NORTH AMERICAN MIGRATORY BIRDS

AND THE

NATIONAL PARK SYSTEM:

SOME INTERPRETIVE THOUGHTS

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PREFACE

"God did offer us, however, a small token of comfort: many large flocks of birds flew over, coming from the north and flying to the SW. They were more varied in kind than any we had seen before and they were land birds, either going to sleep ashore or fleeing the winter in the lands whence they came. I know that most of the islands discovered by the Portuguese have been found because of birds. For these reasons I have decided to alter course and turn the prow to the WSW."

- From the log of Christopher Columbus, October 7, 1492

We need to remember that migratory birds are a shared biological and cultural heritage of every country through which they pass.

"It was a spring without voices. On the mornings that had once throbbed with the dawn chorus of robins, catbirds, doves, jays, wrens, and scores of other birds there was now no sound; only silence lay over the fields and woods and marsh."

(Rachel Carson, Silent Spring, 1962)

NORTH AMERICAN MIGRATORY BIRDS AND THE NATIONAL PARK SYSTEM: SOME INTERPRETIVE THOUGHTS

I. INTRODUCTION

I can recall standing on the boat dock at Fort Jefferson National Monument, in the Dry Tortugas, Florida. It was May, 1962. As I looked out across the waters of the Gulf of Mexico I could see a small bird approaching. It was flying barely above the water and mustered up just enough strength to fly up and land on the dock.

The bird was a male Blackpoll Warbler. It was on its northward migration, heading for its breeding grounds. Blackpolls breed from northern Alaska and northern Yukon, south to British Columbia, across southern Canada to Newfoundland, and then southward to Maine, northwestern Massachusetts and eastern New York. The wintering range of the Blackpoll extends from central Ecuador, Colombia and northern Venezuela southward to Brazil and northern Argentina. Its northern migration is through the West Indies and the Florida peninsula.

The male Blackpoll landed about thirty feet from me. It was obviously exhausted as it immediately closed its eyes and was fast asleep. I walked toward it, taking photographs through my 400 mm telephoto lens. Soon I was so close the telephoto lens was no longer useful. I slowly reached out and touched the warbler with the tip of a finger. No movement. Then I reached down and actually picked up this little feathered migratory machine. It opened a half-cocked eye, which soon closed, and the bird went back to sleep.

I set it down on the dock and photographed it from several angles, picking it up and arranging it however I wanted. After resting for some time, the Blackpoll weakly flew to the nearby beach and began foraging for the meager ration of insects occurring on the Dry Tortugas. Later that day I observed a migrating Cattle Egret capture and swallow a male Blackpoll Warbler that was feeding on the beach. Though I'm not positive, I believe it was the same bird I that had held earlier. Thus the perils of migration!

Perhaps as many as 80 percent of the approximately 650 species of birds that breed in North America migrate to at least some degree. Some species may travel only short distances, such as moving from higher to lower elevations. Many other species, such as the

Neotropical (New World Tropical) migrants, may travel several hundred to several thousand miles annually. About 332 (51%) of the 650 North American breeding species migrate beyond the boundaries of the United States and winter in the Neotropics.

Except for the ten to twelve weeks spent in North America during the breeding season, these migrant species (often referred to as "our birds") actually spend about nine to ten months either on their wintering grounds or during migration. This corresponds to almost two-thirds or their lives being spent outside of the United States and Canada.

Because of their colors, songs, ability to fly, and fascinating habits, birds capture the human imagination and interest. Birds provide an excellent barometer of environmental change. They remind us that change, especially accelerated, unnatural change, can be destructive to all types of life. This is as true for human beings as it is with all the other organisms with which we share this planet. Thus changes in the status of migratory birds provide clues to the quality of earth's environments.

II. THE WONDER OF MIGRATION

The annual migrations of birds have long both fascinated and mystified mankind. Early natural history "knowledge" is replete with many theories on the annual appearance and disappearance of birds. Birds were reputed to hibernate in mud, form frozen balls of ice in winter lakes and ponds, or fly to the moon. Almost all that is known about bird migration (and much is yet to be discovered) has been learned during this century.

