364	542338.18750	309770.00000	1/9/2004	1235	21	0	FWL
148.364	544448.68750	313406.28125	1/9/2004	1819	18	2	FBL
148.364	542554.56250	313711.59375	1/10/2004	1000	18	0	AG
148.364	544075.12500	313345.65625	1/10/2004	2105	25	2	FOK
148.364	543961.75000	313179.84375	1/11/2004	103	38	2	FBL
148.364	542075.93750	314772.12500	1/11/2004	1235	30	0	FBL
148.364	542469.18750	314070.15625	1/12/2004	1104	35	0	AG
148.364	543907.18750	313548.62500	1/12/2004	2000	37	2	FBL
148.364	544730.68750	314143.93750	1/14/2004	1420	30	0	FBL
148.364	544105.93750	313443.96875	1/14/2004	2101	24	2	FBL
148.364	542462.25000	314035.43750	1/15/2004	1122	22	0	AG
148.364	524726.81250	303764.09375	1/15/2004	2244	22	2	FBL
148.364	506509.65625	298116.06250	1/17/2004	45	25	2	FOK
148.364	500120.40625	300360.62500	1/19/2004	1546	17	0	FBL
148.364	507482.96875	297854.18750	1/19/2004	2247	10	2	FBL
148.364	501704.81250	301887.37500	1/22/2004	1245	0	0	WET
148.364	506160.56250	299969.65625	1/23/2004	1359	15	0	FWL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.364	511166.65625	297238.68750	2/21/2004	2104	28	2	FOK
148.364	510338.84375	305973.03125	2/22/2004	1545	40	0	FBL
148.364	509878.21875	305891.46875	2/22/2004	1831	30	2	FOK
148.364	507148.34375	297994.21875	2/23/2004	15	36	2	FBL
148.364	509503.59375	298902.06250	2/23/2004	1146	39	0	FWL
148.364	510397.18750	298925.46875	2/24/2004	1154	35	0	WET
148.364	506021.53125	299064.90625	2/24/2004	2059	34	2	FWL
148.364	512988.81250	300917.12500	2/25/2004	1220	38	0	AG
148.364	509463.93750	306581.00000	2/25/2004	2205	27	2	FBL
148.364	511831.12500	300017.56300	11/16/2003	1807	43	2	AG
148.384	517250.03125	301832.37500	2/18/2003	1600	34	0	AG
148.384	519282.43750	303566.12500	2/18/2003	1907	35	2	FBL
148.384	519297.43750	301579.28125	2/19/2003	1308	35	0	FWL
148.384	518714.21875	303281.37500	2/19/2003	1959	26	2	FOK
148.384	519462.65625	302118.40625	2/20/2003	1244	43	0	Ow
148.384	523430.53125	311667.43750	2/20/2003	2053	40	2	FBL
148.384	521690.03125	309306.03125	2/21/2003	940	40	0	AG
148.384	517790.37500	304255.34375	2/21/2003	1857	35	2	AG
148.384	535109.93750	309737.56250	2/22/2003	1905	18	2	FBL
148.384	534911.50000	307577.78125	2/23/2003	1220	18	0	FBL
148.384	535158.87500	309912.75000	2/23/2003	1935	15	2	AG
148.384	536186.06250	308967.31250	2/24/2003	850	10	0	FOK
148.384	534688.50000	307677.03125	2/24/2003	1951	4	2	FBL
148.384	529521.87500	310563.06250	2/25/2003	1453	15	0	AG
148.384	531732.50000	310308.18750	2/25/2003	2051	11	2	FBL
148.384	529174.81250	310360.46875	2/26/2003	1538	20	0	AG
148.384	522617.25000	312025.87500	2/26/2003	2055	23	2	AG
148.384	523687.96875	313033.18750	2/27/2003	1000	28	0	FBL
148.384	529697.25000	307318.87500	2/27/2003	2016	20	2	FBL
148.384	524716.93750	303299.75000	2/28/2003	1923	21	2	FBL
148.384	528649.06250	302531.75000	3/1/2003	1112	32	0	FWL
148.384	531197.43750	309093.71875	3/1/2003	1909	30	2	AG
148.384	514349.25000	297938.84375	3/14/2003	2020	40	2	FWL
148.384	509032.78125	297952.43750	3/15/2003	1130	50	0	AG
148.384	510592.56250	299303.15625	3/15/2003	1952	40	2	FWL
148.384	511913.81250	298637.71875	3/16/2003	1000	45	0	Ow
148.384	510988.03125	296240.90625	3/16/2003	2000	45	2	AG
148.384	510601.65625	299901.37500	3/17/2003	1319	65	0	FBL
148.384	510207.15625	298413.34375	3/17/2003	2300	40	2	FWL
148.384	506814.84375	298357.71875	3/18/2003	1343	42	0	FBL
148.384	510868.53125	299617.65625	3/18/2003	2230	42	2	FBL
148.384	511773.37500	298285.43750	3/19/2003	1149	35	0	FWL
148.384	516616.18750	297882.75000	3/19/2003	2108	40	2	FWL
148.384	520081.87500	302188.56250	3/20/2003	1120	39	0	FWL
148.384	517924.59375	300809.65625	3/20/2003	1948	40	2	FWL
148.384	516472.90625	297318.84375	3/21/2003	926	40	0	FOK
148.384	516232.59375	297467.90625	3/21/2003	1906	35	2	FCO
148.384	516064.65625	297715.12500	3/22/2003	925	40	0	FWL
148.384	509726.21875	298470.59375	3/22/2003	2039	40	2	FWL
148.384	519795.46875	303083.65625	12/1/2003	1506	43	0	AG

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.384	519339.81250	304248.68750	12/1/2003	1717	43	2	AG
148.384	523825.40625	317015.06250	12/3/2003	1151	39	0	AG
148.384	518753.03125	303659.21875	12/3/2003	2325	31	2	FBL
148.384	518179.00000	304045.34375	12/4/2003	1240	40	0	FOK
148.384	518475.81250	304385.46875	12/4/2003	1943	39	2	FBL
148.384	515666.50000	305628.68750	12/5/2003	1325	30	0	FBL
148.384	518654.31250	303626.00000	12/5/2003	1755	31	2	FBL
148.384	514268.00000	299146.84375	12/6/2003	1454	30	0	AG
148.384	518950.28125	303397.37500	12/6/2003	2043	30	2	FBL
148.384	520356.00000	304855.46875	12/7/2003	1404	32	0	FBL
148.384	518865.12500	303196.34375	12/7/2003	1813	32	2	FBL
148.384	527824.68750	304216.25000	12/8/2003	1516	33	0	FBL
148.384	528569.37500	303465.25000	12/8/2003	1842	33	2	FBL
148.384	532815.56250	310304.59375	12/9/2003	1327	35	0	AG
148.384	522807.75000	310964.81250	12/9/2003	1815	35	2	FBL
148.384	510210.78125	305360.03125	12/12/2003	2211	0	2	FBL
148.384	514094.03125	299506.09375	12/13/2003	1535	10	0	AG
148.384	518143.37500	300984.31250	12/14/2003	1815	27	2	FWL
148.384	517716.06250	301423.28125	12/15/2003	1503	33	0	FWL
148.384	518689.65625	303438.84375	12/15/2003	1913	36	2	FBL
148.384	518075.34375	300852.71875	12/16/2003	1404	27	0	Ow
148.384	519101.28125	303351.43750	12/16/2003	2135	27	2	FOK
148.384	518244.09375	300432.87500	12/17/2003	1120	25	0	FWL
148.384	518199.87500	301523.96875	12/17/2003	1925	19	2	FWL
148.384	518175.81250	301173.03125	12/18/2003	1448	22	0	FWL
148.384	518050.12500	301433.34375	12/18/2003	1757	22	2	FWL
148.384	517880.53125	301522.37500	12/19/2003	2212	25	2	FWL
148.384	518127.12500	301292.53125	12/21/2003	1429	45	0	Ow
148.384	518419.18750	302500.87500	12/21/2003	1755	25	2	WET
148.384	517752.25000	298464.93750	12/22/2003	1255	35	0	FBL
148.384	518099.84375	301069.28125	12/23/2003	1245	30	0	FWL
148.384	520303.40625	301300.68750	12/26/2003	904	30	0	AG
148.384	519020.28125	303385.81250	12/27/2003	2133	45	2	FBL
148.384	519011.53125	303668.81250	12/28/2003	1444	48	0	FBL
148.384	518892.28125	303438.31250	12/28/2003	1925	45	2	FBL
148.384	529138.68750	302432.09375	12/29/2003	1220	35	0	FWL
148.384	528519.56250	303554.31250	12/29/2003	2102	30	2	FBL
148.384	533087.50000	308709.78125	12/30/2003	1335	36	0	FBL
148.384	524384.43750	311264.06250	12/30/2003	2127	39	2	FBL
148.384	525477.50000	301797.03125	12/31/2003	1406	30	0	FWL
148.384	518805.15625	303341.78125	1/1/2004	1130	20	0	FOK
148.384	520333.15625	302821.28125	1/2/2004	27	42	2	FWL
148.384	521949.43750	302193.21875	1/2/2004	930	36	0	Ow
148.384	520519.78125	302955.18750	1/3/2004	1437	29	0	FWL
148.384	519475.34375	303560.31250	1/3/2004	1815	23	2	FBL
148.384	519428.59375	303729.93750	1/4/2004	1333	21	0	FBL
148.384	519445.68750	303082.28125	1/5/2004	1528	14	0	AG
148.384	520039.56250	303484.75000	1/5/2004	1740	8	2	FBL
148.384	514773.12500	314514.25000	1/7/2004	2233	5	2	FOK
148.384	514755.84375	314650.15625	1/8/2004	2230	21	2	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.384	515297.84375	314705.31250	1/10/2004	2228	25	2	FBL
148.384	514717.40625	314366.34375	1/11/2004	2340	38	2	FOK
148.384	512702.37500	316710.18750	1/12/2004	1247	35	0	AG
148.384	514562.56250	314712.93750	1/12/2004	2102	37	2	FOK
148.384	514777.18750	314519.56250	1/14/2004	2011	24	2	FOK
148.384	515239.59375	314557.81250	1/17/2004	10	25	2	FBL
148.384	515367.96875	313166.96875	1/19/2004	1455	17	0	FBL
148.384	515037.62500	313950.34375	1/19/2004	2213	10	2	AG
148.384	516178.87500	313138.37500	1/20/2004	1300	23	0	AG
148.384	515463.50000	313147.75000	1/20/2004	2030	10	2	AG
148.384	525023.75000	311958.34375	1/22/2004	1109	0	0	FBL
148.384	536147.87500	314186.87500	1/22/2004	1518	0	0	FCO
148.384	535023.62500	309745.37500	1/22/2004	2052	0	2	FBL
148.384	532752.56250	308895.18750	1/23/2004	40	14	2	AG
148.384	543174.43750	311383.46875	1/23/2004	1155	15	0	FCO
148.384	539790.81250	309124.21875	1/24/2004	1135	16	0	AG
148.384	534402.93750	309005.59375	1/24/2004	2009	18	2	FBL
148.384	534013.68750	309075.37500	1/25/2004	1345	10	0	AG
148.384	528142.50000	310513.68750	1/25/2004	2000	19	2	FBL
148.384	528612.06250	310412.37500	1/26/2004	1133	20	0	FBL
148.384	523111.59375	311695.37500	1/26/2004	2051	15	2	FBL
148.384	524087.25000	311436.75000	1/27/2004	1305	25	0	FBL
148.384	523304.46875	311454.00000	1/27/2004	1908	15	2	FBL
148.384	533010.68750	308497.53125	1/28/2004	1935	10	2	FBL
148.384	539068.62500	307632.87500	1/29/2004	1113	3	0	AG
148.384	532501.68750	308795.65625	1/29/2004	2059	-10	2	FBL
148.384	533480.00000	310683.93750	1/30/2004	1314	0	0	AG
148.384	523494.18750	311726.81250	1/30/2004	2139	-2	2	FBL
148.384	518213.53125	314515.00000	1/31/2004	1904	12	2	FBL
148.384	518213.90625	314904.43750	2/1/2004	1109	20	0	FBL
148.384	510294.00000	312855.62500	2/2/2004	1114	25	0	FBL
148.384	510341.34375	312791.31250	2/3/2004	1048	17	0	FBL
148.384	514301.96875	313066.09375	2/3/2004	2320	-2	2	FBL
148.384	507472.43750	310679.84375	2/4/2004	1451	17	0	AG
148.384	506738.06250	298067.59375	2/5/2004	2024	25	2	FOK
148.384	517823.09375	297075.56250	2/6/2004	1927	28	2	FBL
148.384	515232.31250	296532.09375	2/7/2004	1439	23	0	FBL
148.384	544013.25000	313666.03125	2/8/2004	1821	23	2	FBL
148.384	540508.18750	312146.12500	2/9/2004	1056	30	0	AG
148.384	521004.34375	316536.37500	2/9/2004	1917	27	2	FBL
148.384	521594.84375	316542.37500	2/10/2004	1030	28	0	FBL
148.384	522888.03125	315319.18750	2/11/2004	1427	25	0	FBL
148.384	522446.18750	311380.43750	2/11/2004	2045	27	2	FBL
148.384	522612.43750	314433.75000	2/12/2004	1105	30	0	AG
148.384	523834.06250	313011.15625	2/12/2004	1848	18	2	AG
148.384	520050.06250	319378.15625	2/13/2004	1205	30	0	FBL
148.384	520907.40625	316778.09375	2/13/2004	2145	25	2	FOK
148.384	510751.68750	309901.71875	2/14/2004	2109	21	2	FBL
148.384	513195.25000	311300.21875	2/17/2004	1108	25	0	AG
148.384	523613.34375	313022.96875	2/17/2004	1943	30	2	FBL

