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Editor: **DAVID G. AINLEY**, H.T. Harvey & Associates, 983 University Avenue, Bldg D, Los Gatos, CA 95032; 408-458-3223; dainley@penguinscience.com

Managing Editor: **DAVID F. DeSANTE**, The Institute for Bird Populations, P.O. Box 1346, Point Reyes Station, CA 94956-1346; 415-663-2052; 415-663-9482 fax; ddesante@birdpop.org

Spanish Translation of Abstracts: **BORJA MILA**, Museo Nacional de Ciencias Naturales, CSIC, José Gutiérrez Abascal 2, Madrid 28006, Spain; bmila@mncn.csic.es; except Lowe and DeSante by **JAMES F. SARACCO**, The Institute for Bird Populations, P.O. Box 1346, Point Reyes Station, CA 94956-1346

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A SURVEY OF AVIFAUNAL DIVERSITY IN WETLANDS AROUND KEOLADEO NATIONAL PARK, BHARATPUR, RAJASTHAN, INDIA¹

BHUMESH SINGH BHADOURIA², VINOD B. MATHUR, AND K. SIVAKUMAR

*Wildlife Institute of India
Chandrabani, Dehradun,
Uttarakhand, India*

K. R. ANOOP

*Keoladeo National Park
Bharatpur, Rajasthan, India*

Abstract. Keoladeo National Park, a world heritage site, is famous for its rich avifaunal diversity but is now facing water shortages. Therefore, many species of migratory birds have been moving to nearby wetlands for foraging. In this connection, a survey was carried out during 2009-10 to understand the status of birds and their use of these wetlands. A total of 27 wetlands have been identified within 100 km radius of the Keoladeo National Park, and within them 75 species of water birds were recorded. Of the 27 wetlands, Rediabundh is the most species rich with 44 bird species, while only one species was found in Chicksana wetland. Larger-sized wetlands with more water attracted larger numbers of species, including more individual birds, than the smaller wetlands. A landscape level conservation plan, including these wetlands, is needed for the long term conservation of birds in Keoladeo National Park.

Key words: India, Keoladeo National Park, Rediabundh, Wetland bird populations.

DIVERSIDAD AVIFAUNISTICA EN LOS HUMEDALES ALEDAÑOS AL PARQUE NACIONAL KEOLADEO, BHARATPUR, RAJASTHAN, INDIA

Resumen. El Parque Nacional Keoladeo, sitio patrimonio de la humanidad, es famoso por su rica diversidad de aves pero se enfrenta a cortes de agua. Por eso, muchas especies migratorias se han desplazado a humedales aledaños para alimentarse. En 2009-10 llevamos a cabo conteos para comprender el estado de las aves y su utilización de estos humedales. Un total de 27 humedales han sido identificados dentro de un radio de

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²Corresponding author: Bhumesh Singh Bhadouria: bhumesh78@gmail.com

100km entorno al Parque Nacional Keoladeo, y 75 especies de aves acuáticas han sido registradas en ellos. De los 27 humedales, Rediabundh es el más rico en especies con 44, mientras que una sola especie fue encontrada en el humedal Chicksana. Humedales grandes y con más agua atraeron un mayor número de especies e individuos que los humedales pequeños. Un plan de conservación a nivel de paisaje que incluya estos humedales es necesario para la conservación a largo plazo de las aves del Parque Nacional Keoladeo.

Palabras clave: India, Parque Nacional Keoladeo, Rediabundh, poblaciones de aves acuáticas.

INTRODUCTION

Keoladeo National Park (27° 8' to 27° 12'N and 77° 30' to 77° 34' E), 28 km² in area, is located on the extreme western edge of the Gangetic Basin, which was once the confluence of the Gambhir and Banganga rivers in Bharatpur district, State of Rajasthan (Fig. 1).

The park has a unique mosaic of habitats that include wetlands, woodlands, scrub forests, and grasslands that support an amazing diversity of both plant and animal species. The flora consists of over 375 species of angiosperms, of which 90 are those of wetlands. More than 350 species of birds have been recorded, with a high diversity of migratory birds during winter. Indeed, Keoladeo National Park is known as “Birders

Paradise” as the park lies on the Central Asian Flyway of the Asia Pacific Global Migratory Flyway. In that capacity, it is a staging / wintering ground for a large number of migratory waterfowl that breed in the Palearctic region. The park had been the only wintering ground for the central population of the endangered Siberian Crane (*Grus leucogeranus*). Due to its rich avian biodiversity value, the park has been declared as both a Ramsar site and World Heritage Site.

Populations of both migratory and resident water birds have been declining in the region due to prolonged drought and a scarcity of water in the supply reservoirs. Birds known to reside within Keoladeo National Park have been

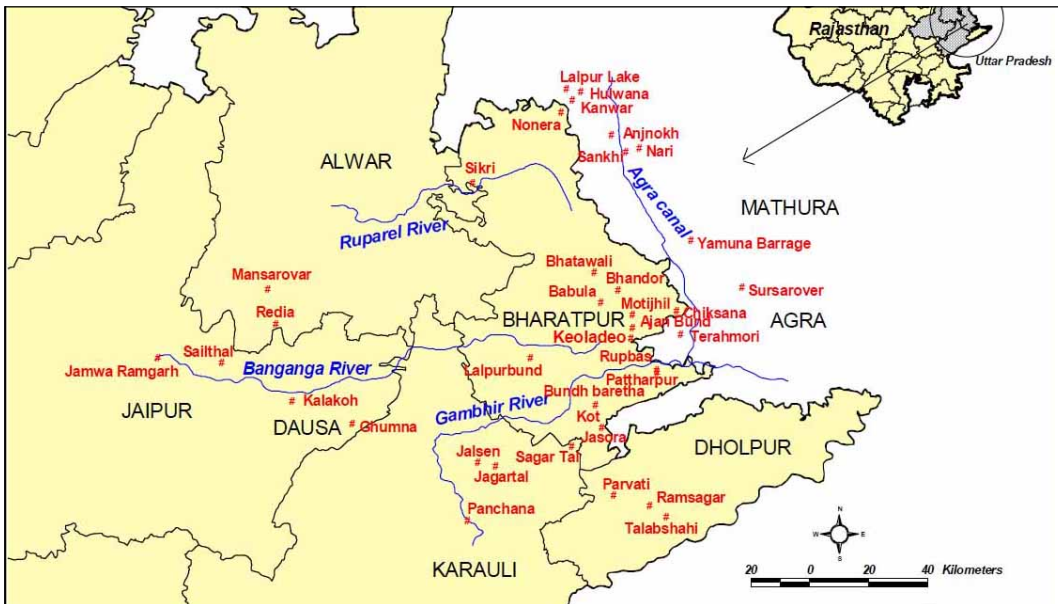


FIGURE 1. Locations of the wetlands surveyed in the vicinity of Keoladeo National Park; inset shows location within the province.

moving to the nearby wetlands as water becomes less available in the park (Mathur et al. 2009). No detailed information is available on bird usage of these wetlands, and therefore it would be difficult to develop a much-needed comprehensive landscape level conservation plan for conserving bird diversity in Keoladeo National Park. Thus, we carried out a rapid survey to assess the species diversity of birds and their use in the wetlands within 100 km of the park.

METHODS

All the wetlands within 100 km radius of Keoladeo National Park were surveyed for water birds during November 2009 to February 2010. A total of 27 wetlands were visited within this area (Fig. 1). During surveys, all water birds were counted according to standard methods (Colin et al. 1992). Birds were identified to

species level by consulting the following works: Ali 1990, 1996, Ali and Ripley (1986), Bhusan et al. (1993), Flemming et al. (2000), Grewal (2000), Inskipp and Inskipp (1999), and Shrestha (2000).

Binoculars and a telescope were used in the counts. During the survey each of the 27 wetlands, on at least two separate days, was visited in both morning and evening to count all the water birds present. Data on populations and species richness was related to wetland area as well as their distance from Keoladeo National Park using non-parametric tests within SPSS and Excel software.

RESULTS AND DISCUSSION

A total of 75 species of wetland birds belonging to 18 families was recorded in these 27 wetlands around the Keoladeo National Park (Table 1). Of the 27 wetlands, the Rediabundh wetland had

TABLE 1. Bird species sighted within the 27 wetlands surveyed within a 100 km radius of the Keoladeo National Park.

	Scientific Name
FAMILY PODICIPEDIDAE (GREBES)	
Little Grebe (Dabchick)	<i>Tachybaptus ruficollis</i>
Great Crested Grebe	<i>Podiceps cristatus</i>
FAMILY PELECANIDAE (PELICANS)	
Great White Pelican (Rosy Pelican)	<i>Pelecanus onocrotalus</i>
Dalmatian Pelican	<i>Pelecanus crispus</i>
FAMILY PHALACROCORACIDAE (CORMORANTS/SHAGS)	
Little Cormorant	<i>Phalacrocorax niger</i>
Indian Cormorant (Indian Shag)	<i>Phalacrocorax fuscicollis</i>
Great Cormorant	<i>Phalacrocorax carbo</i>
FAMILY ANHINGIDAE (DARTERS)	
Darter (Snake-bird)	<i>Anhinga melanogaster</i>
FAMILY ARDEIDAE (HERONS, EGRETS & BITTERNs)	
Little Egret	<i>Egretta garzetta</i>
Grey Heron	<i>Ardea cinerea</i>
Purple Heron	<i>Ardea purpurea</i>
Great Egret (Large Egret)	<i>Casmerodius albus</i>
Intermediate Egret (Median Egret)	<i>Mesophoyx intermedia</i>
Cattle Egret	<i>Bubulcus ibis</i>
Indian Pond-Heron	<i>Ardeola grayii</i>
FAMILY CICONIIDAE (STORKS)	
Painted Stork	<i>Mycteria leucocephala</i>
Asian Openbill (Asian Openbill-Stork)	<i>Anastomus oscitans</i>
White Stork (European White Stork)	<i>Ciconia ciconia</i>
FAMILY THRESKIORNITHIDAE (IBISES & SPOONBILLS)	
Glossy Ibis	<i>Plegadis falcinellus</i>
Black-headed Ibis (Oriental White Ibis)	<i>Threskiornis melanocephalus</i>

TABLE 1. Continued.

	Scientific Name
Black Ibis	<i>Pseudibis papillosa</i>
Eurasian Spoonbill	<i>Platalea leucorodia</i>
FAMILY PHOENICOPTERIDAE (FLAMINGOS)	
Greater Flamingo	<i>Phoenicopterus ruber</i>
FAMILY ANATIDAE (SWANS, GEESE & DUCKS)	
Greylag Goose	<i>Anser anser</i>
Bar-headed Goose	<i>Anser indicus</i>
Ruddy Shelduck (Brahminy Shelduck)	<i>Tadorna ferruginea</i>
Common Shelduck	<i>Tadorna tadorna</i>
Comb Duck	<i>Sarkidiornis melanotos</i>
Cotton Pygmy-Goose (Cotton Teal)	<i>Nettapus coromandelianus</i>
Gadwall	<i>Anas strepera</i>
Eurasian Wigeon	<i>Anas penelope</i>
Mallard	<i>Anas platyrhynchos</i>
Spot-billed Duck	<i>Anas poecilorhyncha</i>
Northern Shoveller	<i>Anas clypeata</i>
Northern Pintail	<i>Anas acuta</i>
Common Teal	<i>Anas crecca</i>
Red-crested Pochard	<i>Rhodonessa rufina</i>
Common Pochard	<i>Aythya ferina</i>
Ferruginous Pochard	<i>Aythya nyroca</i>
Tufted Pochard	<i>Aythya fuligula</i>
FAMILY ACCIPITRIDAE (HAWKS, EAGLES, BUZZARDS, OLD WORLD VULTURES, KITES, HARRIERS)	
Egyptian Vulture	<i>Neophron percnopterus</i>
Eurasian Marsh Harrier	<i>Circus aeruginosus</i>
FAMILY PANDIONIDAE (OSPREY)	
Osprey	<i>Pandion haliaetus</i>
FAMILY GRUIDAE (CRANES)	
Sarus Crane	<i>Grus antigone</i>
Purple Moorhen	<i>Porphyrio porphyrio</i>
Common Moorhen	<i>Gallinula chloropus</i>
Common Coot	<i>Fulica atra</i>
FAMILY JACANIDAE (JACANAS)	
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>
Bronze-winged Jacana	<i>Metopidius indicus</i>
FAMILY CHARADRIIDAE (PLOVERS, DOTTERELS, LAPWINGS)	
Little Ringed Plover	<i>Charadrius dubius</i>
Kentish Plover	<i>Charadrius alexandrinus</i>
River Lapwing	<i>Vanellus duvaucelii</i>
Red-wattled Lapwing	<i>Vanellus indicus</i>
White-tailed Lapwing	<i>Vanellus leucurus</i>
FAMILY SCOLOPACIDAE (SANDPIPERS, STINTS, SNIPES, GODWITS & CURLEWS)	
Common Snipe	<i>Lymnocyptes minimus</i>
Black-tailed Godwit	<i>Limosa limosa</i>
Common Redshank	<i>Tringa totanus</i>
Marsh Sandpiper	<i>Tringa stagnatilis</i>
Common Greenshank	<i>Tringa nebularia</i>
Green Sandpiper	<i>Tringa ochropus</i>
Wood Sandpiper	<i>Tringa glareola</i>
Ruff	<i>Philomachus pugnax</i>
FAMILY RECURVIROSTRIDAE (IBISBILL, AVOCETS & STILTS)	
Black-winged Stilt	<i>Himantopus himantopus</i>
Pied Avocet	<i>Recurvirostra avosetta</i>

TABLE 1. Continued.

	Scientific Name
FAMILY LARIDAE (GULLS, TERNS & NODDIES)	
Herring gull	<i>Larus argentatus</i>
River Tern	<i>Sterna aurantia</i>
Whiskered Tern	<i>Chlidonias hybridus</i>
FAMILY ALCEDINIDAE (KINGFISHERS)	
White-throated Kingfisher (White-breasted Kingfisher)	<i>Halcyon smyrnensis</i>
Pied Kingfisher (Lesser Pied Kingfisher)	<i>Ceryle rudis</i>
FAMILY MOTACILLIDAE (WAGTAILS & PIPITS)	
White-browed Wagtail (Large Pied Wagtail)	<i>Motacilla maderaspatensis</i>
Citrine Wagtail	<i>Motacilla citreola</i>
FAMILY CAMPEPHAGIDAE (CUCKOO-SHRIKES, FLYCATCHER-SHRIKES, TRILLERS, MINIVETS, WOODSHRIKES)	
Southern Grey Shrike	<i>Lanius meridionalis</i>

the highest species richness as well as maximum number of birds. In contrast, the Chicksana wetland contained just one species. A total of 11 wetlands had more than 10 species and eight (former) wetlands had no wetland birds at all

due to lack of water (Table 2).

There was a significant relationship between wetland size and species richness, as well as the number of birds found. However, there was no significant relationship between species richness

TABLE 2. Species richness and number of birds recorded in all wetlands surveyed in the vicinity of Keoladeo National Park.

Name of Wetland	Number Bird Species	Number Individuals
Nonera	13	161
Indroli	2	301
Abua Nagla	16	1852
Bundh Baretha	7	846
Kot	13	41
Jasora	26	275
Tala-E-Shahi	20	3320
Urmila Sagar	33	1104
Roopbaas	3	7
Ramsagar	11	1248
Parvathi	17	769
Bachamdi	7	8
Chicksana	1	1
Girraj Canal	16	430
Jagar Bundh	4	103
Jalsen	0	0
Pachna	0	0
Redia bundh	40	1368
Mansarovar	17	360
Kalakho	0	0
Ghumna	0	0
Saithal	0	0
Bhandor	0	0
Babula	0	0
Motijheel	0	0

and proximity to Keoladeo National Park. It was expected that higher numbers of birds would use wetlands closer to Keoladeo National Park, but this was not true. Wetland size and the availability of water were the factors that determined bird.

During the survey, a rare, white Albino Ibis (*Threskiornis melanocephalus*) was observed in Talab-E-Shahi wetland, which is 80 km away from Keoladeo National Park. Most probably the same bird had been sighted as well in Keoladeo National Park. Therefore, local movements of these and other birds, as well as their habitat use, needs to be assessed so that a comprehensive landscape level conservation plan can be prepared toward conserving avifaunal diversity in the region containing Keoladeo National Park.

The nearest and largest perennial wetland in the vicinity of Keoladeo National Park is Chambal National Park, where more than 200 species of water birds are known (Taigor and Rao 2010). Prolonged drought in and around Keoladeo National Park may be forcing several migratory species to use the Chambal National Park. Therefore, any water-related projects proposed in the Chambal National Park should also consider avifaunal biodiversity and habitat requirements in a regional perspective. Wetlands around the Keoladeo National Park no doubt are playing a crucial role in the conservation of water birds of this region, especially during droughts when some wetlands are not suitable for birds to breed or forage. Current land use patterns of this region could well be posing an added threat to these wetlands. Some of these wetlands should be declared as community or conservation reserves depending on nature educational programs and the subsequent input of local people.

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REFERENCES

- ALI, S. 1996. The Book of Indian Birds. Bombay Natural History Society, Oxford University Press, Mumbai.
- ALI, S. 1990. The Book of Indian Birds. Oxford University Press.
- ALI, S. AND S. D. RIPLEY. 1986. Handbook of the Birds of India and Pakistan, Vol. V. Oxford University Press, London.
- BHUSAN, B., G. FRY, A. HIBI, T. MUNDKUR, D. M. PRAWIRADILAGA, K. SONOBE AND S. USUI. 1993. A field guide to the water birds of Asia. Wildlife Society, Japan.
- BIBBY, C.J., N. D. BURGESS AND A.D. HILL. 1992. Bird census technique. Academic Press, London.
- FLEMING, R.L., R.J. FLEMING, JR. AND L.S. BANGDEL. 2000. Birds of Nepal with reference to Kashmir and Sikkim. First Adarsh Impression, Gaurav Offset, Delhi.
- GREWAL, B. 2000. Birds of Indian Subcontinent. Local Color Limited, Hongkong.
- INSKIPP, C. AND T. INSKIPP. 1991. A guide to the birds of Nepal. Christopher Helm, London.
- MATHUR, V. B., K. SIVAKUMAR, B. SINGH AND K. R. ANOOP. 2009. A bibliographical review for identifying research gap areas: Keoladeo Ghana National Park – A World Heritage Site. Wildlife Institute of India, Dehradun.
- SHRESTHA, T. K. 2000. Birds of Nepal. Mrs. Bimala Shrestha, Kathmandu, Nepal.
- TAIGOR, S. R. AND R. J. RAO. 2010. Habitat features of aquatic animals in the National Chambal Sanctuary, Madhya Pradesh, India. Asian Journal of Experimental Biological Sciences 1:409-414.

OCCURRENCE OF WHITE-WINGED WOOD DUCK (*CAIRINA SCUTULATA*) IN NAMERI NATIONAL PARK, ASSAM, INDIA¹

NIRANJAN DAS²

Department of Geography
North-Eastern Hill University
Shillong-793022, Meghalaya-INDIA

SIJATA DEORI

Department of Geography
North Gauhati College
North Guwahtai-781031, Kamrup (Assam)-INDIA

Abstract. Nameri National Park is a part of the North Bank Landscape of Brahmaputra River as designated by World Wildlife Fund and located near Assam and Arunachal Pradesh; it also is a part of the Eastern Himalayan Bio-diversity Hotspot. A survey conducted during 2008-2009 logged 337 avian species and from that effort a detailed checklist of birds was compiled. Included was White-winged Wood Duck (*Cairina scutulata*), which is considered an endangered species (2010 IUCN Red List Category as evaluated by Bird Life International). Herein we describe the ecology and distribution of White Winged Wood Duck in Nameri National Park, based on this survey.

Key words: India, Nameri National Park, White Winged Wood Duck

FRECUENCIA DEL PATO *CAIRINA SCUTULATA* EN EL PARQUE NACIONAL NAMERI, ASSAM, INDIA

Resumen. El Parque Nacional Nameri forma parte del Paisaje de la Orilla Norte del Río Brahmaputra designado por el Fondo Mundial para la Naturaleza y ubicado cerca de Assam y Arunachal Pradesh; también forma parte del Hotspot de Biodiversidad de los Himalayas Orientales. Un conteo llevado a cabo en 2008-2009 registró 337 especies de aves, y de ese esfuerzo surgió una lista detallada de aves. La lista incluye al pato *Cairina scutulata*, considerado especie en peligro (categoría de la lista roja de la UICN evaluada por BirdLife International). Aquí describimos la ecología y distribución de *Cairina scutulata* en el Parque Nacional Nameri en base a este conteo.

Palabras clave: India, Nameri National Park, pato de ala blanca

INTRODUCTION

The White-winged Wood Duck (*Cairina scutulata*) is identified as an endangered species by the International Union on the Conservation of Nature (IUCN). Little is known of this species

and, therefore, we conducted a survey of Nameri National Park to better understand its habitat preferences and population status. Like most areas in North-East India, Nameri has been inadequately surveyed for avian species. No

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²Corresponding author: das_niranjan2002@yahoo.com, niranjannameri@gmail.com

published checklist of the birds of the park exists, although some literature relates to birds in the neighboring Pakhui Wildlife Sanctuary of Arunachal Pradesh (Datta et al.1998; Singh 1991, 1994). Bird species from Nameri are recorded in Talukdar (1997), Talukdar and Das (1997), Dymond (1998), Hendriks (1998), and Barua and Sharma (1999); see also the IUCN Red List (Bird

Life International 2004). We conducted fieldwork in all seasons from 2008 to September 2009 and herein report our results.

DESCRIPTION OF NAMERI NATIONAL PARK

Nameri National Park (26°50' 48" to 27°03' 43" N, 92°39'00" to 92°59' 00" E) covers 200 km² in the foothills of the eastern Himalayas in Assam (Fig. 1).

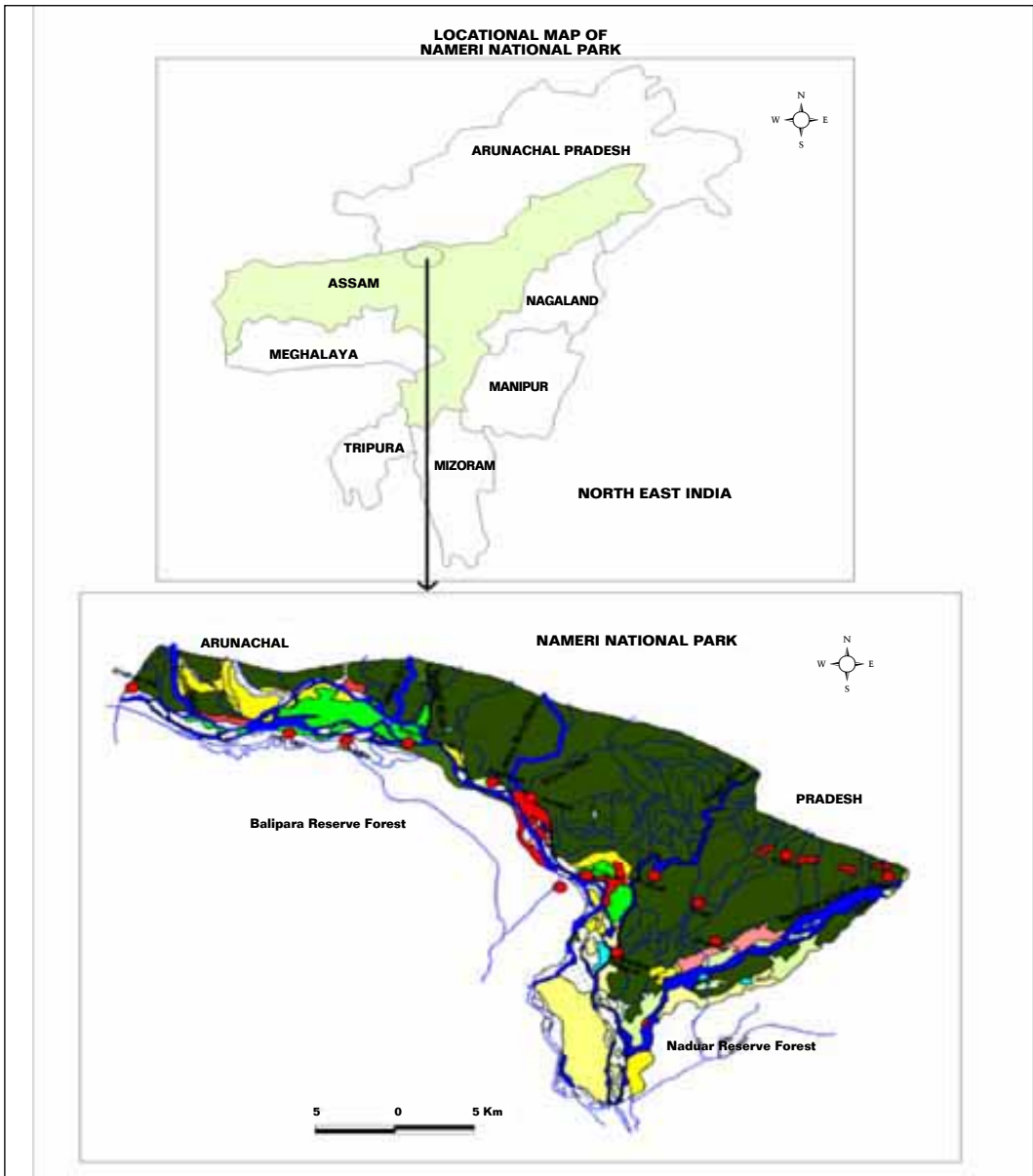


FIGURE 1. Geographic aspects of Nameri National Park.

It is contiguous with Pakhui Wildlife Sanctuary in Arunachal Pradesh to the north, and together they exceed 1,000 km² with an elevation ranging from 79 m to >1500 m. The park is bounded by the Bor-Dikorai River and Sijussa forest camp in the east. Its western border is marked by the Jia-Bhorelli River, adjacent to Balipara Reserve Forest, while its northern border is contiguous with Pakhui Wildlife Sanctuary of Arunachal Pradesh. The southern border is marked by the confluence of Jia-Bhorelli and Bor-Dikorai rivers. The park is criss-crossed by the tributaries of Jia-Bhorelli River, namely Diji, Dinai, Doigurung, Nameri, Dikorai, Khari etc.

The terrain is undulating; lower areas, 80–100 m, occur along the Jia-Bhorelli and its tributaries, and higher areas, 200–225 m, occur in the central and northern parts of the park. Soils are characterized by sandy or sandy loam alluvial deposits. Numerous small rivers and perennial streams originating in Arunachal Pradesh run through the park and feed into the Jia-Bhorelli River. Many rivers shift their course during the rainy season and form dry riverbeds during the winter. Forest and woodland cover the majority of the park (94%, 188 km²). Grasslands are found along the banks of the Jia-Bhorelli River and its tributaries and cover an area of 10 km² (5%). The remaining 2 km² (1%) is formed by various river beds. Nameri is covered by tropical evergreen, semi-evergreen, and moist deciduous forests, with cane and bamboo brakes and narrow strips of open grassland along rivers. Grasslands comprise <10% of the total area of the park; semi-evergreen and moist deciduous species dominate the area. The vegetation of the park is a mosaic of four major forest types (Champion and Seth 1968): (1) eastern alluvial secondary semi-evergreen forest, (2) low alluvial savannah woodland, (3) eastern dillenia swamp forest, and (4) wet bamboo forest (usually found along streams or on badly drained hollows), with areas of cane brakes formed by *Calamus tenuis*. Orchids include *Dendrobium*, *Cymbidium*, ladies slipper etc.; tree ferns, lianas and creepers are some of the specialties of this forest.

The subtropical monsoon climate of the region is characterized by heavy rainfall with an annual average of 3500 mm. The predominance of the southwest monsoon causes precipitation to be highly seasonal (Barthakur 1986). Most of the

rain falls between May and September, which forms the summer (hot) season. Winters (October to April) are usually cool and dry, although rains are not uncommon. The average temperature varies from 5°C in winter to 37°C in summer. The relative humidity is high, and varies 65-90% or more. Parts of the area were declared as Naduar Reserve Forest (Present East Buffer) in 1876 and Nameri Wildlife Sanctuary in 1985. The Nameri National Park was formed in 1998.

RIVERS AND WATER BODIES

The Jia-Bhorelli River forms the western boundary of the national park; its basin covers an area of 11,716 km² and lies between 26°37' to 28°0' N and 92°0' to 93°25'E (Table 1, Fig. 2). It originates in the great Himalayan ranges at an elevation of 4520 m and traverses a total distance of 247 km through mountain, hills and plains until reaching its confluence with the Brahmaputra. Perennial waters of numerous feeder streams coming from different ranges feed the Jia-Bhorelli River. The basin falls in the state of Assam and Arunachal Pradesh accounting for 6.7 % of the total catchments area of the Brahmaputra River system. Out of its total basin area, 10,239.8 km² (87.4%) lies in the hills of Arunachal Pradesh and 1,476.2 km² (12.6%) in the plains of Assam. The Jia-Bhorelli basin, with a truncated base, has a maximum length of 157 km and a maximum width of 143 km. In the Nameri National Park, Jia-Bhorelli River and its flood plain covers an area of 163.4 km², which is 1.39% of the entire Jia-Bhorelli basin. The river traverses a distance of 62 km from Bhalukpung, situated from Assam Arunachal Pradesh border, to its confluence with the Brahmaputra River just near the Bhomoraguri hill near Tezpur (Bora and Goswami 1988).