Why birds migrate is still conjectural and may always remain so. There are two predominate theories, both include changes in climate and food supply. For the latter, it would seem simpler for birds to remain in areas with year-round adequate food supplies than to undergo the perils of twice annual distant migrations. The first theory states that during the last Pleistocene ice age birds living in warm climates were forced southward into the tropics by the advancing ice. As the ice retreated, the birds advanced northward again and repeated the movements thereafter. This seems logical as the majority of birds that migrate, do migrate north and south, leaving areas of colder climate for areas of warmer climate and moving northward again when the climate there has warmed. However, not all migrants move north-south; some move east-west. Also, species that are physically adapted for long-distance (often nonstop) migratory flights were in existence prior to the period of glacial advances and retreats. Many species of birds migrate southward well before the advent of cold weather, while there are still adequate food resources available.

A second theory proposes that species which breed in North America and migrate to the tropics actually originated in the tropics. Thus, these birds are annually returning to their ancestral home. By migrating to northern breeding areas they move into areas where there is less competition for food. When one compares the number of species of certain families that breed in North America (eg. flycatchers, tanagers, orioles, and hummingbirds) with the greater number of species resident in the Neotropics, it lends credence to this theory (see Table 1).

No one theory fits each and every species. Probably each individual species has developed its own individual strategy which has been refined through its evolution.

TABLE 1

Comparison of North American Migratory Land Birds

The following is a representative list of North American migrants that breed north of Mexico and have all or the majority of their population wintering south of the U.S. border. Species which do winter in at least some lesser number in the continental U.S. are named.

TYPE OF BIRD	BREEDING SPECIES	WINTERING SPECIES IN U.S.
Flycatchers	33	4 - Great Kiskadee, Great Crested Flycatcher, Eastern Phoebe, Say's Phoebe
Swallows	8	2 - Tree Swallow, Northern Rough-winged Swallow
Thrushes (spot-breasted type)	5	1 - Hermit Thrush
Warblers	54	8 - Orange-crowned Warbler, Yellow-rumped Warbler, Townsend's Warbler, Yellow-throated Warbler, Pine Warbler, Prairie Warbler, Palm Warbler, Common Yellowthroat
Vireos	11	2 - White-eyed Vireo, Hutton's Vireo
Tanagers	4	0
Orioles	6	2 - Audubon's Oriole, Altimira Oriole

III. THE MECHANICS OF MIGRATION

Bird migration, as we know it in North America, is primarily a phenomenon of spring and fall. Actually some birds are migrating every month of the year. In South Florida, Purple Martins arrive from their wintering grounds as early as late January. During June when many species are at the peak of their breeding activity, late migrant warblers are still moving through California. By July, adult shorebirds which have raised their broods in the Arctic are already heading south (the young birds will follow a month or two later). For the majority of Neotropical landbirds, April-May and September-October are the peak periods of passage through North America. For northbound insectivorous birds, spring arrival is timed to coincide with an increasing supply of insect food. Fall migration for most birds is a period of more leisurely movement, with migrants often spending several days in one location before moving on. There are quantitatively more birds migrating in the fall because of the additional number of immature birds joining the ranks of the adults.

Different types of birds migrate at different times of the day. Birds that feed on the wing, such as swallows and swifts, are diurnal migrants. Soaring birds, such as hawks and vultures, migrate during mid-day, riding on rising thermals of warm air. Waterbirds, in general, migrate during both day and night. For the majority of small land birds migration takes place at night. Radar has revealed that many long-distance landbirds take flight within one or two hours after sunset. Unless they are involved in long over-water flights, some species move only short distances each day, taking time out for feeding and resting.