* Habitat Code based on modified WISCLAND Data, refer to table 1 of chapter 2 (Wisconsin Department of Natural resources 1998)

Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.384	522981.50000	315774.15625	2/18/2004	1540	38	0	WET
148.384	520927.21875	316279.00000	2/18/2004	2151	37	2	FBL
148.384	522265.90625	315013.00000	2/19/2004	1129	39	0	AG
148.384	521400.06250	316685.71875	2/19/2004	1952	36	2	FBL
148.384	520949.46875	316510.65625	2/20/2004	2237	16	2	FOK
148.384	534436.62500	322861.56250	2/21/2004	1851	28	2	FBL
148.384	526447.31250	317350.28125	2/22/2004	1950	30	2	FOK
148.384	530633.18750	319741.75000	2/23/2004	1258	39	0	FBL
148.384	523403.40625	311959.18750	2/23/2004	2343	36	2	FBL
148.384	516282.50000	303694.18750	2/24/2004	2021	34	2	FOK
148.384	517884.34375	304781.12500	2/25/2004	1045	30	0	FBL
148.384	518511.78100	299485.56300	2/25/2004	2228	27	2	FCO
148.384	518600.56250	300991.43750	2/26/2004	1007	40	0	FWL
148.384	518321.81250	301056.37500	2/26/2004	2018	30	2	FWL
148.384	518764.15625	301548.09375	2/27/2004	1009	38	0	FWL
148.384	518471.81250	301243.06250	2/27/2004	1859	36	2	FWL
148.384	514572.25000	305376.75000	2/28/2004	1030	30	0	AG
148.384	520980.71875	316514.53125	2/28/2004	2045	45	2	FOK
148.384	521053.93750	316912.75000	2/29/2004	1935	45	2	FBL
148.384	523030.34375	315706.90625	3/1/2004	1123	50	0	WET
148.384	520840.37500	316873.15625	3/1/2004	2003	41	2	FOK
148.384	521824.78125	316320.59375	3/2/2004	1151	43	0	FBL
148.384	521045.84375	316317.12500	3/2/2004	1913	3	2	AG
148.384	522304.09375	317255.84375	3/3/2004	1100	40	0	FBL
148.384	520955.62500	316650.65625	3/3/2004	2015	37	2	FOK
148.384	522165.18750	318122.37500	3/4/2004	1044	39	0	FBL
148.384	509436.90625	306563.00000	3/4/2004	2018	36	2	FBL
148.384	508659.56250	307136.46875	3/5/2004	1008	38	0	FBL
148.384	509376.21875	306014.68750	3/5/2004	2054	37	2	FBL
148.384	517407.68750	301150.53125	3/7/2004	1110	37	0	FWL
148.384	520292.96875	316985.90625	3/7/2004	1945	30	2	FBL
148.384	522270.90625	315736.03125	3/8/2004	1045	35	0	AG
148.384	521084.21875	316740.40625	3/8/2004	2143	32	2	FOK
148.384	520736.81250	316076.31250	3/9/2004	1045	37	0	AG
148.384	521456.87500	315596.75000	3/9/2004	2035	34	2	AG
148.384	522546.12500	315691.81250	3/10/2004	1017	42	0	WET
148.491	534774.50000	307671.53125	2/8/2002	2045	36	2	FBL
148.491	518735.93750	301449.21875	2/9/2002	1345	48	0	FWL
148.491	504993.50000	301785.81250	2/9/2002	2040	41	2	FCO
148.491	504500.37500	296924.81250	2/11/2002	1345	33	0	AG
148.491	504729.75000	296564.28125	2/12/2002	1149	34	0	FBL
148.491	504918.43750	296164.03125	2/13/2002	1108	35	0	FBL
148.491	506703.71875	298946.84375	2/15/2002	100	38	2	FWL
148.491	503232.81250	295936.25000	2/16/2002	1340	38	0	WET
148.491	518625.96875	302357.25000	2/16/2002	2230	39	2	WET
148.491	507263.21875	298102.78125	3/5/2002	2003	30	2	FBL
148.491	510596.93750	313400.31250	3/6/2002	1422	30	0	AG
148.491	507897.84375	297962.25000	3/7/2002	2001	32	2	FOK
148.491	503370.28125	295672.40625	3/8/2002	1053	44	0	FBL
148.491	503232.93750	298389.43750	3/11/2002	1305	38	0	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.491	506534.81250	297796.00000	3/11/2002	2235	33	2	FBL
148.491	506544.28125	298147.40625	3/12/2002	22	43	2	FBL
148.491	507381.93750	299246.59375	3/12/2002	1147	48	0	FWL
148.491	506560.43750	300701.15625	3/13/2002	1319	50	0	FCO
148.491	507132.12500	300314.62500	3/14/2002	14	40	2	WET
148.491	511120.78125	296790.62500	3/14/2002	2237	36	2	FBL
148.491	504367.03125	297097.25000	3/16/2002	1010	35	0	AG
148.491	506608.43750	298256.56250	3/16/2002	2300	36	2	FBL
148.491	505877.15625	298287.43750	12/2/2002	1508	23	0	FWL
148.491	523181.40625	311927.68750	12/2/2002	1915	25	2	FBL
148.491	506567.18750	298199.18750	12/3/2002	1814	9	2	FBL
148.491	505587.68750	296154.84375	12/6/2002	2102	33	2	FBL
148.491	505655.09375	299643.40625	12/7/2002	1515	38	0	FWL
148.491	505176.87500	299345.31250	12/7/2002	1918	28	2	FWL
148.491	505357.62500	298754.87500	12/8/2002	1820	25	2	FWL
148.491	504679.59375	297405.31250	12/9/2002	1450	28	0	FBL
148.491	506412.96875	298264.68750	12/9/2002	1915	23	2	FOK
148.491	505772.21875	298635.43750	12/10/2002	1230	37	0	Ow
148.491	507380.46875	298162.09375	12/10/2002	1904	35	2	FBL
148.491	504861.12500	298429.96875	12/11/2002	1230	40	0	FWL
148.491	506602.21875	298706.84375	12/11/2002	2230	29	2	FWL
148.491	503751.06250	296303.43750	12/12/2002	1244	35	0	AG
148.491	507007.40625	298873.31250	12/12/2002	1938	30	2	FWL
148.491	504324.90625	296507.50000	12/13/2002	1352	35	0	AG
148.491	506643.56250	298590.96875	12/13/2002	1830	27	2	FBL
148.491	504200.87500	297098.75000	12/14/2002	1149	30	0	AG
148.491	506478.25000	298241.28125	12/14/2002	1920	30	2	FBL
148.491	505813.31250	296649.56250	12/15/2002	1103	40	0	AG
148.491	508371.46875	298087.59375	12/16/2002	1940	30	2	FBL
148.491	505392.96875	299224.84375	12/17/2002	2252	37	2	FWL
148.491	505402.93750	298933.43750	12/18/2002	1059	52	0	FWL
148.491	506387.75000	298333.43750	12/18/2002	1812	36	2	FOK
148.491	505336.18750	298013.78125	12/19/2002	1112	35	0	WET
148.491	517698.03125	304149.28125	12/19/2002	1800	30	2	AG
148.491	501885.59375	295222.06250	12/20/2002	1320	27	0	FBL
148.491	506578.68750	298172.21875	12/20/2002	2048	25	2	FBL
148.491	506569.03125	298161.34375	12/21/2002	2344	29	2	FBL
148.491	504337.18750	296206.71875	12/24/2002	1125	20	0	AG
148.491	500926.50000	294954.18750	12/27/2002	1217	30	0	AG
148.491	507334.71875	298114.84375	12/27/2002	2135	29	2	FBL
148.491	505646.81250	298301.59375	12/28/2002	1217	37	0	FWL
148.491	507352.75000	298815.59375	12/28/2002	1911	30	2	FWL
148.491	505654.65625	298000.65625	12/29/2002	1208	40	0	FBL
148.491	508120.93750	297732.21875	12/29/2002	1950	37	2	FBL
148.491	504990.03125	298453.31250	12/30/2002	1027	51	0	Ow
148.491	506448.34375	298286.81250	12/30/2002	2021	33	2	FBL
148.491	504888.68750	297936.68750	12/31/2002	1117	35	0	FWL
148.491	507912.93750	298101.81250	12/31/2002	1903	20	2	FOK
148.491	505629.31250	298986.00000	1/1/2003	1401	25	0	FWL
148.491	506643.03125	298104.03125	1/1/2003	2029	20	2	FOK

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.491	507148.96875	298267.81250	1/2/2003	1805	29	2	FBL
148.491	504763.06250	298318.87500	1/3/2003	916	30	0	FWL
148.491	505268.50000	298606.65625	1/3/2003	1015	30	0	FWL
148.491	504614.25000	299670.37500	1/3/2003	1152	33	0	FWL
148.491	505567.34375	296938.65625	1/3/2003	1318	33	0	AG
148.491	505766.06250	298138.71875	1/3/2003	1443	35	0	WET
148.491	506141.56250	297782.71875	1/3/2003	1615	32	0	AG
148.491	507151.37500	298174.78125	1/3/2003	1741	30	2	AG
148.491	506190.18750	298531.43750	1/4/2003	1113	25	0	FWL
148.491	506619.25000	298149.75000	1/4/2003	2024	30	2	FBL
148.491	506884.75000	298334.00000	1/5/2003	2100	28	2	FBL
148.491	504045.78125	296890.81250	1/6/2003	1447	34	0	AG
148.491	507138.53125	298157.00000	1/6/2003	1739	29	2	FBL
148.491	507037.37500	298319.12500	1/7/2003	2121	35	2	FBL
148.491	505720.43750	296310.06250	1/8/2003	1120	51	0	FBL
148.491	507492.81250	298321.21875	1/8/2003	1925	33	2	FBL
148.491	504468.96875	297182.59375	1/9/2003	1300	32	0	AG
148.491	506665.25000	298093.78125	1/9/2003	2047	32	2	FOK
148.491	507881.25000	297906.03125	1/10/2003	2126	19	2	FBL
148.491	504563.21875	297295.59375	1/12/2003	1039	19	0	AG
148.491	507223.43750	298075.31250	1/12/2003	2025	20	2	FBL
148.491	504717.81250	295882.21875	1/13/2003	1110	14	0	AG
148.491	507164.84375	297939.03125	1/13/2003	2027	6	2	FBL
148.491	506037.34375	298579.46875	1/14/2003	1135	10	0	FWL
148.491	503562.15625	298268.12500	1/15/2003	1143	10	0	FBL
148.491	507748.09375	297672.25000	1/15/2003	2128	12	2	FBL
148.491	504471.43750	300036.62500	1/16/2003	1405	24	0	FWL
148.491	507770.78125	297964.25000	1/16/2003	2107	20	2	FBL
148.491	505077.00000	299963.75000	1/17/2003	927	18	0	FWL
148.491	507573.84375	297472.84375	1/17/2003	1840	10	2	FBL
148.491	506478.68750	298376.56250	1/18/2003	1015	15	0	FBL
148.491	507303.34375	298026.87500	1/18/2003	2148	14	2	FBL
148.491	507428.90625	298034.90625	1/19/2003	2016	23	2	FBL
148.491	506445.65625	299305.87500	1/20/2003	1250	15	0	FWL
148.491	507925.37500	298492.65625	1/20/2003	2000	12	2	FBL
148.491	503782.15625	295106.28125	1/21/2003	1208	13	0	FOK
148.491	507536.15625	298313.59375	1/21/2003	2047	7	2	FBL
148.491	507225.34375	297863.31250	1/22/2003	2201	1	2	FBL
148.491	507482.37500	297991.28125	1/23/2003	2110	-4	2	FBL
148.491	503794.56250	300034.21875	1/24/2003	1502	2	0	Ow
148.491	507465.12500	298246.53125	1/24/2003	1918	14	2	FBL
148.491	504671.75000	300129.18750	1/25/2003	1115	13	0	FWL
148.491	507180.43750	298071.81250	1/25/2003	1804	18	2	FBL
148.491	506759.25000	298170.15625	1/26/2003	2245	-7	2	FBL
148.491	506767.59375	298133.43750	1/27/2003	2110	20	2	FBL
148.491	504377.15625	296974.96875	1/28/2003	1555	27	0	AG
148.491	507834.31250	298429.62500	1/28/2003	2136	25	2	FBL
148.491	505852.00000	299433.40625	1/29/2003	1414	17	0	FWL
148.491	506805.34375	298060.65625	1/29/2003	1945	20	2	FOK
148.491	504502.25000	297181.62500	1/30/2003	1202	25	0	AG