DESCRIPTION OF THE SPECIES

The White-winged Wood Duck is a large duck, with a black body, a white head thickly spotted with black, conspicuous white patches on the wings and red or orange eyes. Its average length is ~81 cm. The male has more gloss on the plumage and is much larger and heavier than the female. The usual call of the male is a trumpet-like cronk, while the call of the female in flight is a whistle. Its voice, distinctive and ghostly, accounts for the Assamese name 'Deo Hans' or

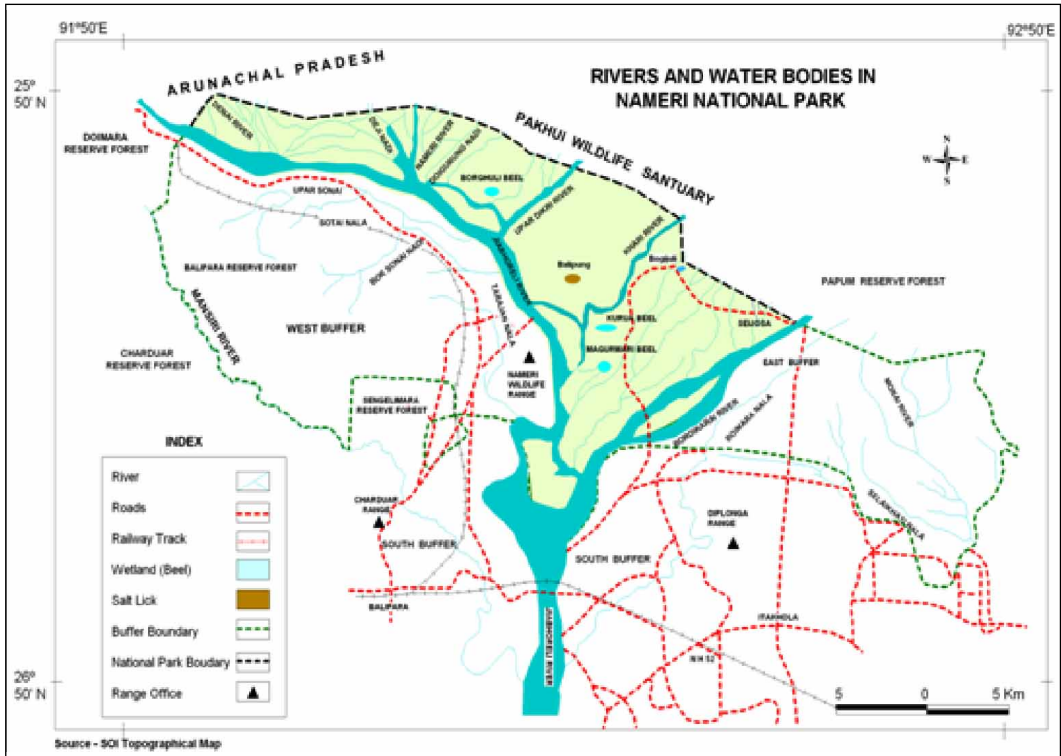


FIGURE 2. Rivers and water bodies in Nameri National Park.

Spirit Duck. In Burma, it is called '*Mandali*', and in Indonesia '*Itik Hutan*', or Forest Duck. It is one of the most endangered birds in the world, but was once distributed widely across north-east India and south-east Asia. But now only about 800 survive in the wild, of which about 450 are present in North-East India. In India, the duck is limited to Assam and Arunachal Pradesh.

The White-winged Wood Duck is essentially a resident of the dense tropical evergreen forest. It prefers to live in inaccessible swampy areas formed by numerous rivers, streams, crocks etc. This duck is generally found in pairs or in small parties of four to six, though parties of >10 have been recorded. It is a shade-loving bird remaining in secluded jungle pools, occasionally perching on the trees during the day. Each pair of White-winged Wood Ducks needs approximately 250 acres of habitat in order to breed. It breeds in the hollows of trees, during summer months.

This duck moves to its feeding ground in open waters after dusk and remains active throughout the night. Adults are largely omnivorous. The food consists of plant and animal material, aquatic plants, seed of wild and cultivated plants, aquatic insects, crustaceans, molluscs, frogs, snakes and fishes. The ducklings seem to start feeding entirely on small animals, progressively expanding their diet to include insects, worms, small snail and fish.

CONSERVATION STATUS

In the beginning of the 20th century this species was very common in south-east Asia. However, during the latter half of the century this duck has largely disappeared. In 1951, the bird was declared to be one of the most threatened species of the ducks of North-Eastern India, by the Indian Wild Life Board and was placed on the special protected list.

In 1997 it was estimated that there were only 450 birds left in the wild, spread between Laos,

TABLE 1. Water bodies, i.e. potential wood duck habitat, of Nameri National Park, based on the Survey of India Topographical Map and researchers' field observations; these areas were visited during our surveys.

Water Course	Nature	Location
CORE AREA		
Jia-Bhoreli River	Perennial	All along the western boundary of the Nameri National Park
Dihaiapur Nala	Perennial	Tributary of Jia-Bhoreli river
Diji Nadi	Perennial	Tributary of Jia-Bhoreli River
Nameri Nadi	Perennial	Tributary of Jia-Bhoreli River
Doigrung Nadi	Perennial	Tributary of Jia-Bhoreli River
Upar-Dikrai Nadi	Perennial	Tributary of Jia-Bhoreli River
Khari Nadi	Perennial	Tributary of Jia-Bhoreli River
Bogijuli Nala	Perennial	Tributary of Jia-Bhoreli River
Koilajuli Nala	Perennial	Tributary of Jia-Bhoreli river running through the area between Bogijuli Nala and Bor-Dikorai river.
EAST BUFFER		
Bor-Dikorai River	Perennial	Tributary of Jia-Bhoreli River along the eastern boundary of the Park
Boimara Nadi	Perennial	Tributary of Jia-Bhoreli River through Nauduar Reserve Forest
Monai Nala	Perennial	Tributary of Ghiladhari River starting from Nauduar Reserve Forest
Selaikhathi Nadi	Perennial	Tributary of Ghiladhari River
Monai and Chota	Perennial	Tributary of Ghiladhari River
WEST BUFFER		
Ghiladhari River	Perennial	Along the Eastern Boundary of Nauduar Reserve Forest
18th mile Nala	Seasonal	Tributary of Jia-Bhoreli River
Upar -Sonai Nadi	Perennial	Tributary of Jia-Bhoreli River
Chotai Nadi	Perennial	Tributary of Uper -Sonai Nadi
Bor-Sonai Nala	Perennial	Tributary of Jia-Bhoreli River
Tarajan Nala	Perennial	Tributary of Jia-Bhoreli River

Thailand, Vietnam, Cambodia, Indonesia (Sumatra), India (north-eastern part) and Myanmar (IUCN). It is thought to now be extinct in Malaysia and Java.

The severe decline in the duck's population is largely attributed to the destruction, degradation and disturbance of riverine habitats, including loss of riparian forest corridors owing to human activity. The resultant small, fragmented populations are vulnerable to extinction due to loss of genetic variability, disturbance, hunting and collection of eggs and chicks for food or pets. More local threats to the bird include inappropriate forest management, and pollution.

World Wildlife Fund-India is working to conserve the habitats of White-winged Wood Duck through its Western Arunachal Pradesh and North Bank Landscapes programmes in Arunachal Pradesh and Assam, respectively. Captive breeding programs have had success in

increasing the captive population, but little success in benefiting the wild population. A few of the captive bred ducks were able to be released into the wild, but rarely is this possible.

RESULTS

Nameri is one of the few areas where this species has been recorded outside its main stronghold in the Dibru-Saikhowa Biosphere Reserve in Dibrugarh and Tinsukia districts, where we now estimate a population of 200 individuals (out of a total Indian population of 300–350 individuals; Islam and Rahmani 2002). As a result of our surveys, it appears that three wetlands, in addition to perennial rivers and streams, namely Borghuli Beel, Kurua Beel, Magurmari Beel (dry courses of Jia-Bhorelli River), comprise the habitat of White-winged Wood Duck in the park (Fig. 3, Table 2). Sightings were fairly regular and evidence of

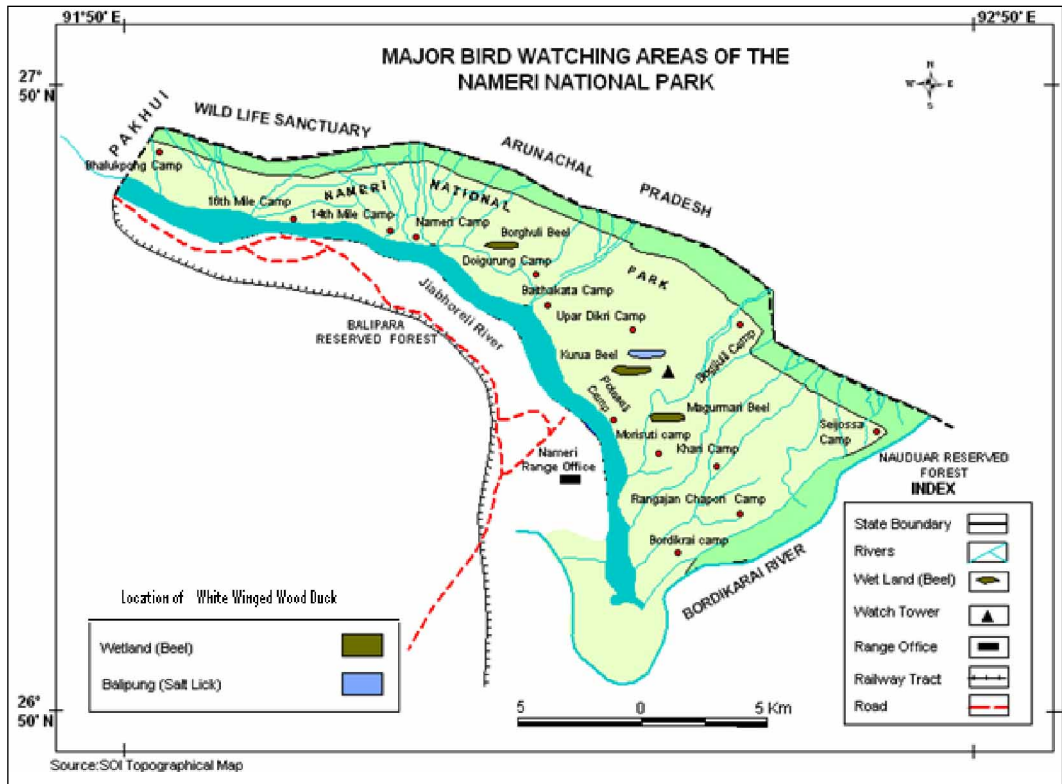


FIGURE 3. Wetland and salt lick locations where White-winged Wood Ducks were found in 2008-09.

TABLE 2. Wetlands, with area, where White-winged Wood Ducks were seen in 2008-09.

Name of wetlands	Area (km ²)	Seasonality
Borghuli Beel	0.20	Only in winter
Kurua Beel	0.30	Throughout the year
Magurmari Beel	0.30	Throughout the year
Near the confluences of Diji and Khari river	0.60	Only in winter
Near the edge of the high forest in Bogijuli area	0.20	Throughout the year

breeding was obtained when 11 ducklings were seen on 17 November 2006 with two adults along with a small group of Oriental Darter (*Anhinga melanogaster*) in Borghuli Beel (secluded wetland).

REFERENCES

BARTHAKUR, M. 1986: Weather and climate of Northeast India. North-Eastern Geographer 18, No. 1 and 2.

BARUA, M., AND P. SHARMA. 1999. Occurrence of the Hill Blue Flycatcher (*Cyornis banyumas*) in Nameri National Park, Assam. Newsletter for Bird-watchers 39: 61–62.

BIRD LIFE INTERNATIONAL. 2004. Threatened Birds of the World 2004. CD-ROM. Bird Life International, Cambridge, U.K.

BORA, A. K., AND, D. C. GOSWAMI. 1988. 'Some Observations on Flow Characteristics of The Jia-Borelli River in Assam', India, Journal of Landscape System and Ecological Studies, Calcutta 2:103-111.

- CHAMPION, G., AND S. K. SETH. 1968. A revised survey of the forest types of India. This manuscript is found for reference in leading Libraries in India as well as in Divisional Forest Office, Nameri National Park
- DATTA, A., P. SINGH, R. M. ATHREYA, AND S. KARTHIKEYAN. 1998. Birds of Pakhui Wildlife Sanctuary in western Arunachal Pradesh, North East India. Newsletter for Birdwatchers 38: 39-43.
- DYMOND, N. 1998. List of birds seen in Nameri National Park: 25–27 November 1998. Unpublished Trip Report, Nameri National Park.
- HENDRIKS, H. 1998. Birds seen in North-Eastern India. Unpublished Trip Report. This report has been kept in ECO-Library (Potasali) in Nameri National Park-Assam
- ISLAM, M. Z., AND A. R. RAHMANI. 2002. Threatened birds of India. *Buceros* 7:1–2.
- SINGH, S. 1991, 1994. Recent bird records from Arunachal, Pradesh. *Forktail* 10: 65–104.
- TALUKDAR, B.K. 1997. Record of largest flock of Great Cormorant in Nameri Wildlife Sanctuary, Assam. Newsletter for Birdwatchers 37: 65.
- TALUKDAR, B. K., AND R. K. DAS. 1997. Record of birds of prey in Nameri Wildlife Sanctuary, Assam. Newsletter for Birdwatchers 37: 50–51.

TRENDS IN VAGRANT CAPTURE RATES AT A COASTAL CALIFORNIA BANDING STATION (1993-2010)¹

MIKE M. STAKE²

*Ventana Wildlife Society
19045 Portola Dr., Suite F-1
Salinas, CA 93908*

Abstract. While monitoring riparian songbirds during 18 years (1993-2010) at a banding station at Big Sur, along the central California coast, Ventana Wildlife Society opportunistically captured 311 vagrants of 50 species. A negative trend in capture rates for vagrants was apparent during that period. Vagrants with a northern North American distribution declined significantly, whereas vagrants with a southeastern distribution did not decline. The decline was evident for fall, but not spring, vagrants. Vagrant trends in California might be associated with trends in source populations, but multiple factors, including a reduction in sampling effort, might have affected vagrant capture rates at Big Sur.

Key words: California, bird banding, population trends, rare birds, vagrants

TENDENCIAS EN TASAS DE CAPTURA DE AVES TRANSEUNTES EN UNA ESTACION DE ANILLAMIENTO DE LA COSTA DE CALIFORNIA (1993-2010)

Resumen. Durante el monitoreo de aves de ribera entre 1993 y 2010 en una estación de anillamiento en Big Sur, en la costa central de California, la Ventana Wildlife Society capturó de forma oportunista 311 transeúntes de 50 especies. Detectamos una tendencia negativa en las tasas de captura de transeúntes durante este periodo. Los transeúntes con distde forma significativa, mientras que aquellas con distribución en el sudeste no declinaron. El declive fue evidente para los transeúntes otoñales pero no los primaverales. Las tendencias de transeúntes en California pueden estar asociadas a tendencias en las poblaciones de origen, pero múltiples factores, como la reducción en esfuerzo de muestreo, pueden haber influenciado las tasas de captura de transeúntes en Big Sur.

Palabras clave: California, anillamiento, tendencias poblacionales, aves raras, transeúntes.

INTRODUCTION

In recent decades, a substantial accumulation has occurred of vagrant landbird records, especially in coastal states, such as California (Shuford 1981). Since 1997, the California Bird Records Committee (CBRC) has annually considered more than 200 reports of rare birds

on the state review list (CBRC website, <http://californiabirds.org>). As a result, the California bird list expanded from 613 in 1997 (Rottenborn and Morlan 2000) to 641 in 2008 (Pike and Compton 2010). A variety of factors have facilitated more frequent observations and reports of vagrants, including an increase in the popularity of birding, improved communi-

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²E-mail address: mikestake@ventanaws.org

cations technology, the growth of long-term monitoring programs, and expanded coverage of field guides to include more information on potential vagrants.

Vagrant studies have greatly improved our understanding of avian distribution and the reasons birds disperse outside of their normal range. DeSante (1983) suggested that vagrants are not necessarily disoriented, but strongly misoriented, or oriented in the wrong direction. Mirror-image misorientation likely prompts many northern and eastern migrants to occur in California (DeSante 1973).

Vagrant reports have also become useful for studying or interpreting source population dynamics. DeBenedictis (1971) was among the first to associate records of vagrants in California with the size of source populations. Veit (2000) linked reproduction for several western passerines with vagrancy of these species in Massachusetts. Patten and Burger (1998) found that spruce budworm (*Choristoneura fumiferana*) density, which affects bird populations in northern forests (Venier et al. 2009), was an excellent predictor of vagrant occurrences for three warbler species in California.

The extent to which vagrant trends are associated with source populations requires additional study, because few investigations have quantified rates of vagrant occurrences over time. Determining vagrant trends can be complicated because the rate at which vagrants are recorded might be heavily influenced by variability in search effort and coverage. Records clearly indicate influxes of vagrants during some years in California (e.g., 1974: Shuford 1981; 1992: Patten and Marantz 1996), but the number of records might poorly represent actual trends over a number of years. DeSante (1983) used consistent netting and censuses on Southeast Farallon Island, California and reported an increase in vagrants during a five-year period in the mid-1970s, particularly for northern vagrants. However, there has been little work on vagrant trends since that time.

Long-term banding projects offer strong potential for studying vagrant trends, because vagrant capture rates can be quantified for a consistent sampling area while accounting for level of effort. I determined trends in vagrant

capture rates, using 18 years of standardized mist net data (1993-2010) from the Ventana Wildlife Society banding station near Big Sur, California (formerly the Big Sur Ornithology Lab). Located along a major songbird migration corridor near the mouth of the Big Sur River on the central California coast, the banding station was established to monitor populations of riparian songbirds. During 18 years of operation, Ventana Wildlife Society captured 170 bird species, 50 of which were considered vagrants. These vagrants were typically migrants, especially warblers and vireos, of northern or southeastern North American breeding distribution, but several species of southwestern and palearctic distribution were also captured. My objectives were to determine a trend in vagrant capture rates, and trends between seasons and among regional groups.

METHODS

Ventana Wildlife Society conducted mist-netting at Andrew Molera State Park (36°17'N, 121°50'W) in Big Sur, Monterey County, California. The banding station was located along the Big Sur River approximately 1.5 km from the river mouth. Twenty-one nylon mist nets (12 m x 2.6 m, 30-mm mesh) were used in or adjacent to riparian woodland thickets; several nets bordered coastal scrub. Nets remained in the same locations for the duration of the study. Predominant tree species included Western Sycamore (*Platanus racemosa*), Black Cottonwood (*Populus trichocarpa*), California Bay Laurel (*Umbellularia californica*), Arroyo Willow (*Salix lasiolepis*), and Red Alder (*Alnus rubra*). The coastal scrub plant community included Western Poison-oak (*Toxicodendron diversilobum*), Coyote Brush (*Baccharis pilularis*), Coffeeberry (*Rhamnus californica*), and California Sagebrush (*Artemisia californica*).

The banding station was operated year-round during most years, with more banding days in spring and fall than in summer or winter. Due to funding constraints, banding effort decreased incrementally during the study period, dropping from an average of nearly 300 banding d yr⁻¹ in 1994-2000, to about 200 d yr⁻¹ in 2001-2007, and <100 d yr⁻¹ in 2008-2010. During the final three years, the banding station was not open in the winter. On banding days,

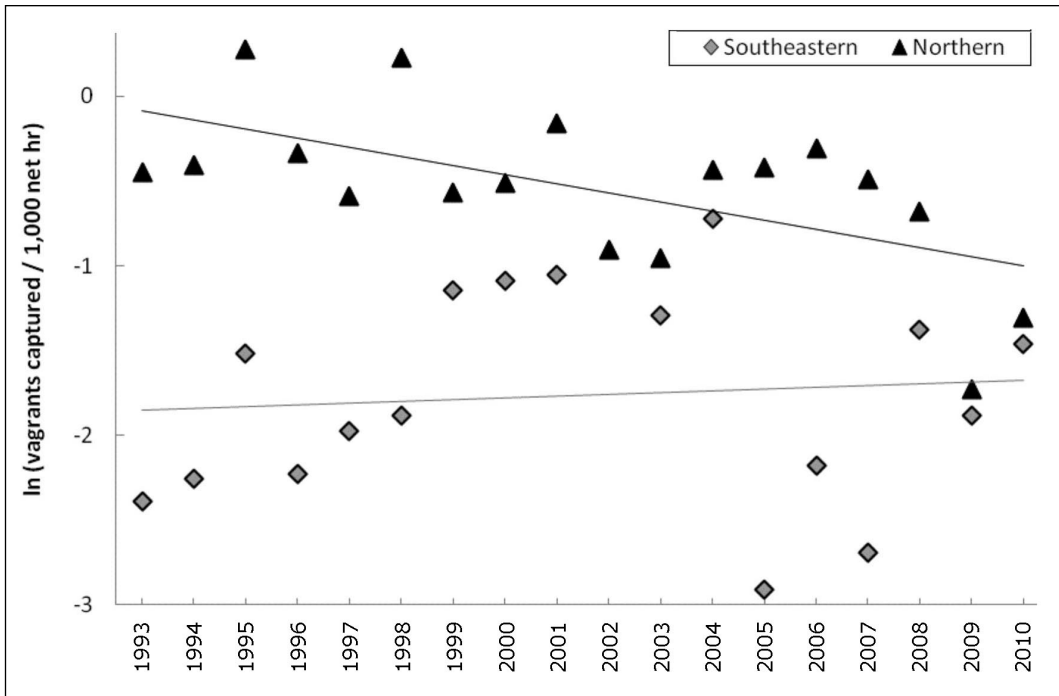


FIGURE 1. Trends in capture rates for southeastern ($P = 0.61$) and northern vagrants ($P = 0.01$) at Big Sur, California from 1993 through 2010.

biologists opened nets about 15 min after sunrise and closed nets about five hours later. Nets were not open when there was rain or excessive wind. Captured passerines and near-passerines, including vagrants, were banded and released at the station. Banders determined the age of captured birds as hatching-year or after-hatching-year, based on plumage characteristics, molt study, and the degree of skull pneumatization (Pyle 1997). Many after-hatching-year birds in spring and summer were further classified as second-year or after-second-year.

I considered a vagrant to be a bird outside of its normal breeding, wintering, or migrating range (Appendix 1). I included several rare California breeders or migrants as vagrants (e.g., Northern Parula, *Parula americana*; American Redstart, *Setophaga ruticilla*) because I considered Big Sur, California to be outside of their typical range, or because they were considered to be vagrants when the study began. My classification of species as vagrants was consistent

with descriptions provided by Roberson (2002) and groupings by Taylor et al. (1994). I excluded one capture of a palearctic species, Great Tit (*Parus major*) on 17 June 2003 (and recaptured on 5 August 2003), because all other California records were presumed escapees, and none were accepted by the California Bird Records Committee (2007). I also excluded an adult male Painted Bunting (*Passerina ciris*) that appeared to be an escapee, based on patterns of feather wear. I categorized vagrants as northern, southeastern, southwestern, and palearctic (Appendix 1), based on general regions of source breeding populations, similar to those used by DeSante (1983).

STATISTICAL ANALYSES

To standardize the number of vagrants captured among years, annual capture rates were calculated, expressed as the number of vagrants captured net hr⁻¹ (x 1,000). I excluded records of recaptured vagrants originally banded at the station; therefore all individuals were sampled

only once. Linear regression in SYSTAT 13 (SYSTAT Software, Inc., Chicago, IL) was used to determine a trend in annual capture rates for vagrants from 1993 through 2010. Capture rates were log-transformed to improve normality of the residuals. I determined trends in annual capture rates for all vagrants, regional categories of vagrants, and spring and fall vagrants. Vagrants captured in April, May, and June were considered to be spring vagrants, and vagrants captured in August, September, and October to be fall vagrants. Linear regression was also used to determine trends for all captures combined at Big Sur and the proportion of captured birds that were vagrants. I considered trends statistically significant if $P < 0.05$.

RESULTS

Ventana Wildlife Society captured 311 vagrants of 50 species at Big Sur, and vagrants accounted for 0.5% of all new captures. Most were categorized as northern ($n = 229$, 74%) or southeastern ($n = 65$, 21%) vagrants. Rose-breasted Grosbeak (*Pheucticus ludovicianus*), Blackpoll Warbler (*Dendroica striata*), Black-and-white Warbler (*Mniotilta varia*), Magnolia Warbler (*D. magnolia*), and Northern Waterthrush (*Seiurus noveboracensis*) were among the most frequent northern vagrants; Hooded Warbler (*Wilsonia citrina*) and Northern Parula were among the most frequent southeastern vagrants (Appendix 1). Relatively few southwestern ($n = 15$, 5%) and palearctic ($n = 2$) vagrants were captured. Palearctic vagrants consisted of one Arctic Warbler (*Phylloscopus borealis*, 13 September 1995) and one Dusky Warbler (*P. fuscatu*s, 2 October 2004). Most

vagrants were captured during fall ($n = 167$, 54%) or spring ($n = 111$, 36%). Young birds accounted for the majority of vagrant captures; hatching-year birds accounted for 87% of all vagrants aged during fall, and second-year birds accounted for 68% of all vagrants aged during spring.

Significant negative trends in capture rates were apparent for vagrants and the proportion of vagrants captured at Big Sur from 1993 through 2010, whereas capture rates for all bird species combined did not decline (Table 1). Vagrant captures were particularly infrequent during the final two years when banding effort was lowest. Capture rates for northern vagrants declined significantly, but were stable for southeastern vagrants (Table 1). I did not calculate trends for southwestern or palearctic vagrants due to small samples. Capture rates for fall vagrants declined, whereas capture rates for all bird species during fall were stable. Capture rates were stable for spring vagrants.

DISCUSSION

Big Sur is one of several sites near the California coast where numerous vagrant birds have been recorded. Exceptional vagrant numbers and species richness have been recorded at Southeast Farallon Island, west of San Francisco (DeSante and Ainley 1980). DeSante (1983) reported that vagrants accounted for 4% of all fall migrants and more than 5% of all spring migrants at Southeast Farallon Island from 1968 through 1978. The proportion of vagrants at Big Sur, by contrast, was $< 1\%$ of migrant captures in both spring and fall. The rate of vagrant occurrences in California might have changed since the

TABLE 1. Regression statistics for the relationship between capture rate (birds caught net hr⁻¹ × 1000) and year for vagrants at Big Sur, California, 1993 - 2010.

Category	Coefficient	SE	r ²	P
Vagrants	-0.03	0.02	0.23	<0.05
All vagrants and non-vagrants	0.01	0.01	0.10	0.20
Proportion of vagrants	-0.04	0.02	0.29	0.02
Northern vagrants	-0.05	0.02	0.36	0.01
Southeastern vagrants	0.02	0.03	0.02	0.61
Fall vagrants	-0.06	0.03	0.30	0.03
Spring vagrants	0.03	0.03	0.04	0.44
All fall vagrants and non-vagrants	0.00	0.01	0.00	0.81

1970s, but vagrant proportions at the two sites indicate that vagrants are probably less frequent at Big Sur than at Southeast Farallon Island. The proportion of vagrant captures at Big Sur might be more similar to Palomarin Field Station, at Point Reyes National Seashore just north of San Francisco, where a fair number of vagrant species, but < 1% of all birds, were captured from 1976 through 1986 (Taylor et al. 1994).

I found a decline in vagrant capture rates, particularly for northern vagrants, at Big Sur, but this trend might be at least partially associated with the decline in banding effort. Low vagrant capture rates in the final two years, during a period when banding effort was lowest, contributed to the negative trends for all vagrants and northern vagrants. Using capture rates rather than absolute vagrant numbers helped account for variability in effort, but when studying infrequent events such as vagrant occurrences, a reduction in sampling effort can render results less representative of actual rates. Closing the station in the winter accounted for part of the reduction in effort during the last three years. Because relatively few vagrants occurred during the winter, the lack of winter effort in 2009 and 2010 could have biased the capture rates high, rather than low, relative to other years. Therefore, the role of reduced sampling effort in negative vagrant trends at Big Sur is unclear.

If vagrant trends at Big Sur are largely independent of variability in effort, the decline in vagrant occurrences might be associated with declines in source populations for these species and/or declines in the proportion of vagrant individuals in source populations. Veit (2000) provided support for the idea that vagrancy is driven by population growth. If Big Sur vagrant trends are associated with source population trends, negative population trends should be more evident for the northern species captured than for the southeastern species. To evaluate this, I analyzed breeding bird survey results from 1993-2007 (Sauer et al. 2008), using a linear regression approach based on estimating equations, and found some support for an association. Of the 24 northern vagrant species captured at Big Sur, 12 declined significantly survey-wide, while four increased significantly. The remaining eight species had stable or non-significant trends, or were not adequately

covered by surveys. Of the 15 southeastern vagrants captured at Big Sur, only three declined significantly, while six increased. The remaining six species had stable or non-significant trends. Population trends for some northern birds have been associated with periodic outbreaks of spruce budworm. Holmes and Sanders et al. (2009) found that numbers for many forest species increased as budworm densities increased, although songbird populations reached their peak at least five years before budworm densities reached their peak in 1990. Based on this chronology, spruce budworm densities and populations of several associated bird species were likely declining as my study began. Because budworm density can be an excellent predictor of vagrant occurrences for several warbler species in California (Patten and Burger 1998), such population declines could have contributed to the negative trend found for northern vagrants at Big Sur.