Migration in North America occurs across the width of the continent. There are several major routes by which birds reach northern breeding or southern wintering grounds: (1) along the Atlantic Coast through Florida and the West Indies; (2) nonstop migration across the Gulf of Mexico; (3) through Mexico and Central America; (4) through the Mississippi River Valley; (5) along the Pacific Coastal states; (6) a direct nonstop transatlantic flight from northeastern U.S. and Canada to South America. Some species, such as the Lesser Golden Plover, Hudsonian Godwit, and Blackpoll Warbler, migrate southward on one route and return northward by another. Other species use the same route in both directions.

Several species are noted for long, spectacular migrations. Perhaps most famous is the Arctic Tern. Breeding in northern Alaska, Canada, Greenland, southward to Maine and Massachusetts, this species migrates south along the west African coast to winter off Antarctica. Pacific coast birds fly along western North and South America to reach the same wintering destination. Thus some birds may have a roundtrip journey of more than 22,000 miles.

The Blackpoll Warbler that I saw at Dry Tortugas performs one of the most spectacular migrations of any of the landbirds. Each fall Blackpolls congregate along the coasts of southeastern Canada and New England. Building up their fuel reserves of body fat and waiting for proper weather conditions, such as the passage of a cold front (high pressure area), they launch into the night sky. They will fly southeastward over the Atlantic Ocean, make a southwestward course change over the Sargasso Sea, and land on the northeastern coast of South America. This little bird, weighing perhaps 3/4 of an ounce, has a non-stop flight of about 80 hours - over three days in the air!

There is much more to bird migration than can be covered in this brief overview (i.e. effects of weather, orientation and navigation, behavior, physiological changes, etc.). For further information on these and other migration topics I refer you to the "Selected References" (especially Terres, 1980; Campbell and Lack, 1985; Leahy, 1982; Dorst, 1962; Welty, 1982; and Able, 1983) enclosed with this memorandum.

IV. THE PERILS OF MIGRATION

Each fall an estimated five billion birds leave North America and head south for the Caribbean, Central or South America. A radar screen in South Carolina once recorded the image of two million landbirds flying overhead. Many of these fall migrants are immature birds, making their first migration. For some of them it will be their one and only migration.

Once birds have been successfully fledged from the nest, migration becomes the most hazardous experience of their lives. For birds flying over water for long distances, storms, strong headwinds, fog, and fatigue cause heavy mortality. Predators, such as hawks (or the Cattle Egret that ate the Blackpoll Warbler I observed), are mostly diurnal dangers. Man-made hazards such as: lighthouses, skyscrapers, television and radio towers, kill many nocturnal migrants which are attracted to their lights. Shooting, oil spills, pesticides and other chemicals, collision with automobiles, and human harassment, all take a toll.

Especially vulnerable to harassment are migratory shorebirds along beaches. Long-distance shorebird migrants require freedom from human or other harassment in order to rest and feed to build up their fuel reserves for the long hours of flight ahead of them. Oversand vehicles and dogs roaming free on beaches cause unnecessary stress and use of energy by migratory shorebirds. Coastal development has so reduced available habitat for feeding and resting that protection must be afforded to the few remaining places where shorebirds concentrate. Several of these critical places are our national seashores.

V. HABITAT LOSS

1. FOREST FRAGMENTATION IN THE UNITED STATES

I have always thought how exciting it would be to travel back in time to explore North America at the time of the first European settlement. To be able to travel through what was once an almost unbroken forest throughout much of the eastern part of the United States. To see and experience things that are no longer in existence.

I can remember when I was a small boy visiting my grandfather on his farm in northern Illinois. This was the time of my biological awareness awakening. It was a very formative and important period in my life. I can recall my grandfather telling me of the time when he was a small boy and he thrilled to the flocks of "wild pigeons" flying overhead. I feel cheated that I will never experience those sky-darkening flights of Passenger Pigeons. Nor will I ever see the Ivory-billed Woodpecker or the Carolina Parakeet. I have been cheated out of part of my natural heritage.

The cheating process is still going on. The unbroken forest is long gone. Cities, suburbs, highways, farms, and factories continue to increase and forests to diminish. Yesterday's birds are gone. Today's birds are in peril.