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.491	507416.21875	297940.21875	1/30/2003	1957	31	2	FBL
148.491	505007.90625	297123.00000	1/31/2003	1130	33	0	AG
148.491	506449.84375	297880.46875	1/31/2003	1901	35	2	FBL
148.491	505117.09375	296979.21875	2/1/2003	1345	34	0	AG
148.491	507221.62500	297725.93750	2/1/2003	1750	28	2	FBL
148.491	505496.46875	297064.78125	2/2/2003	1345	33	0	AG
148.491	506679.53125	298109.96875	2/3/2003	2100	30	2	FOK
148.491	505915.90625	297358.18750	2/4/2003	2120	7	2	FOK
148.491	505469.21875	298583.37500	2/5/2003	1155	10	0	FBL
148.491	507211.81250	297903.34375	2/5/2003	2255	20	2	FBL
148.491	505033.84375	295353.78125	2/6/2003	1125	15	0	AG
148.491	507421.87500	298070.56250	2/6/2003	1855	13	2	FOK
148.491	506700.28125	297523.18750	2/7/2003	2018	10	2	FOK
148.491	506473.18750	299373.53125	2/8/2003	1402	22	0	FWL
148.491	507426.25000	298371.37500	2/8/2003	1921	15	2	FBL
148.491	506417.28125	298623.43750	2/9/2003	2222	10	2	FWL
148.491	506342.25000	298379.40625	2/10/2003	1359	13	0	FBL
148.491	507279.37500	297955.12500	2/10/2003	2139	-3	2	FBL
148.491	507161.12500	298209.15625	2/11/2003	2124	16	2	FBL
148.491	504028.68750	295545.43750	2/12/2003	1038	7	0	FBL
148.491	506734.93750	298055.90625	2/12/2003	2137	10	2	FOK
148.491	508629.09375	295278.90625	2/13/2003	1311	17	0	FBL
148.491	506693.71875	298299.03125	2/13/2003	2022	10	2	FOK
148.491	507219.03125	297926.09375	2/14/2003	1930	25	2	FBL
148.491	507165.06250	297950.09375	2/15/2003	1825	10	2	FBL
148.491	507704.53125	297696.62500	2/17/2003	2015	27	2	F
148.491	501257.62500	295787.59375	2/18/2003	1515	34	0	AG
148.491	507279.21875	298262.12500	2/18/2003	1947	35	2	FBL
148.491	501117.56250	295552.31250	2/19/2003	1343	35	0	AG
148.491	509555.81250	298689.81250	2/19/2003	2023	26	2	FWL
148.491	507073.62500	296693.06250	2/20/2003	1314	46	0	FBL
148.491	507487.93750	298051.71875	2/20/2003	2022	40	2	FBL
148.491	504319.78125	296700.18750	2/21/2003	1212	40	0	AG
148.491	506752.93750	298289.53125	2/21/2003	1933	35	2	FBL
148.491	507187.96875	297787.46875	2/22/2003	1955	18	2	FBL
148.491	509872.43750	299036.53125	2/23/2003	2004	20	2	FWL
148.491	509289.56250	299005.84375	2/24/2003	938	10	0	Ow
148.491	506856.71875	298320.15625	2/24/2003	2031	4	2	FBL
148.491	510302.59375	305977.75000	11/19/2003	2232	38	2	FBL
148.491	507772.28125	300794.25000	11/20/2003	1018	60	0	WET
148.491	508615.81250	297749.28125	11/20/2003	2109	50	2	FBL
148.491	506252.84375	298013.25000	11/21/2003	2005	39	2	FOK
148.491	504409.12500	296712.56250	11/24/2003	1507	22	0	AG
148.491	519581.09375	302428.68750	11/24/2003	2227	23	2	FBL
148.491	508172.59375	297272.93750	11/26/2003	1902	30	2	FBL
148.491	504449.06250	299528.37500	11/27/2003	1017	35	0	FWL
148.491	504967.59375	298998.34375	11/27/2003	2316	32	2	FWL
148.491	506732.68750	300152.09375	11/30/2003	1600	50	0	WET
148.491	507291.68750	297988.43750	11/30/2003	2301	37	2	FBL
148.491	507229.71875	297902.53125	12/11/2003	1818	7	2	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.491	507799.40625	299591.90625	12/12/2003	2148	0	2	FWL
148.491	507332.15625	300694.50000	12/13/2003	1602	10	0	FWL
148.491	503103.21875	298690.00000	12/14/2003	1840	27	2	FBL
148.491	507518.78125	300108.59375	12/15/2003	1509	33	0	WET
148.491	503228.12500	298504.87500	12/15/2003	2002	36	2	FBL
148.491	505719.87500	299862.93750	12/16/2003	1447	27	0	FWL
148.491	519129.25000	303686.87500	12/16/2003	2137	27	2	FBL
148.491	502094.75000	300482.28125	12/17/2003	1215	25	0	WET
148.491	508185.62500	300006.96875	12/17/2003	1959	19	2	FWL
148.491	504550.37500	298655.93750	12/18/2003	1512	22	0	AG
148.491	507159.34375	300211.09375	12/18/2003	1736	22	2	Ow
148.491	509912.90625	298507.90625	12/19/2003	2228	25	2	FWL
148.491	505008.21875	299618.75000	12/21/2003	1502	45	0	FWL
148.491	506693.15625	300105.81250	12/21/2003	1725	25	2	WET
148.491	506808.34375	299744.90625	12/22/2003	1150	35	0	FWL
148.491	502145.34375	300770.68750	12/23/2003	1210	30	0	FWL
148.491	503343.37500	301114.56250	12/26/2003	1009	30	0	AG
148.491	505723.18750	299472.71875	12/27/2003	2057	45	2	FWL
148.491	502500.34375	300213.15625	12/28/2003	1413	48	0	AG
148.491	501150.46875	301306.59375	12/28/2003	1949	45	2	FWL
148.491	499681.71875	298831.84375	12/29/2003	1105	35	0	FBL
148.491	508872.34375	299055.25000	12/29/2003	1957	30	2	FWL
148.491	505938.50000	299729.90625	12/30/2003	1127	29	0	FWL
148.491	506257.87500	297387.37500	12/30/2003	2027	39	2	FBL
148.491	502564.09375	299631.78125	12/31/2003	1236	30	0	FBL
148.491	507202.53125	298042.62500	12/31/2003	1830	25	2	FBL
148.491	502698.84375	294556.06250	1/1/2004	1301	20	0	AG
148.491	502173.71875	294328.81250	1/2/2004	1016	36	0	AG
148.491	501042.59375	294430.59375	1/7/2004	1607	20	0	AG
148.491	506488.65625	297226.40625	1/12/2004	2139	37	2	FBL
148.491	504588.34375	299626.31250	1/14/2004	1630	30	0	FBL
148.491	506504.15625	298119.06250	1/14/2004	1928	24	2	FOK
148.491	506487.87500	298125.03125	1/15/2004	2312	22	2	FBL
148.491	503184.40625	298427.53125	1/17/2004	46	25	2	FBL
148.491	502902.90625	300384.71875	1/19/2004	1546	17	0	FWL
148.491	504544.62500	299295.56250	1/20/2004	1410	20	0	FWL
148.491	506476.93750	297876.06250	1/20/2004	2115	5	2	FOK
148.491	507524.34375	298072.21875	3/9/2004	2121	34	2	FBL
148.491	505752.18750	299259.25000	11/28/2003	1931	23	2	FWL
148.665	521201.68750	316958.87500	1/20/2002	1930	12	2	FBL
148.665	524438.12500	308203.87500	2/8/2002	2355	36	2	AG
148.665	518243.40625	304115.81250	2/9/2002	1500	48	0	FOK
148.665	507198.90625	299521.53125	2/9/2002	2100	41	2	FBL
148.665	512800.09375	297969.37500	2/11/2002	1308	33	0	FBL
148.665	512304.31250	306914.84375	2/12/2002	1110	34	0	FOK
148.665	535582.43750	308981.59375	2/15/2002	1627	0	0	FWL
148.665	521079.90625	316895.18750	2/16/2002	200	38	2	FBL
148.665	507839.46875	298483.87500	2/18/2002	1245	37	0	FBL
148.665	505677.12500	298696.43750	2/18/2002	2123	35	2	FWL
148.665	501673.53125	300761.50000	2/19/2002	1330	48	0	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.665	506951.71875	299655.18750	2/19/2002	1955	45	2	FWL
148.665	506890.40625	297615.96875	2/20/2002	1914	32	2	AG
148.665	518906.12500	301120.81250	2/21/2002	1046	27	0	FWL
148.665	501346.34375	301337.68750	2/22/2002	1310	29	0	FWL
148.665	505903.12500	299469.18750	2/22/2002	2058	25	2	FWL
148.665	499862.31250	300302.56250	2/25/2002	2045	30	2	FBL
148.665	511268.87500	310619.68750	2/27/2002	1344	26	0	FBL
148.665	514893.75000	306719.09375	2/27/2002	1935	10	2	FBL
148.665	523165.56250	314669.43750	3/1/2002	1037	20	0	FBL
148.665	524645.25000	311348.65625	3/1/2002	1853	24	2	FBL
148.665	524701.12500	311406.12500	3/2/2002	1112	21	0	FBL
148.665	524829.37500	311374.25000	3/2/2002	1841	19	2	FBL
148.665	523322.96875	311828.93750	3/4/2002	600	9	2	FBL
148.665	546110.37500	313495.96875	3/4/2002	955	0	0	AG
148.665	514863.31250	311522.43750	3/4/2002	1311	0	0	FBL
148.665	522376.03125	312467.43750	3/5/2002	1258	24	0	FOK
148.665	521005.81250	316874.37500	3/5/2002	2041	24	2	FBL
148.665	521548.56250	317284.78125	3/6/2002	1402	30	0	FBL
148.665	521349.84375	316808.09375	3/6/2002	1916	30	2	FBL
148.665	523352.93750	312067.87500	3/7/2002	1320	29	0	FBL
148.665	521400.09375	316581.93750	3/7/2002	1930	32	2	FBL
148.665	522686.18750	313611.71875	3/8/2002	1144	44	0	FOK
148.665	530870.06250	315546.12500	3/9/2002	1305	31	0	FBL
148.665	534815.81250	313911.46875	3/10/2002	1219	0	0	AG
148.665	529675.81250	311906.56250	3/11/2002	1124	38	0	AG
148.665	521072.21875	316623.93750	3/11/2002	2158	33	2	FBL
148.665	519209.43750	315612.40625	3/12/2002	1045	48	0	FBL
148.665	521118.84375	316886.75000	3/12/2002	2358	43	2	FBL
148.665	521029.40625	316671.56250	3/13/2002	1220	50	0	FBL
148.665	516705.15625	316989.71875	3/13/2002	1425	50	0	FBL
148.665	521398.15625	316868.71875	3/13/2002	2347	40	2	FBL
148.665	506499.96875	298152.75000	3/14/2002	2238	36	2	FBL
148.665	506608.43750	298256.56250	3/16/2002	2300	36	2	FBL
148.665	505951.15625	299939.71875	3/19/2002	2028	35	2	FWL
148.665	527940.37500	303435.87500	1/2/2003	1942	29	2	FBL
148.665	527341.56250	304331.56250	1/3/2003	1145	26	0	FBL
148.665	527757.56250	304340.68750	1/3/2003	1722	24	2	FBL
148.665	526689.81250	303957.87500	1/4/2003	1033	25	0	FBL
148.665	524343.00000	306419.62500	1/4/2003	1820	30	2	FBL
148.665	521712.93750	304051.53125	1/5/2003	1303	25	0	FBL
148.665	519045.18750	307677.62500	1/5/2003	1935	28	2	FBL
148.665	523544.65625	308425.09375	1/6/2003	1541	34	0	AG
148.665	522977.71875	311986.21875	1/6/2003	1823	29	2	FBL
148.665	524081.43750	304773.21875	1/7/2003	1948	35	2	FBL
148.665	523875.21875	306662.40625	1/8/2003	1328	51	0	FBL
148.665	523166.25000	307534.50000	1/8/2003	2028	34	2	FOK
148.665	527385.00000	306387.59375	1/9/2003	1130	32	0	FBL
148.665	529207.56250	308317.15625	1/9/2003	2120	32	2	FBL
148.665	525396.56250	307487.68750	1/10/2003	1155	19	0	FOK
148.665	520907.87500	316485.21875	1/10/2003	2029	19	2	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.665	524534.62500	306511.56250	1/11/2003	1533	12	0	FBL
148.665	521084.40625	316379.43750	1/11/2003	1820	12	2	FOK
148.665	508137.59375	302688.96875	1/12/2003	1225	20	0	AG
148.665	507161.84375	297834.21875	1/12/2003	2025	20	2	FBL
148.665	508742.65625	300493.09375	1/13/2003	1110	14	0	WET
148.665	507358.34375	298056.34375	1/13/2003	2040	10	2	FBL
148.665	507343.06250	298121.15625	1/14/2003	1203	10	0	FBL
148.665	509622.31250	299856.56250	1/15/2003	1131	10	0	WET
148.665	507258.12500	297870.15625	1/15/2003	2128	12	2	FBL
148.665	524763.31250	307588.59375	1/16/2003	2119	20	2	FBL
148.665	528020.31250	302525.56250	1/17/2003	840	18	0	FWL
148.665	520448.03125	308188.34375	1/17/2003	1816	10	2	FBL
148.665	521034.21875	316913.59375	1/18/2003	2116	14	2	FBL
148.665	527106.00000	310374.68750	1/19/2003	1216	18	0	AG
148.665	521060.78125	316484.21875	1/19/2003	1946	23	2	FBL
148.665	532486.12500	311341.15625	1/20/2003	1410	15	0	AG
148.665	523581.03125	316347.56250	1/21/2003	1131	13	0	AG
148.665	521062.59375	316739.62500	1/21/2003	2131	7	2	FOK
148.665	521856.09375	314487.90625	1/22/2003	2252	1	2	FOK
148.665	528996.93750	301815.71875	1/24/2003	1324	2	0	FWL
148.665	506256.90625	298296.59375	1/24/2003	1918	14	2	FBL
148.665	509119.96875	299780.03125	1/25/2003	1005	13	0	FWL
148.665	506301.87500	297741.06250	1/25/2003	1815	18	2	FBL
148.665	519453.18750	296856.65625	1/26/2003	1158	1	0	FBL
148.665	506578.84375	298588.06250	1/26/2003	2245	-7	2	FWL
148.665	507047.50000	297816.03125	1/27/2003	2110	20	2	AG
148.665	507857.06250	299753.34375	1/28/2003	1545	27	0	FWL
148.665	506579.93750	298143.12500	1/28/2003	2136	25	2	FBL
148.665	509467.15625	297808.90625	1/29/2003	1945	20	2	FBL
148.665	503033.62500	295207.81250	1/30/2003	1211	25	0	FBL
148.665	511287.62500	298984.18750	1/30/2003	2006	31	2	FWL
148.665	510150.65625	305735.53125	1/31/2003	1007	33	0	AG
148.665	507369.34375	300431.62500	1/31/2003	1902	35	2	WET
148.665	507970.46875	306149.34375	2/1/2003	1300	34	0	FBL
148.665	507994.25000	299728.53125	2/1/2003	1757	28	2	FWL
148.665	511943.50000	296464.65625	2/2/2003	1248	33	0	FOK
148.665	514126.00000	303964.06250	2/3/2003	1235	33	0	FBL
148.665	512121.46875	297455.43750	2/3/2003	2108	30	2	FBL
148.665	514265.62500	303876.03125	2/4/2003	1600	11	0	FOK
148.665	508333.56250	298136.53125	2/4/2003	2100	7	2	FBL
148.665	513347.09375	301277.40625	2/5/2003	1126	10	0	AG
148.665	507873.12500	300087.87500	2/5/2003	2303	20	2	WET
148.665	511939.34375	304120.59375	2/6/2003	1025	15	0	AG
148.665	508931.37500	299866.43750	2/6/2003	1855	13	2	FWL
148.665	518163.15625	306174.90625	2/8/2003	1308	22	0	FBL
148.665	518126.09375	306252.96875	2/8/2003	2012	15	2	FBL
148.665	510120.43750	299328.15625	2/9/2003	2228	10	2	FBL
148.665	512660.71875	300721.68750	2/10/2003	1417	13	0	AG
148.665	518918.06250	300220.25000	2/10/2003	2156	-3	2	FC
148.665	512996.18750	297856.78125	2/11/2003	2104	16	2	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.665	507373.78125	299603.90625	2/12/2003	2137	10	2	FWL
148.665	517777.31250	312196.12500	2/13/2003	1216	17	0	AG
148.665	517734.12500	304298.71875	2/13/2003	2100	10	2	AG
148.665	520048.96875	301990.03125	2/14/2003	1315	27	0	FWL
148.665	511811.18750	299187.25000	2/14/2003	1918	2527	2	WET
148.665	512545.56250	300085.18750	2/15/2003	1133	10	0	AG
148.665	508208.43750	299698.93750	2/15/2003	1825	10	2	FWL
148.665	510269.34375	299386.43750	2/16/2003	1305	17	0	FWL
148.665	510239.59375	298574.90625	2/16/2003	2011	15	2	FWL
148.665	522134.37500	296975.00000	2/17/2003	1335	25	0	FWL
148.665	510625.53125	297528.18750	2/17/2003	2016	27	2	FOK
148.665	518353.68750	305877.43750	2/18/2003	1430	34	0	AG
148.665	521905.09375	302177.93750	2/18/2003	1907	35	2	Ow
148.665	518728.78125	301206.90625	2/19/2003	1308	35	0	FWL
148.665	521888.40625	302363.65625	2/19/2003	2005	26	2	Ow
148.691	534596.12500	307662.75000	1/31/2002	611	23	2	FBL
148.691	534833.75000	307646.53125	2/1/2002	611	11	2	FBL
148.691	535866.50000	307057.87500	2/1/2002	1532	0	0	FBL
148.691	535003.37500	305298.78125	2/2/2002	1330	28	0	FWL
148.691	534849.31250	307613.21875	2/2/2002	1853	28	2	FBL
148.691	535566.68750	307566.03125	2/3/2002	1455	27	0	FWL
148.691	534731.50000	307634.03125	2/3/2002	1951	22	2	FBL
148.691	528048.31250	303409.65625	2/4/2002	654	16	2	FBL
148.691	526869.06250	307946.81250	2/4/2002	1440	20	0	AG
148.691	523074.00000	302536.43750	2/5/2002	1420	20	0	FWL
148.691	522574.00000	302223.96875	2/6/2002	1230	40	0	AG
148.691	521972.40625	302298.31250	2/8/2002	1256	42	0	Ow
148.691	524087.25000	303950.84375	2/8/2002	2345	36	2	FBL
148.691	535173.62500	310084.21875	2/9/2002	1110	48	0	AG
148.691	534338.43750	307652.50000	2/9/2002	2020	41	2	FBL
148.691	515940.81250	301672.25000	2/11/2002	1158	33	0	AG
148.691	509638.56250	299549.25000	1/23/2003	2140	-4	2	FWL
148.691	510441.53125	299919.21875	1/24/2003	1404	2	0	WET
148.691	507896.46875	300395.43750	1/25/2003	1035	13	0	WET
148.691	501738.00000	294912.50000	1/25/2003	1835	18	2	FBL
148.691	509009.71875	299647.40625	2/20/2003	1314	47	0	FWL
148.691	519589.84375	302612.93750	2/20/2003	2001	40	2	FWL
148.691	520504.90625	302814.21875	2/21/2003	1120	40	0	Ow
148.691	513855.21875	300502.18750	3/15/2003	1038	50	0	AG
148.691	508522.43750	305229.31250	3/15/2003	2027	40	2	FBL
148.691	509037.03125	304802.81250	3/16/2003	1942	45	2	AG
148.691	507248.50000	300222.06250	3/17/2003	1240	55	0	FWL
148.691	509289.56250	305525.87500	3/17/2003	2307	40	2	AG
148.691	505518.87500	313731.12500	3/18/2003	1550	42	0	FBL
148.691	509504.00000	305335.65625	3/18/2003	2221	42	2	FBL
148.691	509153.15625	299551.46875	3/19/2003	1127	35	0	FWL
148.691	508159.81250	299073.96875	3/19/2003	2151	40	2	FWL
148.691	510736.62500	299170.84375	3/20/2003	1130	39	0	Ow
148.691	508876.53125	299819.62500	3/20/2003	2010	40	2	FWL
148.691	511017.34375	299287.78125	3/21/2003	948	40	0	FWL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.691	509101.53125	299235.43750	3/21/2003	1933	35	2	Ow
148.691	512232.34375	298522.75000	3/22/2003	941	40	0	FWL
148.691	511201.15625	298566.96875	3/22/2003	2011	40	2	FWL
148.691	510797.62500	299385.81250	3/23/2003	1113	50	0	FWL
148.691	510008.96875	306075.09375	2/5/2004	1950	25	2	FBL
148.691	499050.46875	301937.68750	2/24/2004	2124	34	2	FWL
148.714	534227.31250	307667.75000	1/31/2002	611	32	2	FBL
148.714	534370.50000	307632.00000	2/1/2002	600	11	2	FBL
148.714	536109.50000	306532.68750	2/1/2002	1645	0	0	AG
148.714	534813.31250	306486.25000	2/2/2002	1330	28	0	Ow
148.714	534849.31250	307613.21875	2/2/2002	1853	28	2	FBL
148.714	536746.43750	307584.40625	2/3/2002	1457	27	0	Ow
148.714	533127.25000	308677.31250	2/3/2002	2001	22	2	FBL
148.714	535057.81250	307684.43750	2/4/2002	635	16	2	FBL
148.714	538079.81250	307231.09375	2/4/2002	1440	20	0	FWL
148.714	535265.31250	307154.81250	2/5/2002	1055	20	0	FBL
148.714	535320.93750	307631.15625	2/6/2002	1140	40	0	FBL
148.714	535633.25000	308999.37500	2/7/2002	1145	45	0	FWL
148.714	532615.12500	299554.28125	2/8/2002	1221	38	0	AG
148.714	532305.81250	302853.18750	2/8/2002	2315	36	2	WET
148.714	532923.93750	309561.75000	2/9/2002	1245	48	0	AG
148.714	534166.50000	319920.46875	2/9/2002	1930	41	2	FBL
148.714	535450.81250	321180.12500	2/11/2002	1530	33	0	AG
148.714	536980.68750	318436.71875	2/12/2002	1000	34	0	FBL
148.714	535705.68750	306520.71875	2/27/2002	1313	26	0	FWL
148.714	548957.12500	335848.93750	12/19/2002	2040	30	2	FBL
148.714	550722.37500	343582.59375	12/20/2002	1137	30	0	WET
148.714	552041.62500	343694.56250	12/20/2002	2248	25	2	FOK
148.714	549803.00000	343295.87500	12/24/2002	1333	20	0	FWL
148.714	554730.93750	344471.81250	12/26/2002	1215	27	0	FWL
148.714	552911.68750	343877.28125	12/28/2002	1408	37	0	AG
148.714	550051.18750	344465.68750	12/28/2002	2135	29	2	FWL
148.714	542730.18750	344350.09375	12/29/2002	1013	35	0	FC
148.714	534170.43750	307615.68750	12/31/2002	1827	20	2	FBL
148.714	518513.96875	313473.90625	12/7/2003	1500	23	0	FBL
148.714	528443.43750	303592.31250	1/22/2004	1400	0	0	FBL
148.714	528397.56250	303450.37500	1/22/2004	2013	0	2	FBL
148.714	528477.56250	303550.46875	1/23/2004	2335	14	2	FBL
148.714	521830.75000	310476.71875	1/26/2004	1316	20	0	WET
148.714	522262.96875	311980.25000	1/26/2004	2136	15	2	AG
148.714	522727.43750	310349.90625	1/27/2004	1242	25	0	AG
148.739	523880.12500	311504.00000	2/1/2002	629	11	2	FBL
148.739	523255.25000	311526.75000	2/2/2002	1923	28	2	FBL
148.739	526652.00000	307844.75000	2/3/2002	1520	27	0	AG
148.739	523420.78125	311765.78125	2/3/2002	2200	22	2	FOK
148.739	507227.96875	305968.28125	2/4/2002	1212	20	0	FBL
148.739	522801.28125	311468.50000	12/2/2002	1726	25	2	FBL
148.739	522810.03125	311453.96875	12/3/2002	1924	9	2	FBL
148.739	519182.87500	303593.15625	12/6/2002	2017	33	2	FBL
148.739	524187.90625	302650.56250	12/7/2002	1406	38	0	FWL