Several factors could influence the proportion of vagrant individuals in populations of these species. Able (1972) speculated that levels of toxic chemicals in the environment might affect the number of vagrants, perhaps by compromising orientation or the ability of birds to properly navigate. DeSante (1983) offered several hypotheses to explain vagrant trends, one of which linked rates of habitat change to the proportion of vagrant individuals in populations. Both hypotheses were presented as explanations for apparent increases in vagrant occurrences observed in the past. Either could have contributed to an increase in vagrant occurrences, but their association with decreasing vagrant trends is difficult to support. McLaren (1981) and Patten and Marantz (1996) considered that vagrant trends in Nova Scotia and California, respectively, were associated with range expansions for some species, although these processes were not exclusive, in their estimation, of changes in abundance. Patten and Marantz (1996), while suggesting that ranges of some southeastern species might be expanding, noted that northern vagrants were recorded with decreasing frequency in California, a pattern supported by Big Sur data over 18 subsequent years. I did not find a significant increase in southeastern vagrants that would support the idea of range expansion, but neither did I find a decline for that group.

Weather disturbances can also affect the proportion of vagrants in a population. Kaufman (1977) suggested that navigation error is more important than weather in causing vagrancy, but storms might displace individuals, and prevailing winds can abet navigation error in misoriented birds. Anomalous weather patterns have been linked to influxes of vagrants in some years (DeSante 1983, Patten and Marantz 1996). An unusually strong El Niño in the winter of 1997-1998 was perhaps responsible for exceptional capture rates of migrants at Big Sur in 1998, including vagrants. This apparent influx of migrants early in the study likely contributed to the negative vagrant trend. I repeated regressions with 1998 captures removed, and the negative trend for northern vagrants remained significant ($P=0.01$), whereas the trend for all vagrants was near, but no longer, significant ($P=0.07$). Therefore, I consider that weather patterns had some effect on vagrant trends at Big Sur, but multiple factors likely contributed to the negative trend for northern vagrants and the stable trend for southeastern vagrants.

I consider it likely that vagrant trends in California are at least partially associated with increases and decreases in source populations. Because most vagrant captures at Big Sur were young birds, changes in productivity might affect vagrant trends. Reduced productivity could limit the number of young birds migrating in the fall, thereby reducing the source pool of birds that become misoriented. Although negative breeding bird survey trends for many northern species provide some support for an association between vagrant trends at Big Sur and source populations, this association is probably not a simple one, given the uncertain role of sampling variability, weather, and other processes. However, vagrant studies can complement long-term monitoring projects by further documenting the distribution of vagrants and evaluating temporal associations between vagrants and source populations.

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REFERENCES

- ABLE, K. T. 1972. The changing seasons: fall 1971. *American Birds* 26:25-30.
- CALIFORNIA BIRD RECORDS COMMITTEE (R. A. HAMILTON, M. A. PATTEN, AND R. A. ERICKSON, EDs.). 2007. *Rare Birds of California*. Western Field Ornithologists, Camarillo, California.
- DEBENEDICTIS, P. 1971. Wood warblers and vireos in California: the nature of the accidental. *California Birds* 2:111-128.
- DESANTE, D. F. 1973. An analysis of the fall occurrences and nocturnal orientations of vagrant wood warblers (Parulidae) in California. Ph.D. dissertation. Stanford University, Palo Alto, California.
- DESANTE, D. F. 1983. Annual variability in the abundance of migrant landbirds on Southeast Farallon Island, California. *Auk* 100:826-852.
- DESANTE, D. F., AND D. G. AINLEY. 1980. The avifauna of the South Farallon Islands, California. *Studies in Avian Biology* No. 4, Cooper Ornithological Society.
- HOLMES, S. B., AND SANDERS, C. J., D. FILLMAN, AND D. A. WELSH. 2009. Changes in a forest bird community during an outbreak cycle of the spruce budworm in Northwestern Ontario. *Bird Populations* 9:13-28.
- KAUFMAN, K. 1977. The changing seasons: an intimate look at Kathleen and other avian phenomena of autumn, 1976. *American Birds* 31:142-152.
- MCCLAREN, I. A. 1981. The incidence of vagrant landbirds on Nova Scotian Islands. *Auk* 98:243-257.
- PATTEN, M. A., AND J. C. BURGER. 1998. Spruce budworm outbreaks and the incidence of vagrancy in eastern North American wood-warblers. *Canadian Journal of Zoology* 76:433-439.
- PATTEN, M. A., AND C. A. MARANTZ. 1996. Implications of vagrant southeastern vireos and warblers in California. *Auk* 113:911-923.

- PIKE, J. E., AND D. M. COMPTON. 2010. The 34th report of the California Bird Records Committee: 2008 records. *Western Birds* 41:130-159.
- PYLE, P. 1997. Identification guide to North American Birds. Part 1 Columbidae to Ploceidae. Slate Creek Press, Bolinas, California.
- ROBERSON, D. 2002. Monterey Birds: Status and Distribution of Birds in Monterey County, California, 2nd edition. Monterey Peninsula Audubon Society, Carmel, California.
- ROTTENBORN, S. C., AND J. MORLAN. 2000. Report of the California Bird Records Committee: 1997 records. *Western Birds* 31:1-37.
- SAUER, J. R., J. E. HINES, AND J. FALLON. 2008. The North American breeding bird survey, results and analysis 1966-2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, Maryland.
- SHUFORD, W. D. 1981. A note on assessing the status of vagrant warblers on the California coast. *American Birds* 35:264-266.
- TAYLOR, D. M., D. F. DESANTE, G. R. GEUPEL, AND K. HOUGHTON. 1994. Autumn populations of landbirds along central coastal California 1976-1986. *Journal of Field Ornithology* 65:169-185.
- VEIT, R. R. 2000. Vagrants as the expanding fringe of a growing population. *Auk* 117:242-246.
- VENIER, L. A., J. L. PEARCE, D. R. FILLMAN, D. K. MCNICOL, AND D. A. WELSH. 2009. Effects of spruce budworm (*Choristoneura fumiferana* (Clem.)) outbreaks on boreal mixed-wood bird communities. *Avian Conservation and Ecology – Ecologie et Conservation des Oiseaux* 4:3. [online] URL: <http://www.ace-eco.org/vol4/iss1/art3/>.

APPENDIX 1. Number of captures by month for northern (NO), southeastern (SE), southwestern (SW), and paelearctic (PA) vagrant birds at Big Sur, California, 1993-2010.

Species	Region	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Yellow-billed Cuckoo	SW						2	1						3
Red-naped Sapsucker	SW		1								1	1		3
Least Flycatcher	NO									4				4
Eastern Phoebe	NO											1		1
Great Crested Flycatcher	NO										1			1
White-eyed Vireo	SE						2							2
Bell's Vireo	SW									1				1
Yellow-throated Vireo	SE				1			1						2
Blue-headed Vireo	NO									1				1
Philadelphia Vireo	NO									2	2			4
Red-eyed Vireo	NO				1			5	1	6				13
Yellow-green Vireo	SW									1				1
Dusky Warbler	PA										1			1
Arctic Warbler	PA									1				1
Veery	NO									1				1
Gray Catbird	NO						2	1						3
Blue-winged Warbler	SE						1			1				2
Tennessee Warbler	NO				1	2	1			3	2			9
Virginia's Warbler	SW									1				1
Lucy's Warbler	SW											1		1
Northern Parula	SE				2	6	6	2						16
Chestnut-sided Warbler	NO				1	3				6	3			13
Magnolia Warbler	NO									6	14	1		21
Black-throated Blue Warbler	SE										1	2		3
Black-throated Green Warbler	NO									1		3		4
Prairie Warbler	SE										1			1
Palm Warbler	NO				1						9	1		11
Blackpoll Warbler	NO									16	10			26
Cerulean Warbler	SE										1			1
Black-and-white Warbler	NO				1	4	1	1		4	9		1	21
American Redstart	NO						5		1	6	1			13
Prothonotary Warbler	SE				1	2					2			5
Worm-eating Warbler	SE									1	1			2
Ovenbird	NO				1	3				2	1			7
Northern Waterthrush	NO					7			2	11				20
Louisiana Waterthrush	SE				1									1
Kentucky Warbler	SE				2									2
Connecticut Warbler	NO										1			1
Mourning Warbler	NO				1					4				5
Hooded Warbler	SE				4	13		1						18
Canada Warbler	NO						1				1			2
Summer Tanager	SW					1	1							2
Green-tailed Towhee	SW									2				2
American Tree Sparrow	NO											1		1
Clay-colored Sparrow	NO				1					3	3			7
Black-throated Sparrow	SW								1					1
Rose-breasted Grosbeak	NO					9	22	5	1	3				40
Indigo Bunting	SE					3	1				1			5
Painted Bunting	SE								1	3				4
Orchard Oriole	SE									1				1
Total		0	1	0	3	42	66	20	10	91	66	11	1	311

AN ASSESSMENT OF VEGETATION COVER FOR GRASSLAND BIRD BREEDING HABITAT IN SOUTHEASTERN WISCONSIN¹

J. WOLF²

*Department of Geography
University of Wisconsin – Parkside
Kenosha, WI 53141*

R. BAKER

*Department of Biology
University of Wisconsin – Parkside
Kenosha, WI 53141*

E. REED

*Department of Geography
University of Wisconsin – Parkside
Kenosha, WI 53141*

Abstract. Population declines in grassland breeding birds are a concern for land managers, acknowledging that many grassland breeding birds have specific habitat requirements to sustain viable populations. In a pilot study in collaboration with the Wisconsin Department of Natural Resources, we compared vegetation cover as a habitat indicator for nesting birds from two managed prairie sites in southeastern Wisconsin: Chiwaukee Prairie State Natural Area (CPSNA) and Richard Bong State Recreation Area (RBSRA). At CPSNA, bobolink (*Dolichonyx oryzivorus*), Henslow's sparrow (*Ammodramus henslowii*), and eastern meadowlark (*Sturnella magna*) have been in steady decline. The purpose of our study, ultimately, was to determine whether vegetation differences were linked to this trend. At CPSNA, cover plant types, recorded in belt transects, were grasses, forbs, wet matrix, trees, and shrubs, and at RBSRA cover types were grasses, forbs and shrubs. At both sites, shrub densities were high and a concern for management of grassland birds, but differing between sites were vegetation cover distributions and shrub growth stage. While some differences may be due to land management practices, a review of the Breeding Birds of Wisconsin Survey indicates that these differences may be due to habitat factors such as soil type, topography, maritime effects, fragmentation, and distance to residence. The results of this pilot study can assist land managers working on management plans to devise future strategies toward restoring breeding bird habitat in Wisconsin grasslands.

Key words: grassland breeding bird habitat, landscape structure, Lake Michigan prairie, Wisconsin

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²Corresponding author: wolf@uwp.edu

EVALUACION DE LA COBERTURA VEGETAL PARA HABITAT DE REPRODUCCION DE AVES DE PRADERA EN EL SUDESTE DE WISCONSIN

Resumen. Los declives poblacionales en aves reproductoras de pradera preocupan a los gestores de recursos, resaltando que muchas especies de pradera tienen requisitos de hábitat específicos para mantener poblaciones viables. En un estudio piloto en colaboración con el Departamento de Recursos Naturales de Wisconsin, comparamos la cobertura vegetal como indicador de hábitat para aves nidificantes en dos lugares de pradera manejada en el sudeste de Wisconsin: Chiwaukee Prairie State Natural Area (CPSNA) y Richard Bong State Recreation Area (RBSRA). En CPSNA, *Dolichonyx oryzivorus*, *Ammodramus henslowii*, y *Sturnella magna* han mostrado un declive constante. El objetivo final de nuestro estudio fue determinar si las diferencias en vegetación estaban ligadas a esta tendencia. En CPSNA, los tipos de planta registrados en los transectos fueron hierbas, anuales y arbustos. En ambos lugares, las densidades de arbustos fueron altas y preocupantes para el manejo de aves de pradera, pero diferencias entre sitios incluyeron distribuciones de cobertura de la vegetación y estadio de crecimiento de los arbustos. Aunque algunas de las diferencias pueden ser debidas a las prácticas de manejo, una revisión en el Censo de Aves Reproductoras de Wisconsin indica que estas diferencias pueden ser debidas a factores del hábitat como tipo de suelo, topografía, efectos marítimos, fragmentación y distancia a residencia. Los resultados de este estudio piloto puede ayudar a gestores de recursos a diseñar estrategias futuras para restaurar el hábitat de reproducción de las aves de pradera de Wisconsin.

Palabras clave: hábitat de reproducción de aves de pradera, estructura del paisaje, praderas del Lago Michigan, Wisconsin

INTRODUCTION

Like many organisms, grassland birds are especially sensitive to habitat changes and require certain habitat types for breeding. In much of the country, grasslands have been subjected to agricultural development and urbanization, thus grassland bird species have been faced with habitat loss (Sample and Mossman 1997, Coppedge et al. 2001, Ribic and Sample 2001, Vos and Ribic 2011). For these reasons as well as complex migration dynamics that are difficult to resolve, certain grassland bird population have declined along Wisconsin's Breeding Bird Survey routes (Sample and Mossman 1997).

Well considered land management is important not only to known declining species but also to other fauna and flora that comprise the grassland bird community (Sample and Mossman 1997). One form of management involves the incorporation of land into the Conservation Reserve Program (CRP). Using landscape metrics, one study found that indices of juniper and total tree cover increased but patch sizes decreased in agricultural land converted back to a grassland ecosystem in a

CRP (Coppedge et al 2001). These structural changes led to an increase in some grassland species as well as other open-habitat generalist bird species. Other forms of management have included the assessment of cover types such as hedgerows, ephemeral wetlands, old fields, isolated trees, and ditches, followed by conversions (Ribic and Sample 2001).

In grasslands, the survival of breeding birds relies on fine scale habitat features, which vary greatly among individual species. For example, the Bank Swallow (*Riparia riparia*), found in Chiwaukee Prairie State Natural Area (CPSNA) but not at Richard Bong State Recreation Area (RBSRA; Table 1), requires specific soil texture to form its burrows (Cutright et al. 2006, Chiwaukee Prairie Preservation Fund 2010). Another example, the Blue-winged Warbler (*Vermivora pinus*), which breeds in RBSRA but not in CPSNA, nests on the ground in grass and sedge dominated habitat (Cutright et al. 2006). Since these areas offer regionally important breeding bird habitat, it is important to better understand these habitats and, hence, the reason for this study.

Both CPSNA and RBSRA have been identified as viable grassland habitat for

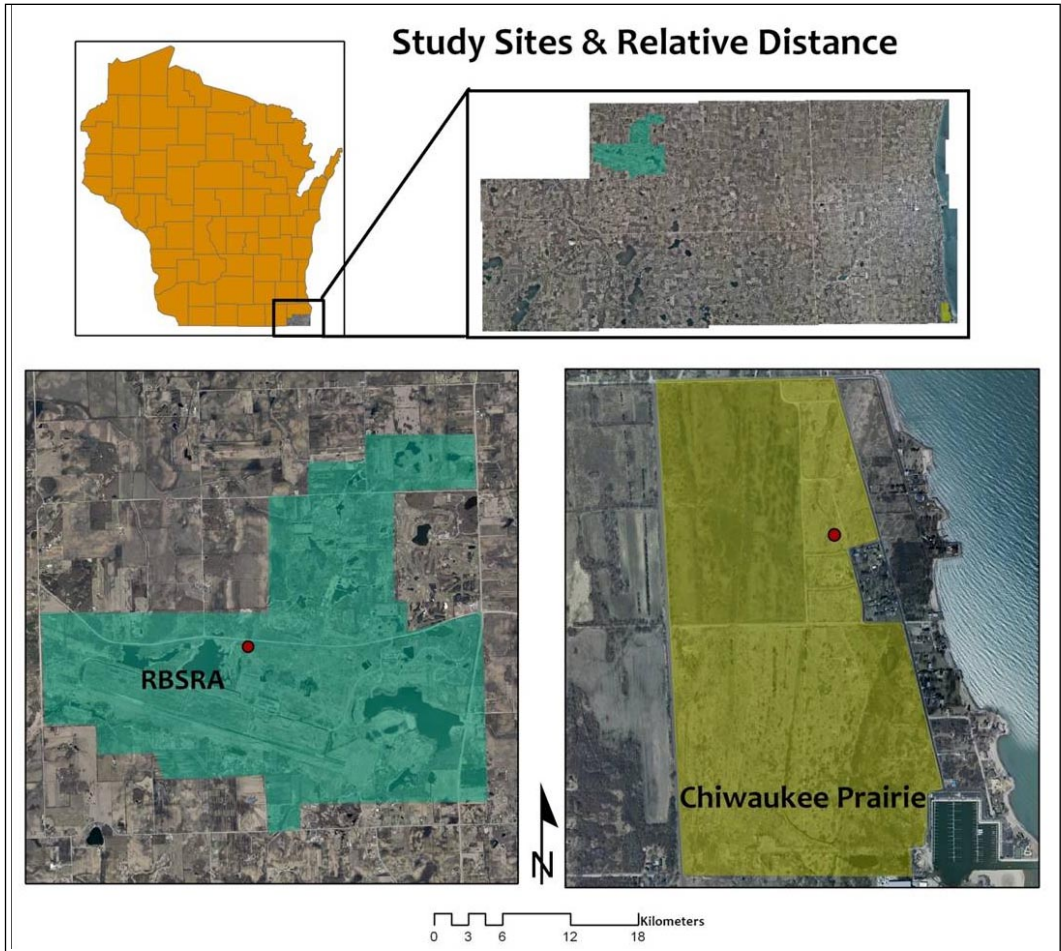


FIGURE 1. Study sites for breeding bird habitat at Richard Bong State Recreation Area (RBSRA) and Chiwaukee Prairie State Natural Area in southeastern Wisconsin.

breeding bird species in southeastern Wisconsin, where grassland habitats are considered threatened (Henderson and Krause 1995). CPSNA is an internationally known coastal prairie remnant on Lake Michigan that supports many nesting bird species. CPSNA consists of ridges with dry-mesic prairie and swales with wet-mesic prairie and is rich in grasses, sedges, cattails, spring ephemerals, and later forbs. At this site, the dry-mesic prairie is managed as nesting bird habitat.

Thirty-six kilometers inland, RBSRA consists of dry to mesic prairie, oak savanna, and wetland habitat, but has been subjected to intense disturbance. Historically, the land had

been developed for agriculture and in the 1950's the area was slated to become an airstrip. Despite this, a variety of nesting birds use the grasslands of RBSRA, and as a result the National Audubon Society (2010) designates it as a priority site for grassland birds.

The purpose of this study was to compare CPSNA and RBSRA, both being managed by the Wisconsin Department of Natural Resources (WDNR), so that managers could better understand why some bird populations are in decline in CPSNA but not at RBSRA. Differences in vegetation identified may help to design surveys by which to explain differences in the

TABLE 1. Breeding birds observed in Chiwaukee Prairie State Natural Area (CPSNA) and Richard Bong State Recreation Area (RBSRA), with the preferred habitat and nesting vegetation noted for each. Species in RBSRA use open grasslands with short vegetation. Species in CPSNA rely on wet grasslands with tall vegetation. Both locations also support species that are dependent on shrub habitat for nesting (Chiwaukee Prairie Preservation Fund 2010, Wisconsin Society for Ornithology 2006).

CPSNA		
Alder Flycatcher	<i>Empidonax alnorum</i>	scrub/shrub
Bank Swallow	<i>Riparia riparia</i>	lake or pond/burrow
Chimney Swift	<i>Chaetura pelagica</i>	urban/building
Henslow's Sparrow	<i>Ammodramus henslowii</i>	tall grassland/ground
Sedge Wren	<i>Cistothorus platensis</i>	marsh/shrub
Yellow-breasted Chat	<i>Icteria virens</i>	scrub/shrub
RBSRA		
Clay-colored Sparrow	<i>Spizella pallida</i>	grassland/shrub
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	scrub/ground
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	open grassland/ground
Horned Lark	<i>Eremophila alpestris</i>	short grassland/ground
Savannah Sparrow	<i>Passerculus sandwichensis</i>	grassland/ground
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	wet-prairie/shrub

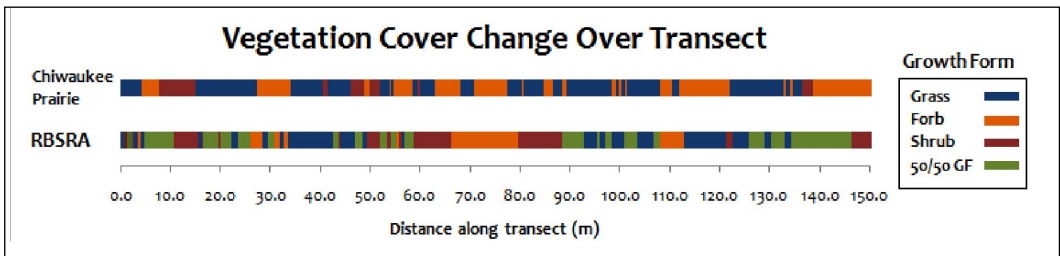


FIGURE 2. Spatial distribution of vegetation cover transects in Chiwaukee Prairie and Richard Bong State Recreation Area (RBSRA) and Chiwaukee Prairie State Natural Area in southeastern Wisconsin.

composition and population trends of the grassland bird populations.

METHODS

We collected vegetation cover data at the time of year appropriate for land management restoration such as prescribed burning. Data were collected along separate transect lines at CPSNA on 22 September, and at RBSRA on 13 October 2010. At each location, five 150 m transects were guided through the selected area perpendicularly to a bearing transect line at the edge of the habitat (Table 2). Along each transect line, to the nearest 0.1 m, the dominant vegetation cover type was noted along with the distance it persisted along the transect line.

At CPSNA, the bearing transect line ran south to north to accommodate the vegetation

boundaries constrained by the ridge and swale topography from glacial Lake Chicago. Vegetation cover data were collected in the eastern portion of the site by the Al Krampert Trail located near 42°30'09"N, 87°48'35"W. At RBSRA, vegetation cover data were collected in a section of managed breeding bird habitat in the north-central portion of the site near 42°30'09"N, 87°48'35"W. The transect line ran west to east to utilize the fire break road for an origin mark.

The data were analyzed to compare suitable habitat between CPSNA and RBSRA, ultimately to be related to bird species assemblages. We used percent cover to represent density by dividing each cover type by the total of all cover types along the transect (Table 2). Relative importance values (RIV) for each cover type were expressed as cover type density divided by

TABLE 2. Ground cover, standard deviation, standard error, density, mean and range for vegetation in transects (trans) in breeding habitat in Chiwaukee Prairie. RIV = relative importance value.

Cover Type	Trans 1	Trans 2	Trans 3	Trans 4	Trans 5	Mean (m)	Transect Density	RIV	St Dev	St Error	St Range
Grasses	45.00	55.40	68.40	80.50	69.10	63.68	40.87	0.409	13.71	6.13	35.50
Forbs	26.00	74.20	31.90	53.90	56.50	48.50	31.13	0.311	19.59	8.76	48.20
Shrubs	59.00	17.67	48.20	15.60	22.90	32.67	20.97	0.210	19.66	8.79	43.40
Wet	19.00	3.80	22.00	0.00	0.00	8.96	5.75	0.058	10.70	4.79	22.00
Trees	10.00	0.00	0.00	0.00	0.00	2.00	1.28	0.013	4.47	2.00	10.00
Total Cover	159.00	151.06	170.50	150.00	148.50	155.81	100.00				

100. To account for differences in bird species composition between the two areas (Table 1), we tested for differences in habitat type. This was done with two-tailed t-tests on the means and variances for the vegetation cover using the data from all transects between the two areas. Significance level was set at 0.05. Prior to conducting the t-tests, F-tests were performed to test whether the variances between the groups of the two locations were significantly different from each other. Heterogeneity of cover types was expressed by a diversity index, using the equation from Turner et al. (2001):

$$H = -\sum_{i=1}^{ns} (p_i \ln p_i / \ln s),$$

where H = diversity, p_i = cover type proportion and s = the number of cover types.

RESULTS

While both sites are used by grassland birds, there are differences in the species that nest in each, as noted (Table 1). Possibly related to these differences, CPSNA transects varied in the proportional distance that shrubs occupied each transect. At CPSNA, shrub encroachment is high, especially from *Rhamnus frangula* and *Cornus stolonifera* (Table 2). Shrubs within the prairie matrix are more clustered in CPSNA, a pattern that could reflect high or low density.

Variance was not significantly different for vegetation cover type between CPSNA and RBSRA (grasses, $F = 0.603$; forbs, $F = 0.840$; shrubs, $F = 0.590$). Overall, grasses were more dominant at CPSNA as compared to RBSRA (Table 2) and the t-test shows significant differences in grass cover between CPSNA and RBSRA ($P = 0.049$). Mean forb ($P = 0.297$) and shrub cover ($P = 0.833$) did not differ between

sites. The diversity indices (H) between sites were similar (CPSNA = 206.61 vs RBSRA = 232.28). Although one should expect the diversity index to increase with the number of cover types, CPSNA had one extra cover type; the statistic was lower because density was not as even. The dominant cover type in CPSNA was grasses (mean: 63.68m and density: 40.87m), and shrubs and forbs were also high in density (shrubs: 20.97 and forbs: 31.13). Forb density may be higher depending on season. This study was conducted past peak in the growing season. Wet matrix species, such as *Typa* and *Carex*, only had a density of 5.75, possibly due to the wet area vegetation growing within the swales, which was not dominant in the area surveyed. *Populus tremuloides* was recorded in Transect 1; however, these trees were not noted in any other transect.

At RBSRA, the vegetative cover was more uniform for both grasses and forbs overall, but varied greatly from transect to transect (Table 3). Similar to CPSNA, shrub density was either very high or low; but the range was narrower. A high degree of variance existed between forbs and the mixed category of 50/50 grass/forb, perhaps due to the ambiguousness of the mixed category. Depending on individual group data collection standards, this category could possibly skew the overall results.

The data for the cover types in RBSRA reflect similar densities. Unlike CPSNA, grasses were only slightly higher at RBSRA (mean: 45.80, density: 29.23). Cover type densities were similar to grasses and each other. Forbs had a mean of 35.36 and an overall density of 22.57, the mixture category had a mean of 40.30 and an overall density of 25.72, and shrubs had a mean of 35.06 and an overall density of 22.37. Based

TABLE 3. Ground cover, standard deviation, standard error, density, mean and range for vegetation types in transects (trans) in breeding habitat in Richard Bong State Recreation Area. RIV = relative importance value.

Cover Type	Trans 1	Trans 2	Trans 3	Trans 4	Trans 5	Mean (m)	Density* (ni)	RIV	St Dev	St Error	St Range
Grasses	32.00	59.70	44.90	51.00	41.40	45.80	29.23	0.292	10.38	4.64	27.70
Forbs	60.00	21.20	24.10	23.50	48.00	35.36	22.57	0.226	17.57	7.86	38.80
50/50 GF	36.00	58.50	52.00	18.00	37.00	40.30	25.72	0.257	15.77	7.05	40.50
Shrubs	23.00	42.10	29.00	57.50	23.70	35.06	22.37	0.224	14.70	6.57	34.50
No Cover	0.00	0.00	0.00	0.00	0.90	0.18	0.11	0.001	0.40	0.18	0.90
Total Cover	151.00	181.50	150.00	150.00	151.00	156.70	100.00				

* Density is represented by percent cover for each cover type.

on these data, the cover types at RBSRA are more uniform with respect to abundance. The site at RBSRA is a dry-mesic prairie, thus no wet matrix was recorded. Transect 5 contained a section of bare cover (density = 0.11). These trends regarding the composition of RBSRA cover types are reflected in the RIVs (Table 3).

DISCUSSION

Many factors including vegetation structure and type, habitat fragmentation, urbanization, surrounding landscapes and management history may influence the composition of breeding bird species, some of which could explain the differences in avian composition at the two study sites. In prairies, shrubs can encroach into native grasslands, thus changing vegetative structure, leading to a decrease in certain grassland birds but an increase in bird species that require shrub habitat. Shrub dominance was apparent at both study sites and seemed to occur in clusters throughout, as indicated by the varying shrub data. In CPSNA, areas dominated by forbs had few grasses and a mixture of the two was not common like it was at RBSRA. In addition, the swales in CPSNA support wet habitat species. The ridge-swale topography would influence the clustered cover types in CPSNA. Understanding cover type diversity may be a useful reference when managing CPSNA. Indeed, one study showed that in areas that had less diversity in cover types, bird densities were higher (Ribic and Sample 2001).

In both areas, shrub density is a concern to management of grasslands and their birds. Some shrubs are necessary, but without control measures there is potential for encroachment. Cutright

et al. (2006) note that grassland/prairie habitats, whether native or non-native, have < 25% woody vegetation cover, a pattern noted previously (Northern Prairie Wildlife Research Center 2006): "unsuitable habitats for grassland birds include grasslands with too much woody cover (i.e., generally more than 30% cover)." Based on our data, both study sites have high shrub densities (CPSNA shrub density = 20.97, RBSRA shrub density = 22.37), but there were differences in the growth patterns and life stages of the shrubs. Shrubs at CPSNA appeared to form dense thickets, were taller and possibly older than those at RBSRA. This could be due to topography differences, but shrubs at RBSRA (mostly *Cornus*) were shorter and less dense in the area sampled (although other areas at RBSRA have tall, dense shrubs). The species in wet matrix habitat in the swales may not have been well represented in the data.