The continuing fragmentation of America's forests is contributing to declines in the populations of several North American birds. The species most vulnerable to severe fragmentation are those which breed in North America and winter in Latin America and the Caribbean. These species are often major components of the summer breeding populations of large forests. Perhaps as much as 90 percent of the breeding pairs will be Neotropical migrant species. Many areas in the United States have apparently suffered significant decreases in the species mix that inhabit fragmented forests. Thus both diversity and populations change.

As forests become fragmented certain Neotropical migrant species seem unable to adapt to the smaller tracts of remaining woodland. Warblers apparently most sensitive to diminishing habitat size are the Black-and-White, Worm-eating, Ovenbird, Hooded, Cerulean, and American Redstart. For reasons currently unknown, Neotropical migrants seem incapable of relocating to new breeding sites created by forest fragmentation. This does not appear to be true of resident, non-

migratory species which do move in and occupy smaller forests or woodlots (such as chickadees, woodpeckers, etc.).

Creation of forest fragments also creates more edge, which leads to easier penetration by predators, competitors, and parasites. In eastern forests nest predators such as Blue Jays and Common Grackles are more numerous along forest edges than in the interior. Another species that benefits from new forest edge is the parasitic Brown-headed Cowbird. Cowbirds do not build their own nests, but lay their eggs in the nests of other birds. Cowbird chicks develop more rapidly than the nestlings of the host parents. By either physically ejecting the host nestlings or consuming more food than them, the young cowbirds may live to reach maturity, to the detriment of the other nestlings which may not survive. At least 214 species of birds are known to be parasitized by the Brown-headed Cowbird. Through a continuing population explosion and range expansion during this century, Brown-headed Cowbirds now pose actual threats to the survival of several bird species. Many of these species are warblers and other Neotropical migrants. Thus, forest fragmentation not only reduces available breeding and feeding habitat, but increases opportunity for predations by birds, cats, dogs, rats, and parasitism by cowbirds.

2. TROPICAL DEFORESTATION

As important as loss of habitat is here on the North American breeding grounds, there is an even more critical situation developing in Latin America with the loss of wintering habitat. Though some Neotropical migrants fly as far as South America to spend the winter, the great majority of species and individual birds winter in Mexico, Central America, and the West Indies.

A glance at a map of the Western Hemisphere reveals how compressed the area of Mexico, Central America, and the Caribbean is compared to the great land mass of the United States and Canada. It is in to this compressed area that dozens of species and countless numbers of individual birds move each fall.

Because species are so concentrated on their Latin American wintering grounds, it has been estimated that the clearing of one acre of tropical forest is equivalent to the clearing of about 12 acres on the breeding grounds. Five Latin American countries may

contain almost 50 percent of all the landbirds that breed in North America - Mexico, Bahamas, Cuba, Haiti and the Dominican Republic.

Currently much attention is being focused on the accelerating loss of tropical rain forests. The loss of tropical dry forest and habitats other than primary forest is probably increasing at an even greater rate. These latter habitats are of critical importance to many migrant species. Research indicates that many wintering species establish and defend territories just as they do on their breeding grounds. Displaced birds returning to territories that have been cutover are forced into territories of other wintering birds. There may be a high incidence of mortality in Neotropical migrants which have lost their wintering habitat. This then becomes a significant factor in species-population declines.

The National Breeding Birds Survey, conducted by the United States Fish and Wildlife Service, was initiated in 1966. Data analyzed from these surveys, which are conducted throughout the United States, indicate that since the summer nesting seasons of 1979 and 1980, there has been a continual decline in songbirds wintering in the tropics. Declines by as much as 30 percent may be occurring in certain species.