* Habitat Code based on modified WISCLAND Data, refer to table 1 of chapter 2 (Wisconsin Department of Natural resources 1998)

Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.739	519290.37500	303377.56250	12/7/2002	1842	28	2	AG
148.739	507550.56250	299001.87500	2/20/2003	1305	47	0	FWL
148.739	523211.40625	311137.46875	2/20/2003	2108	40	2	AG
148.739	524013.00000	307187.93750	2/21/2003	1020	40	0	FBL
148.739	523119.59375	311195.53125	2/21/2003	2007	35	2	FBL
148.739	507121.37500	298455.75000	2/22/2003	1955	18	2	FBL
148.739	524148.21875	310837.03125	11/18/2003	1900	55	2	FBL
148.739	539151.81250	306495.15625	11/19/2003	1258	50	0	AG
148.739	522744.15625	311797.00000	11/19/2003	2155	38	2	FOK
148.739	524552.25000	312273.62500	11/20/2003	1156	60	0	AG
148.739	522866.93750	311576.81250	11/20/2003	2027	50	2	FBL
148.739	523202.90625	312065.06250	11/30/2003	2344	37	2	FBL
148.739	526676.87500	311136.56250	12/1/2003	1445	43	0	AG
148.739	526755.62500	310471.09375	12/1/2003	1753	43	2	FBL
148.739	511712.81250	317340.21875	12/3/2003	1228	39	0	AG
148.739	512912.40625	314543.21875	12/3/2003	2225	31	2	FOK
148.739	512978.71875	314947.96875	12/4/2003	1038	40	0	FBL
148.739	523302.00000	312034.12500	12/4/2003	1919	39	2	FBL
148.739	514743.00000	313417.03125	12/5/2003	1249	30	0	FBL
148.739	523307.00000	312079.90625	12/5/2003	1733	31	2	FBL
148.739	512754.87500	311431.37500	12/6/2003	1608	30	0	AG
148.739	506099.03125	316005.87500	12/6/2003	2150	30	2	FBL
148.739	522489.50000	311105.28125	12/7/2003	1432	32	0	AG
148.739	522093.81250	310604.93750	12/7/2003	1834	32	2	FWL
148.739	514825.81250	311997.31250	12/8/2003	1432	33	0	AG
148.739	522409.81250	311646.62500	12/8/2003	1807	33	2	FBL
148.739	514788.37500	312453.15625	12/9/2003	1445	35	0	FBL
148.739	522771.90625	310982.90625	12/9/2003	1811	35	2	FBL
148.739	510353.46875	306107.81250	12/11/2003	1907	7	2	FBL
148.739	526606.12500	310162.56250	12/12/2003	2051	0	2	FC
148.739	531521.75000	308652.25000	12/13/2003	1314	10	0	AG
148.739	527927.25000	312460.12500	12/13/2003	2139	20	2	AG
148.739	523789.40625	311597.96875	12/14/2003	1745	27	2	FBL
148.739	510359.59375	302922.81250	12/15/2003	1509	33	0	AG
148.739	510279.40625	306215.40625	12/15/2003	1930	36	2	FBL
148.739	519366.84375	303410.21875	12/16/2003	1345	27	0	FOK
148.739	524700.68750	311420.75000	12/16/2003	2100	27	2	FBL
148.739	519931.75000	303422.62500	12/17/2003	1910	19	2	FBL
148.739	519677.65625	303269.09375	12/18/2003	1431	22	0	AG
148.739	522174.00000	310330.25000	12/18/2003	1825	22	2	WET
148.739	523742.09375	304233.03125	12/19/2003	2331	25	2	FBL
148.739	524169.06250	303360.28125	12/21/2003	1414	45	0	FBL
148.739	522200.59375	310358.53125	12/21/2003	1813	25	2	WET
148.739	531528.06250	305294.96875	12/23/2003	1325	30	0	FOK
148.739	517483.40625	301731.15625	12/26/2003	920	30	0	FWL
148.739	520879.21875	316865.12500	12/27/2003	1958	45	2	FBL
148.739	516502.40625	314591.37500	12/28/2003	1245	48	0	WET
148.739	520970.59375	317144.12500	12/28/2003	1846	45	2	FBL
148.739	520388.81250	313414.93750	12/29/2003	1855	30	2	FBL
148.739	515701.53125	314116.65625	12/30/2003	1044	29	0	AG