Although cover density was similar with a high diversity index, other variables may influence the breeding birds that live and nest in the two study sites. On a broad scale, CPSNA and RBSRA have different ecological landscapes. CPSNA is part of the Southern Lake Michigan Coastal Ecological Landscape composed of areas with the unique ridge and swale topography and sandy plains (CPSNA is mentioned as a Lake Plain prairie; Cutright et al. 2006). Avian species found in this community include the Peregrine Falcon (*Falco peregrinus*), Prairie Warbler (*Dendroica discolor*), Yellow-crowned Night-heron (*Nyctanassa violacea*), Tufted Titmouse (*Baeolophus bicolor*), Bell's Vireo (*Vireo bellii*), White-eyed Vireo (*Vireo griseus*), Cerulean Warbler (*Dendroica cerulea*), Orchard Oriole (*Icterus spurius*), and Henslow's Sparrow (*Ammodramus henslowii*). RBSRA is also in this

ecological region, but it closely borders the Southeast Glacial Plains, which are dominated by prairies, oak savannas, and wet-mesic prairies, and does not have ridge and swale topography.

Vegetative height also can have important implications to grassland birds. The height differences may be better understood by soil texture. CPSNA's unique coastal prairie community consists of wet-mesic species in the swales and dry-mesic species on the ridges; the soil is > 90% sand. Although RBSRA is southeastern Wisconsin's largest managed prairie, it also has large components of oak savanna and wetland, with more clayey soil.

An important difference between CPSNA and RBSRA is in the landscape surrounding these sites. While the degree of isolation certainly influences the suitable habitat of the local landscape, adjacent cover types would limit or facilitate habitat-based species (Ribic and Sample 2001). As well, as noted by the Northern Prairie Wildlife Research Center (2006), "the character of the surrounding land use may affect bird occupancy of a habitat patch and in some cases the nature of the habitat around a site may be more important than the field or patch size". CPSNA, as noted by WDNR (2010), is roughly 166 hectares. This is a large tract of land, but some nesting birds require expansive habitat. In addition, some species are sensitive to patch area, such as the Boblink (*Dolichonyx oryzivorus*), Baird's Sparrow (*Ammodramus bairdii*), and Grasshopper Sparrow (*Ammodramus savenarum*), which are found in larger patches (Johnson and Igl 2001). Patch vegetation or disturbance intensity also plays a role in bird assemblages. Some species such as Vesper Sparrow (*Poocetes gramineus*) prefer smaller patches with shorter vegetation and woody cover (Vos and Ribic 2011). Overall, larger patches of native habitat in a landscape sustain more of the obligate grassland birds that are considered of management concern.

A confounding factor is that many parcels of the land in CPSNA are privately owned, and can be severely overgrown. This degradation of habitat structure and quality fragments the managed areas, and may deter some breeding bird species from finding CPSNA to be suitable for nesting. Although RBSRA has a history of severe disturbance, it encompasses 1827 hectares

and is surrounded by agricultural land (WDNR 2009). Its larger size and similar surrounding land provide a contiguous habitat for breeding birds. Indeed, the smallest reasonable management size for grassland habitat for birds should be either 2023 hectare or 404 hectare blocks (Sample and Mossman 1997). At this scale, it is more likely that ecological processes (indeed, resistance to shrubs) that maintain viable grassland habitat can also operate, such as fire, grazing and drought (Askins et al. 2007).

In addition, the nesting bird habitat at CPSNA consists of a remnant, species-rich coastal prairie, with *Typha* and shrub encroachment. The area sampled at RBSRA is also a known nesting bird habitat with shrub encroachment but this was difficult to detect without close observation. This study confirmed that the shrubs were much shorter than at CPSNA due to management practices.

While vegetative cover is an important component, it alone does not provide information as to the quality of the habitat. Breeding bird nesting strategies and habitats are dynamic. When land is converted to CRP, "row crops can be used to buffer managed grassland habitat from woody edges and nest predation" (Northern Prairie Wildlife Research Center 2006). Other considerations should include management history, topography, soil characteristics, vegetative height/species variations, vegetative cover type, patch size, and the management of the surrounding land.

While data were collected late in the season for land management purposes, future vegetative surveys should give a more comprehensive perspective of reasons behind bird population fluctuations. That is, bird use information taken during the breeding season such as the number of males present and nest locations would allow for more detailed information to better understand characteristics that may contribute to the differences in breeding bird species between these two habitats. Bird locations can differ as a result from cover type manipulations, precipitation patterns, or location preference regardless of disturbance (Weins and Rotenberry 1986). Management decisions to facilitate bird movement may consider corridors that could link fragmented grasslands. To further help with land management decisions, more focus should

be placed on specific vegetation, including structure, that birds use for resources and nest placement.

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LITERATURE CITED

- ASKINS, R. A., F. CHÁVEZ-RAMÍREZ, B. C. DALE, C. A. HAAS, J. R. HERKERT, F. L. KNOFF, AND P. D. VICKERY. 2007. Conservation of grassland birds in North America: understanding ecological process in different regions. *Ornithological Monographs*, no. 64.
- CHIWAUKEE PRAIRIE PRESERVATION FUND. 2010. Richard Bong State Recreation Area Site Profile. Available at: <http://www.chiwaukee.org/birds.htm> [Accessed 16 November 2010].
- COPPEDGE, B. R., D. M. ENGLE, R. E. MASTERS, AND M. S. GREGORY. 2001. Avian response to landscape change in fragmented southern Great Plains Grasslands. *Ecological Applications* 11: 47-59.
- CUTRIGHT, N. J., B. R. HARRIMAN, AND R. W. HOWE. EDS. 2006. Atlas of breeding birds of Wisconsin. Wisconsin Society for Ornithology, Inc, Waukesha, WI.
- HENDERSON, R. A., AND J. KRAUSE. 1995. Identification of landscape management opportunities and needs in Wisconsin. Wisconsin Department of Natural Resources. Final report. Pittman-Robertson Project W-160-P.
- JOHNSON, D. H. AND L. D. IGL. 2001. Area requirements of grassland birds: a regional perspective. *Auk* 118: 24-34.
- NATIONAL AUDUBON SOCIETY, 2010. Wisconsin breeding bird atlas. Available at: <http://iba.audubon.org/iba/viewSiteProfile.do?siteId=3654&navSite=state> [Accessed 13 November 2010].
- NORTHERN PRAIRIE WILDLIFE RESEARCH CENTER. 2006. Managing habitat for grassland birds: a guide for Wisconsin. Available at: <http://www.npwr.usgs.gov/resource/birds/wiscbird/overview.htm> [Accessed 13 November 2010].
- RIBIC, C. A. AND D. W. SAMPLE. 2001. Associations of grassland birds with landscape factors in southern Wisconsin. *American Midland Naturalist* 146:105-121.
- SAMPLE, D. W. AND M. J. MOSSMAN. 1997. Managing habitat for grassland birds, a guide for Wisconsin. Wisconsin Department of Natural Resources, Madison.
- TURNER, M. G., R. H. GARDNER AND R. V. O'NEILL. 2001. Landscape ecology in theory and practice: pattern and process, Spring-Verlag.
- VOS, S., AND C. RIBIC. 2011. Grassland bird use of oak barrens and dry prairies in Wisconsin. *Natural Areas Journal*. 31: 26-33.
- WIENS, J. A, J. T. ROTENBERRY, AND B. VAN HORNE. 1986. A lesson in the limitations of field experiments: shrubsteppe birds and habitat alteration. *Ecology* 67(2): 365-376.
- WISCONSIN SOCIETY FOR ORNITHOLOGY. 2006. Wisconsin breeding bird atlas. [online] Available at: <http://www.uwgb.edu/birds/wbba/index.htm> [Accessed 16 November 2010].
- WDNR. 2010. Chiwaukee Prairie (No. 54). [online] Available at: <http://dnr.wi.gov/org/land/er/sna/index.asp?SNA=54> [Accessed 16 November 2010].
- WDNR. 2009. Richard Bong State Recreation Area. [online] Available at: <http://dnr.wi.gov/org/land/parks/specific/bong/> [Accessed 16 November 2010].

BIRD MONITORING AT ZACKENBERG, NORTHEAST GREENLAND, 2009^{1,2}

JANNIK HANSEN³, LARS HOLST HANSEN, LINE ANKER KYHN AND NIELS MARTIN SCHMIDT

*Department of Bioscience
Aarhus University
P.O. Box 358
DK-4000 Roskilde, Denmark*

JEROEN RENEERKENS
*Animal Ecology Group
Centre for Ecological and Evolutionary Studies
University of Groningen
PO Box 14
9750 AA Haren, The Netherlands*

Abstract. In 2009, monitoring continued of bird populations in a 15.8 km² designated area at Zackenberg Research Station in central Northeast Greenland. Results are presented and compared with those from previous seasons (1995 – 2008). Despite the extremely limited spring snow cover in 2009, nest initiation was early for Dunlin (*Calidris alpina*) and Red Knot (*Calidris canutus*), very early in Ruddy Turnstone (*Arenaria interpes*), and close to average in Sanderling (*Calidris alba*). The all-wader nest success was extremely low in 2009. The mean wader clutch size was 3.91, which is a little above average. The total number of Barnacle Goose (*Branta leucopsis*) broods was nine, while the maximum number of goslings seen at any one time was only three. The mean brood size remained low throughout the season. This season was one of the four latest seasons in nest initiation for Long-tailed Skua (*Stercorarius longicaudus*), based on only two nests found. The low number of skua nests also reflected the low density of lemmings in the valley. This season the second lowest number of lemming winter nests ever was registered.

Key words: Greenland, monitoring, Arctic, waders, geese, Long-tailed Skua, Rock Ptarmigan, Snow Bunting, climate.

MONITOREO DE AVES EN ZACKENBERG, NORESTE DE GROENLANDIA, 2009

Resumen. En 2009, el monitoreo de poblaciones de aves continuó en un área de 15.8 km² designada en la Estación de Investigación de Zackenberg, en el centro del noreste de Groenlandia. Los resultados presentados se comparan con los de temporadas anteriores (1995-2008). A pesar de que la cobertura de nieve en primavera fue extremadamente limitada en 2009, el inicio de la nidificación fue temprano para *Calidris alpina* y *C. canutus*, muy temprana para *Arenaria interpes*, y casi promedio en *Calidris alba*. El éxito reproductivo de zancudas fue extremadamente bajo en 2009, con una puesta promedio de 3.91, algo por debajo de

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³Corresponding author: jaha@dmu.dk

la media. El número total de puestas de *Branta leucopsis* fue 9, mientras que el número máximo de pollos observado fue de solo 3. El tamaño de puesta promedio permaneció bajo durante toda la temporada. Esta temporada fue una de las más tardías en iniciación de nidos para *Stercorarius longicaudus* en base a dos nidos encontrados. El bajo número de nidos de skua también reflejó la baja densidad de leming en el valle. Esta temporada se registraron las segundas cifras de anidación de leming más bajas nunca registradas..

Palabras clave: : Groenlandia, monitoreo, Artico, zancudas, gansos, skua, perdiz nival, gorrión nival, clima.

INTRODUCTION

The monitoring programme, Zackenberg Basic, based at the Zackenberg Research Station in central Northeast Greenland (Figure 1), was conducted for the 14th season. For details of the previous years, please refer to Hansen et al. (2010a).

This paper presents a summary of the bird monitoring part of the Biobasis programme from the 2009 season. The results presented here will also be available in the 15th ZERO Annual Report (Jensen and Rasch 2010). Similar reports from previous seasons are available for all previous field seasons (see www.zackenberg.dk/publications.htm).

Details on Biobasis methodology are available at the home page of the research station (<http://www.zackenberg.dk/monitoring/biobasis/>), the current sampling protocol (Schmidt et al. 2010) is available through the authors, while the database is available online: <http://www.zackenberg.dk/data/>.

METHODS

A complete initial census was performed between 8 and 19 June, which is a relatively early start date, and a normal last day of census. The weather prevented census work on several days in the period. The completion of the survey took 39 'man-hours', which is a near average. Almost the entire 15.8 km² census area was snow free, and the entire census was performed in good weather conditions.

In addition to the initial census, large parts of the census area were covered regularly during June, July and most of August, exceptions being the closed goose moulting area along the coast and the Aucellabjerg slopes above 350 m a.s.l. The latter were covered on only five occasions by

the BioBasis staff, but by many visits by Reneerkens and colleagues.

The total effort in June and July 2009 was a little higher in June (132 hrs) and lower in July (49 hrs) compared to recent years. The results of the initial census, supplemented with records during the rest of the season (see Schmidt et al. 2010), are presented in Table 1, and in Table 2, these are compared with the estimates of previous seasons.

RESULTS AND DISCUSSION

BREEDING POPULATIONS

The first diver (*Gavia* spp.) was observed 22 May (Day of year (DOY) 142; Table 3). The first pair of Red-throated Divers (*Gavia stellata*) to settle was a pair in a fen near the research station on 29 May (DOY 149). Up to four pairs attempted to breed within the census area and two nests were found. Both suffered predation. In adjacent areas, red-throated diver pairs were recorded in three lakes. In Vesterport Sø, a pair nested briefly at the nest site used in the last few seasons (2007-08). Most likely, the nest suffered predation. In Gâsesø, a pair nested for a few days, until the nest was lost to predation. Red-throated Divers started to form smaller flocks 26 July (DOY 207), just as in 2007. In the small lake, Træsko, a pair with two chicks was recorded on 24 August (DOY 236). The last two red-throated divers were seen on 2 September (DOY 246).

As in recent years, Sanderling (*Calidris alba*) territories were recorded at relatively high numbers (Table 4.17). The last five Sanderlings were seen 7 September, near Halvøen. Dunlin (*Calidris alpina*) territories were found in markedly lower numbers than in recent years, but close to the level of the early years (cf. Hansen et al. 2010a, but see Meltofte 2006).

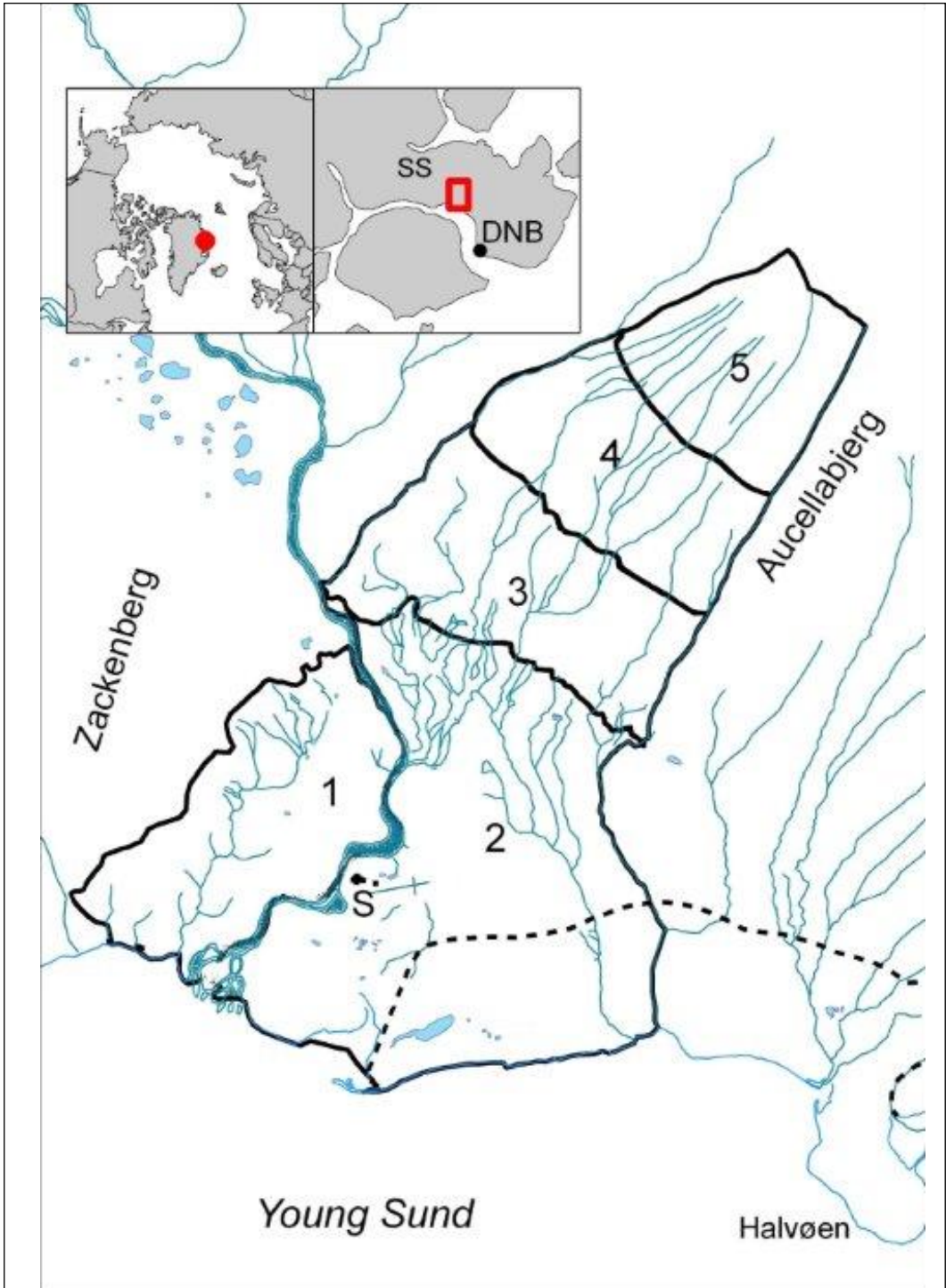


FIGURE 1. Map of the study area in Zackenbergdalen, central Northeast Greenland, with sections 1-5 of the bird census area. Also shown, selected place names mentioned in the text, the research station (S) and the border of the closed goose moulting area, 1c (broken line)..

TABLE 1. Estimated numbers of pairs/territories in four sectors of the 15.8 km² census area in Zackenbergdalen, 2009.

Species	<50 m a.s.l. 7.77 km ²	50-150 m a.s.l. 3.33 km ²	150-300 m a.s.l. 2.51 km ²	300-600 m a.s.l. 2.24 km ²	Total
Red-throated Diver	3-4	0	0	0	3-4
King Eider	0-1	0	0	0	0-1
Long-tailed Duck	4-6	0	0	0	4-6
Rock Ptarmigan	1	2	1	0	4
Common Ringed Plover	10-13	9	5-6	2	26-30
Red Knot	9-13	9-12	2	1	21-28
Sanderling	28-33	3-4	13	15	59-65
Dunlin	59-68	16	1-2	1	77-87
Ruddy Turnstone	19-26	17	1	0	37-44
Red-necked Phalarope	0-1	0	0	0	0-1
Long-tailed Skua	10-12	3-5	0	0	13-17
Glaucous Gull	1	0	0	0	1
Arctic Redpoll	2-1	1	0	0-1	3-5
Snow Bunting	13	20-22	12-13	4	49-52

Numbers of Common Ringed Plover (*Charadrius hiaticula*) territories have varied considerably, but in 2009 numbers were near average. Most common ringed plovers were gone by August, and only a few, late migrants were seen between 2 and 17 September (DOY 246-261).

Numbers of Ruddy Turnstone (*Arenaria interpres*) territories were higher than in the previous few years, although breeding success for this species was lower (below). Red knot (*Calidris canutus*) territory numbers were near average (Tables 1, 2).

No Red-necked Phalarope (*Phalaropus lobatus*) nests were found in the census area in 2009. However, in a fen west of Zackenbergelven, a nest of three eggs was discovered. This nest was later found to have suffered predation. In the census area, a female was seen in fens near the research station on 5-6 June (DOY 156-157). No certain Red Phalarope (*Phalaropus fulicarius*) observations were made in 2009. On 10 June (DOY 161), a pair of unidentified phalaropes was seen near the research station.

Long-tailed Skua (*Stercorarius longicaudus*) territories were found in lower than average numbers (Table 2). Only one pair nested in the census area (see below); another nested west of the river, Zackenbergelven.

A Glaucous Gull (*Larus hyperboreus*) pair has been breeding on an islet in Zackenbergelven at least since 2004. It is not unlikely that a pair was breeding at that location prior to 2004, but had

been overlooked (H. Meltofte, pers. comm.). In 2009, the pair was back with a nest on an islet in the same stretch of the river. No chicks were seen, and the nest is thought to have fallen victim to predation. Glaucous Gulls were seen almost daily throughout the season. In mid-September numbers of observations dropped, and by the last week of September none was observed.

The number of Rock Ptarmigan (*Lagopus mutus*) territories was a little higher than in recent years. During the census, four pairs were registered, and two broods were found in the census area. In adjacent areas, a nest was found on the slopes of Zackenbergfjeld.

The number of Snow Bunting (*Plectrophenax nivalis*) territories was equal to the last few years, but higher than the period 1996-2003 (Table 2). Juvenile buntings were seen both within the census area and in adjacent areas – in numbers suggesting a good season for this species with a high rate of successful fledging. In September, flocks of thousands were seen around the valley. The first day, 4 September (DOY 248), had the highest numbers. According to journal notes, “thousands” were observed. On a few days, only few were seen, while on most days until 1 October (DOY 275) flocks of tens to hundreds were reported from the entire valley. From 2 October only two were recorded daily until the last four were recorded on 9 October (DOY 283).

TABLE 2. Estimated numbers of pairs/territories in the 15.8 km² census area in Zackenbergdalen in 2009 compared to the 1996-2008 averages.

Regular breeders				
Species	No. of territories	Average min. and max. no. territories 1996-2008	No nests found ¹	Comments
Red-throated Diver	3-4	2.3-2.7	1	Chicks seen in adjacent areas
Common Eider	0	0.4-0.5	0	Flocks seen in June and July, no chicks seen
King Eider	0-1	1.3-2	0	
Long-tailed Duck	4-6	5.5-6.5	0	
Rock Ptarmigan	4	2.5-3.5	0	
Common Ringed Plover	26-30	29.8-35.4	0	
Red Knot	21-28	25-32.3	1	
Sanderling	59-65	49.6-57.5	25	
Dunlin	77-87	73.8-84	6	
Ruddy Turnstone	37-44	41.5-46.7	8	
Red-necked Phalarope	0-1	0.6-0.8	0	
Long-tailed Skua	13-17	18.5-22.5	1	
Glaucous Gull	1	0.4	1	
Common Raven	2	-	0	Nests outside the census area.
Snow Bunting	49-52	41.5-46.6	0	Nests of passerines are only found oportunistically.
Irregular breeders				
Species	No. of territories	Average min. and max. no. territories 1996-2008	No of nests found ^a	Comments
Pink-footed Goose	0	0.2	0	Min. 3175 immatures migrated northwards over the area
Eurasian Golden Plover	0	0.1	0	
Red Phalarope	0	0.6-0.8	0	
Snowy Owl	0	0.1	0	
Northern Wheatear	0-1	0.1	0	Nests of passerines are only found oportunistically
Arctic Redpoll	3-5	1.1-3.3	0	Nests of passerines are only found oportunistically

¹ Within the census area

Arctic Redpoll (*Carduelis hornemanni*) territories were found in slightly higher numbers than usual (Table 2). The last flock of minimally 10 Arctic Redpolls were seen on 16 September on the eastern face of Zackenbergfjeld.

REPRODUCTIVE PHENOLOGY IN WADERS

Nest initiation was fairly early in Dunlin and Red Knot, very early in Ruddy Turnstone, and close to average in Sanderling (Table 4). Just over 5% of all wader nests were initiated before 1 June, 28.8% before 10 June and 22.7% after 20 June. The snow cover on 10 June 2009 was

extremely low (4%), and nest initiation was near average (Table 5).

REPRODUCTIVE SUCCESS IN WADERS

The all-wader nest success was extremely low in 2009. On the basis of the modified Mayfield method (Johnson 1979), 86% of the wader nests were subjected to predation. Dunlin nests were hit less hard than others this season, with 80% nest success. That is a very high success rate. Sanderling nests suffered extremely from predation again this season, although they fared better than in the last few seasons (Table 6). Four

TABLE 3. Dates of first observation of selected species at Zackenberg 1996-2009.

Species	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Red-throated Diver	≤155	150	154	155	158	154	152	≤155	≤153	149	155	152	152	142
Pink-footed Goose	≤155	≤148	147	154	156	154	152	≤154	≤153	≤139	≤146	≤145	136	≤132
Common Eider	165	153	175	180	163	161	163	163	169	155	163	172	164	176
King Eider	164	155	166	167	≤174	160	152	≤164	166	172	163	173	170	168
Long-tailed Duck	≤153	150	153	157	158	158	154	158	154	152	158	156	155	151
Red-necked Phalarope	157	150	156	161	159	155	156	162	≤153	147	157	148	153	156

TABLE 4. Median first egg dates for waders at Zackenberg 2009 as estimated from incomplete clutches, egg floating, hatching dates, as well as weights and observed sizes of chicks.

Species	Median date	Range	N
Common Ringed Plover	—	—	—
Red Knot	156	150-160	4
Sanderling	167	152-181	63
Dunlin	162	151-180	18
Ruddy Turnstone	154	149-162	11

TABLE 5. Snow cover on 10 June, together with median first egg dates for waders at Zackenberg 1995-2009. Data based on fewer than 10 nests/broods are marked with *, fewer than five are omitted. The snow cover is the weighted means of area 1, 2, 3 and 4 (see section 2.2), from where the vast majority of the egg laying phenology data originate.

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Snow cover on 10 June	84	82	76	80	91	53	84	79	83	48	28	85	48	71	4
Sanderling		168*	169	169	174.5	168	173.5	168	164	160	166'	181	166	169	167
Dunlin	169*	163.5	164	167.5	173	163.5	176	159	163	164	163	178	166	169	162
Ruddy Turnstone	163*	170.5	164	163.5	175	163	174	160	159	160	162	172*	158	170	154

TABLE 6. Mean nest success (%) 1996-2009 according to the modified Mayfield method (Johnson 1979). Poor data (below 125 nest days or five predations) are marked with *. Data from species with fewer than 50 nest days have been omitted ("—" indicates no nests at all). Nests with at least one pipped egg or one hatched young are considered successful. Also given are total numbers of adult foxes observed by the bird observer in the bird census area during June-July (away from the research station proper), along with the number of fox dens holding pups.

Species	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	1996-2009
Common Ringed Plover				60*		38*				—	0*	—	2*	—	47-51
Red Knot	—	—			—		—			—	—	100*			26
Sanderling	72*	33-100*	88*	40	46*	19	33*	45	71-85		7*	3	5	7.5	18-19
Dunlin			28-47	65	68	75*		63	93	43*	47	48	17	80*	57-62
Ruddy Turnstone	21-68	67-100	16	23-28	29	60*	52	21-27	83			36	22*	27*	35-40
Red-necked Phalarope	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Red Phalarope	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All waders	33-63	52-100	32-37	42-44	44	43	43	42-44	87-90	22	37	18	16	14	33-36
N nests	17	31	44	44	47	32	21	51	55	15	28	60	58	66	569
N nest days	163	228	334	520.8	375	328.4	178.9	552	700	104	332.2	532.7	423.5	508.5	5281
Fox encounters	14	5	7	13	11	14	21	11	16	18	22	23	20	11	
Fox dens with pups	2	0	1	0	2	2	0-1	2	3	0	2	3	5	3	

Sanderling nests were abandoned before hatching. Only two nests of Red Knot were found in 2009, and one suffered predation. Ruddy Turnstones suffered predation to a relatively high level: only 27% nests were successful. One Red-necked Phalarope nest was found, eventually falling victim to predation.

The number of fox (*Alopex lagopus*) encounters was relatively low, but this species – the most likely predator of most nests – had pups in three dens this season (Table 6). This certainly added to the high predation rate, not least in the early stages of the wader breeding season.

The wader mean clutch size was 3.91 in 2009; a little above average (Table 7). Nests containing fewer than four eggs were: Sanderling, two nest of three eggs and one nest of two eggs; Dunlin, one nest of one eggs (abandoned during laying); Ruddy Turnstone, three nests of three eggs; Red-necked Phalarope, one nest of three eggs.

In July and early August, alarm-calling parents – and later juveniles – were found in the fens and marshes (Dunlins), on the slopes of Aucellabjerg and in the dry lowlands (Common Ringed Plovers, Red Knots, Sanderlings, Dunlins, Ruddy Turnstones).

Data on chick survival is scarce, and as early as 12 June, flocks of Long-tailed Skuas roamed the lower slopes of Aucellabjerg and the lowlands. The largest flock contained 37 individuals. The many skuas would be consistent with the high predation pressure on wader chicks.

REPRODUCTIVE PHENOLOGY AND SUCCESS IN LONG-TAILED SKUAS

None of the Long-tailed Skua nests was initiated prior to the census period, and 2009 was one of the four latest seasons for nest initiation in this species (Table 8), despite the fact that only two nests were found.

No Collared Lemming (*Dicrostonyx groenlandicus*) was observed by the bird observer, reflecting a season with record low lemmings (Table 8). Consistent with that pattern, both skua nests had one egg each, but only one chick hatched. Nest success in 2009 was among the lowest recorded (average nest success 1996-2008: 47.1%; Table 8). The last observation of a chick (accompanied by an adult) was on 12 July. This young bird would be six days old. Whether it survived to fledging is unknown.

One observation of a 3rd-year bird is the only observation of immature skuas in the study area.

BARNACLE GOOSE

A Barnacle Goose (*Branta leucopsis*) colony on the southern face of the mountain Zackenbergfjeldet was probably active, based on observations on birds flying towards that part of the mountain. The colony was not properly visited this year, due to failing ice conditions early in the season. For further, recent details on the colony, see Hansen et al. (2010a).

In Zackenbergdalen, the first families with goslings were seen on 29 June (DOY 180). The total number of broods recorded was nine (Table 9), while the maximum number of goslings seen at one time, was only three. The mean brood size was low throughout the period (Table 9).

Southward migrating Barnacle Geese were seen from 10 August (DOY 222) onwards, when 15 flew over Cardiocerasbjerg. In late August and the beginning of September, flocks migrated over and rested in the census area, peaking on 30 August (DOY 242) with four flying over the area, and 105 foraging in the valley. A total of 3,530 geese were recorded (unsystematically) on southward migration in 2009. The last observation of the season was of seven Barnacle Geese foraging in a fen near the research station on 9 September (DOY 252).