The amount of tropical forest that is being lost globally varies with the estimator. Estimates from 50 to 100 acres per minute, on a global basis, are frequently seen. Up to 74,000 acres of cleared tropical forest per day is estimated by the Nature Conservancy. That adds up to almost 40,000 square miles - about the same size as the state of West Virginia. Another estimate by a well-respected American botanist is an annual loss of 80,000 square miles, equivalent to the size of Nebraska. Either way, an enormous amount of tropical forest is diminishing at an accelerated rate. Current estimates are that 50 percent of the forest cover in Central America and the West Indies has already been lost.

Human population growth in the tropics, one of the highest rates in the world, creates demand for new agricultural and ranching land, firewood, timber, roads, housing, and urban sprawl. Exports of products to the United States and Canada (such as beef, sugar, coffee, and bananas) fuels the chainsaws, the bulldozers, and the fires that destroy the forests. The loss of the forests also means the loss of the Earth's most diverse ecosystems (See "Selected

References" for readings on tropical forest life and its destruction).

It is important to note that several (exact number unknown) species of Neotropical land birds appear to show great adaptability in their selection of wintering habitat. These species are able to use second growth forest, coffee plantations, suburban plantings and similar altered environments. So there is a degree of hope for these species. However, there are other species that are dependent upon primary forest which will continually be impacted as these forests are diminished. It is safest to say that at this time there is much yet to be learned about the ecology of Neotropical migrants on their wintering grounds.

3. WETLANDS

Loss of forest habitat in both North America and in Latin America is not the only concern facing migratory species. Loss of wetlands throughout the Americas is reducing available habitat for shorebirds, wading birds, waterfowl, and other species. This is occurring on breeding and wintering grounds and on stopover wetlands needed for feeding and resting during migration.

Drainage for agricultural development, especially in Latin America, is increasing in scope and intensity. The extent of the loss of wetlands in the tropics is not known. Use of pesticides and herbicides in the tropics may be affecting shorebird reproduction. Hunting and poaching are additional dangers shorebirds face on their wintering grounds and during migration. The drought of summer 1988 impacted waterfowl, shorebirds, and other waterbirds, causing loss of breeding productivity. If indeed we are beginning to experience the "greenhouse effect", diminished aquatic habitat will affect all water-related species.

There are approximately 50 species of shorebirds (plovers, sandpipers, etc.) that breed in North America. Almost 40 of these species migrate south to winter predominately in tropical and temperate regions of Central and South America. About two dozen of these shorebird species annually fly between Arctic America and South America - making a round trip of more than 25,000 miles.

Major shorebird migration routes occur along both the Atlantic and Pacific Coasts, along the Texas and Louisiana Gulf Coasts, and inland through the Great

Plains. Some shorebird species concentrate along only one route while other species use two or more routes.

For example, the Hudsonian Godwit, which breeds in Arctic Alaska and Canada and along the southern shore of Hudson Bay, moves eastward to the Atlantic shore of Canada. From there it flies southward over the open ocean west of Bermuda and lands on the South American coast between the mouths of the Orinoco and Amazon rivers. They then move south to spend the winter in Chile and Argentina (Patagonia to Tierra del Fuego). During northward spring migration Hudsonian Godwits arrive on the Gulf Coast of Texas and Louisiana in April. From there they move north through the Mississippi Valley to central Canada and arrive on their Arctic breeding grounds by May and June. This species was nearly exterminated by market hunters in the 1800's. Though its population has recovered, it is always a prized birding find when seen in the U.S.

Another example is the Red Knot. This species was once the most abundant shorebird in North America. During the latter 1800's and early 1900's it was virtually slaughtered by the thousands along its migration routes. It breeds in northernmost Northwest Territories of Canada and in Greenland. Though a few winter along the Atlantic and Pacific Coasts of the United States, the vast majority of birds winter along the coasts of South America. Some birds go as far south as the Straits of Magellan, thus performing an annual round trip of almost 19,000 miles - one of the longest migrations of any bird. Spring and fall migrations in the United States are mainly along both coasts. Red Knots time their spring migration to coincide with the breeding of horseshoe crabs. Each spring as many as 100,000 Red Knots (which is about one-half the estimated world population) congregate on the mudflats of Delaware Bay. Here they gorge on horseshoe crab eggs, building up their fuel reserves for the long flight to the arctic.