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.739	524107.96875	311550.71875	12/30/2003	2116	39	2	FBL
148.739	513155.03125	306105.71875	12/31/2003	1208	30	0	FBL
148.739	529524.31250	303137.18750	1/1/2004	1100	18	0	FBL
148.739	516922.56250	298191.21875	1/7/2004	1639	20	0	FWL
148.739	519819.87500	301081.65625	1/8/2004	1130	20	0	AG
148.739	518898.75000	303428.78125	1/8/2004	2159	21	2	FBL
148.739	519512.25000	303350.28125	1/9/2004	1916	18	2	FBL
148.739	522837.50000	311975.90625	1/10/2004	2130	25	2	FBL
148.739	534884.56250	307700.25000	1/11/2004	47	38	2	FBL
148.739	533719.62500	307786.25000	1/11/2004	1210	30	0	FBL
148.739	541878.50000	309524.59375	1/12/2004	1148	35	0	FBL
148.739	520930.53125	316623.87500	1/12/2004	2044	37	2	FOK
148.739	533448.18750	306667.50000	1/14/2004	1509	30	0	FOK
148.739	521003.93750	316679.06250	1/14/2004	2027	24	2	FBL
148.739	541150.31250	309365.78125	1/15/2004	1317	22	0	AG
148.739	521004.53125	316897.03125	1/15/2004	2341	22	2	FBL
148.739	520165.06250	312457.62500	1/17/2004	2355	25	2	FBL
148.739	516295.34375	315801.09375	1/19/2004	1511	17	0	AG
148.739	518731.50000	313980.28125	1/19/2004	2133	10	2	FBL
148.739	516200.84375	313952.06250	1/20/2004	1300	23	0	AG
148.739	517643.43750	314106.87500	1/20/2004	2023	10	2	AG
148.739	517216.12500	314118.56250	1/22/2004	1143	0	0	AG
148.739	520383.50000	312796.78125	1/22/2004	1950	0	2	FOK
148.739	520016.96875	312432.62500	1/23/2004	13	14	2	FBL
148.739	516645.68750	314251.50000	1/24/2004	1320	20	0	WET
148.739	518591.71875	314419.78125	1/24/2004	1929	18	2	FBL
148.739	516140.40625	314981.03125	1/25/2004	1022	10	0	AG
148.739	523200.71875	311523.18750	1/25/2004	2043	19	2	FBL
148.739	516646.25000	313740.21875	1/26/2004	1203	20	0	AG
148.739	518744.31250	313829.21875	1/26/2004	2114	15	2	FOK
148.739	517373.56250	313426.65625	1/27/2004	1219	25	0	AG
148.739	519643.50000	314612.06250	1/27/2004	1924	15	2	FBL
148.739	522447.18750	311711.28125	1/28/2004	1913	10	2	FBL
148.739	516892.62500	314120.34375	1/29/2004	1158	3	0	WET
148.739	519616.65625	313785.00000	1/29/2004	2142	-10	2	FBL
148.739	516839.25000	314219.62500	1/30/2004	1216	0	0	WET
148.739	518419.96875	313862.03125	1/30/2004	2113	-2	2	FOK
148.739	517710.65625	316319.65625	1/31/2004	1321	-5	0	FBL
148.739	518452.00000	313033.31250	1/31/2004	1923	12	2	FBL
148.739	516832.06250	312973.84375	2/1/2004	1117	20	0	WET
148.739	523006.03125	311200.75000	2/1/2004	2020	30	2	FBL
148.739	512100.12500	311150.21875	2/2/2004	1050	25	0	FBL
148.739	518734.34375	314311.78125	2/2/2004	1845	30	2	FBL
148.739	516968.21875	313880.34375	2/3/2004	1014	17	0	WET
148.739	520975.71875	316593.53125	2/3/2004	2344	-2	2	FOK
148.739	522824.87500	316478.25000	2/4/2004	1406	17	0	FBL
148.739	522239.28125	312535.40625	2/4/2004	1843	20	2	AG
148.739	515239.21875	314252.00000	2/5/2004	953	23	0	AG
148.739	510064.06250	306182.81250	2/5/2004	1931	25	2	FBL
148.739	516929.25000	314150.87500	2/11/2004	1524	25	0	FWL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.739	518335.31250	313754.87500	2/11/2004	2011	27	2	FBL
148.739	516070.12500	315437.81250	2/12/2004	1033	30	0	FBL
148.739	509712.34375	305607.96875	2/12/2004	1942	18	2	FBL
148.762	514684.87500	298101.46875	1/1/2002	2104	37	2	FWL
148.762	537964.93750	309652.25000	1/10/2002	1300	43	0	AG
148.762	535268.18750	306457.46875	1/10/2002	2030	37	2	FBL
148.762	534314.31250	304437.25000	1/11/2002	1630	38	0	FWL
148.762	538588.87500	310023.68750	1/11/2002	1840	0	2	FBL
148.762	515024.50000	298571.06250	1/12/2002	806	0	0	FWL
148.762	506381.25000	300128.40625	1/12/2002	1530	32	0	Ow
148.762	507868.71875	297997.15625	1/13/2002	1950	0	2	FBL
148.762	506992.56250	299911.31250	1/14/2002	1231	34	0	FWL
148.762	512691.06250	296987.34375	1/14/2002	2158	32	2	FBL
148.762	502980.21875	300164.81250	1/15/2002	1815	27	2	FWL
148.762	506322.65625	298811.81250	1/16/2002	1620	25	0	FWL
148.762	508102.46875	298096.93750	1/16/2002	2050	24	2	FBL
148.762	508223.62500	298308.12500	1/17/2002	2024	21	2	FBL
148.762	519489.12500	302437.25000	1/18/2002	1335	10	0	FWL
148.762	505342.96875	299247.43750	1/18/2002	2144	0	2	FWL
148.762	508435.34375	295454.18750	1/20/2002	2040	28	2	FBL
148.762	506489.09375	299496.53125	1/21/2002	1645	36	2	FWL
148.762	504055.65625	295802.09375	1/22/2002	2310	40	2	FBL
148.762	507595.00000	298907.62500	1/23/2002	2145	35	2	FWL
148.762	505706.81250	299945.00000	1/24/2002	2035	36	2	FWL
148.762	505806.03125	298742.25000	1/25/2002	1152	45	0	AG
148.791	535613.81250	309704.81250	1/17/2002	611	8	2	AG
148.791	542428.18750	314128.46875	1/18/2002	1040	10	0	AG
148.791	534570.93750	307665.65625	1/18/2002	1930	0	2	FBL
148.791	534786.93750	307691.81250	1/19/2002	1150	24	0	F
148.791	529047.68750	302950.84375	1/19/2002	1930	0	2	FWL
148.791	535730.25000	309681.40625	1/20/2002	1330	23	0	AG
148.791	534756.31250	307627.75000	1/20/2002	2159	28	2	FBL
148.791	529352.62500	304071.03125	1/22/2002	1547	47	0	FBL
148.791	528114.25000	303176.81250	1/22/2002	2105	40	2	AG
148.791	541219.18750	344865.46875	12/21/2002	1741	29	2	FBL
148.791	517299.93750	301358.03125	12/27/2002	2059	29	2	FWL
148.791	518471.65625	301045.81250	12/28/2002	1140	35	0	Ow
148.791	513414.53125	298304.75000	12/28/2002	1845	30	2	FWL
148.811	534598.37500	307656.18750	1/17/2002	1946	21	2	FBL
148.811	532641.93750	308834.03125	1/18/2002	1210	10	0	AG
148.811	534570.93750	307665.65625	1/18/2002	1930	0	2	FBL
148.811	533202.93750	307763.09375	1/19/2002	1140	24	0	FBL
148.811	534587.56250	307620.90625	1/19/2002	1815	0	2	FBL
148.811	534153.87500	307385.78125	1/20/2002	1400	23	0	FOK
148.811	534602.81250	307655.56250	1/20/2002	2159	28	2	FBL
148.811	534384.75000	307651.03125	1/21/2002	2015	36	2	FBL
148.811	534604.25000	306658.71875	1/22/2002	1426	47	0	FBL
148.811	534276.06250	307713.21875	1/22/2002	2030	40	2	FBL
148.811	535078.50000	307682.03125	1/23/2002	2057	35	2	FBL
148.811	534142.06250	307737.53125	1/24/2002	1959	36	2	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.811	532992.75000	303742.28125	1/25/2002	1005	45	0	FWL
148.835	543706.93750	313251.18750	1/17/2002	0	8	2	FBL
148.835	537529.25000	309662.03125	1/17/2002	1230	0	0	AG
148.835	542802.37500	313392.62500	1/18/2002	1040	10	0	Ow
148.835	543885.31250	313282.56250	1/18/2002	1930	0	2	FBL
148.835	542029.50000	310099.53125	1/19/2002	1320	24	0	URB
148.835	540564.56250	308800.15625	1/20/2002	1020	23	0	Ow
148.835	543991.93750	313242.09375	1/20/2002	2142	28	2	FBL
148.835	541939.93750	309647.90625	1/21/2002	735	0	0	Ow
148.835	543997.75000	313303.84375	1/21/2002	1823	36	2	FBL
148.835	544094.75000	312326.84375	1/22/2002	1342	47	0	AG
148.835	544136.37500	312896.68750	1/22/2002	2005	40	2	F
148.835	544278.25000	313522.84375	1/23/2002	2041	35	2	FBL
148.835	544197.81250	313518.71875	1/24/2002	1939	36	2	FBL
148.835	542557.43750	310787.06250	1/25/2002	932	48	0	URB
148.835	543361.68750	314565.93750	1/26/2002	1100	0	0	FBL
148.835	542316.93750	310214.96875	1/28/2002	1045	36	0	AG
148.835	526172.31250	302148.68750	1/28/2002	2248	31	2	FWL
148.835	542049.43750	309892.87500	1/29/2002	844	25	0	Ow
148.835	543331.68750	312127.56250	1/30/2002	1100	29	0	Ow
148.835	534700.25000	307533.31250	1/30/2002	2021	32	2	FOK
148.835	542392.37500	310227.03125	1/31/2002	1412	27	0	AG
148.835	544278.93750	313484.68750	2/1/2002	545	11	2	FBL
148.835	542151.43750	310198.90625	2/1/2002	1459	0	0	AG
148.835	541647.87500	309564.25000	2/2/2002	1240	28	0	Ow
148.835	544158.43750	313190.37500	2/2/2002	1816	28	2	FBL
148.835	541678.43750	312136.18750	2/3/2002	1416	27	0	AG
148.835	543969.43750	313169.34375	2/3/2002	2102	22	2	FBL
148.835	544037.56250	313292.31250	2/4/2002	620	16	2	FBL
148.835	540157.68750	308212.46875	2/4/2002	1453	20	0	Ow
148.835	541162.18750	319936.03125	2/5/2002	1455	20	0	FBL
148.835	540791.87500	310803.37500	2/6/2002	1458	40	0	AG
148.835	537728.50000	307107.31250	2/7/2002	1112	45	0	FWL
148.835	534119.18750	310574.28125	2/8/2002	1142	38	0	AG
148.835	542942.75000	321856.81250	2/8/2002	2125	36	2	AG
148.835	543012.50000	309760.00000	2/9/2002	1050	40	0	FBL
148.835	539979.56250	320082.46875	2/9/2002	2000	41	2	AG
148.835	541469.31250	320450.62500	2/11/2002	1301	33	0	AG
148.835	540410.12500	307677.81250	2/12/2002	1013	34	0	AG
148.835	540638.00000	309167.06250	2/13/2002	956	35	0	AG
148.835	542087.93750	319284.56250	2/15/2002	1355	0	0	AG
148.835	540691.68750	323583.00000	2/15/2002	2115	40	2	FBL
148.835	542425.62500	317287.31250	2/16/2002	1055	38	0	AG
148.835	543839.18750	313251.09375	2/16/2002	2040	38	2	FBL
148.835	534887.50000	311276.65625	2/17/2002	1110	31	0	FWL
148.835	540084.31250	320103.00000	2/17/2002	1915	31	2	AG
148.835	541169.00000	309482.09375	2/18/2002	928	37	0	AG
148.835	542018.00000	322843.81250	2/18/2002	1825	35	2	AG
148.835	540562.00000	322253.46875	2/19/2002	1510	47	0	AG
148.835	539977.75000	320065.71875	2/19/2002	1924	45	2	AG