TABLE 7. Weighted mean clutch sizes in waders at Zackenberg 1995-2009. Samples of fewer than five clutches are marked with *.

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Common Ringed Plover	4.00*	4.00*	3.50*	4.00*	3.50*	4.00*	3.50*	4.00*	4.00*	4.00*		3.75*		3.75*		3.76
Red Knot				4.00*	4.00*		4.00*		4.00*	4.00*			4.00*	4.00*	4.00*	3.14
Sanderling	4.00*	4.00	3.86	4.00	3.67	4.00	3.43	3.83	4.00	4.00	3.75	3.63	3.73	3.77	3.91	3.83
Dunlin		4.00*	3.75*	3.90	3.70	3.93	3.63	4.00*	4.00	3.92	4.00	3.13	3.79	3.67	4.00	3.78
Ruddy Turnstone		3.71	3.79	3.82	3.58	3.80	3.75	4.00	3.77	3.92	3.86	3.00*	4.00*	3.71	3.78	3.78
Mean	4.00	4.00	3.76	3.90	3.65	3.89	3.63	3.95	3.94	3.94	3.89	3.33	3.76	3.74	3.91	3.80

TABLE 8. Egg-laying phenology, breeding effort and success in Long-tailed Skuas at Zackenberg 1996-2009. Median egg laying date is the date when half the supposed first clutches were laid. Clutches found includes replacement clutches. Mean hatching success according to the modified Mayfield method (Johnson 1979). Poor data (fewer than 125 nest days or five predations) are marked with *. Nests with at least one pipped egg or one hatched young are considered successful. Also given, are numbers of lemming winter nests within the lemming census area. Data from 1996-2006 are from the original 18.8 km², while data from 2007 onwards is from the reduced area, 15.8 km². Please note that in 2006, only one of two eggs hatched (other never hatched)..

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Median 1st egg date		158	163	168	170	166	160	166	160	159	170	163	164	168
No. of clutches found	8	17	23	8	5	21	14	7	21	8	2	15	9	2
No. of young hatched	1	25	16	2	2	18	14	5	36	6	1	11	3	1
Nest success % (Mayfield)		80.6*	26.7	18.1*	17.5*	39.5	44.1	76.2*	94*	51.8*	100*	23	33	25.9
Estimated no. of young fledged	0	5	6	1	0	5	4	2	22	1	0	1	2	1
1Lemming winter nests/km ²	224.5	247.2	467	227.4	136.8	208.5	178.3	66	238.7	170.8	189.6	236.8	75.5	49.1

TABLE 9. Average brood sizes of Barnacle Geese in Zackenbergdalen during July and early August, 1995-2009, together with the total number of broods brought to the valley. Samples of <10 broods are marked with *. Average brood size data from autumn on the Isle of Islay in Scotland are given for comparison, including the percentage of juveniles in the population (Ogilvie, pers. comm.).

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Primo July		3.0*	3.1	2.9*	1.9	3.2*	1.8*	2.4	1.8*	2.6	1.7*	2.0*	1.3	4*	1*
Medio July		2.3*	2.7	2.3	1.8	3.1*	1.7*	2.4	1.2*	2.3	2.7	1.5*	1.5	1.6	1.33*
Ultimo July	2.0*	3.0*	2.6	2.2	1.7	3.1		2.3	1.1*	2.3	2.2*	1.1*	3.3*	1.5*	1*
Primo August	2.3*	2.3*	2.4		1.8		2.0*	2.2	1.2*	1.9*		1.5*	-	1*	1.5*
No. broods	≥7	6-7	19-21	≥18	29	11	4	32	8	26	14	9	28	15	9
Scotland	2.00	2.30	1.95	2.28	1.92	2.20	1.94	2.23	1.59	2.35	1.67	1.15	2.14	1.9	1.9
% juv.	7.2	10.3	6.1	10.5	8.1	10.8	7.1	12.5	6.4	15.9	6.3	3.23	9.8	8.2	3.8

On Isle of Islay, western Scotland, the percentage of young in wintering flocks was very low (Table 9; M. Ogilvie, pers. comm.). Immature geese moulted in numbers well above average (1995-2007 average: 196) in 2009 (Table 10).

COMMON BIRDS, NOT BREEDING IN THE CENSUS AREA

Pink-footed Geese (*Anser brachyrhynchus*) were recorded unsystematically; on northbound moult migration 3175 immature individuals flew over Zackenbergdalen. The northward migration took place from 5 June (DOY 156) until 10 July (DOY 191). In the general Zackenberg area, only two immature Pink-footed Geese were found moulting in 2009 (Table 10). Immature geese on southward migration were recorded from 26 August (DOY 239), when 70 were seen in the former delta. During the following days large

flocks of roosting immatures were seen (maximum: 110 in two flocks 28 August [DOY 241]), in addition to migrating flocks. A total of 3483 immatures were recorded (unsystematically) on southward migration, which ended with nine immatures on 14 September (DOY 258).

On 25 June (DOY 176), the first Common Eiders (*Somateria mollissima*) were seen flying up Zackenbergelven – five females and a male. In the following month pairs and smaller flocks were seen regularly. On 11 July (DOY 192) 21 females and 18 males were observed in a flock on Young Sund, constituting the largest adult flock of the season. The last five adult males were seen on 14 July. A flock of eight adults and 29 ducklings were seen on 10 August (DOY 222), and a single adult with an unknown number of ducklings were seen on 30 August (DOY 242). The last ducklings were seen on 8

TABLE 10. The number of immature Pink-footed Geese and Barnacle Geese moulting in the study area at Zackenberg 1995-2009. The closed area is zone 1c (see map, <http://www.zackenberg.dk>).

Study area	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
PINK-FOOTED GOOSE															
Closed moulting area and further east	310	246	247	5	127	35	0	30	41	11	17	27	0	0	1
Coast west of closed area	230	40	60?	0	29	0	0	0	0	10	0	3	2	0	0
Upper Zackenbergdalen	230	40	60?	0	29	0	0	0	0	10	0	3	2	0	0
Pink-footed Goose total	540	286	322	5	156	35	0	30	41	21	17	31	2	2	2
BARNACLE GOOSE															
Closed area at Lomsø and Kystkærene	21	0	29	21	60	84	137	86	120	81	87	148	66	106	70
Coast east of closed area	>120	150?	96	55	66	0	109	80	45	0	2	218	46	125	77
Coast west of closed area	0	0	0	0	0	30	0	0	0	0	29	29	106	65	34
Upper Zackenbergdalen	41	85	2	75	<57	27	60	0	14	0	25	30	6	41	51
Barnacle Goose total	>182	235?	127	151	<183	141	306	166	179	81	143	425	224	337	232

September (DOY 251). During September, flocks of females were seen regularly, peaking with more than 13 individuals on 17 September (DOY 260), ending with the last five females in Zackenberg Bugt on 27 September (DOY 270; see also the paragraph on Daneborg in Hansen et al. 2010b).

A male and two female King Eiders (*Somateria spectabilis*) were seen on 17 June (DOY 168), a date that is a little later than usual (Table 3; 1996-2008 average arrival date: 14 June [DOY 165]). Two days later a pair was still present in the former delta. This was the last we saw of King Eiders in 2009. No nesting attempts were recorded.

Long-tailed Ducks (*Clangula hyemalis*) were seen from 31 May (DOY 151; Table 3), with pairs seen regularly – almost daily – until late June. In early July, only a few pairs were seen, although regularly so. The last male was seen on 11 July (DOY 192). Later in July, only females were seen, in flocks of up to 17 birds (former delta, 17 July [DOY 198]). The last Long-tailed Duck of the season was a lone bird on Lomsø on 22 August (DOY 234). No chicks were seen in 2009.

We estimated that two pairs of Common Raven (*Corvus corax*) covered the valley, both assumed to nest in areas beyond the borders of the census area. The first six juvenile birds were seen on 6 July (DOY 187) at the research station. During July, August, September, and until the last bird observer left the research station on 11 October, either one or two birds from this flock were seen regularly around the valley.

VISITORS AND VAGRANTS

A Canada Goose (*Branta canadensis*) was seen on 5 June (DOY 156) flying to a temporary pond west of the census area. This is only the third season at Zackenberg during which this species was seen (Table 11).

Gyr Falcons (*Falco rusticolus*) were spotted several times during the season. There was a single observation of one grey Gyr Falcon on 8 June (DOY 159). Two different individuals were seen around the valley on 18 June (DOY 169) – one white morph, one grey. A white morph bird was observed by several people at the station on 25 July (DOY 206). In September, several birds were seen regularly. On 4 September (DOY 248), a group of four (two white morphs, a grey and a very dark bird) was seen, and later the same day a single white bird was seen. Another 14 observations of Gyr Falcons followed until 24 September. Eleven of these were of light-morphed birds, one was dark and the last observation came without any morph indication. They seemed to follow the peaks of Snow Bunting immatures in the valley, sometimes staying for a few days.

Eurasian Golden Plover (*Pluvialis apricaria*) was recorded with an uncertain observation of a pair on 30 June (DOY 181), at the foot of Aucellabjerg, and with a certain observation of one individual, 2 July (DOY 183). Eurasian Golden Plovers have been recorded at Zackenberg almost every year since 1996 (Table 11).

A single (possible female) Pectoral Sandpiper (*Calidris melanotos*) was seen on at least two

TABLE 11. Numbers of individuals and observations of avian visitors and vagrants at Zackenberg 2009, compared with the numbers of individuals observed in the preceding seasons, 1995-2008. Multiple observations reasonably believed to have been of the same individual have been reported as one individual.

Species	Visitors and vagrants																
	Previous records																2009
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	No individual	No. observations	
Great Northern Diver	0	0	0	0	0	0	1	0	0	0	0	0	2	2	0	0	
Whooper Swan	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	
Snow Goose	0	0	0	0	0	2	11	0	23	0	0	0	1	0	0	0	
Canada Goose	0	0	0	0	0	0	0	0	0	0	0	4 ^e	3 ^e	0	1	1	
Merlin	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
Gyr Falcon	1	1	1	3	0	4	5	1	3	4	2	0	3 ^e	2 ^c	4	4	
Pintail Duck	0	0	0	1 ^d	0	0	0	0	0	0	0	0	3 ^d	0	0	0	
Common Teal	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
Eurasian Golden Plover	0	3	1	3	1	0	3 ^e	1	0	1	1	1	1	1	2	1	
White-rumped Sandpiper	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	
Pectoral Sandpiper	0	0	0	1	0	0	0	2	0	0	0	1	1	0	1	3	
Purple Sandpiper	0	0	0	0	0	0	0	1 ^f	0	0	0	0	0	0	0	0	
Red Phalarope	0	0	0	4 ⁵	0	0	4 ^e	0	1	0	2 ^c	11 ^e	0	2	0	0	
Common Snipe	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
Whimbrel	0	0	0	0	0	1	1	0	0	2	1	0	1	2	0	0	
Eurasian Curlew	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
Redshank	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
Pomarine Skua	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	
Arctic Skua	0	0	11	6	0	2	7	4	3	2	0	1	0	0 ^g	0	0	
Great Skua	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	
Lesser Black-backed Gull	0	0	0	0	0	0	1	0	1	2	1	4	0	0	0	0	
Iceland Gull	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
Great Black-backed Gull	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	
Black-legged Kittiwake	0	0	0	0	0	0	0	0	14 ^h	0	0	0	0	0	0	0	
Arctic Tern	≈200	2	1	2	0	14	0	0	32	0	0	0	0	57	0	0	
Snowy Owl	0	0	2	1	1	1-2	≥4 ^f	0	0	0	0	0	1 ^b	0	0	0	
Meadow Pipit	0	0	0	1	0	0	0	0	0	0	1 ^c	1 ^c	0	0	0	0	

TABLE 11. Continued.

Species	Visitors and vagrants															
	Previous records												2009			
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	No individual	No. observations
White Wagtail	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Northern Wheatear	4	8 ^c	4	3 ^c	1-2 ^c	0 ^b	0	0	0	0	2	1	4 ^b	2	2 ^d	3
Lapland Longspur	0	0	0	0	1-2	0	1	0	0	0	1	0	0	0	0	0

^a Subspecies interior

^b See Hansen et al. 2009

^c After regular season, 4 observations of 1-3 birds.

^d Northernmost records in East Greenland (cf. Bortmann 1994)

^e At least one territory, possible territory or breeding found, see Table 1

^f Juvenile

^g Before the regular season, 1 in adjacent areas

^h One dead individual found

ⁱ Further more another to pairs plus 2 juveniles in adjacent areas.

occasions in 2009; 8 and 12 June (DOY 159 and 163), as well as an uncertain observation on 24 July (DOY 205).

On 17 June (DOY 168), a light morph Arctic Skua (*Stercorarius parasiticus*) was seen in the central part of the census area.

Northern Wheatear (*Oenanthe oenanthe*) was back as a breeding bird in 2009, albeit outside of the census area. At least three different pairs were seen, and at least one pair had fledged young. Inside the census area a single bird was seen near the research station on three occasions: 14 May, 19 June and 28 June (DOY 134, 170 and 179). This is considered to be a bird from the pair that was seen regularly at the Zackenberg trapping station – the likely parents of the fledged young. On 22 September (DOY 265) a Northern Wheatear was found dead – in fresh condition – under the porch of the accommodation building. The specimen was collected.

VALIDATION OF SIGHTINGS FROM PREVIOUS SEASONS

The Rarities Committee for Denmark and Greenland (BirdLife Denmark) have approved the observations of Pectoral Sandpipers (2006, 2007) and White-rumped Sandpiper (*Calidris fuscicollis*) (2005) from Zackenberg (Kristensen et al. 2007, 2009). All rare birds reported in the annual reports from Zackenberg have been approved, and are considered true observations. This season’s observation of a Pectoral Sandpiper is currently under review.

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REFERENCES

- HANSEN, J., H. MELTOFTE, AND N. M. SCHMIDT. 2009. Bird Monitoring at Zackenberg, Northwest Greenland, 2006. *Bird Population* 9: 1-12.
- HANSEN, J., L. H. HANSEN, N. M. SCHMIDT, AND J. RENEERKENS. 2010a. Bird monitoring at Zackenberg, Northeast Greenland, 2008, with comparison to 1995-2007. *Bird Populations* 10:68-78.
- HANSEN, J., L. H. HANSEN, K. BOESGAARD, K. ALBERT, S. SVENDSEN, S. H. HANSEN, A. MICHELSEN, L. A. KYHN, K. S. CHRISTOFFERSEN, AND N. M. SCHMIDT. 2010b. Zackenberg Basic – The BioBasis Programme. P. 43-66. *In* Jensen, L.M. and M. Rasch (eds.) 2010. Zackenberg Ecological Research Operations, 15th Annual Report, 2009. National Environmental Research Institute, Aarhus University, Denmark.
- JOHNSON, D. H. 1979. Estimating nest success: The Mayfield method and an alternative. *Auk* 96:651-661.
- KRISTENSEN, A. B., O. AMSTRUP, AND T. E. ORTVAD. 2007. Sjældne fugle i Danmark og Grønland i 2006. Rapport nr. 37 fra Sjældenhedsudvalget. Fugleåret 2006, 99-115. Dansk Ornitologisk Forening, Copenhagen. (In Danish, with English summary).
- KRISTENSEN, A. B., A. S. FRICH, T. E. ORTVAD, AND M. SCHWALBE, M. 2009. Sjældne fugle i Danmark og Grønland i 2008. Rapport nr. 39 fra Sjældenhedsudvalget. Fugleåret 2008, 123-143. Dansk Ornitologisk Forening, Copenhagen. (In Danish, with English summary).
- MELTOFTE, H. 2006. Wader populations at Zackenberg, high-arctic Northeast Greenland, 1996-2005. *Dansk Ornitologisk Forenings Tidsskrift* 100: 16-28.
- JENSEN, L. M. AND M. RASCH (EDS.) 2010. Zackenberg Ecological Research Operations, 15th Annual Report, 2009. National Environmental Research Institute, Aarhus University, Denmark. 134 pp.
- SCHMIDT, N. M., H. MELTOFTE, AND T. B. BERG. 2010. BioBasis, conceptual design and sampling procedures of the biological programme at Zackenberg Basic. 13th ed. – National Environmental Research Institute, Department of Arctic Environment, University of Aarhus, Roskilde.

BIRD MONITORING AT ZACKENBERG, NORTHEAST GREENLAND, 2010, WITH COMPARISON WITH 1996-2009^{1,2}

JANNIK HANSEN³, LARS HOLST HANSEN AND NIELS MARTIN SCHMIDT

*Department of Bioscience
Aarhus University
P.O. Box 358
DK-4000 Roskilde, Denmark*

JEROEN RENEERKENS

*Animal Ecology Group
Centre for Ecological and Evolutionary Studies
University of Groningen
PO Box 14
9750 AA Haren, The Netherlands*

Abstract. In 2010, bird populations continue to be monitored in a 15.8 km² designated area at Zackenberg Research Station in central Northeast Greenland. Results are presented and compared with those from previous seasons (1995 – 2009). The breeding bird census resulted in densities generally comparable with previous years, but with relatively high densities of Sanderling (*Calidris alba*) and Dunlin (*Calidris alpina*). For all wader species, nesting was early compared to previous years, but with extremely low nest success. The number of Long-tailed Skua (*Stercorarius longicaudus*) territories was lower than average, and only one pair nested (unsuccessfully) in the census area, reflecting a season with very low lemming numbers. For Barnacle Geese (*Branta leucopsis*), the mean brood size was low early in the season, but later in the season numbers were close to average.

Key words: Monitoring, Arctic, waders, geese, Lapland bunting, Long-tailed Skua, Rock Ptarmigan, Snow Bunting, climate.

MONITOREO DE AVES EN ZACKENBERG, NORESTE DE GROENLANDIA, 2010,
CON UNA COMPARACION CON 1996-2009

Resumen. En 2010, el monitoreo de poblaciones de aves continuó en un área de 15.8 km² designada en la Estación de Investigación de Zackenberg, en el centro del noreste de Groenlandia. Los resultados presentados se comparan con los de temporadas anteriores (1995-2009). El censo de aves reproductoras mostró densidades generalmente comparables a las de años anteriores, pero con densidades relativamente altas para *Calidris alba* y *C. alpina*. Para todas las zancudas, la nidificación fue temprana con respecto a años anteriores, pero con un éxito reproductivo extremadamente bajo. El número de territorio de *Stercorarius longicaudus* fue inferior a la media, y solo una pareja anidó (sin éxito) en el área de censo,

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²Adapted with permission from Aarhus University (2011)

³Corresponding author: jaha@dmu.dk

reflejando una temporada de pocos lemmings. Para *Branta leucopsis*, el tamaño medio de puesta fue bajo a principio de temporada, pero hacia el final los números fueron cercanos al promedio.

Palabras clave: : Groenlandia, monitoreo, Artico, zancudas, gansos, skua, perdiz nival, gorrion nival, clima.

INTRODUCTION

In central Northeast Greenland, the monitoring programme, Zackenberg Basic, based at the Zackenberg Research Station (74°30'N, 21°00'W), was conducted for the 15th consecutive season. For details of the previous years, and a summary of the bird monitoring part of the BioBasis programme, please refer to Hansen et al. (2010). The 16th ZERO Annual Report (Jensen and Rasch 2011) also presents these data. Reports from all previous seasons are available at www.zackenberg.dk/publications/

The methodologies used by BioBasis are available at the home page of the research station (<http://www.zackenberg.dk/monitoring/biobasis/>) and the current sampling protocol (Schmidt et al. 2010) is available through the authors. The database is available online: <http://www.zackenberg.dk/data/>

RESULTS AND DISCUSSION

BREEDING POPULATIONS

Between day 166 and 176 (15 June to 25 June), a complete initial census was carried out. That is a normal start and a slightly delayed last day of census. The entire census was performed on days with good weather conditions; poor weather was encountered only on a few days. The completion of the survey took 36 'man-hours', which is average. In addition, large parts of the census area were covered regularly during June, July and most of August, with the exception of avoiding a closed goose moulting area along the coast and the Aucellabjerg slopes above 350 m a.s.l. The latter were covered on only six occasions, in addition to the many visits by Reneerkens and colleagues. The total effort in June and July 2010 was average in June and lower in July compared to recent years.

The results of the initial census, supplemented with records from the rest of the season (see

Meltofte et al. 2009), are presented in Table 1; and in Table 2, these are compared with the estimates of previous seasons.

The first Red-throated Diver (*Gavia stellata*) was observed day 150 (30 May). On day 156 (5 June), the first pair of Red-throated Divers settled in a fen near the research station. Three pairs attempted to breed within the census area and two nests were found. Both nests were eventually predated. In adjacent areas, a Red-throated Diver pair was recorded in the lake, Vesterport Sø. The pair nested briefly at the nest site used in the last few seasons (2007-09). Like the last couple of years, this attempt was unsuccessful due to predation.

A female and two male Pintail Ducks (*Anas acuta*) were seen around the study area from day 158 (7 June) until day 173 (22 June), after which one male disappeared. The remaining pair stayed until day 198 (17 July). No nest or other signs of nesting was found. This is the first time Pintail Ducks have been present in the study area during the breeding season (Table 2).

Sanderling (*Calidris alba*) territories were recorded at comparatively high numbers, which has been the trend in recent years (Table 2). Dunlin (*Calidris alpina*) territories were found in higher than average numbers (cf. Hansen et al. 2010, 2012). It should be noted that numbers from earlier years might have been underestimated (Meltofte 2006). The number of Common Ringed Plover (*Charadrius hiaticula*) territories was near average. Ruddy Turnstone (*Arenaria interpres*) territories were almost back to the average numbers, as were those of Red Knot (*Calidris canutus*) (Tables 1, 2).

No Red-necked Phalarope (*Phalaropus lobatus*) nests were found in 2010. A female was seen in ponds around the research station from day 159 (8 June), and with a male from day 162 (11 DOY: 162). The pair was last seen on day 168 (17 June). One Red Phalarope (*Phalaropus fulicarius*) nest was found in the census area in 2010. In the

TABLE 1. Estimated numbers of pairs/territories in four sectors of the 15.8 km² census area in Zackenbergdalen, 2010.

Species	<50 m a.s.l. 7.77 km ²	50-150 m a.s.l. 3.33 km ²	150-300 m a.s.l. 2.51 km ²	300-600 m a.s.l. 2.24 km ²	Total
Red-throated Diver	3	0	0	0	3
Pintail Duck	1	0	0	0	1
King Eider	1-3	0	0	0	1-3
Long-tailed Duck	5	0	0	0	5
Rock Ptarmigan	1	0	0-1	0	1-2
Common Ringed Plover	12-14	3	4-5	8-9	27-31
Red Knot	4	10	7	3	24
Sanderling	31-38	2-3	9-12	12-13	55-67
Dunlin	64-70	21-23	2	0	87-95
Ruddy Turnstone	16	18-20	3	0	37-39
Red-necked Phalarope	1	0	0	0	1
Red Phalarope	1	0	0	0	1
Long-tailed Skua	7	6	0	0	13-19
Glaucous Gull	1	0	0	0	1
Arctic Redpoll	1	0	0	0	1
Snow Bunting	16-19	23	6-7	3	48-52
Lapland Bunting	1	0	0	0	1

census area, a female was seen in fens near the research station during day 166-171 (15-20 June), being with a male on day 168 (17 June). The nest was found fully laid on day 181 (30 June), and by day 185 (4 July) all four eggs were starred. However, on day 187 (6 July) the nest was found predated, and the nest cup smelled of Arctic Fox (*Alopex lagopus*) urine.

Long-tailed Skua (*Stercorarius longicaudus*) territories were found in lower numbers than usual (as low as 2009: 13-17 territories; Table 2). Only one pair nested in the census area (see below).

A Glaucous Gull (*Larus hyperboreus*) pair had a nest on an islet in the same stretch of Zackenbergelven, as it has had since at least 2004. No chicks were seen, and the nest is thought to have fallen victim to predation. This species was seen daily throughout the season.

The number of Rock Ptarmigan territories (*Lagopus muta*) was low. During the census, only one territory, and a possible second one, was found. The brood of the certain pair was encountered on day 216 (4 August). In adjacent areas, a female with a brood of 10 was found on the southern slopes of Mt. Zackenberg, at 50 m a.s.l. on day 209 (28 July).

Numbers of Snow Bunting (*Plectrophenax nivalis*) territories were below the average of the

last few years, yet higher than the period 1996-2003 (Table 2, Figure 1). Juveniles of snow bunting were seen both within the census area and in adjacent areas – in fair numbers. No systematic counts of juveniles were made, but the impression is that snow buntings had a breeding season with a fair rate of successful fledging. Only one Arctic Redpoll (*Carduelis hornemanni*) territory was recorded this year (Table 2). For the first time since the start of BioBasis, a pair of Lapland Bunting (*Calcarius lapponicus*) bred in the study area. One pair nested on the lower slopes of Aucellabjerg. Fledglings were observed on day 199 (18 July). Unfortunately, we do not have the number of fledglings. This is the northernmost breeding record of the species (Boertmann 1994).

REPRODUCTIVE PHENOLOGY IN WADERS

Nest initiation was early in all species (Table 3): 28.3% of all wader nests were initiated before 10 June, 86.6% before 20 June and just 10% after 20 June. The snow cover on 10 June 2010 was 72% and nest initiation was early compared to previous seasons (Table 4).

REPRODUCTIVE SUCCESS IN WADERS

The all-wader nest success was extremely low in 2010 – lower than ever before during the

TABLE 2. Estimated numbers of pairs/territories in the 15.8 km² census area in Zackenbergdalen; 2010 compared with the 1996-2009 averages.

Regular breeders				
Species	No. territories	Average min. and max. territories 1996-2009	Nests found ¹	Comments
Red-throated Diver	3	2.4-2.8	1	Chicks seen in adjacent areas
Pintail Duck	1	0	0	
Common Eider	0	0.4	0	
King Eider	1-3	1.2-1.9	0	
Long-tailed Duck	5	5.4-6.4	0	
Rock Ptarmigan	1-2	2.6-3.6	0	
Common Ringed Plover	27-31	28.7-35	1	
Red Knot	24	24.7-32	3	
Sanderling	55-67	50.3-58	17	
Dunlin	87-95	74-84.2	8	
Ruddy Turnstone	37-39	41.4-46.5	10	
Red-necked Phalarope	1	0.8-1.7	0	
Long-tailed Skua	13-19	18.1-22.1	1	
Glaucous Gull	1	0.4	1	
Common Raven	2	-	0	Nests outside the census area.
Arctic Redpoll	1	6.4-10.4	0	
Snow Bunting	48-51	42-47	1	Nests of passerines are only found opportunistically.
Irregular breeders				
Species	No. of territories	Average min. and max. no. territories 1996-2009	No of nests found ¹	Comments
Pink-footed Goose	0	0.1	0	
Eurasian Golden Plover	0	0.1	0	
Red Phalarope	1	0.6-0.8	1	
Snowy Owl	0	0.1	0	
Northern Wheatear	0	0.1-0.2	0	Territory recorded outside census area
Lapland bunting	1	0	1	

¹Within the census area

BioBasis programme. Using the modified Mayfield method (Johnson 1979), 91% of the wader nests were subjected to predation.

Dunlin nests were less hard than hit other wader species, with 61.5% nest success, which is a fairly high success rate. It was another rough season for Sanderling nests (Table 5). Three Red Knot nests were found, all of which suffered predation. Just over a third of the Ruddy Turnstone nests were successful, the remainder having been predated. As described above, a single Red Phalarope nest was unsuccessful.

The number of Arctic fox encounters was

relatively low. However, in these numbers we have excluded fox visits to the research station, which were pronounced this year. An adult fox brought pups – surprisingly young – to the research station as early as day 187 (6 July). The apparent “getting used to” the research station is an increasing problem – primarily linked to problems around the way our kitchen waste is being disposed of (Hansen 2011). Pups were recorded in three dens this season (Table 5). This would probably be the part of the reason for the high predation on wader eggs.

The mean wader clutch size in 2010 was 3.80,

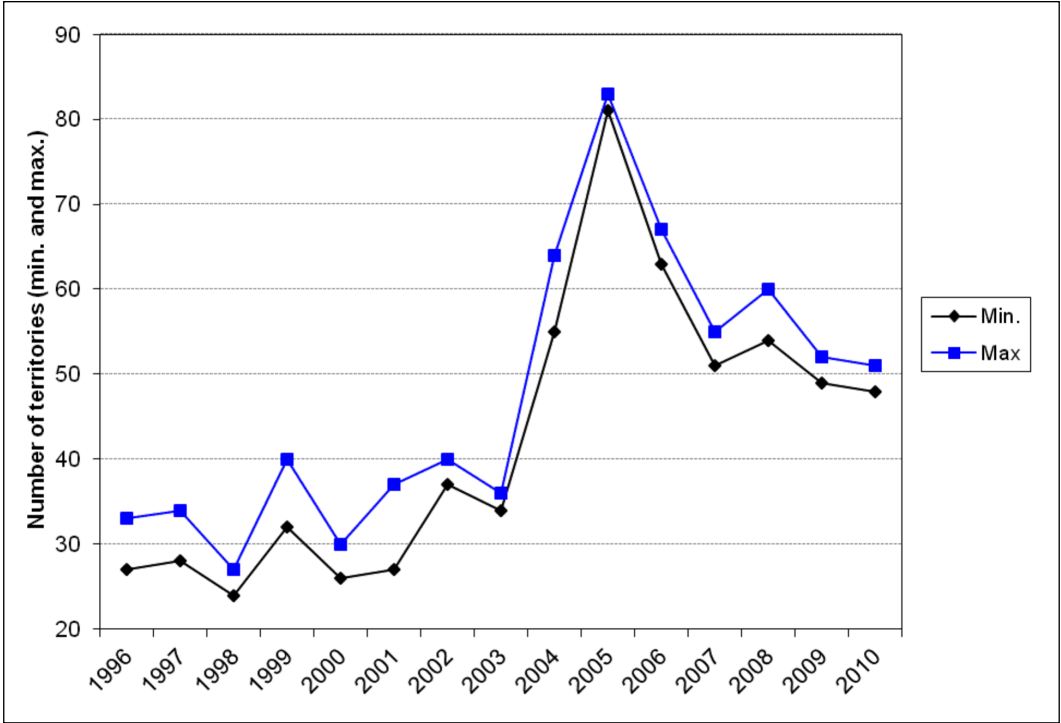


FIGURE 1. Numbers (minimum and maximum) of Snow Bunting territories in the census area at Zackenberg, 1996-2010.