The loss of coastal and interior wetlands in the United States now exceeds 40 percent of the original acreage. California has lost over two-thirds of its coastal wetlands that existed in 1900. Of San Francisco Bay's original 200,000 acres, 160,000 acres have been either diked or filled. Because of this widespread drainage and development, some shorebird species may have declined by as much as 70 percent during the last 15 years.

To preserve critical shorebird habitat for breeding, migration, and wintering, the Western Hemisphere Shorebird Reserve Network (WHSRN) has been established. It is a collaborative effort between government and private agencies and organizations which are committed to conservation of shorebirds. The WHSRN provides international recognition to critical shorebird habitat. By establishing an international network of shorebird reserves the WHSRN intends that each site gain international recognition and local support for wetlands management and conservation.

Critical reserve sites in North America for northward migration include: Copper River-Bering River Delta System (Alaska); Grays Harbor-Columbia River System (Washington); San Francisco Bay (California); Cheyenne Bottoms (Kansas); and Delaware Bay (Delaware). For southward migration critical sites are: James Bay (Canada); San Francisco Bay (California); Bay of Fundy (Canada); and Cheyenne Bottoms (Kansas). Reserve network sites have been established at several critical Latin American wintering areas. If you would like more information on the WHSRN please contact the author of this paper.

VI. THE ROLE OF THE NATIONAL PARK SYSTEM

1. IMPORTANCE AS BREEDING AREAS

Many units within the National Park System preserve essential habitat for Neotropical migrant birds. Almost every unit in the continental United States harbors at least a few species of breeding migrants. Many of our historical and cultural parks, such as Gettysburg National Military Park and Montezuma Castle National Monument, provide good habitat for nesting species.

There are several areas of the National Park System that are critical for Neotropical migrant breeding. The following list is not meant to be totally inclusive, but provides representative examples of important parks.

Acadia National Park
Cape Cod National Seashore
Great Smoky Mountains National Park
Shenandoah National Park
Blue Ridge Parkway
Isle Royale National Park
Voyageurs National Park
Rocky Mountain National Park
Glacier National Park
Olympic National Park
Yosemite National Park

2. IMPORTANCE AS STOPOVER AREAS

Almost every unit within the National Park System hosts at least a few migrant birds at some time of the year. However, there are several park areas that provide important habitat for stopover migrants. These parks form critical links during each species southward and/or northward migrations. As habitat external to these parks is developed, the parks will become even more important in years to come as places of feeding and resting refuge for migratory birds.

The following list is not meant to be totally inclusive, but provides representative examples of important stopover parks.

Cape Cod National Seashore
Fire Island National Seashore
Assateague Island National Seashore
Cape Hatteras National Seashore
Cumberland Island National Seashore

Canaveral National Seashore
Biscayne National Park
Everglades National Park
Fort Jefferson National Monument
Gulf Islands National Seashore
Padre Island National Seashore
Big Bend National Park
Organ Pipe Cactus National Monument
Point Reyes National Seashore
Channel Islands National Park
Cabrillo National Monument
Death Valley National Monument

3. IMPORTANCE AS WINTERING AREAS

Because the majority of Neotropical migratory landbirds winter well south of the United States, there are few areas within the National Park System that are important wintering ground parks. Some of the southernmost continental parks, such as Everglades National Park, harbor a few individuals of several species that winter predominantly further south. Several parks, especially national seashores, provide aquatic habitat for wintering waterfowl and shorebirds.

The following list is not meant to be totally inclusive, but provides representative examples of important wintering ground areas.