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.835	544753.00000	313387.18750	2/20/2002	2101	32	2	FOK
148.835	541372.12500	321220.56250	2/21/2002	856	27	0	AG
148.835	540370.12500	308489.96875	2/22/2002	1025	24	0	Ow
148.835	541218.56250	320397.96875	2/22/2002	1930	25	2	FBL
148.835	530565.06250	319735.56250	2/23/2002	1440	42	0	FBL
148.835	535130.31250	319191.84375	2/23/2002	2115	35	2	FBL
148.835	542352.12500	309988.12500	2/24/2002	1014	44	0	FBL
148.835	533673.12500	320326.59375	2/24/2002	1922	53	2	AG
148.835	533889.18750	307202.06250	2/25/2002	1323	15	0	FBL
148.835	543409.37500	314192.34375	2/25/2002	1438	30	0	FBL
148.835	543717.43750	313232.90625	2/25/2002	1845	30	2	FCO
148.835	542549.62500	316194.87500	2/26/2002	1335	21	0	Ow
148.835	543806.68750	313032.90625	2/26/2002	2001	17	2	AG
148.835	547905.81250	316274.93750	2/27/2002	1630	26	0	AG
148.835	541475.62500	309270.53125	3/1/2002	950	20	0	FBL
148.835	534595.43750	307666.43750	3/1/2002	1915	24	2	FBL
148.835	544004.56250	311912.78125	3/2/2002	1145	9	0	AG
148.835	543325.00000	311997.43750	3/2/2002	1254	21	0	Ow
148.835	545716.12500	315562.84375	3/2/2002	1930	19	2	AG
148.835	543865.31250	313680.56250	3/4/2002	529	9	2	FBL
148.835	543390.25000	310188.25000	3/4/2002	938	32	0	FBL
148.835	543377.50000	312469.62500	3/5/2002	1348	24	0	FWL
148.835	543731.62500	314739.75000	3/5/2002	1956	24	2	FBL
148.835	539841.06250	310836.21875	3/6/2002	1313	30	0	AG
148.835	544651.25000	313655.71875	3/6/2002	1837	30	2	FBL
148.835	547056.75000	311532.53125	3/7/2002	1115	29	0	FCO
148.835	544425.43750	314170.90625	3/7/2002	1849	32	2	FBL
148.835	542781.75000	309931.21875	3/8/2002	1239	44	0	FBL
148.835	541990.12500	317592.78125	3/9/2002	1115	31	0	AG
148.835	542547.68750	314549.37500	3/10/2002	1108	0	0	AG
148.835	545392.31250	309647.75000	3/11/2002	1026	38	0	FBL
148.835	549672.75000	313415.78125	3/11/2002	2020	33	2	Ow
148.835	541712.81250	309377.53125	3/12/2002	954	48	0	FBL
148.835	549654.81250	320838.21875	3/12/2002	2240	43	2	FCO
148.835	548326.31250	320557.21875	3/13/2002	1100	50	0	FBL
148.835	549819.81250	320960.62500	3/13/2002	2256	40	2	FCO
148.835	544230.25000	313531.84375	3/14/2002	2139	36	2	FBL
148.835	542391.56250	310288.37500	3/16/2002	841	35	0	Ow
148.835	544238.43750	324406.43750	3/16/2002	1023	36	2	FOK
148.835	543953.56250	324388.87500	3/18/2002	539	32	2	FOK
148.835	543664.37500	316841.40625	3/18/2002	1040	35	0	Ow
148.835	542148.00000	324470.93750	3/19/2002	1856	35	2	FOK
148.835	541960.81250	319556.21875	3/20/2002	1145	50	0	AG
148.835	542201.81250	324494.90625	3/20/2002	2305	34	2	FOK
148.835	544086.87500	315930.00000	3/21/2002	1528	23	0	AG
148.835	544664.18750	313576.06250	3/21/2002	2016	18	2	FOK
148.835	543182.31250	317523.53125	3/22/2002	1235	30	0	AG
148.835	535285.62500	321441.21875	3/26/2002	527	21	2	FBL
148.835	510317.06250	299291.96875	12/6/2002	2102	33	2	FBL
148.835	506222.65625	300525.93750	12/7/2002	1528	38	0	AG

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.835	505715.06250	299271.03125	12/7/2002	1946	28	2	FWL
148.835	507352.53125	298888.53125	12/8/2002	1820	25	2	FWL
148.835	514165.68750	298201.87500	12/9/2002	1537	28	0	FWL
148.835	513827.78125	297176.31250	12/9/2002	1825	23	2	FBL
148.835	521516.96875	302363.15625	12/10/2002	1039	37	0	Ow
148.835	519132.00000	303568.37500	12/10/2002	1827	35	2	FBL
148.835	531173.87500	305222.50000	12/11/2002	1110	40	0	FOK
148.835	544034.43750	313402.34375	12/11/2002	2000	29	2	FBL
148.835	546913.56250	315218.56250	12/12/2002	1122	35	0	AG
148.835	519790.59375	303420.09375	12/12/2002	1900	30	2	FBL
148.835	518463.12500	303541.12500	12/13/2002	1259	35	0	FOK
148.835	519810.90625	303476.18750	12/13/2002	1742	27	2	FBL
148.835	517717.93750	304075.15625	12/14/2002	1100	30	0	FBL
148.835	501778.18750	295917.00000	12/15/2002	1755	30	2	FBL
148.835	506582.68750	298101.62500	1/7/2003	2121	35	2	FBL
148.835	504916.59375	298220.62500	1/8/2003	1040	51	0	FWL
148.835	508365.68750	297374.21875	1/11/2003	2003	12	2	FBL
148.835	500398.12500	294368.96875	1/15/2003	1234	10	0	AG
148.835	514411.50000	297869.50000	2/7/2003	2052	10	2	FWL
148.835	543695.06250	314712.43750	2/8/2003	2133	0	2	FBL
148.835	544639.43750	312936.90625	2/9/2003	1215	12	0	FBL
148.835	544200.37500	313148.90625	2/9/2003	2018	10	2	FBL
148.835	541987.37500	314496.21875	2/10/2003	1235	13	0	AG
148.835	544132.62500	313217.43750	2/10/2003	2046	-3	2	FBL
148.835	543374.06250	314223.62500	2/11/2003	1325	22	0	FBL
148.835	543176.68750	314566.40625	2/12/2003	1213	7	0	FBL
148.835	543450.37500	314520.46875	2/12/2003	2025	10	2	FBL
148.835	542877.43750	313274.81250	2/13/2003	1034	17	0	AG
148.835	541445.50000	306670.62500	2/13/2003	2035	17	2	FBL
148.835	534894.06250	307698.40625	2/14/2003	2052	25	2	FBL
148.835	544470.00000	310314.09375	2/15/2003	1005	10	0	AG
148.835	544264.25000	315185.96875	2/15/2003	1942	1	2	FBL
148.835	507026.65625	297642.53125	2/16/2003	1346	17	0	FBL
148.835	534601.18750	307233.96875	2/24/2003	1958	4	2	FBL
148.835	544354.06250	313467.71875	2/25/2003	2014	11	2	FBL
148.835	542347.37500	314561.46875	2/26/2003	1257	20	0	AG
148.835	543843.93750	313491.34375	2/26/2003	1853	23	2	FBL
148.835	542397.50000	315017.25000	2/27/2003	900	28	0	Ow
148.835	543769.50000	313046.21875	2/27/2003	1932	20	2	AG
148.835	541990.37500	314506.09375	2/28/2003	1250	35	0	FBL
148.835	543714.50000	313167.40625	2/28/2003	1956	21	2	FCO
148.835	542495.50000	314184.25000	3/1/2003	1018	32	0	AG
148.835	544997.31250	313514.09375	3/1/2003	1835	30	2	FOK
148.835	543902.68750	312036.21875	3/2/2003	1134	15	0	AG
148.835	543736.81250	313489.50000	3/2/2003	2148	13	2	FBL
148.835	543190.56250	313095.25000	3/3/2003	1209	20	0	AG
148.835	543756.81250	313548.12500	3/3/2003	1840	16	2	FBL
148.835	542131.81250	314632.68750	3/4/2003	1429	18	0	Ow
148.835	543917.43750	313580.00000	3/4/2003	2001	13	2	FBL
148.835	544098.87500	313290.50000	3/5/2003	2125	19	2	FOK

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.835	533998.43750	308103.37500	3/6/2003	1020	25	0	AG
148.835	544166.06250	313196.12500	3/6/2003	2120	20	2	FBL
148.835	543209.00000	315300.81250	3/7/2003	1240	35	0	AG
148.835	543904.06250	314746.15625	3/7/2003	1923	28	2	FBL
148.835	546109.43750	315553.21875	3/8/2003	1134	27	0	AG
148.835	544143.00000	313155.96875	3/8/2003	2053	10	2	FBL
148.835	537254.18750	324036.50000	11/16/2003	1708	43	2	FBL
148.835	542331.50000	310544.09375	11/17/2003	1445	55	0	URB
148.835	537185.62500	323646.25000	11/17/2003	1650	40	2	FBL
148.835	548359.00000	312212.53125	11/18/2003	1354	55	0	AG
148.835	548219.68750	312108.03125	11/18/2003	2015	55	2	AG
148.835	544342.06250	313709.96875	11/19/2003	1140	50	0	FBL
148.835	544523.75000	314196.28125	11/19/2003	2113	38	2	FBL
148.835	548672.12500	313728.84375	11/20/2003	1238	60	0	FBL
148.835	549219.25000	311276.50000	11/20/2003	1939	50	2	FBL
148.835	542062.12500	314558.06250	11/21/2003	1305	50	0	Ow
148.835	552392.75000	312375.06250	11/21/2003	1906	39	2	FCO
148.835	549564.00000	314481.93750	11/22/2003	1121	38	0	FBL
148.835	549033.87500	312036.09375	11/22/2003	2038	40	2	FOK
148.835	543126.87500	316079.53125	11/23/2003	1516	43	0	AG
148.835	548030.81250	313869.50000	11/23/2003	1854	43	2	FBL
148.835	542633.56250	316345.28125	11/24/2003	1241	22	0	Ow
148.835	542344.68750	315300.03125	11/25/2003	1343	35	0	Ow
148.835	543651.68750	314665.43750	11/25/2003	2200	32	2	FBL
148.835	543516.56250	314942.25000	11/26/2003	1742	30	2	FBL
148.835	543547.50000	316638.40625	11/27/2003	1146	35	0	Ow
148.835	543355.93750	314649.68750	11/27/2003	2040	32	2	FBL
148.835	549254.75000	313809.18750	11/28/2003	1202	29	0	AG
148.835	544284.87500	315029.06250	11/28/2003	2112	23	2	FBL
148.835	539043.12500	322931.93750	11/30/2003	22	37	2	AG
148.835	545749.06250	317992.09375	11/30/2003	1343	50	0	FBL
148.835	545505.43750	315845.37500	12/1/2003	1350	43	0	AG
148.835	547016.00000	317183.62500	12/1/2003	1846	43	2	AG
148.835	541448.18750	316082.59375	12/2/2003	1351	44	0	AG
148.384	518144.15625	311563.56250	12/2/2003	1450	44	0	AG
148.384	524133.68750	312659.25000	12/2/2003	1851	44	2	FBL
148.835	542216.87500	316372.12500	12/2/2003	1945	44	2	FOK
148.835	542626.93750	315880.93750	12/3/2003	1058	39	0	AG
148.835	542951.62500	313227.59375	12/4/2003	1412	40	0	AG
148.835	544085.25000	313155.96875	12/4/2003	1845	39	2	FBL
148.835	543396.43750	312042.12500	12/5/2003	1126	30	0	FBL
148.835	544298.75000	317640.53125	12/5/2003	1924	31	2	FCO
148.835	541811.18750	309021.34375	12/6/2003	1315	30	0	FWL
148.835	537173.12500	322617.78125	12/6/2003	1938	30	2	FBL
148.835	543018.93750	309470.84375	12/7/2003	1310	32	0	F
148.835	544707.25000	317234.40625	12/7/2003	1942	32	2	FOK
148.835	542807.37500	315990.25000	12/8/2003	1249	33	0	FCO
148.835	543245.62500	316405.00000	12/8/2003	1919	33	2	AG
148.835	539203.81250	316825.81250	12/9/2003	1259	35	0	AG
148.835	545443.93750	316300.06250	12/9/2003	1931	35	2	FBL

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.835	543030.37500	311998.28125	12/11/2003	1120	15	0	AG
148.835	542827.37500	319146.43750	12/11/2003	2121	7	2	AG
148.835	542153.37500	315850.93750	12/12/2003	2010	0	2	FBL
148.835	544064.62500	312869.03125	12/13/2003	1308	10	0	FCO
148.835	541948.56250	314906.78125	12/13/2003	2055	20	2	FBL
148.835	543982.93750	313386.15625	12/14/2003	1711	27	2	FBL
148.835	543285.75000	312640.56250	12/15/2003	1327	33	0	Ow
148.835	543977.31250	313430.25000	12/15/2003	1759	36	2	FCO
148.835	544536.68750	314693.68750	12/16/2003	1254	27	0	AG
148.835	542640.12500	314958.21875	12/16/2003	2112	27	2	FBL
148.835	544189.43750	312005.75000	12/17/2003	1050	25	0	AG
148.835	541822.31250	315218.34375	12/17/2003	1820	19	2	FBL
148.835	544004.31250	313622.56250	12/18/2003	1341	22	0	FBL
148.835	541930.87500	315239.59375	12/18/2003	1856	22	2	FBL
148.835	542902.37500	314531.00000	12/19/2003	2102	25	2	FBL
148.835	544019.87500	314726.43750	12/21/2003	1318	45	0	FBL
148.835	535629.25000	323161.06250	12/21/2003	1907	25	2	FBL
148.835	541821.31250	309004.78125	12/22/2003	1005	35	0	FWL
148.835	541000.25000	309801.75000	12/23/2003	1010	30	0	AG
148.835	542970.00000	313043.00000	12/26/2003	750	30	0	Ow
148.835	531303.50000	309033.62500	12/27/2003	1906	45	2	FBL
148.835	543966.75000	312944.87500	12/28/2003	1149	48	0	FCO
148.835	543910.00000	313558.06250	12/28/2003	1810	45	2	FBL
148.835	542862.50000	313313.59375	12/29/2003	1403	35	0	AG
148.835	543945.68750	313746.12500	12/29/2003	2138	30	2	FBL
148.835	541527.18750	308533.31250	12/30/2003	1355	36	0	FBL
148.835	540974.12500	309228.71875	12/31/2003	1440	30	0	Ow
148.835	543853.12500	313248.78125	12/31/2003	1744	25	2	FBL
148.835	541409.31250	309457.90625	1/1/2004	1415	20	0	Ow
148.835	542576.93750	314199.43750	1/2/2004	830	36	0	AG
148.835	535185.56250	309743.75000	1/2/2004	2355	42	2	FBL
148.835	541502.18750	305014.87500	1/3/2004	1405	29	0	FBL
148.835	544000.18750	313474.87500	1/3/2004	1908	23	2	FBL
148.835	542281.87500	309582.87500	1/4/2004	1105	21	0	FBL
148.835	536444.06250	323767.46875	1/4/2004	2337	21	2	FBL
148.835	539892.06250	308522.78125	1/5/2004	1030	9	0	WET
148.835	540249.18750	307759.78125	1/5/2004	1442	14	0	FWL
148.835	543923.62500	313202.78125	1/5/2004	1819	8	2	FBL
148.835	543291.43750	312584.37500	1/7/2004	1410	20	0	Ow
148.835	543737.81250	313193.56250	1/7/2004	2058	10	2	FCO
148.835	536812.06250	307751.06250	1/8/2004	1042	20	0	FWL
148.835	544141.81250	313283.12500	1/8/2004	2026	21	2	FBL
148.835	540619.81250	307397.75000	1/9/2004	1235	21	0	FCO
148.835	534263.81250	307564.65625	1/9/2004	1842	18	2	FBL
148.835	543014.93750	312971.40625	1/10/2004	1000	18	0	AG
148.835	543927.62500	313558.31250	1/10/2004	2105	18	2	FBL
148.835	543987.81250	313453.00000	1/11/2004	103	38	2	FCO
148.835	545720.50000	312934.65625	1/11/2004	1240	30	0	FBL
148.835	539072.75000	308051.62500	1/12/2004	1159	35	0	AG
148.835	544077.37500	313370.09375	1/12/2004	2000	37	0	FOK