TABLE 3. Median first egg dates for waders at Zackenberg 2010 as estimated from incomplete clutches, egg floating, hatching dates, as well as weights and observed sizes of pulli.

Species	Median date	Range	N	Average 1996-2009
Common Ringed Plover	162	162	1	166.8
Red Knot	163	161-166	3	166.8
Sanderling	163	152-178	29	168.7
Dunlin	164	152-177	13	166.7
Ruddy Turnstone	165	157-172	12	164.5

TABLE 4. Snow cover on 10 June together with median first egg dates for waders at Zackenberg 2010. Data based on < 10 nests/broods are in brackets, data when < 5 are omitted. The snow cover is pooled (weighted means) from section 1, 2, 3 and 4 (Sigsgaard et al. 2011), from where the vast majority of the egg laying phenology data originate. Refer to Hansen et al. (this issue) for data from previous seasons.

Species	2010
Snow cover on 10 June	72
Sanderling	163
Dunlin	165.5
Ruddy Turnstone	165

which is below average (Table 6). Nests containing fewer than four eggs were as follows: Sanderling, two nests of three eggs; Ruddy Turnstone, two nests of three eggs. A Ruddy Turnstone nest – unusually – contained five eggs. These three Ruddy Turnstone nests suffered predation.

In July and early August, alarming parents – and later juveniles – were found in the fens and marshes (Dunlins), and on the slopes of Aucellabjerg and in the dry lowlands (Common Ringed Plovers, Red Knots, Sanderlings, Dunlins, Turnstones).

Data on chick survival are scarce, and as early as day 168 (17 June), flocks of Long-tailed Skuas roamed the lower slopes of Aucellabjerg and the lowlands. The largest flock had 32 individuals.

REPRODUCTIVE PHENOLOGY AND SUCCESS IN LONG-TAILED SKUAS (*STERCORARIUS LONGICAUDUS*)

Only one nest was found initiated after the census period (later than the average of any preceding year; Table 7). The nest suffered predation. No Northern Collared Lemming (*Dicrostonyx groenlandicus*) was observed by the bird observer, reflecting a season with record low lemming winter nests found (Table 8). On day 223 (11 August), a large juvenile appeared in the area, seemingly coming from one of the adjacent valleys, Store Sødal or Lindemandsdal.

One observation of a third-calendar year bird – in a flock of four birds – is the only observation of immatures this season.

TABLE 5. Mean nest success (%) 2010 according to the modified Mayfield method (Johnson 1979), compared to the 1996-2010 average. Poor data (< 125 nest days or five predations) are given in brackets. Data from species with < 50 nest days have been omitted. If no nest was found, it is indicated by “-”. Nests with at least one pipped egg or one hatched young are considered successful. Also given are total numbers of adult foxes observed by the bird observer in the bird census area during June-July (away from the research station proper), along with the number of fox dens holding pups. Refer to Hansen et al. (this issue) for data from previous seasons.

Species	2010	1996-2010
Common Ringed Plover		45-48
Red Knot		18.5
Sanderling	3	15.5-16.5
Dunlin	(61.5)	57-62
Ruddy Turnstone	(33.7)	35-40
Red-necked Phalarope	-	0.8
Red Phalarope		42.2
All waders	9	31.4
N nests	46	42.3
N nest days	306.5	373.3
Fox encounters	9	
Fox dens with pups	3	

TABLE 6. Mean clutch sizes in waders at Zackenberg 2010 compared to the weighted mean of previous seasons. Samples of < 5 clutches are given in brackets.

Species	2010	Weighted mean
Common Ringed Plover	4.00*	3.88
Red Knot	4.00*	4.00
Sanderling	3.92	4.28
Dunlin	4.00	4.01
Ruddy Turnstone	3.92	4.10
Weighted mean	3.80	4.13

TABLE 7. Egg-laying phenology, breeding effort and success in Long-tailed Skuas at Zackenberg 2010. Median egg laying date is the date when half the supposed first clutches were laid. Number of clutches found includes replacement clutches. Mean hatching success according to the modified Mayfield method (Johnson 1979). Poor data (< 125 nest days or five predations) are given in brackets. Nests with at least one pipped egg or one hatched young are considered successful. For lemming winter nests, see Table 9. Refer to Hansen et al. (this issue) for data from previous seasons.

Variable	2010
Median 1st egg date	172
No. of clutches found	1
No. of young hatched	0
Nest success % (Mayfield)	0
Estimated no. of young fledged	0

TABLE 8. Annual numbers of collared lemming winter nests recorded within the 1.06 km² census area in Zackenbergdalen 1996-2010, together with the numbers of animals encountered by one person with comparable effort each year within the 15.8 km² bird census area during June-July.

Year	New winter nests	Old winter nests	Animals seen
1996	84	154	0
1997	202	60	1
1998	428	67	43
1999	205	36	9
2000	107	38	1
2001	208	13	11
2002	169	20	4
2003	51	19	1
2004	238	15	23
2005	98	83	1
2006	161	40	3
2007	251	21	1
2008	80	20	4
2009	55	9	0
2010	27	23	0

BARNACLE GEESE (*BRANTA LEUCOPSIS*)

No activity was seen at the Barnacle Goose colony on the southern face of the mountain Zackenbergfjeldet. However, it was probably active, since birds were frequently seen flying towards that part of the mountain, and families with pulli were seen at the foot of the mountain later in the season. For further, recent details on the colony, see Hansen et al. (2009).

In Zackenbergdalen, the first families with goslings were seen on day 180 (29 June). This year, 18 broods were seen (Table 9), and the maximum number of goslings seen at one time, was 6. The mean brood size was low early in the season, but numbers were close to, and even above, the average later in the season (Table 9).

Southward migrating Barnacle Geese were seen from day 220 (8 August), when four flew over the present delta. At total of 144 geese were seen migrating southwards in 2010. The last four flew over the research station on day 258 (15 September). On Isle of Islay, Western Scotland, the percentage of young in the wintering flocks was relatively high (Table 9; Ogilvie 2011).

Immature barnacle geese moulted in numbers below average (1995-2009 average: 209) in 2010 (Table 10).

COMMON BIRDS, NOT BREEDING IN THE CENSUS AREA

Between day 156 (5 June) and day 182 (1 July), 2066 individual immature Pink-footed Geese

TABLE 9. Average brood sizes of Barnacle Geese in Zackenbergdalen during July and early August, 2010, together with the total number of broods brought to the valley. Samples of < 10 broods are given in brackets. Average brood size data from autumn on the Isle of Islay in Scotland are given for comparison, including the percentage of juveniles in the population (Ogilvie 2011, pers. comm.). Refer to Hansen et al. (this issue) for data from previous seasons.

	2010
Primo July	1.5*
Medio July	1.8*
Ultimo July	1.4*
Primo August	1.6*
No. of broods	18
Scotland	2.26
Percent juveniles	11.2

TABLE 10. The number of immature Pink-footed Geese and Barnacle Geese moulting in the study area at Zackenberg 2010. The closed area is zone 1c (see http://www.zackenberg.dk/fileadmin/Resources/DMU/GEM/Zackenberg/pdf/mapzoner_stor_opl.jpg). Refer to Hansen et al. (this issue) for data from previous seasons.

	2010
PINK-FOOTED GOOSE	
Closed moulting area and further east	10
Coast west of closed area	0
Upper Zackenbergdalen	0
Pink-footed Goose total	10
BARNACLE GOOSE	
Closed area at Lomsø and Kystkærene	80
Coast east of closed area	13
Coast west of closed area	0
Upper Zackenbergdalen	0
Barnacle Goose total	93

(*Anser brachyrhynchus*) (recorded unsystematically) on northbound moult migration flew over Zackenbergdalen. Only 10 immature Pink-footed Geese were found moulting in the Zackenberg area (Table 10). Immature Pink-footed Geese on southward migration were recorded from late July and on day 226 (14 August), and a hundred were seen in the former delta. No more records were made in 2010.

On day 170 (19 June), the first pair of Common Eiders (*Somateria mollissima*) was seen in Kystkærene, but no ducklings were seen at or near Zackenberg. A male and three female King Eiders (*Somateria spectabilis*) were seen on day 161 (10 June). No nesting attempts were recorded, and no ducklings were seen. For both eider species,

small flocks were seen from June to ultimo July (king eider)/mid-August (common eider).

Long-tailed Ducks (*Clangula hyemalis*) were seen from day 154 (3 June), after which pairs were seen almost daily until mid-July. In late July and August, only a few pairs were seen but no nest or ducklings were seen.

We estimate that two pairs of Common Raven (*Corvus corax*) nested in areas beyond the borders of the census area, with home ranges well within our study area. The first three juvenile birds were seen on day 217 (3 August) at Sydkærene.

VISITORS AND VAGRANTS

In Table 11 we present data on avian visitors and vagrants. A single Pectoral Sandpiper (*Calidris*

TABLE 11. Numbers of individuals and observations of avian visitors and vagrants at Zackenberg 2010. Multiple observations reasonably believed to have been of the same individual have been reported as one individual. Refer to Hansen et al. (this issue) for data from previous seasons.

Species	Visitors and vagrants	
	2010	
	No. individuals	No. of observations
Great Northern Diver	1	1
Whooper Swan	0	0
Greylag Goose	1	1
Snow Goose	0 ^a	0
Canada Goose	0	0
Merlin	0	0
Gyr Falcon	3	4
Pintail Duck	3	11
Common Teal	0	0
Eurasian Golden Plover	2	2
White-rumped Sandpiper	0	0
Pectoral Sandpiper	1	3
Purple Sandpiper	0	0
Red Phalarope	2	3
Common Snipe	0	0
Whimbrel	0	0
Eurasian Curlew	0	0
Redshank	0	0
Pomarine Skua	0	0
Arctic Skua	0	0
Great Skua	0	0
Lesser Black-backed Gull	0	0
Iceland Gull	0	0
Great Black-backed Gull	0	0
Black-legged Kittiwake	0	0
Arctic Tern	0	0
Snowy Owl	0	0
Meadow Pipit	0	0
White Wagtail	0	0
Northern Wheatear	5 ^b	7
Lapland Longspur	2 ^c	7

^a Two outside census area

^b Three juveniles, all from pair(s) outside the census area

^c At least one territory, possible territory or breeding found, see Table 1

melanotos) (likely female) was seen day 159 (8 June) and day 160 (9 June). Photo evidence was obtained at the first sighting. On day 163 (12 June), the bird was spotted again at the same site as day 160 (T. Roslin, pers. comm.). This is the only notable rarity in 2010.

VALIDATION OF SIGHTINGS FROM PREVIOUS SEASONS

The Rarities Committee for Denmark, Faroe Islands and Greenland (under BirdLife Denmark) has officially recognised two observations of Pectoral Sandpiper from 2009

(Hansen et al. 2012) and the one from 2010 described above. All submitted rarities from Zackenberg over the years are now officially recognised sightings.

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REFERENCES

- BOERTMANN, D. 1994. An annotated checklist to the birds of Greenland. *Meddelelser om Grønland, Bioscience* 38. 63 pp.
- HANSEN, J., SCHMIDT, N. M., HANSEN, L. H., AND RENEERKENS, J. 2010. Bird monitoring at Zackenberg, Northeast Greenland, 2008 – with comparison to 1995-2007. *Bird Populations* 9:1-12.
- HANSEN, J., SCHMIDT, N. M., HANSEN, L. H. AND RENEERKENS, J. 2012. Bird monitoring at Zackenberg, Northeast Greenland, 2009. *Bird Populations*, this issue.
- HANSEN, J. 2011. Disturbances in the study area. In Jensen, L.M. and Rasch, M. (eds.) *Zackenberg Ecological Research Operations, 16th Annual Report, 2010*. Aarhus University, DCE – Danish Centre for Environment and Energy, Roskilde. P. 100-101.
- JOHNSON, D. H. 1979. Estimating nest success: The Mayfield method and an alternative. *Auk* 96:651-661.
- MELTOFTE, H. 2006. Wader populations at Zackenberg, high-arctic Northeast Greenland, 1996-2005. *Dansk Ornitologisk Tidsskrift* 100:16-28.
- SCHMIDT, N. M., BERG, T. B. AND MELTOFTE, H. 2011. BioBasis, Conceptual design and sampling procedures of the biological programme at Zackenberg Basic. 14th ed. National Environmental Research Institute, Department of Arctic Environment, University of Aarhus, Roskilde.
- SIGSGAARD, C., THORSØE, K., LUND, M., SKOV, K., LARSEN, M., PETERSEN, D., HANGAARD, P., FALK, J. M., HANSEN, B. U., MASTEPANOV, M., CHRISTENSEN, T. R., AND TAMSTORF, M. P. 2011. The ClimateBasis and GeoBasis programmes. In Jensen, L.M. and Rasch, M. (eds.) *Zackenberg Ecological Research Operations, 16th Annual Report, 2010*. Aarhus University, DCE – Danish Centre for Environment and Energy, Roskilde. P. 13-32.
- OGILVIE, M. 2011. Breeding success in 2010 of Barnacle Geese wintering on Islay and of Greenland White-fronted Geese wintering on Islay, Jura and Kintyre. Unpublished report, available from the author. <http://www.indaal.demon.co.uk/>

THE 2009 NORTH AMERICAN BREEDING BIRD CENSUS¹

JAMES D. LOWE²

*Cornell Lab of Ornithology
159 Sapsucker Woods Road
Ithaca, NY, 14850 USA*

and

DAVID F. DESANTE

*The Institute for Bird Populations
P.O. Box 1346
Point Reyes Station, CA 94956-1346*

Abstract. The Breeding Bird Census (BBC) is one of the longest, continuously-run bird monitoring programs in North America. Here we publish reports of Breeding Bird Censuses that were conducted at 21 sites during 2009.

EL CENSO DE AVES REPRODUCTORAS DE NORTEAMÉRICA DE 2009

Resumen. El Censo de Aves Reproductoras (BBC) es un de los programas de monitoreo de aves continuo más longevo de Norteamérica. Publicamos los informes del BBC que se llevaron a cabo a 21 sitios en 2009.

INTRODUCTION

The Breeding Bird Census (BBC) is the breeding season component of the Resident Bird Counts (RBC), which also include the Winter Bird Population Study. The BBC uses the spot- or territory-mapping method to estimate densities of breeding birds. More information on methods, history, and uses of BBC data can be found in Lowe (2006).

A total of 21 BBC reports were submitted for 2009, similar to the numbers of submissions during the previous six years (2003 through 2008; 20-25 reports per year). The number of years of study among censuses conducted during 2009 ranged from 1 to 54 yr, with 13 being > 25 yr and with the mean being 26.1 yr.

Please contact Tom Gardali (tgardali@prbo.org) for BBC instructions and data forms. To understand the layout of the reports, see Gardali and Lowe (2006).

THE 2009 BREEDING BIRD CENSUS

A total of 21 Breeding Bird Census reports are included for 2009 (Table 1). The counts come from 5 U.S. states plus the District of Columbia, and 1 Canadian province. The numbers of counts per state or province during 2009 were similar to the numbers of counts per state or province during the previous six years (2003-2008), with the highest numbers being in

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²Corresponding author: JDL6@cornell.edu

California (8 counts) and Connecticut (5 counts), and with 2 counts each in New York, Pennsylvania, and Ontario. The distribution among habitats of the counts conducted during 2009 was also similar to previous years, with most in broadleaf forests (8 counts), followed by mixed habitats (5 counts) and broadleaf/needleleaf forests and shrublands (3 counts each).

LITERATURE CITED

GARDALI, T., AND J.D. LOWE. 2006. Reviving resident bird counts: the 2001 and 2002 Breeding Bird Census. *Bird Populations* 7:90-95.
 LOWE, J.D. 2006. An annotated bibliography of Breeding Bird Census publications. *Bird Populations* 7:128-135.

TABLE 1. Summary of Breeding Bird Census reports from 2009.

Habitat	State/ Prov.	Author(s)	Plot Size (ha)	Terr. per 40 ha	Num. spp.	Hrs. Obs.	Yrs. Study
Broadleaf Forests							
1. Riparian Forest	CA	T. Barbee	9.9	590	15	14.7	1
2. Mixed Hardwood Poletimber	CT	D. Rosgen	8.5	784	56	24.0	44
3. Second-growth Hardwood Forest	CT	D. Rosgen	10.1	477	46	20.0	43
4. Central Hardwood Forest with Scattered Pine	DC	G. Gough	26.3	112	31	22.0	54
5. White Oak Savannah	ON	M.F.G. Clark	10.4	402	23	17.9	12
6. Oak-Maple Ridge-top Forest	PA	D.R. Barber	19.3	78	13	18.5	28
7. Oak-Maple Slope Forest	PA	D.R. Barber	16.9	104	15	17.7	28
8. Virgin Hardwood Swamp Forest	SC	M. Dawson	8.9	326	16	13.5	16
Needleleaf Forests							
9. Upland Christmas Tree Farm	NY	E.W. Brooks	10.7	264	18	12.3	27
Broadleaf/Needleleaf Forests							
10. Climax Hemlock-White Pine Forest with Transition Hardwoods	CT	D. Rosgen	10.5	541	52	22.0	43
11. Young Mixed Hardwood-Conifer Stand	CT	D. Rosgen	8.5	405	37	15.5	32
12. Upland Mixed Pine-Spruce-Hardwood Plantation	NY	E.W. Brooks	16.6	196	29	13.3	36
Mixed Habitats							
13. Riparian Scrub	CA	J. Coumoutso	14.6	286	23	21.6	4
14. Riparian Scrub Basin	CA	M. Aimar	12.7	422	27	16.0	6
15. Streamside Riparian Woodland I	CA	T. Reeser	17.8	435	33	48.8	6
16. Streamside Riparian Woodland III	CA	A. Beckman	12.3	616	36	24.0	6
17. Field, Ridge, Shrubby Trees, and Woods	ON	M.F.G. Clark	5.8	600	18	13.5	14
Non-forested Wetlands							
18. Shrubby Swamp and Sedge Hummocks	CT	D. Rosgen	8.1	1123	52	28.0	43
Shrublands							
19. Coastal Scrub	CA	M. Elrod, I. Koulouris	8.1	284	29	252.7	35
20. Disturbed Coastal Scrub A	CA	A. Wang, I. Koulouris	4.7	366	30	227.2	35
21. Disturbed Coastal Scrub B	CA	M. Kellogg, I. Koulouris	8.1	415	29	373.3	35

BREEDING BIRD CENSUS: 2009

1. RIPARIAN FOREST

BOSQUE RIBEREÑO

TALULA BARBEE

Orange County Water District

14980 River Road

Corona CA 92880

Location: California; Riverside Co.; Riverside; Santa Ana River; 33°57'45"N, 117°27'59"W; Riverside West Quadrangle, USGS. **Continuity:** New. **Size:** 9.9 ha. **Description of Plot:** The irregularly shaped plot is located within the Santa Ana River floodplain. Its longest side is 570 m and its shortest side is 76 m. The plot is comprised of over 75% native flora such as cottonwood, elderberry, and wild grape. The closed canopy is dominated by cottonwood, arroyo willow, and black willow. Mean canopy height, 10 m (range 8–12 m). The understory is dominated by elderberry and arroyo willow, and the dominant ground cover plants are blackberry and wild grape. Roughly 1.8 ha of giant cane (*Arundo donax*) were removed from the plot before the 2009 season, and the site is currently being managed for regrowth. The river has a maximum depth of approximately 1 m. The maximum width is 35 m. **Edge:** Between 51 and 75% of the plot's perimeter is bordered by the same habitat, and the plot lies within a tract of similar habitat >500 ha in size. The plot is bordered by the Santa Ana River, non-native grassland, and the Van Buren Boulevard Bridge. Similar riparian woodlands occur along several miles of the Santa Ana River. Residential and industrial parks are near to the plot as well. **Topography and Elevation:** The plot is nearly level with a slope of <5%. Minimum elevation 202 m, maximum 208 m. **Weather:** Mean start temp., 17.6°C (range 10–22°C). The weather was typical for southern California. No survey visits were conducted within 24 hours of rainfall. **Source:** wind and temperature data were obtained by using a Kestrel weather meter. **Coverage:** 14.7 h; 7 visits (2 sunrise, 0 sunset); 29 April; 1, 8, 15, 22, 29 June; 6 July; 2009. **Census:** Common Yellowthroat, 47.0 (190); Song Sparrow, 23.0 (93); Yellow Warbler, 20.0 (81); American Goldfinch, 14.0 (57); Spotted Towhee, 11.0 (44); Northern Rough-winged Swallow, 7.0 (28); Least Bell's Vireo, 5.0 (20; 2N,5FL); Anna's Hummingbird, 4.0 (16); Bushtit, 4.0; Bewick's Wren, 3.0 (12); Yellow-breasted Chat, 3.0; Nuttall's Woodpecker, 2.0; Black Phoebe, 1.0;

California Towhee, 1.0; House Finch, 1.0. **Total:** 15 species; 146.0 territories (590/40 ha). **Visitors:** Mallard, Cooper's Hawk, Mourning Dove, Black-chinned Hummingbird, Downy Woodpecker, Pacific-slope Flycatcher, House Wren, Black-headed Grosbeak, Blue Grosbeak, Red-winged Blackbird, Bullock's Oriole, Lesser Goldfinch. **Remarks:** Heavy debris racks at this site provided nesting substrate for ground-nesting species. Least Bell's Vireo nesting was monitored at this site. Breeding by two California species of concern, Yellow Warbler and Yellow-breasted Chat, was documented. The site is also managed for removal of invasive plants such as *Arundo donax* and castor bean. **Other Observer:** David McMichael.

2. MIXED HARDWOOD POLETIMBER

BOSQUE MIXTO MADERERO

DAVID ROSGEN

White Memorial Conservation Center

P.O. Box 368

Litchfield CT 06759

Site Number: CT1265009. **Location:** Connecticut; Litchfield Co.; Litchfield; White Memorial Foundation–Wheeler Hill; 41°42'N, 73°13'W; Litchfield Quadrangle, USGS. **Continuity:** Established 1965; 44 yr. **Size:** 8.5 ha. **Description of Plot:** See Aud. Field Notes 19:609–610 (1965), J. Field Ornithol. 64(Suppl.):36 (1993), and Bird Populations 8:125 (2007). Non-native invasive shrubs, vines, and herbaceous plants are continuing to take over this plot. **Weather:** Mean start temp., 21.2°C (range 12–28°C). The weather throughout all of 2009 was much wetter than normal in Connecticut. The months of May, June, and July saw more wet days than dry ones. It was very conducive to vegetation growth, and it helped produce an abundance of seeds, berries, and insects as the season progressed. Rainfall was above average in May with 22 wet days producing a total of 13 cm of rain. The number of wet days remained at 22 in June, but the amount of precipitation increased significantly to 21.6 cm. That's well-above average. In July, there were 19 wet days that produced a total of 29.2 cm of rain. That's also way above average. May's mean temperature was 13.7°C, which is about average. The mean temperature in June was 17.7°C, which is a little below average. In July, the mean temperature was 19.4°C, which is close

to average. **Source:** White Memorial Foundation's weather station. **Coverage:** 24.0 h; 10 visits (0 sunrise, 4 sunset); 8, 15, 22 May; 1, 8, 16, 25 June; 6, 14, 24 July; 2009. Maximum number of observers/visit, 3. **Census:** Ovenbird, 16.5 (78; 2N,13FL); Veery, 16.0 (75; 1N,11FL); Red-eyed Vireo, 15.0 (71; 8FL); Gray Catbird, 13.5 (64; 2N,16FL); American Redstart, 13.0 (61; 4N,22FL); Eastern Towhee, 10.0 (47; 1N,15FL); Common Yellowthroat, 8.5 (40; 12FL); Chestnut-sided Warbler, 5.5 (26; 6FL); Yellow Warbler, 5.0 (24; 2N,12FL); Black-capped Chickadee, 4.5 (21; 2N,20FL); Tufted Titmouse, 4.5 (22FL); American Robin, 4.0 (19; 1N,9FL); Northern Cardinal, 4.0 (1N,7FL); Wood Thrush, 3.5 (16; 1FL); Black-and-white Warbler, 3.5 (7FL); Baltimore Oriole, 3.5 (3N,11FL); Eastern Wood-Pewee, 3.0 (2FL); Cedar Waxwing, 3.0 (1N,2FL); American Goldfinch, 2.5; Blue Jay, 2.0 (2FL); American Crow, 2.0 (1N,7FL); Scarlet Tanager, 2.0 (2FL); Mourning Dove, 1.5; Red-bellied Woodpecker, 1.5 (3FL); Blue-winged Warbler, 1.5 (3FL); Rose-breasted Grosbeak, 1.5 (3FL); Downy Woodpecker, 1.0 (1N,4FL); Eastern Kingbird, 1.0 (1FL); Tree Swallow, 1.0 (1N,5FL); White-breasted Nuthatch, 1.0 (4FL); House Wren, 1.0 (1N,6FL); Blue-gray Gnatcatcher, 1.0 (1N,2FL); Chipping Sparrow, 1.0 (1N,3FL); Song Sparrow, 1.0 (1N,4FL); Red-winged Blackbird, 1.0 (4FL); Common Grackle, 1.0 (1N,4FL); Brown-headed Cowbird, 1.0 (1FL); House Finch, 1.0; Wild Turkey, 0.5; Ruby-throated Hummingbird, 0.5; Yellow-bellied Sapsucker, 0.5; Hairy Woodpecker, 0.5; Great Crested Flycatcher, 0.5; Yellow-throated Vireo, 0.5; Warbling Vireo, 0.5; Broad-winged Hawk, +; Red-tailed Hawk, +; Barred Owl, +; Northern Flicker, +; Pileated Woodpecker, +; Least Flycatcher, +; Fish Crow, +; Eastern Bluebird, +; Louisiana Waterthrush, +; Hooded Warbler, +; Purple Finch, +. **Total:** 56 species; 166.5 territories (784/40 ha). **Visitors:** Eastern Phoebe, Pine Warbler, Yellow-rumped Warbler, Black-throated Green Warbler. **Remarks:** This was another record-setting year for breeding birds in this plot. The total of 56 species was eight more than the previous 10-year average of 48 and nine more than last year. The total of 166.5 territories far surpassed the previous record high of 141.0 set in 2007, was 31.5 more than last year, and was far more than the 10-year average of 110. The growing number of bird feeders and nest boxes at the adjacent campground store, along with continued habitat succession (despite the fact that much of the vegetation is non-native and invasive) may be contributing factors in some of these increases. The most abundant species this year was Ovenbird, which increased by 3.5 territories over last year when it was number three. Veery increased by 2.0 territories from last year but dropped from number one to number two. Red-eyed Vireo moved up to the number three spot this year, from number four last year, with an increase of 2.5 territories. Gray Catbird dropped from number two last year to number four this year even

though its number of territories was unchanged. No species suffered any real significant decreases in number this year. Species found on territory this year but not last year included Broad-winged Hawk, Red-tailed Hawk, Pileated Woodpecker, Tree Swallow (using a new nest box), Fish Crow, Eastern Bluebird, Blue-gray Gnatcatcher, Louisiana Waterthrush (in a seasonal stream that didn't dry up this year), and Hooded Warbler (a first for this plot). There weren't any species found last year but not this year. Nesting success was fantastic this year with a total of 254 fledglings from 35 different species being detected. That is quite a bit better than last year's 198 fledglings from 30 species. **Other Observers:** John Eykelhoff and John Grabowski. **Acknowledgments:** Samantha Foster and Ashley Hayes helped type the original report.