Virgin Islands National Park
Everglades National Park
Biscayne National Park
Canaveral National Seashore (waterbirds)
Cumberland Island National Seashore (waterbirds)
Cape Hatteras National Seashore (waterbirds)
Gulf Island National Seashore (waterbirds)
Padre Island National Seashore (waterbirds)
Organ Pipe Cactus National Monument
Point Reyes National Seashore
Golden Gate National Recreation Area

VII. SOME INTERPRETIVE THOUGHTS

The loss of breeding, stopover, and wintering habitats, offers National Park Service interpreters excellent opportunities for educating the American public about the plight of North American migratory birds. It is fitting and proper that the National Park Service be the primary Federal agency in communicating this critical conservation story.

It is hoped that there is enough basic information contained within this memorandum to develop an interpretive program. This information could form the format for an interpretive program using the same sequence as outlined in the "Contents" page (I-VII). The "Selected References" suggest many additional sources.

1. LINKAGE PARKS

It is hereby suggested that a series of "linkage parks" be developed across the National Park System. This technique would link two different National Park sites together. A breeding area park would be linked to a stopover area park. The "linkage" will consist of two representative migrant species that occur in each of the two parks.

The two parks should exchange a few representative slides, a bird checklist, and the park brochure of their park. Each park's interpretive program would not only discuss the significance of their park for habitat preservation for breeding (or for stopover migration) but would also relate the significance of their "linkage park", also for habitat preservation.

The two representative Neotropical migrants should be interpreted as to their: breeding range, breeding biology, food habits, interesting behavioral traits, migratory routes, wintering range and conservation status. This information can be easily compiled from three primary sources: Terres (1980); Ehrlich, Dobkin, and Wheye (1988); and Bent (1919-1968) - see "Selected References."

Table 2 lists <u>suggested</u> "Linkage Parks and Linkage Birds." Because there are more northern breeding ground parks than there are southern stopover parks, some of the southern parks have been "linked" to more than one northern park. Parks may wish to establish other linkage parks and/or birds than those recommended here.

It is hoped that eventually we can extend the linkage to national parks in Canada (for breeding grounds) and to national parks and preserves in Latin America (for wintering grounds.

It is not meant to imply that the exact population of a species from a breeding grounds park passes through the stopover park. The linkage represents species which occur in both parks, not park-specific populations of each species.

Table 2
POSSIBLE LINKAGE PARKS AND LINKAGE BIRDS

Acadia NP - Everglades NP	Blackpoll Warbler and Eastern Wood-Pewee
Cape Cod NS - Cumberland Island NS	Ovenbird and American Redstart
Fire Island NS - Fort Jefferson NM	Eastern Kingbird and Black-and-White Warbler
Prince William Forest Park-Biscayne NP	Eastern Wood-Pewee and Northern Parula
Shenandoah NP - Canaveral NS	American Redstart and Red-eyed Vireo
Blue Ridge Parkway - Biscayne NP	Gray Catbird and Northern Parula
Great Smoky Mountains NP - Everglades NP	Black-throated Blue Warbler and Rose-breasted Grosbeak
Cuyahoga Valley NRA - Gulf Islands NS	Wood Thrush and Yellow-throated Vireo
Indiana Dunes NL - Natchez Trace Parkway	Yellow-billed Cuckoo and Golden-winged Warbler
Isle Royale NP - Gulf Islands NS	Scarlet Tanager and Magnolia Warbler
Sleeping Bear Dunes NL - Big Thicket N PRES	Solitary Vireo and Northern Oriole