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.835	543892.87500	309886.53125	1/14/2004	1420	30	0	AG
148.835	544043.31250	313161.93750	1/14/2004	2101	24	2	FBL
148.835	537609.50000	311552.68750	1/15/2004	1327	22	0	AG
148.835	543901.43750	313460.75000	1/15/2004	2157	22	2	FOK
148.835	543647.93750	316508.46875	1/17/2004	139	25	2	FBL
148.835	543973.93750	313510.25000	1/19/2004	2015	10	2	FBL
148.835	543363.06250	312354.59375	1/20/2004	1113	16	0	FCO
148.835	543873.50000	313323.03125	1/20/2004	2248	5	2	FBL
148.835	543284.18750	312835.81250	1/21/2004	1438	32	0	AG
148.835	543709.81250	312893.37500	1/21/2004	1833	25	2	AG
148.835	526207.06300	306236.31300	1/22/2004	1935	0	2	FBL
148.835	526748.68750	306290.15625	1/23/2004	1310	15	0	FBL
148.835	528409.31250	303436.46875	1/23/2004	2339	14	2	FBL
148.835	540499.81250	305705.06250	1/24/2004	1126	16	0	FBL
148.835	517475.68750	315988.37500	1/31/2004	1331	-5	0	AG
148.835	547713.25000	314047.28125	2/10/2004	2304	16	2	FOK
148.835	542541.18750	310308.96875	2/11/2004	1135	25	0	FWL
148.835	543932.18750	313184.06250	2/11/2004	1935	27	2	FBL
148.835	544190.56250	313061.62500	2/12/2004	2032	18	2	FBL
148.835	541337.43750	309548.31250	2/13/2004	1050	30	0	FBL
148.835	544062.81250	313173.31250	2/13/2004	2050	25	2	FBL
148.835	541638.62500	309617.34375	2/14/2004	920	30	0	WET
148.835	543811.31250	313301.90625	2/14/2004	2004	21	2	FBL
148.835	542973.06250	310987.43750	2/15/2004	1111	21	0	FBL
148.835	543799.00000	313266.75000	2/15/2004	2024	10	2	FCO
148.835	544932.68750	311465.40625	2/16/2004	1230	20	0	FBL
148.835	544013.18750	313352.81250	2/17/2004	0	16	2	FBL
148.835	542971.37500	313033.87500	2/17/2004	1204	32	0	Ow
148.835	541632.43750	309800.75000	2/18/2004	1415	38	0	FBL
148.835	543930.18750	313172.46875	2/18/2004	1847	37	2	FBL
148.835	542283.93750	308453.84375	2/20/2004	948	35	0	FBL
148.835	543806.68750	313248.46875	2/20/2004	1930	34	2	FBL
148.835	543913.43750	312840.93750	2/21/2004	1307	39	0	AG
148.835	543783.06250	313500.46875	2/21/2004	1930	28	2	FBL
148.835	541966.87500	309540.75000	2/22/2004	1130	43	0	FBL
148.835	543966.50000	313179.09375	2/22/2004	2035	34	2	FBL
148.835	541054.50000	309081.65625	2/23/2004	950	39	0	Ow
148.835	543886.06250	313505.15625	2/23/2004	1854	37	2	FBL
148.835	541260.31250	309517.68750	2/24/2004	1112	35	0	AG
148.835	543927.81250	313342.21875	2/24/2004	1915	34	2	FBL
148.835	543880.06250	309827.78125	2/25/2004	1400	38	0	AG
148.835	544020.12500	313177.34375	2/25/2004	2310	27	2	FBL
148.835	543789.68750	313292.40625	2/26/2004	1910	30	2	FBL
148.835	542653.50000	308831.50000	2/27/2004	1048	38	0	AG
148.835	543827.62500	313487.50000	2/27/2004	2018	36	2	FBL
148.835	544071.62500	306379.78125	2/28/2004	925	35	0	FBL
148.835	543936.62500	313309.25000	2/28/2004	1945	45	2	FBL
148.835	541614.37500	309597.75000	2/29/2004	1130	59	0	Ow
148.835	541015.43750	309052.59375	3/1/2004	1205	50	0	Ow
148.835	543814.81250	313365.59375	3/1/2004	2102	41	2	FBL

* Habitat Code based on modified WISCLAND Data, refer to table 1 of chapter 2 (Wisconsin Department of Natural resources 1998)

Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.835	543609.00000	312316.25000	3/2/2004	1243	43	0	AG
148.835	543817.25000	313524.75000	3/2/2004	2210	37	2	FBL
148.835	543363.31250	312095.43750	3/3/2004	1207	40	0	FBL
148.835	543833.43750	313224.25000	3/3/2004	1923	37	2	FBL
148.835	543854.93750	313221.90625	3/4/2004	1920	36	2	FBL
148.835	543537.12500	311989.53125	3/5/2004	1058	38	0	AG
148.835	543878.75000	313408.18750	3/5/2004	1932	37	2	FBL
148.835	544589.18750	312713.09375	3/7/2004	930	37	0	FBL
148.835	544053.25000	312952.25000	3/7/2004	2107	34	2	FBL
148.835	542093.00000	309933.75000	3/8/2004	1130	35	0	FBL
148.835	544470.50000	312844.09375	3/8/2004	2218	32	2	FBL
148.835	542101.25000	309970.12500	3/9/2004	1007	37	0	Ow
148.835	541547.25000	309288.96875	3/9/2004	1943	34	2	FBL
148.835	542153.56250	309377.59375	3/10/2004	953	42	0	FBL
148.835	541604.31250	309438.75000	3/11/2004	1144	25	0	Ow
148.835	540572.68750	324145.84375	3/11/2004	2057	19	2	FOK
148.835	541620.68750	309763.40625	3/12/2004	909	30	0	FWL
148.835	541175.68750	309283.65625	3/12/2004	1032	30	0	Ow
148.835	543762.00000	313206.84375	3/12/2004	2011	27	2	FCO
148.835	540016.06250	323772.37500	3/13/2004	2156	37	2	AG
148.835	543106.31250	315458.81250	3/14/2004	1100	34	0	FBL
148.835	536862.87500	323247.37500	3/14/2004	2053	38	2	FOK
148.835	542084.93750	309834.03125	3/15/2004	1103	35	0	FBL
148.835	544057.06250	313280.00000	3/15/2004	2010	28	2	FBL
148.835	541291.18750	308649.90625	3/16/2004	1149	0	0	FBL
148.835	543828.31250	313446.90625	3/16/2004	1935	32	2	AG
148.835	541166.25000	309297.12500	3/17/2004	1236	35	0	Ow
148.835	541126.50000	309277.78125	3/17/2004	2050	34	2	Ow
148.835	540651.00000	309157.06250	3/18/2004	1127	35	0	AG
148.835	543950.93750	313304.46875	3/18/2004	1923	36	2	FBL
148.835	542060.50000	309892.15625	3/19/2004	1036	40	0	Ow
148.835	545170.31250	313576.31250	3/19/2004	1959	50	2	FOK
148.835	545057.43750	313596.34375	3/20/2004	102	28	2	FBL
148.835	544792.87500	311428.34375	3/20/2004	952	55	0	AG
148.835	542588.75000	310391.62500	3/21/2004	1018	35	0	Ow
148.835	549284.25000	312488.56250	3/21/2004	2105	23	2	FBL
148.835	548913.00000	313094.90625	3/22/2004	1131	38	0	AG
148.835	545573.43750	313105.43750	3/22/2004	2107	35	2	FBL
148.835	541309.12500	308984.12500	3/23/2004	1029	55	0	FWL
148.835	547046.68750	313490.06250	3/23/2004	2042	45	2	FBL
148.835	543762.62500	315013.59375	11/24/2003	2005	23	2	FBL
148.835	548286.93750	313043.59375	11/26/2003	1319	36	0	Ow
148.864	534745.81250	307663.31250	1/17/2002	1946	21	2	FBL
148.864	542349.37500	314406.68750	1/18/2002	1040	10	0	AG
148.864	543590.56250	334605.75000	1/19/2002	1820	12	2	FBL
148.864	539555.87500	347443.56250	1/20/2002	1849	28	2	FOK
148.864	541413.25000	344403.21875	1/24/2002	1810	36	2	FWL
148.864	542234.93750	347586.34375	1/28/2002	1549	31	0	FBL
148.864	541997.06250	344369.50000	1/28/2002	1804	31	2	FBL
148.864	542900.93750	347025.68750	1/29/2002	1426	25	0	Ow

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.864	542900.93750	347025.68750	1/30/2002	720	24	0	Ow
148.864	542398.81250	344849.93750	2/1/2002	1939	35	2	AG
148.864	548666.62500	343566.06250	12/24/2002	1405	20	0	AG
148.864	547655.87500	343789.34375	12/26/2002	1154	27	0	Ow
148.864	551533.62500	321386.00000	1/13/2003	1910	10	2	FBL
148.864	550689.06250	320686.28125	1/15/2003	2224	12	2	FCO
148.890	532577.87500	307944.59375	1/16/2002	2005	24	2	FOK
148.890	534619.37500	307674.90625	1/17/2002	1536	0	0	FBL
148.890	534798.81250	307620.43750	1/18/2002	545	8	2	FBL
148.890	517512.50000	309766.12500	1/18/2002	1610	10	0	FBL
148.890	523807.68750	311549.96875	1/18/2002	2100	0	2	FBL
148.890	537070.06250	310458.78125	3/11/2002	1204	38	0	AG
148.890	521353.50000	316753.43750	3/11/2002	2204	33	2	FBL
148.890	519658.56250	317103.34375	3/12/2002	1045	48	0	FOK
148.890	545022.87500	323573.18750	12/21/2002	1504	33	0	FBL
148.890	544657.50000	324277.56250	12/21/2002	1935	29	2	FBL
148.890	546179.50000	343989.68750	12/24/2002	1318	20	0	Ow
148.890	542150.12500	315786.46875	12/26/2002	1020	27	0	FBL
148.890	543566.00000	313441.84375	12/27/2002	1405	30	0	AG
148.890	543934.75000	313447.50000	12/27/2002	2000	29	2	FBL
148.890	541747.00000	309345.68750	12/28/2002	1035	35	0	FBL
148.890	534233.75000	307060.87500	12/28/2002	2015	29	2	FOK
148.890	541772.31250	309350.37500	12/29/2002	1109	35	0	FWL
148.890	543133.87500	347677.25000	12/29/2002	2018	30	2	FCO
148.890	545606.75000	344632.43750	12/30/2002	953	40	0	FWL
148.890	541714.43750	309172.28125	12/31/2002	1220	35	0	FWL
148.890	533645.12500	307203.62500	12/31/2002	1827	20	2	FBL
148.890	532855.06250	304023.68750	1/1/2003	1501	25	0	FWL
148.890	522841.65625	310893.40625	1/1/2003	2136	20	2	FBL
148.890	522706.96875	311721.87500	1/2/2003	1903	29	2	FBL
148.890	520983.40625	316576.21875	1/3/2003	1809	24	2	FOK
148.890	520617.40625	316738.81250	1/4/2003	1908	30	2	FOK
148.890	520912.81250	316582.59375	1/5/2003	2018	28	2	FBL
148.890	520918.28125	316500.87500	1/6/2003	1857	29	2	FBL
148.890	521172.12500	316244.43750	1/7/2003	2014	35	2	AG
148.890	521026.28125	317041.78125	1/8/2003	2049	34	2	FBL
148.890	521026.28125	317041.78125	1/9/2003	2127	32	2	FBL
148.890	521063.56250	316868.68750	1/10/2003	2040	19	2	FBL
148.890	537774.75000	323540.28125	3/5/2003	2154	19	2	FBL
148.890	535032.81250	322901.00000	2/10/2004	2149	16	2	FBL
148.890	531499.00000	315749.87500	2/11/2004	1424	25	0	AG
148.890	521017.93750	316464.12500	2/11/2004	2024	27	2	FBL
148.890	522519.59375	314773.28125	2/12/2004	1105	30	0	AG
148.890	520956.06250	316605.03125	2/12/2004	1913	18	2	FOK
148.890	522893.28125	318748.28125	2/13/2004	1235	30	0	FBL
148.890	520989.96875	316600.96875	2/13/2004	2145	25	2	FOK
148.935	543714.12500	313166.90625	1/16/2003	1920	15	2	FCO
148.935	534577.00000	307279.09375	2/3/2003	1949	30	2	FBL
148.935	543244.18750	313729.78125	2/4/2003	1424	11	0	AG
148.935	542489.62500	315216.15625	2/5/2003	1031	10	0	Ow