3. SECOND-GROWTH HARDWOOD FOREST BOSQUE SECUNDARIO DE MADERAS DURAS

DAVID ROSGEN

White Memorial Conservation Center

P.O. Box 368

Litchfield CT 06759

Site Number: CT2765006. **Location:** Connecticut; Litchfield Co.; Morris; White Memorial Foundation–Van Winkle Road; 41°42'N, 73°12'W; Litchfield Quadrangle, USGS. **Continuity:** Established 1965; 43 yr. **Size:** 10.1 ha. **Description of Plot:** See Aud. Field Notes 19:590–591 (1965), J. Field Ornithol. 64(Suppl.):37–38 (1993), and Bird Populations 8:126 (2007). Frequent flooding of the brooks that flow through the plot has deposited quite a bit of silt which hasn't been good for native herbaceous plants. Non-native invasive species like Garlic Mustard are thriving. **Weather:** Mean start temp., 19.1°C (range 15–22°C). The weather throughout all of 2009 was much wetter than normal in Connecticut. The months of May, June, and July saw more wet days than dry ones. It was very conducive to vegetation growth, and it helped produce an abundance of seeds, berries, and insects as the season progressed. Rainfall was above average in May with 22 wet days producing a total of 13 cm of rain. The number of wet days remained at 22 in June, but the amount of precipitation increased significantly to 21.6 cm. That's well-above average. In July, there were 19 wet days that produced a total of 29.2 cm of rain. That's also way above average. May's mean temperature was 13.7°C, which is about average. The mean temperature in June was 17.7°C, which is a little below average. In July, the mean temperature was 19.4°C, which is close to average. **Source:** White Memorial Foundation's weather station. **Coverage:** 20.0 h; 10 visits (0 sunrise, 6 sunset); 11, 21 May; 1, 8, 19, 26 June; 5, 13, 23, 30 July; 2009. **Census:** Veery, 18.5 (73; 8FL); Ovenbird, 18.0 (71; 3N,19FL); Red-eyed Vireo, 16.5 (65; 8FL); Wood Thrush, 6.0 (24; 2FL); Yellow-bellied Sapsucker, 5.0 (20;

4N,13FL); Eastern Wood-Pewee, 4.5 (18; 1N,2FL); Scarlet Tanager, 4.5 (3FL); Great Crested Flycatcher, 3.5 (14; 6FL); Tufted Titmouse, 3.5 (1N,12FL); American Robin, 3.5 (1N,5FL); Black-capped Chickadee, 3.0 (12; 2N,11FL); Gray Catbird, 3.0 (1N,5FL); Black-and-white Warbler, 2.5 (7FL); Northern Cardinal, 2.5 (2N,8FL); Red-bellied Woodpecker, 2.0 (1N,3FL); Blue Jay, 2.0 (1N,5FL); American Crow, 2.0 (1N,6FL); Cedar Waxwing, 2.0 (2FL); Eastern Phoebe, 1.5 (6FL); Black-throated Green Warbler, 1.5 (1FL); Downy Woodpecker, 1.0 (1N,4FL); Hairy Woodpecker, 1.0 (1N,3FL); White-breasted Nuthatch, 1.0 (1N,5FL); American Redstart, 1.0 (1N,7FL); Chipping Sparrow, 1.0 (2FL); Song Sparrow, 1.0 (4FL); Rose-breasted Grosbeak, 1.0; Brown-headed Cowbird, 1.0 (1FL); Baltimore Oriole, 1.0 (2N,6FL); Mourning Dove, 0.5; Northern Flicker, 0.5; Pileated Woodpecker, 0.5; Blue-headed Vireo, 0.5; Brown Creeper, 0.5 (4FL); Blue-gray Gnatcatcher, 0.5 (3FL); Hermit Thrush, 0.5; Northern Waterthrush, 0.5 (2FL); Common Yellowthroat, 0.5; Chestnut-sided Warbler, 0.5 (2FL); Pine Warbler, 0.5 (2FL); American Goldfinch, 0.5; Wild Turkey, +; Barred Owl, + (3FL); Yellow-throated Vireo, +; Blue-winged Warbler, +; Blackburnian Warbler, +. **Total:** 46 species; 120.5 territories (477/40 ha). **Visitors:** Wood Duck, Red-tailed Hawk, Louisiana Waterthrush, Magnolia Warbler, Eastern Towhee, Indigo Bunting. **Remarks:** This formerly stable plot saw another big increase in the number of territorial males this year despite a slight decrease in the number of species from 47 last year to 46 this year. The number of territories went from 103.0 last year to a record high 120.5 this year. That's far more than the previous 10-year average of 92 which was impacted by three bad years (2004, 2005, and 2006). The number of species found those years was also less than average, but the numbers now are in line with the long-term average. We still don't know what went wrong in those years. This year, things went right for the birds with good weather favoring breeding success. Veery remained the most abundant species this year, and its number of territories increased by 1.0. Ovenbird remained in the number two spot despite increasing by 2.5 territories. Red-eyed Vireo remained in the number three spot and increased by 1.5 territories. Most of the rest of the top ten species either increased in number or remained stable. No species saw any significant decrease in number. Species found on territory this year but not last year included Barred Owl, Brown Creeper, Blue-gray Gnatcatcher, Blue-winged Warbler, and Blackburnian Warbler. Species found on territory last year but not this year included Red-tailed Hawk, Eastern Kingbird, Louisiana Waterthrush, Magnolia Warbler, Yellow-rumped Warbler, and Eastern Towhee. Breeding success was excellent this year with a total of 180 fledglings from 34 different species being detected. Last year, 159 fledglings from 28 species were detected. **Other Observer:** John Eykelhoff. **Acknowledgments:**

Samantha Foster and Ashley Hayes helped type the original report.

4. CENTRAL HARDWOOD FOREST WITH SCATTERED PINE

BOSQUE CENTRAL DE MADERAS DURAS CON PINOS DISPERSOS

GREGORY GOUGH

Smithsonian Migratory Bird Center, National Zoological Park

P.O. Box 37012-MRC 5503

Washington DC 20013

Location: District of Columbia; Washington; Rock Creek Park; 38°57'N, 77°3'W; Washington West Quadrangle, USGS. **Continuity:** Established 1948; 54 yr. **Size:** 26.3 ha. **Description of Plot:** See Aud. Field Notes 2:153–154 (1948). **Weather:** Mean start temp., 15°C (range 4–22°C). **Coverage:** 22.0 h; 22 visits (2 sunrise, 0 sunset); 24, 31 March; 9, 13, 16, 21, 28 April; 6, 13, 20, 28 May; 1, 3, 8, 10, 12, 18, 22, 24, 26, 29 June; 1 July; 2009. Maximum number of observers/visit, 3. **Census:** American Robin, 11.5 (17; 8N); Acadian Flycatcher, 10.0 (15; 3N); Blue-gray Gnatcatcher, 8.0 (12); Red-eyed Vireo, 6.5 (10); Carolina Chickadee, 5.0 (8); Tufted Titmouse, 5.0; Red-bellied Woodpecker, 4.0 (6); Downy Woodpecker, 3.0 (5); Eastern Wood-Pewee, 2.5; Brown-headed Cowbird, 2.5 (2FL); Yellow-throated Vireo, 2.0; White-breasted Nuthatch, 2.0; Wood Thrush, 2.0 (2N); Ovenbird, 2.0; Northern Cardinal, 1.5 (1N); Hairy Woodpecker, 1.0; Northern Flicker, 1.0; Pileated Woodpecker, 1.0; Great Crested Flycatcher, 1.0; Scarlet Tanager, 1.0; Yellow-billed Cuckoo, 0.5; Carolina Wren, 0.5; Red-shouldered Hawk, +; Mourning Dove, +; Chimney Swift, +; Ruby-throated Hummingbird, +; Eastern Phoebe, +; Blue Jay, +; American Crow, +; Common Grackle, +; Baltimore Oriole, +. **Total:** 31 species; 73.5 territories (112/40 ha). **Visitors:** Black-throated Blue Warbler. **Remarks:** American Robins appear to be colonizing the forest plot; they were the most abundant species in 2009 but had no territories from 1973–1981. The last census, in 2002, recorded 1.0 territory. Other thrushes, Veery and Wood Thrush, are in decline. Veery went unrecorded, and there were only 2.0 Wood Thrush territories. A Black-throated Blue Warbler appeared once on 24 June. **Other Observers:** Bob Ford and Bill Yeaman.

5. WHITE OAK SAVANNAH

SAVANA DE ROBLE BLANCO

MICHAEL F. G. CLARK

101 Governor's Road, #708

Dundas ON L9H 6L7

Site Number: ON2893110. **Location:** Ontario; Municipality of Muskoka; Torrance; Southwood Shield

Plateau; 44°56'N, 79°30'W. **Continuity:** Established 1993; 12 yr. **Size:** 10.4 ha. **Description of Plot:** See J. Field Ornithol. 65(Suppl.):60–61 (1994) and Bird Populations 8:127–128 (2007). **Weather:** Mean start temp., 12.6°C (range 9–17°C). Temperatures were about 1°C below the norm each month. Rainfall was 18% over the norm for the 3-month study period. June's rainfall was 23% below the norm, and July's was 76% over the norm. **Source:** Environment Canada. **Coverage:** 17.9 h; 10 visits (0 sunrise, 1 sunset); 17, 30 May; 6, 8, 10(2), 11(2) June; 13, 14 July; 2009. **Census:** Chestnut-sided Warbler, 19.0 (73); American Robin, 10.0 (38); Red-eyed Vireo, 9.0 (35); Chipping Sparrow, 8.0 (31); Field Sparrow, 8.0; Yellow-rumped Warbler, 6.5 (25); Brown Thrasher, 6.0 (23); American Redstart, 6.0; Eastern Towhee, 6.0; Common Yellowthroat, 5.5 (21); Black-capped Chickadee, 4.5 (17); Song Sparrow, 4.0 (15); Veery, 3.0 (12); cuckoo sp., 1.0; Eastern Whip-poor-will, 1.0; Northern Flicker, 1.0; Great Crested Flycatcher, 1.0; Eastern Bluebird, 1.0; Gray Catbird, 1.0; Brown-headed Cowbird, 1.0; American Goldfinch, 1.0; Rose-breasted Grosbeak, 0.5; Red-winged Blackbird, 0.5. **Total:** 23 species; 104.5 territories (402/40 ha). **Visitors:** Killdeer, Common Nighthawk, Hairy Woodpecker, Eastern Kingbird, Blue Jay, White-breasted Nuthatch, Hermit Thrush, Ovenbird, Yellow Warbler, Scarlet Tanager, Baltimore Oriole. **Remarks:** Resurgent breeding warbler numbers continue to be the story on this plot. Both the 37 total warbler pairs and the 19 Chestnut-sided Warbler pairs set new plot highs (the latter for all species). The four Song Sparrow pairs was the highest count in nine years. Rose-breasted Grosbeak bred for only the second time on the plot, and Gray Catbird bred for the first time since 2000. The 104.5 total territories is the plot's third highest, with the total warbler territories (37.0; 4 species) dominating the seedeaters (27.5 territories; 6 species) for the third year running. The total of 23 breeding species is at the 12-year average.

6. OAK-MAPLE RIDGE-TOP FOREST

BOSQUE DE ROBLE-ARCE DE TOPE DE COLINAS

DAVID R. BARBER

Acopian Center for Conservation Learning

Hawk Mountain Sanctuary

410 Summer Valley Road

Orwigsburg PA 17961

Site Number: PA1382312. **Location:** Pennsylvania; Berks Co.; Eckville; Owl's Head; 40°44'N 75°50'W; New Ringgold Quadrangle, USGS. **Continuity:** Established 1982; 28 yr. **Size:** 19.3 ha. **Description of Plot:** See Am. Birds 37:55 (1983). **Weather:** Mean start temp., 11.8°C (range 0–21°C). **Coverage:** 18.5 h; 10 visits (10 sunrise); 16, 23 April; 19, 29 May; 10, 15, 17, 19, 22, 25 June; 2009. **Census:** Ovenbird, 15.0 (31); Red-eyed Vireo, 7.0 (15); Scarlet Tanager, 3.5 (7); Great

Crested Flycatcher, 3.0 (6); Eastern Towhee, 1.5; Indigo Bunting, 1.5; Eastern Wood-Pewee, 1.0; Blue Jay, 1.0; Wood Thrush, 1.0; Black-and-white Warbler, 1.0; Rose-breasted Grosbeak, 1.0; Downy Woodpecker, 0.5 (1N); Common Yellowthroat, 0.5. **Total:** 13 species; 37.5 territories (78/40 ha). **Visitors:** Mourning Dove, Common Raven, Black-capped Chickadee, Tufted Titmouse, White-breasted Nuthatch, Hermit Thrush, Gray Catbird, Cedar Waxwing, Hooded Warbler, American Redstart, Brown-headed Cowbird, American Goldfinch. **Other Observers:** Sue Schmoeyer and Mike Ward.

7. OAK-MAPLE SLOPE FOREST

BOSQUE DE ROBLE-ARCE DE LADERAS

DAVID R. BARBER

Acopian Center for Conservation Learning

Hawk Mountain Sanctuary

410 Summer Valley Road

Orwigsburg PA 17961

Site Number: PA1382313. **Location:** Pennsylvania; Berks Co.; Eckville; River of Rocks; 40°45'N 75°50'W; New Ringgold Quadrangle, USGS. **Continuity:** Established 1982; 28 yr. **Size:** 16.9 ha. **Description of Plot:** See Am. Birds 37:55 (1983). **Weather:** Mean start temp., 12.7°C (range 5–17°C). **Coverage:** 17.7 h; 10 visits (10 sunrise); 17, 24 April; 15, 30 May; 2, 4, 11, 16, 23, 30 June; 2009. **Census:** Red-eyed Vireo, 11.0 (26); Ovenbird, 8.0 (19); Scarlet Tanager, 3.5 (8); Eastern Wood-Pewee, 3.0 (7); Black-throated Green Warbler, 3.0; Blue-headed Vireo, 2.5; Blue-gray Gnatcatcher, 2.0; Wood Thrush, 2.0; Black-and-white Warbler, 2.0; Brown-headed Cowbird, 2.0; Downy Woodpecker, 1.0 (1N); Northern Flicker, 1.0 (1N); Tufted Titmouse, 1.0; White-breasted Nuthatch, 1.0; Rose-breasted Grosbeak, 1.0. **Total:** 15 species; 44.0 territories (104/40 ha). **Visitors:** Mourning Dove, Yellow-billed Cuckoo, Ruby-throated Hummingbird, Hairy Woodpecker, Pileated Woodpecker, Great Crested Flycatcher, Blue Jay, Black-capped Chickadee, Hermit Thrush, American Robin, Cedar Waxwing, Hooded Warbler, American Redstart. **Other Observers:** Laurie Goodrich and Dave Krueel.

8. VIRGIN HARDWOOD SWAMP FOREST

BOSQUE PANTANOSO VIRGEN DE MADERAS
DURAS

MICHAEL DAWSON

Audubon Center at Francis Beidler Forest

336 Sanctuary Road

Harleyville SC 29448

Location: South Carolina; Dorchester Co.; Harleyville; Francis Beidler Forest Sanctuary; 33°13'N, 80°20'W; Pringletown Quadrangle, USGS. **Continuity:**

Established 1979; 16 yr. **Size:** 8.9 ha. **Description of Plot:** See Am. Birds 34:50 (1980) and J. Field Ornithol. 65(Suppl.):64 (1994). The plot is continuing to recover from the damage caused by hurricane Hugo in 1989. Scrubby areas have thinned greatly as saplings have increased in height and shaded the forest floor. **Weather:** Mean start temp., 17.2°C (range 13–19°C). The weather was seasonable. Water levels were slightly higher than average for the season. **Coverage:** 13.5 h; 9 visits (9 sunrise, 0 sunset); 30 April; 6, 7, 15, 21, 26, 27 May; 2, 4, June; 2009. **Census:** Blue-gray Gnatcatcher, 23.0 (103); Northern Parula, 6.5 (29); White-eyed Vireo, 5.5 (25); Red-eyed Vireo, 4.5 (20); Tufted Titmouse, 4.5; Acadian Flycatcher, 4.0 (18); Great Crested Flycatcher, 4.0; Red-bellied Woodpecker, 3.5 (16); Carolina Wren, 3.5; Pileated Woodpecker, 3.0 (13); Prothonotary Warbler, 3.0; Northern Cardinal, 3.0; Hooded Warbler, 2.0; Downy Woodpecker, 1.0; American Crow, 1.0; Swainson's Warbler, 0.5. **Total:** 16 species; 72.5 territories (326/40 ha). **Visitors:** Wood Duck, Yellow-crowned Night-Heron, White Ibis, Red-shouldered Hawk, Yellow-billed Cuckoo, Barred Owl, Kentucky Warbler, Summer Tanager. **Other Observer:** Norman Brunswig.

9. UPLAND CHRISTMAS TREE FARM

FINCAS DE ARBOLES DE NAVIDAD DE ALTURAS

ELIZABETH W. BROOKS

5540 Jericho Hill Road

Alfred Station NY 14803

Site Number: NY2483108. **Location:** New York, Allegany Co., Andover; Kent Christmas Tree Farm; 42°10'N, 77°50'W; Andover Quadrangle, USGS. **Continuity:** Established 1983; 27 yr. **Size:** 10.7 ha. **Description of Plot:** See Am. Birds 38:91(1984). During the previous two years, all the Scotch pine trees in the study area were removed and either burned or left in large piles to decompose. **Weather:** Mean start temp. 17.9°C (range 12.2–25.6°C). **Coverage:** 12.3 h; 8 visits plus 1 woodcock survey (0 sunrise, 1 sunset); 9 April; 6, 15, 23 June; 6, 13, 20, 27 July; 3 August; 2009. **Census:** Chipping Sparrow, 15.0 (56; 2N,3FL); Song Sparrow, 14.0 (52); American Robin, 7.0 (26; 1N,3FL); Yellow-rumped Warbler, 7.0; Cedar Waxwing, 5.0 (19); Purple Finch, 5.0; Magnolia Warbler, 3.0 (11); American Goldfinch, 3.0; Eastern Towhee, 2.0 (1N,3FL); Field Sparrow, 2.0; Brown-headed Cowbird, 2.0 (females); American Woodcock, 1.0; Mourning Dove, 1.0; Savannah Sparrow, 1.0; Red-winged Blackbird, 1.0; Common Yellowthroat, 0.5; Indigo Bunting, 0.5; Bobolink, 0.5. **Total:** 18 species; 70.5 territories (264/40 ha). **Visitors:** Northern Harrier, Killdeer, Black-billed Cuckoo, Yellow-bellied Sapsucker, Eastern Kingbird, Red-eyed Vireo, Blue Jay, American Crow, Black-capped Chickadee, Prairie Warbler, Common Grackle, Pine Siskin. **Remarks:** The

number of territories (70.5) was above the 26-year average of 67.3 territories. There were no new species recorded in the study area. Because of a potential insect pest, all the Scotch pine trees in the study area were removed and either burned or left in large piles to decompose during the previous two years. Most birds preferred to nest in spruce rather than Scotch pine, and most of the removed Scotch pines were over 4 m tall and not normally used by birds for nest sites, so the removal of the Scotch pine trees had little effect on nesting activity. No nests were found parasitized by cowbirds. **Acknowledgments:** Appreciation to Rick Walker and Dennis Smith for weather data and to Tom and Kathy Kent for their continued interest and permission to conduct the study on their land.

10. CLIMAX HEMLOCK-WHITE PINE FOREST WITH TRANSITION HARDWOODS

BOSQUE CLIMAX DE PICEA-PINO BLANCO EN TRANSICION A MADERAS DURAS

DAVID ROSGEN

White Memorial Conservation Center

P.O. Box 368

Litchfield CT 06759

Site Number: CT2765008. **Location:** Connecticut; Litchfield Co.; Litchfield; White Memorial Foundation-Catlin Woods; 41°43'N, 73°12'W; Litchfield Quadrangle, USGS. **Continuity:** Established 1965; 43 yr. **Size:** 10.5 ha. **Description of Plot:** See Aud. Field Notes 19:594–595 (1965), J. Field Ornithol. 67(Suppl.):60 (1996), and Bird Populations 8:129–130 (2007). The vegetation was resurveyed in 1990 and 2004, but the results have not been published. More storm damage has occurred which has increased the number of blow-downs. Succession is continuing in places opened up by previous blow-downs. **Weather:** Mean start temp., 20.3°C (range 14–26°C). The weather throughout all of 2009 was much wetter than normal in Connecticut. The months of May, June, and July saw more wet days than dry ones. It was very conducive to vegetation growth, and it helped produce an abundance of seeds, berries, and insects as the season progressed. Rainfall was above average in May with 22 wet days producing a total of 13 cm of rain. The number of wet days remained at 22 in June, but the amount of precipitation increased significantly to 21.6 cm. That's well-above average. In July, there were 19 wet days that produced a total of 29.2 cm of rain. That's also way above average. May's mean temperature was 13.7°C, which is about average. The mean temperature in June was 17.7°C, which is a little below average. In July, the mean temperature was 19.4°C, which is close to average. **Source:** White Memorial Foundation's weather station. **Coverage:** 22.0 h; 11 visits (0 sunrise, 7 sunset); 7, 15, 22, 30 May; 11, 23 June; 5, 14, 20, 30 July; 4 August; 2009. **Census:** Ovenbird, 18.0 (69; 4N,22FL);

Veery, 17.0 (65; 15FL); Black-throated Green Warbler, 14.0 (53; 5N,19FL); Red-eyed Vireo, 12.0 (46; 7FL); Hermit Thrush, 10.0 (38; 7FL); Wood Thrush, 7.5 (1N,9FL); Blackburnian Warbler, 6.5 (25; 2FL); Scarlet Tanager, 4.5 (3FL); Great Crested Flycatcher, 4.0 (15; 4FL); Pine Warbler, 4.0 (7FL); Black-capped Chickadee, 3.5 (13; 1N,22FL); Blue-headed Vireo, 3.0 (11); Mourning Dove, 2.5; Eastern Wood-Pewee, 2.5 (1N,2FL); American Robin, 2.5 (2N,11FL); Gray Catbird, 2.5 (4FL); Black-and-white Warbler, 2.5 (3FL); Blue Jay, 2.0 (5FL); Cedar Waxwing, 2.0 (2FL); Northern Cardinal, 2.0 (1N,5FL); Yellow-bellied Sapsucker, 1.5 (1FL); Downy Woodpecker, 1.5 (1FL); Hairy Woodpecker, 1.5 (4FL); American Crow, 1.5 (2FL); Tufted Titmouse, 1.5 (8FL); Common Yellowthroat, 1.5 (2FL); Yellow-rumped Warbler, 1.5 (1N,3FL); Pileated Woodpecker, 1.0 (1N,3FL); Chipping Sparrow, 1.0 (4FL); American Goldfinch, 1.0; Wild Turkey, 0.5; Great Horned Owl, 0.5 (3FL); Red-bellied Woodpecker, 0.5; White-breasted Nuthatch, 0.5; Brown Creeper, 0.5 (5FL); Blue-gray Gnatcatcher, 0.5 (3FL); Worm-eating Warbler, 0.5; Blue-winged Warbler, 0.5 (3FL); Chestnut-sided Warbler, 0.5 (3FL); Baltimore Oriole, 0.5; Purple Finch, 0.5; Pine Siskin, 0.5 (4FL); Barred Owl, +; Northern Flicker, +; Eastern Kingbird, +; Winter Wren, +; Golden-crowned Kinglet, +; Black-throated Blue Warbler, +; Dark-eyed Junco, +; Rose-breasted Grosbeak, +; Common Grackle, +; Brown-headed Cowbird, +. **Total:** 52 species; 142.0 territories (541/40 ha). **Visitors:** Broad-winged Hawk, Fish Crow. **Remarks:** A total of 52 species, 142.0 territories, 17 active nests, and 198 fledglings were found this year. The species and territory totals are new record highs, and the numbers of nests and fledglings detected are above average. Last year, 46 species and 133.0 territories were found in this plot. This year's increase is probably due to very good weather conditions for much of the breeding season. The most abundant species changed their order this year with Ovenbird increasing by 2.0 territories to move into the top spot. Veery dropped to number two even though its number of territories was unchanged, and Black-throated Green Warbler dropped to number three, because it lost 2.5 territories. Red-eyed Vireo remained in fourth place despite increasing by 2.0 territories. Hermit Thrush also increased by 2.0 territories, but remained in fifth place. This is a new record high for Hermit Thrush which has been on an increasing trend for many years. Species found on territory this year but not last year included Blue-gray Gnatcatcher, Blue-winged Warbler (extending its territory from more suitable habitat on the south side of Webster Road), Pine Siskin (leftover from last winter's irruption), and Baltimore Oriole (a visitor last year). Species found last year but not this year included Red-tailed Hawk, Least Flycatcher, Northern Waterthrush, and Yellow Warbler. **Other Observer:** John Eykelhoff.

11. YOUNG MIXED HARDWOOD-CONIFER STAND

BOSQUE JOVEN-MIXTO DE MADERAS
DURAS/RODAL DE CONIFEROS

DAVID ROSEN

White Memorial Conservation Center

P.O. Box 368

Litchfield CT 06759

Site Number: CT2778262. **Location:** Connecticut; Litchfield Co.; Morris; White Memorial Foundation-Pitch Road; 41°42'N, 73°10'W; Litchfield Quadrangle, USGS. **Continuity:** Established 1978; 32 yr. **Size:** 8.5 ha. **Description of Plot:** See Am. Birds 33:72 (1979). The plot has suffered further degradation in the form of torn-up ground and broken trees, shrubs, and herbaceous plants from a constant onslaught of ATV, dirt bike, and 4-wheel-drive truck traffic. This is despite our best efforts to block them from gaining access to the plot. **Weather:** Mean start temp., 20.9°C (range 15–25°C). The weather throughout all of 2009 was much wetter than normal in Connecticut. The months of May, June, and July saw more wet days than dry ones. It was very conducive to vegetation growth, and it helped produce an abundance of seeds, berries, and insects as the season progressed. Rainfall was above average in May with 22 wet days producing a total of 13 cm of rain. The number of wet days remained at 22 in June, but the amount of precipitation increased significantly to 21.6 cm. That's well-above average. In July, there were 19 wet days that produced a total of 29.2 cm of rain. That's also way above average. May's mean temperature was 13.7°C, which is about average. The mean temperature in June was 17.7°C, which is a little below average. In July, the mean temperature was 19.4°C, which is close to average. **Source:** White Memorial Foundation's weather station. **Coverage:** 15.5 h; 8 visits (1 sunrise, 4 sunset); 2, 14, 25 June; 6, 15, 24, 30 July; 4 August; 2009. **Census:** Red-eyed Vireo, 13.5 (64; 1N,7FL); Veery, 12.0 (56; 5FL); Ovenbird, 10.0 (47; 2N,9FL); Wood Thrush, 5.0 (24; 1FL); Black-capped Chickadee, 4.0 (19; 14FL); Tufted Titmouse, 4.0 (18FL); American Robin, 3.5 (16; 4N,14FL); Scarlet Tanager, 3.5; Gray Catbird, 3.0 (14; 1N,5FL); Eastern Wood-Pewee, 2.0 (2FL); Hermit Thrush, 2.0; Chipping Sparrow, 2.0 (3FL); Yellow-bellied Sapsucker, 1.5; Downy Woodpecker, 1.5 (1FL); Blue Jay, 1.5; White-breasted Nuthatch, 1.5 (6FL); Cedar Waxwing, 1.5; Common Yellowthroat, 1.5; American Redstart, 1.5; Northern Cardinal, 1.5 (2FL); Red-bellied Woodpecker, 1.0; American Crow, 1.0 (3FL); Black-throated Green Warbler, 1.0; Rose-breasted Grosbeak, 1.0; American Goldfinch, 1.0; Mourning Dove, 0.5; Hairy Woodpecker, 0.5; Eastern Phoebe, 0.5 (1FL); Great Crested Flycatcher, 0.5; Blue-headed Vireo, 0.5; Golden-crowned Kinglet, 0.5 (1N,3FL); Louisiana Waterthrush, 0.5 (2FL); Black-and-white Warbler, 0.5;

Song Sparrow, 0.5; Barred Owl, +; Black-throated Blue Warbler, +; Brown-headed Cowbird, +. **Total:** 37 species; 86.0 territories (405/40 ha). **Visitors:** Blackburnian Warbler. **Remarks:** The number of species found this year rebounded slightly to 37, but that is still below the 10-year average of 42. The total number of territorial males also rebounded. This year, 86.0 were recorded. That is 9.5 more than last year and 13.5 territories over the previous 10-year average. It is, however, still well below the numbers recorded from 1979 through 2003. It was in 2004 that ATVs, dirt bikes, and 4-wheelers started destroying the plot. Red-eyed Vireo remained the most abundant species this year and increased by 1.5 territories over last year. Veery moved up to second place with an increase of 1.0 territory over last year. Ovenbird dropped to third place with a decrease of 1.5 territories from last year. Species found here this year but not last year included Cedar Waxwing, Golden-crowned Kinglet, and Song Sparrow. The only species found last year but not this year was Pine Warbler. **Other Observer:** Russ Naylor. **Acknowledgments:** Samantha Foster and Ashley Hayes helped type the original report.

12. UPLAND MIXED PINE-SPRUCE-HARDWOOD PLANTATION

PLANTACION MIXTA DE PINO-ABETO-MADERAS DURAS EN ALTURAS

ELIZABETH W. BROOKS
5540 Jericho Hill Road
Alfred Station NY 14803

Site Number: NY2474107. **Location:** New York; Allegany Co., Ward; Phillips Creek State Reforestation Tract; 42°8'N, 77°45'W; Andover Quadrangle, USGS. **Continuity:** Established 1974; 36 yr. **Size:** 16.6 ha. **Description of Plot:** See *Am. Birds* 28:699-700 (1974), *J. Field Ornithol.* 63(Suppl.):79-80 (1992) and 66(Suppl.):79-80 (1995), *Bird Populations* 10:130-131 (2010). **Weather:** Mean start temp., 14.2°C (range 11.1-22.2°C). **Coverage:** 13.3 h; 9 visits (1 sunrise, 5 sunset); 31 May; 7, 14, 22, 28 June; 4, 12, 19, 26 July; 2009. **Census:** Black-throated Green Warbler, 7.0 (17); Dark-eyed Junco, 7.0; Blackburnian Warbler, 6.0 (14); Common Yellowthroat, 5.0 (12); Magnolia Warbler, 5.0; Blue Jay, 4.0 (10); Ovenbird, 4.0; Yellow-rumped Warbler, 4.0; Purple Finch, 4.0; Blue-headed Vireo, 3.5 (8); Black-capped Chickadee, 3.0 (7); Red-breasted Nuthatch, 3.0; Winter Wren, 3.0; Brown Creeper, 2.0; Golden-crowned Kinglet, 2.0; Hermit Thrush, 2.0; American Robin, 2.0; Chestnut-sided Warbler, 2.0; Chipping Sparrow, 2.0; Yellow-bellied Sapsucker, 1.5; Mourning Warbler, 1.5; Red-shouldered Hawk, 1.0; Great Crested Flycatcher, 1.0; American Crow, 1.0; Cedar Waxwing, 1.0; Song Sparrow, 1.0; Scarlet Tanager, 1.0; Indigo Bunting, 1.0; American Goldfinch, 1.0. **Total:** 29 species; 81.5 territories (196/40 ha).