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.935	544426.68750	313686.31250	2/5/2003	2145	20	2	FBL
148.935	541909.62500	315344.46875	2/6/2003	850	15	0	AG
148.935	544057.18750	313181.28125	2/6/2003	2000	13	2	FBL
148.935	537167.75000	311532.12500	2/7/2003	1158	15	0	AG
148.935	543970.62500	314759.28125	2/7/2003	2222	5	2	FBL
148.935	542992.68750	312986.15625	2/8/2003	951	22	0	AG
148.935	543439.00000	312958.28125	2/8/2003	2133	0	2	FBL
148.935	543259.56250	312642.53125	2/9/2003	1330	12	0	Ow
148.935	544423.00000	313536.25000	2/9/2003	2018	10	2	FBL
148.935	543253.62500	314469.25000	2/10/2003	1236	13	0	AG
148.935	544221.68750	313587.40625	2/10/2003	2047	-3	2	FBL
148.935	543022.87500	312470.12500	2/11/2003	1333	22	0	Ow
148.935	543736.18750	314904.28125	2/11/2003	1958	16	2	FBL
148.935	543134.56250	313040.81250	2/12/2003	1213	7	0	WET
148.935	543780.81250	313557.25000	2/12/2003	2025	10	2	FBL
148.935	543401.56250	313694.84375	2/13/2003	1048	17	0	FBL
148.935	544372.68750	314132.18750	2/13/2003	1955	17	2	FBL
148.935	543877.43750	313582.31250	2/14/2003	1110	27	0	FBL
148.935	544717.93750	312982.15625	2/14/2003	2135	25	2	FBL
148.935	543346.18750	312392.06250	2/15/2003	957	10	0	Ow
148.935	544141.81250	312578.03125	2/15/2003	1942	1	2	FCO
148.935	543995.81250	312018.75000	2/16/2003	1445	17	0	AG
148.935	544375.12500	313400.40625	2/17/2003	1930	27	2	FBL
148.935	544060.00000	313350.00000	2/18/2003	1303	34	0	FOK
148.935	544022.00000	313189.46875	2/18/2003	2050	35	2	FBL
148.935	544260.12500	313539.75000	2/19/2003	1548	35	0	FBL
148.935	544369.93750	313550.40625	2/19/2003	2112	26	2	FOK
148.935	541479.62500	308987.53125	2/20/2003	1155	43	0	FWL
148.935	544056.56250	313339.78125	2/20/2003	1913	40	2	FOK
148.935	540999.75000	309360.84375	2/21/2003	840	40	0	AG
148.935	534350.43750	307671.87500	2/21/2003	1906	40	2	FBL
148.935	544184.56250	313425.00000	2/24/2003	2146	4	2	FBL
148.935	543356.62500	314212.09375	2/25/2003	1524	15	0	FBL
148.935	544016.00000	313603.40625	2/25/2003	2014	11	2	FBL
148.935	545053.56250	310928.75000	2/26/2003	1257	20	0	FBL
148.935	546371.43750	313699.87500	2/26/2003	1908	23	2	FBL
148.935	546140.62500	312767.15625	2/27/2003	1300	28	0	FBL
148.935	545702.75000	313822.31250	2/27/2003	1936	20	2	FBL
148.935	547049.18750	320449.68750	3/13/2003	2144	30	2	FBL
148.935	549176.75000	317543.81250	3/14/2003	2150	35	2	AG
148.935	537224.87500	308749.09375	1/26/2004	1100	20	0	FWL
148.989	531859.31250	335402.81250	1/2/2003	1433	35	0	AG
148.989	521921.31250	303004.25000	1/9/2003	1903	32	2	FWL
148.989	521872.65625	302413.40625	1/10/2003	1430	19	0	Ow
148.989	521219.75000	302194.53125	1/10/2003	2258	19	2	FWL
148.989	522556.43750	303801.21875	1/11/2003	1025	10	0	AG
148.989	522708.15625	303053.00000	1/11/2003	1302	12	0	WET
148.989	519026.25000	304066.06250	1/11/2003	2037	12	2	AG
148.989	518526.62500	304213.40625	1/12/2003	959	19	0	FOK
148.989	542171.62500	344810.62500	1/13/2003	1824	10	2	FCO

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.989	542035.68750	345084.84375	1/15/2003	1800	12	2	FOK
148.989	544981.37500	344502.46875	1/16/2003	1216	20	0	FCO
148.989	542321.56250	344484.03125	1/16/2003	1752	20	2	FOK
148.989	529006.62500	337471.62500	1/17/2003	2344	10	2	FBL
148.989	541575.43750	344898.31250	1/18/2003	1739	14	2	Ow
148.989	541571.50000	344784.25000	1/19/2003	1047	20	0	Ow
148.989	541237.43750	344648.62500	1/19/2003	1835	23	2	FOK
148.989	541541.37500	344019.25000	1/20/2003	1408	16	0	FOK
148.989	541426.62500	344394.78125	1/20/2003	2103	12	2	FWL
148.989	531012.43750	334623.56250	1/22/2003	1456	6	0	FBL
148.989	519295.43750	303355.00000	1/22/2003	2219	1	2	FBL
148.989	512965.84375	303895.84375	1/23/2003	1225	-4	0	FCO
148.989	512110.65625	304352.15625	1/23/2003	2202	-4	2	AG
148.989	512811.65625	299478.18750	1/24/2003	1415	2	0	AG
148.989	518004.09375	303615.25000	1/24/2003	1848	14	2	FOK
148.989	517633.84375	304477.71875	1/26/2003	2303	-7	2	FBL
148.989	509444.53125	306083.62500	1/27/2003	2126	20	2	FBL
148.989	514744.21875	311273.40625	1/28/2003	1515	27	0	AG
148.989	510298.21875	305978.25000	1/28/2003	2159	25	2	FBL
148.989	513056.34375	316327.71875	1/29/2003	1333	17	0	FBL
148.989	511963.90625	306271.56250	1/29/2003	1914	20	2	FBL
148.989	514794.40625	311668.37500	1/30/2003	1020	20	0	FBL
148.989	514830.25000	311530.59375	1/30/2003	1112	25	0	FBL
148.989	533880.75000	335077.56250	2/1/2003	1943	28	2	FBL
148.989	532335.56250	334443.09375	2/2/2003	2055	34	2	FBL
148.989	531981.93750	334267.71875	2/3/2003	1833	30	2	FOK
148.989	544287.68750	317666.62500	2/4/2003	2130	7	2	FCO
148.989	523436.68750	311017.59375	2/5/2003	2213	20	2	FBL
148.989	531656.81250	334707.62500	2/10/2003	1541	13	0	AG
148.989	532309.12500	334620.59375	2/11/2003	1446	23	0	FBL
148.989	532155.50000	334439.25000	2/11/2003	2233	16	2	FOK
148.989	531784.56250	335389.93750	2/15/2003	1222	25	0	AG
148.989	531035.37500	334478.56250	2/15/2003	2029	1	2	AG
148.989	531458.81250	334422.46875	2/16/2003	1412	19	0	AG
148.989	532037.68750	334311.46875	2/17/2003	2050	27	2	FBL
148.989	530880.43750	334073.53125	2/20/2003	2155	40	2	FOK
148.989	531934.62500	334588.31250	2/21/2003	1959	40	2	FBL
148.989	530824.25000	334883.00000	2/22/2003	2106	18	2	FBL
148.989	531053.93750	334553.78125	2/23/2003	2013	15	2	FBL
148.989	501901.93750	301202.65625	3/14/2003	1208	40	0	WET
148.989	504210.21875	299714.78125	3/14/2003	2020	40	2	FWL
148.989	503887.37500	299687.71875	3/15/2003	1130	50	0	FWL
148.989	508129.12500	297940.75000	3/15/2003	2000	40	2	FBL
148.989	505090.59375	302845.53125	3/16/2003	2030	45	2	FCO
148.989	536259.56250	307607.87500	1/4/2004	1147	21	0	FWL
148.989	537986.25000	308147.93750	1/4/2004	2300	21	2	FWL
148.989	536266.43750	308004.06250	1/5/2004	1055	9	0	FWL
148.989	536236.43750	306196.84375	1/5/2004	1452	14	0	FBL
148.989	534974.87500	307225.00000	1/5/2004	1843	8	2	FBL
148.989	541547.43750	309537.53125	1/7/2004	1410	20	0	WET

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Bird ID	WTM_X	WTM_Y	DATE	TIME	Temp (f)	Roost_2	Habitat Code
148.989	537370.68750	307761.37500	1/7/2004	2351	10	2	FWL
148.989	540736.31250	307022.53125	1/8/2004	1042	20	0	WET
148.989	534598.43750	307599.96875	1/8/2004	2253	21	0	FBL
148.989	535996.31250	307591.68750	1/9/2004	1306	21	0	Ow
148.989	534594.25000	307615.50000	1/9/2004	1854	18	2	FBL
148.989	537327.37500	307073.00000	1/10/2004	1015	18	0	FBL
148.989	519464.03125	303521.09375	1/10/2004	2016	18	2	FBL
148.989	524996.25000	303660.09375	1/11/2004	16	38	2	FBL
148.989	532345.93750	307649.62500	1/11/2004	1154	30	0	AG
148.989	523898.90625	302395.03125	1/12/2004	1224	35	0	FWL
148.989	518779.34375	303196.15625	1/14/2004	1539	30	0	FBL
148.989	518631.18750	303380.37500	1/14/2004	1951	24	2	FBL
148.989	523333.28125	302637.03125	1/15/2004	1405	22	0	FWL
148.989	519176.21875	303567.18750	1/15/2004	2234	22	2	FBL
148.989	526098.18750	302300.00000	1/22/2004	1340	0	0	FWL
148.989	526670.06250	303187.71875	1/22/2004	1921	0	2	FBL
148.989	527642.68750	300891.40625	1/23/2004	1308	15	0	FWL
148.989	526637.62500	303264.78125	1/23/2004	2347	14	2	AG
148.989	526943.06250	302002.56250	1/24/2004	1218	16	0	FWL
148.989	526167.56250	303837.28125	1/24/2004	1820	18	2	AG
148.989	534455.68750	302630.09375	1/25/2004	949	10	0	FBL
148.989	534698.18750	307623.06250	1/25/2004	1907	19	2	FBL
148.989	529084.81250	309761.68750	1/26/2004	2018	15	2	FOK
148.989	533689.50000	303204.21875	1/27/2004	1052	25	0	FWL
148.989	528753.87500	333437.62500	2/17/2004	946	25	0	AG
148.989	528309.00000	301697.15625	2/21/2004	1504	43	0	FBL
148.989	509930.87500	305935.87500	2/21/2004	2035	28	2	FBL
148.989	510054.03125	306224.09375	2/22/2004	1545	40	0	FBL
148.989	510058.90625	306146.78125	2/22/2004	1831	30	2	FBL

* Habitat Code based on modified WISCLAND Data, refer to table 1 of chapter 2 (Wisconsin Department of Natural resources 1998)

Appendix 2. Eagle Watching Economic Survey

Survey to be given only to visitors that live greater than 5 miles away from Sauk Prairie. Given in interview style by FBEC volunteers at the FBEC overlook

The Ferry Bluff Eagle Council is a local, non-profit organization interested in the local wintering eagle population. We are trying to learn more about the many folks who visit Sauk Prairie to watch bald eagles. You will help us a lot by answering a few short questions about your visit today.

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1) What town_____County_____and State_____ are you from?
2) Estimate how many miles you live from here?_____miles
3) Including yourself, how many people are in your vehicle? _____
4) How many are under 16 years old? _____
5) What is the primary reason for your visit to Sauk Prairie?

   _____

6) When did you arrive in the Sauk Prairie area? Time _____ ___Day _____
7) When do you expect to leave the area? Time _____ __ Day _____
8) Estimate how much your party will spend in the area during this visit on:
   a. Gasoline: _____
   b. Food: _____
   c. Lodging: _____
   d. Merchandise: _____
   e. Other: _____

Try to get an amount for each category. If you are interviewing them at the beginning of their visit here ask them to estimate the amount and mark it with the abbreviation est.

9) When did you first learn that eagles were here? _____Month _____Year
10) Where did you first learn that eagles were here? (source) _____
11) Estimate how many eagles you have seen during this visit? _____
12) Time you spent both looking for and watching eagles on this visit? _____
13) In what order have you gone to the following sites to look for eagles (note number 1, 2, or 3 with a zero for sites not yet visited today)
    a. dam _____ b. Veterans Park _____ c. FBEC Overlook _____
14) How many times (total) have you come here to see eagles? _____
15) **Would you recommend this trip to others? _____
16) **How would you rate the importance of protecting eagle habitat (the river, shorelines, bluffs and agriculture) in this area?

highly important_____ important_____ not sure_____ not important_____

** indicates questions added to the 2004 survey for intrinsic value information

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For interviewer to fill out at the time of the survey:
Initials_____ Date_____ Day of the week_____ Time_____
Location: Dam_____ Veterans Park _____ FBEC overlook_____
# of people at overlook now _____ Time of first arrival_____