Visitors: Broad-winged Hawk, Ruby-throated Hummingbird, Downy Woodpecker, Eastern Wood-pewee, Eastern Phoebe, Common Raven, House Wren, Veery, Gray Catbird, Canada Warbler, Rose-breasted Grosbeak. **Remarks:** The total number of territories (81.5) was down from the 35-year average (86.8). There were no new species recorded in the study area. Wood Thrush was missing after being reported in 30 of the past 34 years; Purple Finch had the highest number of territorial males (4) ever recorded. **Acknowledgments:** Appreciation to Rick Walker and Dennis Smith for weather data.

13. RIPARIAN SCRUB

MATORRAL RIBEREÑO

JILL COUMOUTSO

Santa Ana Watershed Association
P.O. Box 219
Chino CA 91708

Location: California; Riverside Co.; Norco; Norco Burn; 33°57'29"N, 117°31'56"W; Corona North Quadrangle, USGS. **Continuity:** Established 2006; 4 yr. **Size:** 14.6 ha. **Description of Plot:** See *Bird Populations* 9:192 (2009). **Weather:** Mean start temp., 17.9°C (range 11.2-25.3°C). Temperatures were mild, as typical for southern California's Mediterranean climate. **Source:** a Kestrel 3000 was used to measure temperature and wind speed. **Coverage:** 21.6 h; 8 visits (0 sunrise, 0 sunset); 26 March; 13, 30 April; 14, 28 May; 11, 24 June; 13 July; 2009. **Census:** Anna's Hummingbird, 13.0 (36); Least Bell's Vireo, 13.0 (17N,45FL); Yellow Warbler, 11.0 (30; 1N,1FL); Song Sparrow, 11.0; Spotted Towhee, 9.0 (25; 2FL); House Wren, 8.0 (22; 2N); Yellow-breasted Chat, 7.0 (19; 1FL); Black-headed Grosbeak, 6.0 (16); Common Yellowthroat, 5.0 (14); Mourning Dove, 4.0 (11; 1N); California Towhee, 3.0 (8); House Finch, 3.0; Lesser Goldfinch, 2.0; American Goldfinch, 2.0; Cooper's Hawk, 1.5; Nuttall's Woodpecker, 1.0 (1N); Pacific-slope Flycatcher, 1.0; Bewick's Wren, 1.0 (1FL); California Thrasher, 1.0; Northern Flicker, 0.5; Say's Phoebe, 0.5; Tree Swallow, 0.5 (1N); Western Bluebird, 0.5 (1N). **Total:** 23 species; 104.5 territories (286/40 ha). **Visitors:** Red-tailed Hawk, Eurasian Collared-Dove, Common Ground-Dove, Black-chinned Hummingbird, Downy Woodpecker, Western Wood-pewee, Willow Flycatcher, Black Phoebe, Ash-throated Flycatcher, Cassin's Kingbird, Warbling Vireo, Western Scrub-Jay, Barn Swallow, Bushtit, American Robin, Northern Mockingbird, Orange-crowned Warbler, Western Tanager, Blue Grosbeak, Hooded Oriole, Bullock's Oriole. **Remarks:** The endangered Least Bell's Vireo and Anna's Hummingbird were the most abundant breeders on the plot. The high number of vireos is probably due to an increase in population across the entire site, which

allowed it to go from third most abundant species last year to most abundant this year. In addition to winter and breeding bird surveys, this site is currently being monitored for the nests of Least Bell's Vireo. Other species of concern that bred on the plot included Yellow-breasted Chat and Yellow Warbler. One Yellow Warbler nest was located which fledged at least one young. This site continues to be treated for Arundo re-growth on a yearly basis. A Brown-headed Cowbird trap was present adjacent to the plot for the entire breeding season.

14. RIPARIAN SCRUB BASIN CUENCA CON MATORRAL RIBEREÑO

MELODY AIMAR

Santa Ana Watershed Association
6075 Kimball Avenue, Bldg. D
Chino CA 91708

Location: California; Riverside Co.; Riverside; Mockingbird Canyon; 33°53'33"N, 117°24'47"W; Riverside West Quadrangle, USGS. **Continuity:** Established 2004; 6 yr. **Size:** 12.7 ha. **Description of Plot:** See Bird Populations 8:142-143 (2007). **Weather:** Mean start temp., 20.3°C (range 14-27°C). Temperatures were mild, as is typical for southern California's Mediterranean climate. There was no precipitation within 24 hours of survey visits. **Coverage:** 16.0 h; 8 visits (0 sunrise, 0 sunset); 11 March; 1, 8 April; 19 May; 11, 17 June; 2, 14 July; 2009. **Census:** Bewick's Wren, 20.0 (63; 3FL); California Towhee, 16.5 (52; 1FL); Song Sparrow, 12.5 (39); Spotted Towhee, 12.0 (38); Anna's Hummingbird, 10.0 (31); California Quail, 7.0 (22); Black-headed Grosbeak, 7.0 (2FL); Lesser Goldfinch, 7.0; Bushtit, 5.0 (16); California Thrasher, 4.5 (14); Nuttall's Woodpecker, 4.0 (13); Phainopepla, 4.0; Common Yellowthroat, 4.0; Western Scrub-Jay, 3.0 (9); Hooded Oriole, 3.0 (1FL); Black-chinned Hummingbird, 2.5; Mourning Dove, 2.0; Black Phoebe, 2.0 (1N); House Finch, 2.0 (2FL); Northern Flicker, 1.0 (1N); Ash-throated Flycatcher, 1.0; Western Kingbird, 1.0; House Wren, 1.0; Cooper's Hawk, 0.5; Red-tailed Hawk, 0.5; Least Bell's Vireo, 0.5 (1FL); California Gnatcatcher, 0.5 (3FL). **Total:** 27 species; 134.0 territories (422/40 ha). **Visitors:** Downy Woodpecker, Northern Rough-winged Swallow, Barn Swallow, Northern Mockingbird, Yellow Warbler, American Goldfinch. **Remarks:** As in previous years, Song Sparrow, California Towhee, Spotted Towhee, and Bewick's Wren remain the four most abundant species. This year, however, Bewick's Wren moved to the top, doubling in numbers from last year. Phainopepla, which was absent last year, returned this year with 4.0 territories. Although the Red-tailed Hawks utilized the plot, they did not nest on-site this year, but they did produce at least one young. Most territory

numbers increased in 2009. **Acknowledgments:** We would like to thank Gage Canal for access to their property.

15. STREAMSIDE RIPARIAN WOODLAND I BOSQUE RIBEREÑO I

TERRY REESER

Santa Ana Watershed Association
P.O. Box 219
Chino CA 91708

Location: California; Orange Co.; Yorba Linda; Featherly Regional Park; 33°52'24"N, 117°42'23"W; Black Star Canyon and Prado Dam Quadrangles, USGS. **Continuity:** Established 2004; 6 yr. **Size:** 17.8 ha. **Description of Plot:** See Bird Populations 8:143-144 (2007) and 9:182 (2009). The Freeway Complex wildfire in November 2008 severely burned 80-90% of the plot. Habitat recovery and regrowth is progressing slowly throughout the plot, augmented by invasive plant management. Both cover and understory density were impaired in most of the plot. **Weather:** Mean start temp., 20.5°C (range 17-26°C). Temperatures were mild, as typical for southern California's Mediterranean climate. **Source:** weather data were obtained with a Kestrel 3000 weather meter. **Coverage:** 48.8 h; 8 visits (0 sunrise, 0 sunset); 31 March; 14, 24 April; 12, 28 May; 17, 25 June; 14 July; 2009. **Census:** Song Sparrow, 32.0 (72); Common Yellowthroat, 24.0 (54); Spotted Towhee, 13.0 (29); Yellow Warbler, 12.5 (28; 2N,1FL); Least Bell's Vireo, 11.0 (25; 3N,1FL); Anna's Hummingbird, 10.5 (24); House Wren, 10.5 (1N,1FL); Bewick's Wren, 9.0 (20; 1N,1FL); Black-headed Grosbeak, 8.0 (18); Nuttall's Woodpecker, 7.0 (16); Yellow-breasted Chat, 7.0; California Towhee, 7.0; Black Phoebe, 5.0 (11); Wrentit, 4.0 (9); House Finch, 4.0 (1N,3FL); Wood Duck, 3.0 (7); American Coot, 3.0 (6FL); Lesser Goldfinch, 3.0 (5FL); Western Bluebird, 2.5 (1N,1FL); Mallard, 2.0 (2FL); Downy Woodpecker, 2.0; Ash-throated Flycatcher, 2.0; Red-winged Blackbird, 2.0; Cooper's Hawk, 1.0 (1N,3FL); Red-shouldered Hawk, 1.0; Common Gallinule, 1.0 (4FL); Western Oriole, 1.0; American Goldfinch, 1.0; Acorn Woodpecker, 0.5. **Total:** 33 species; 193.5 territories (435/40 ha). **Visitors:** California Quail, Great Blue Heron, Great Egret, Snowy Egret, Black-crowned Night-Heron, Killdeer, Spotted Sandpiper, Mourning Dove, Greater Roadrunner, Allen's Hummingbird, Say's Phoebe, Western Kingbird, Common Raven, Northern Rough-winged Swallow, American Robin, California Thrasher, Phainopepla, Blue Grosbeak, Bullock's Oriole. **Remarks:** The breeding bird community includes riparian, coastal sage, and chaparral species. The endangered Least Bell's Vireo and California species of concern Yellow Warbler and Yellow-breasted Chat bred on the plot along with other species of concern such as Downy Woodpecker. The remaining mature stands of cottonwood and black

willow throughout the plot benefit many species observed including Yellow Warbler, Nuttall's Woodpecker, and Downy Woodpecker. I possibly over-counted some species due to surveying only one side of the river, but I took this into account for some species. The Red-shouldered Hawk territory represents two half-territories where the other parts of the territories are upstream for one and to the south for the other. Nest monitoring for Least Bell's Vireo and winter bird surveys take place on the plot. **Acknowledgments:** I thank Harbors, Beaches, and Parks Resources and Development Department, County of Orange, including Supervising Park Ranger, Ron Nadeau, for site access and its continuing logistical support.

16. STREAMSIDE RIPARIAN WOODLAND III BOSQUE RIBEREÑO III

ALLYSON BECKMAN

*Santa Ana Watershed Association
25864-K Business Center Drive
Redlands CA 92374*

Location: California; Riverside Co.; Redlands; San Timoteo Canyon; 33°59'5"N, 117°7'45"W; Sunnymead Quadrangle, USGS. **Continuity:** Established 2004; 6 yr. **Size:** 12.3 ha. **Description of Plot:** See Bird Populations 8:144-145 (2007) and 9:182-183 (2009). **Weather:** Mean start temp., 19.6°C (range 11-31°C). Temperatures were warm, as typical for southern California's Mediterranean climate. There was no precipitation during, or within 24 hours of, any survey visit. **Source:** weather data were obtained by using a Kestrel 3000 weather meter. **Coverage:** 24.0 h; 8 visits (1 sunrise, 0 sunset); 27 March; 7, 28 April; 11, 18 May; 16, 23 June; 14 July; 2009. **Census:** Song Sparrow, 21.0 (68); Bewick's Wren, 18.0 (59); Spotted Towhee, 16.0 (52); California Towhee, 13.0 (42); Lesser Goldfinch, 13.0; Mourning Dove, 10.0 (33); Bushtit, 9.0 (29); Anna's Hummingbird, 8.0 (26); Northern Rough-winged Swallow, 8.0; Least Bell's Vireo, 7.5 (24; 9N,29FL); Common Yellowthroat, 6.0 (20); Yellow Warbler, 5.0 (16); House Finch, 5.0; American Crow, 4.0 (13); Oak Titmouse, 4.0; Black-chinned Hummingbird, 3.0 (10); Nuttall's Woodpecker, 3.0; Black Phoebe, 3.0; Ash-throated Flycatcher, 3.0; House Wren, 3.0; Yellow-breasted Chat, 3.0; Black-headed Grosbeak, 3.0; American Goldfinch, 3.0; Northern Flicker, 2.0; Common Raven, 2.0; European Starling, 2.0; Phainopepla, 2.0; Bullock's Oriole, 2.0; Red-shouldered Hawk, 1.5; California Quail, 1.0; Cooper's Hawk, 1.0; Barn Owl, 1.0; Downy Woodpecker, 1.0; Western Bluebird, 1.0; California Thrasher, 1.0; White-tailed Kite, 0.5. **Total:** 36 species; 189.5 territories (616/40 ha). **Visitors:** Red-tailed Hawk, American Kestrel, Western Scrub-Jay, Blue Grosbeak. **Remarks:** Thirty-six species bred on this plot. The plot has been undergoing passive restoration over the last eight years after the removal of over 80 ha of invasive *Arundo donax*. One endangered

species, Least Bell's Vireo, bred on the plot. Nest monitoring for the Least Bell's Vireo and winter bird surveys are also conducted on this plot.

17. FIELD, RIDGE, SHRUBBY TREES, AND WOODS

CAMPOS, COLINAS, ARBUSTOS Y BOSQUES

MICHAEL F. G. CLARK

*101 Governor's Road, #708
Dundas ON L9H 6L7*

Location: Ontario; Municipality of Hamilton-Wentworth; Dundas; Dundas Valley Plot #1; 43°15'N, 79°54'W. **Continuity:** Established 1994; 14 yr. **Size:** 5.8 ha. **Description of Plot:** See J. Field Ornithol. 60(Suppl.):14 (1989), 66(Suppl.):27-28 (1995), and 67(Suppl.):73-74 (1996). Ongoing succession or "thickening up" continues. **Weather:** Mean start temp., 19.6°C (range 14-26°C). Temperatures were about 1°C under the norm for both months. Rainfall was 16% over the 30-year norm for the 2-month study period. **Source:** Environment Canada. **Coverage:** 13.5 h; 8 visits (0 sunrise, 2 sunset); 5, 13, 21, 25 May; 2, 4, 17, 23 June; 2009. **Census:** Yellow Warbler, 15.0 (103); Gray Catbird, 12.0 (83); Northern Cardinal, 12.0; Blue-winged Warbler, 6.0 (41); American Goldfinch, 6.0; American Robin, 5.0 (34); Field Sparrow, 5.0; Indigo Bunting, 4.5 (31); Rose-breasted Grosbeak, 4.0 (28); Common Grackle, 4.0; Song Sparrow, 3.5 (24); Blue Jay, 3.0 (21); Black-capped Chickadee, 3.0; Yellow-billed Cuckoo, 1.0; Great Crested Flycatcher, 1.0; Baltimore Oriole, 1.0; Ruby-throated Hummingbird, 0.5; House Wren, 0.5. **Total:** 18 species; 87.0 territories (600/40 ha). **Visitors:** Northern Flicker, American Crow, White-breasted Nuthatch, Common Yellowthroat, Chipping Sparrow. **Remarks:** Continuing habitat "thickening up" (succession) may account for the lowest Yellow Warbler breeding total and second lowest Gray Catbird total over 14 years on this revised plot. Below-normal start temperatures may have affected bird detection on some visits. Breeding seedeaters (6 species; 35 pairs) outnumbered warblers (2 species; 21 pairs) by 14 pairs, a plot record. The total of 87 breeding pairs, the plot's second lowest total, is up 7.5 pairs from last year. The total of 18 breeding species is at the plot average. Song Sparrow recovered from zero breeding pairs last year to 3.5 this year.

18. SHRUBBY SWAMP AND SEDGE HUMMOCKS PANTANO ARBUSTIVO-MOGOTE

DAVID ROSGEN

*White Memorial Conservation Center
P.O. Box 368
Litchfield CT 06759*

Location: Connecticut; Litchfield Co.; Litchfield; White Memorial Foundation-North Shore Marsh; 41°43'N, 73°13'W; Litchfield Quadrangle, USGS. **Continuity:**

Established 1965; 43 yr. **Size:** 8.1 ha. **Description of Plot:** See Aud. Field Notes 19:625–627 (1965), Bird Populations 7:125–126 (2006) and 10:133–134 (2010). Habitat succession continued despite numerous serious flooding events. Two of these occurred during the breeding season. The entire plot was much wetter than normal all year. **Weather:** Mean start temp., 21.9°C (range 16–26°C). The weather throughout all of 2009 was much wetter than normal in Connecticut. The months of May, June, and July saw more wet days than dry ones. It was very conducive to vegetation growth, and it helped produce an abundance of seeds, berries, and insects as the season progressed. Rainfall was above average in May with 22 wet days producing a total of 13 cm of rain. The number of wet days remained at 22 in June, but the amount of precipitation increased significantly to 21.6 cm. That's well-above average. In July, there were 19 wet days that produced a total of 29.2 cm of rain. That's also way above average. May's mean temperature was 13.7°C, which is about average. The mean temperature in June was 17.7°C, which is a little below average. In July, the mean temperature was 19.4°C, which is close to average. **Source:** White Memorial Foundation's weather station. **Coverage:** 28.0 h; 12 visits (0 sunrise, 8 sunset); 2, 9, 19, 26 May; 2, 12, 23 June; 4, 13, 19, 27 July; 3 August; 2009. Maximum number of observers/visit, 3. **Census:** Swamp Sparrow, 31.5 (16; 1N,48FL); Red-winged Blackbird, 30.5 (151; 5N,52FL); Yellow Warbler, 29.0 (143; 5N,59FL); Common Yellowthroat, 22.0 (109; 2N,27FL); Gray Catbird, 18.5 (91; 6N,39FL); Song Sparrow, 9.0 (44; 1N,15FL); Veery, 7.5 (37; 10FL); Tree Swallow, 7.0 (35; 4N,27FL); Common Grackle, 7.0 (2N,24FL); American Robin, 5.0 (25; 4N,19FL); Cedar Waxwing, 5.0 (2N,11FL); Eastern Kingbird, 4.0 (20; 2N,7FL); American Goldfinch, 4.0 (4FL); Black-capped Chickadee, 3.5 (17; 17FL); Great Crested Flycatcher, 3.0 (15; 1N,9FL); Warbling Vireo, 3.0 (2N,9FL); Baltimore Oriole, 3.0 (2N,10FL); Yellow-bellied Sapsucker, 2.5 (2N,14FL); Willow Flycatcher, 2.5 (1N,7FL); Least Flycatcher, 2.5 (1FL); Blue-gray Gnatcatcher, 2.5 (2N,8FL); American Redstart, 2.5 (1N,12FL); Downy Woodpecker, 2.0 (2N,7FL); Alder Flycatcher, 2.0 (2FL); Tufted Titmouse, 2.0 (8FL); Northern Cardinal, 2.0 (4FL); Northern Flicker, 1.5 (1N,6FL); Black-and-white Warbler, 1.5 (6FL); Great Blue Heron, 1.0 (1N,3FL); Mourning Dove, 1.0 (2FL); Red-bellied Woodpecker, 1.0 (3FL); Hairy Woodpecker, 1.0 (1N,4FL); Eastern Wood-pewee, 1.0; White-breasted Nuthatch, 1.0 (4FL); Wood Duck, 0.5 (3FL); Osprey, 0.5 (1FL); Bald Eagle, 0.5; Spotted Sandpiper, 0.5; Red-eyed Vireo, 0.5; Blue Jay, 0.5 (1FL); Wood Thrush, 0.5 (1FL); Northern Waterthrush, 0.5; Chestnut-sided Warbler, 0.5; Rose-breasted Grosbeak, 0.5; Brown-headed Cowbird, 0.5 (1FL); Mallard, +; Green Heron, +; American Woodcock, +; Black-billed Cuckoo, +; Ruby-throated Hummingbird, +; Pileated Woodpecker, +; Purple Finch, +. **Total:** 52 species; 227.5 territories (1123/40 ha). **Visitors:** Mute

Swan, Yellow-throated Vireo, Fish Crow, Carolina Wren, Blue-winged Warbler, Canada Warbler. **Remarks:** Despite the wet conditions, including flooding, birds did very well with their breeding activity this year. As would be expected in these conditions, birds nesting in trees or shrubs fared much better than those attempting to nest on the ground. A record-tying high of 52 species were found on territory this year. That's the same number as last year and 2006. Woodland species have really taken hold with continued tree growth. The total number of territories decreased slightly to 227.5, but that's still the second highest number ever recorded in this plot. The record high is 232.5 territories last year. Swamp Sparrow increased by 1.5 territories from last year, and moved into the number one spot. The second most abundant species this year was Red-winged Blackbird. It decreased by 5.5 territories from last year. Yellow Warbler, which nested in the shrubs above the floodwaters, remained in the number three spot with the same number of territories as last year. The numbers for most of the other top ten species were fairly close to last year's figures. For the first time in many years, a pair of Great Blue Herons nested in this marsh this year. Also, a pair of Osprey, which nested a little farther up the Bantam River, included this marsh in their territory. Though they didn't build a nest, a pair of Bald Eagles was territorial here for the first half of the season. Besides the eagles, other species found on territory this year but not last year included Green Heron, Black-billed Cuckoo, and Ruby-throated Hummingbird. In spite of the flooding, an impressive total of 485 fledglings from 38 different species were detected this year. Last year, 443 fledglings from 34 species were detected. **Other Observers:** Lorraine Amalavage, John Eykelhoff, Daren Jacklin, and Terry Weaver.

19. COASTAL SCRUB

MATORRAL COSTANERO

MEGAN ELROD & IRENE KOULOURIS

PRBO Conservation Science

3820 Cypress Drive #11

Petaluma CA 94954

Location: California; Marin Co.; Bolinas; Palomar Field Station; 37°55'N, 122°45'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1971; 35 yr. **Size:** 8.1 ha. **Description of Plot:** See Am. Birds 25:1003–1004 (1971). Succession from coastal scrub continues on the plot. **Weather:** The bioyear rainfall (1 July 2008–30 June 2009) was 532.4 mm. The breeding season rainfall (1 April–31 July) was 23.2 mm. **Coverage:** 252.7 h; 71 visits (55 sunrise, 0 sunset). 2009. **Census:** Wrentit, 11.5 (57; 12N,33FL); Bushtit, 5.0 (25); Spotted Towhee, 5.0 (6N,7FL); Swainson's Thrush, 4.0 (20); Orange-crowned Warbler, 4.0 (2N,1FL); Allen's Hummingbird, 3.5 (17); Bewick's Wren, 3.5 (3N); Golden-crowned Kinglet, 3.0 (15); Hutton's Vireo, 2.5; Chestnut-backed Chickadee,

2.5; Wilson's Warbler, 2.0 (1N); Anna's Hummingbird, 1.5; Purple Finch, 1.5; Mourning Dove, 1.0; Winter Wren, 1.0; American Robin, 1.0; Song Sparrow, 1.0 (3N,6FL); White-crowned Sparrow, 1.0 (5N,7FL); American Goldfinch, 1.0 (2N); California Quail, 0.5; Northern Flicker, 0.5; Pacific-slope Flycatcher, 0.5; Western Scrub-Jay, 0.5; Red-tailed Hawk, +; Band-tailed Pigeon, +; Hairy Woodpecker, +; Olive-sided Flycatcher, +; Red-breasted Nuthatch, +; Dark-eyed Junco, +. **Total:** 29 species; 57.5 territories (284/40 ha). **Visitors:** None listed. **Remarks:** The total number of territories on the plot decreased from 58.5 in 2008 to 57.5 this year. Wrentit territories decreased from 13.0 to 11.5, Bewick's Wren territories decreased from 6.0 to 3.5, and Wilson's Warbler territories decreased from 5.0 to 2.0. Bushtit territories increased from 3.0 in 2008 to 5.0 this year. The observers and supervisors believe that the density of the vegetation is having a negative effect on their ability to completely monitor the plot. **Acknowledgments:** We thank the Point Reyes National Seashore for their cooperation. This is PRBO contribution No. 1846.

20. DISTURBED COASTAL SCRUB A MATORRAL PERTURBADO A

ALEX WANG & IRENE KOULOURIS

PRBO Conservation Science

3820 Cypress Drive #11

Petaluma CA 94954

Location: California; Marin Co.; Bolinas; Palomarin Field Station; 37°55'N, 122°45'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1972; 35 yr. **Size:** 4.7 ha. **Description of Plot:** See Am. Birds 26:987-988 (1972). Succession from coastal scrub continues on the plot. **Weather:** The bioyear rainfall (1 July 2008-30 June 2009) was 532.4 mm. The breeding season rainfall (1 April-31 July) was 23.2 mm. **Coverage:** 227.2 h; 79 visits (40 sunrise, 0 sunset). 2009. **Census:** Wrentit, 7.0 (60; 14N,19FL); Wilson's Warbler, 6.5 (55; 2N,4FL); Song Sparrow, 4.5 (38; 9N,11FL); Orange-crowned Warbler, 3.5 (30; 2N,4FL); Anna's Hummingbird, 2.5; Allen's Hummingbird, 2.5; Bewick's Wren, 2.5 (1N); Swainson's Thrush, 2.5; Bushtit, 2.0 (2N); Chestnut-backed Chickadee, 1.5; Spotted Towhee, 1.5 (5N,12FL); Hutton's Vireo, 1.0; Purple Finch, 1.0; American Goldfinch, 1.0 (1N); California Quail, 0.5; Mourning Dove, 0.5; Northern Flicker, 0.5; Pacific-slope Flycatcher, 0.5; Western Scrub-Jay, 0.5; American Robin, 0.5; Dark-eyed Junco, 0.5 (2N,4FL); Red-tailed Hawk, +; Band-tailed Pigeon, + (1N); Olive-sided Flycatcher, +; Steller's Jay, +; Red-breasted Nuthatch, +; Golden-crowned Kinglet, +; White-crowned Sparrow, +; Black-headed Grosbeak, +; Brown-headed Cowbird, + (2FL). **Total:** 30 species; 43.0 territories (366/40 ha). **Visitors:** None listed. **Remarks:** The total number of territories increased from 37.5 in 2008 to 43.0 this year. Wrentit territories remained about the same (7.5 in 2008 to 7.0

this year), Wilson's Warbler territories increased from 1.5 to 6.5, and Song Sparrow territories increased from 3.0 to 4.5. The observers and supervisors believe that the density of the vegetation is having a negative effect on their ability to completely monitor the plot. **Acknowledgments:** We thank the Point Reyes National Seashore for their cooperation. This is PRBO contribution No. 1844.

21. DISTURBED COASTAL SCRUB B MATORRAL PERTURBADO B

MARGARET KELLOGG & IRENE KOULOURIS

PRBO Conservation Science

3820 Cypress Drive #11

Petaluma CA 94954

Location: California; Marin Co.; Bolinas; Palomarin Field Station; 37°55'N, 122°46'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1971; 35 yr. **Size:** 8.1 ha. **Description of Plot:** See Am. Birds 25:1002-1003 (1971) and J. Field Ornithol. 66(Suppl.):104 (1995). Succession from coastal scrub continues on the plot. **Weather:** The bioyear rainfall (1 July 2008-30 June 2009) was 532.4 mm. The breeding season rainfall (1 April-31 July) was 23.2 mm. **Coverage:** 373.3 h; 80 visits (46 sunrise, 0 sunset). 2009. **Census:** Wrentit, 14.5 (72; 14N,16FL); Wilson's Warbler, 9.0 (44); American Goldfinch, 8.0 (40; 11N,4FL); Bewick's Wren, 6.5 (32); Winter Wren, 5.5 (27); Swainson's Thrush, 5.0 (25); Orange-crowned Warbler, 5.0 (1N); Golden-crowned Kinglet, 4.5 (22); Allen's Hummingbird, 4.0 (20); Anna's Hummingbird, 3.5 (17); Song Sparrow, 3.5 (4N,2FL); Chestnut-backed Chickadee, 3.0 (15); Spotted Towhee, 3.0 (1N); Purple Finch, 2.0; Mourning Dove, 1.5 (1N); Bushtit, 1.0 (1N); Brown-headed Cowbird, 1.0; Band-tailed Pigeon, 0.5; Northern Flicker, 0.5; Hutton's Vireo, 0.5; Steller's Jay, 0.5; Western Scrub-Jay, 0.5; Western Bluebird, 0.5; American Robin, 0.5; California Quail, +; Red-tailed Hawk, +; Pacific-slope Flycatcher, +; Red-breasted Nuthatch, +; White-crowned Sparrow, +. **Total:** 29 species; 84.0 territories (415/40 ha). **Visitors:** None listed. **Remarks:** The total number of territories increased dramatically from 2008 to 2009, rising from 59.5 to 84.0. Wrentit increased from 13.0 to 14.5 territories, Golden-crowned Kinglet increased from 2.0 to 4.5, American Goldfinch doubled from 4.0 to 8.0, Orange-crowned Warbler increased from 1.0 to 5.0, and Bewick's Wren increased from 5.5 to 6.5. Swainson's Thrush decreased from 7.0 to 5.0 territories, and Song Sparrow decreased from 5.0 to 3.5. Western Bluebird was not present in 2008 but had 0.5 territories in 2009. The observers and supervisors believe that the density of the vegetation is having a negative effect on their ability to completely monitor the plot. **Acknowledgments:** We thank the Point Reyes National Seashore for their cooperation. This is PRBO contribution No. 1845.

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