Table 2 continued

Apostle Islands NL - Gulf Islands NS	Swainson's Thrush and Scarlet Tanager
Mammoth Cave NP - Padre Island NS	Black-and-White Warbler and Great Crested Flycatcher
Voyageurs NP - Padre Island NS	Blackburnian Warbler and Northern Oriole
Rocky Mountain NP - Guadalupe Mountains NP	Swainson's Thrush and Yellow Warbler
Glacier NP - Guadalupe Mountains NP	Northern Waterthrush and Swainson's Thrush
Yellowstone NP - Big Bend NP	Dusky Flycatcher and Wilson's Warbler
Grand Teton NP - Organ Pipe Cactus NM	Western Wood-Pewee and Black-headed Grosbeak
Grand Canyon NP - Organ Pipe Cactus NM	Black-throated Gray Warbler and Warbling Vireo
Denali NP - Hawaii Volcanoes NP	Lesser Golden Plover
Crater Lake NP - Golden Gate NRA	Sharp-shinned Hawk and Western Tanager
North Cascades NP - Lake Mead NRA	MacGillivray's Warbler and Western Flycatcher
Olympic NP - Point Reyes NS	Black-throated Gray Warbler and Western Tanager
Mount Ranier NP - Chiricahua NM	Olive-sided Flycatcher and Townsend's Warbler
Lassen Volcanic NP - Joshua Tree NM	Hermit Warbler and Western Tanager
Redwood NP - Channel Islands NP	Northern Oriole and Wilson's Warbler
Yosemite NP- Death Valley NM	Western Tanager and Warbling Vireo

Fire Island, Assateague Island, and Cape Hatteras National Seashores are three critical stopover areas for water birds, shorebirds and land birds. All three parks also have a significant variety of breeding species during summer. Fort Jefferson National Monument in the Dry Tortugas, Florida, is one of the most important migratory stopover areas within the National Park System. Over 280 species of birds, predominately migrants, have been recorded from these isolated islands.

2. ECOLOGICAL RAMIFICATIONS OF LOSS

Another important aspect of the migratory bird issue is the role of insectivorous birds in forest ecosystems. Migrant passerines, especially warblers, may be important predators of spruce budworms and other forest insect pests. The role of insect-eating forest birds may be as one of constant suppressers of insect pests rather than actual controllers. Thus birds may be beneficial in suppressing potential outbreaks of insect pests.

The actual role of individual bird species in forest ecosystems is not well known. Loss of species or continued decimation of populations on breeding grounds could possibly have serious implications for future forest and fire management in the national parks and national forests.

For the interpretive story, emphasis should be placed on how little we really know about the role of migratory birds in forest ecosystems. Another example of how we are losing biological resources without understanding the long-term ecological ramifications.

3. TEACHING GEOGRAPHY

Recent public surveys undertaken for the National Geographic Society revealed a poor understanding of geography by the American public. This deficiency included the geography of the United States, North America, the Western Hemisphere, and the rest of the globe in general.

The migratory birds issue offers an exciting opportunity for communicating environmental conservation, bird biology, and geography. By the use of maps or slides of maps, breeding range, migratory routes, and wintering range (in Latin America or Caribbean) can be illustrated. The depiction of "linkage parks" also illustrates geography.

This approach offers exciting possibilities for environmental education activities with local schools. In fact, creative teachers could take this an extra step beyond geography by teaching social sciences about the Latin American countries where these birds winter.

An interesting footnote on history is the relation of migrating birds and Columbus' discovery of the New World. Columbus' log of his first voyage contains many references to birds seen as they approached the Americas. Sunday, October 7, 1942: "God did offer us, however, a small token of comfort: many large flocks of birds flew over, coming from the north and flying to the SW. They were more varied in kind than any we had seen before and they were land birds, either going to sleep ashore or fleeing the winter in the lands whence they came. I know that most of the islands discovered by the Portuguese have been found because of birds. For these reasons I have decided to alter course and turn the prow to the WSW." (Fuson, R.H. 1987. The Log of Christopher Columbus. Camden, Maine: International Marine Publishing Co., p.71). Columbus changed his course and with it the course of history changed.

4. EDUCATIONAL PROGRAMS AND OUTREACH

The following are suggestions for developing both on-site and off-site interpretive/educational activities. Many of these activities can be developed at low expense.

1) Give campfire/auditorium slide talks on-site.
2) Give off-site slide talks to special interest groups.
3) Develop an "Adopt a Migratory Bird" exhibit for visitor center use.
4) Develop a special Volunteer in Parks field observer's team for monitoring bird populations in park.
5) Write articles on migratory birds issue for local newspaper.
6) Write articles for park "newspaper."
7) Hold a special "Bird Migration Day" at your park featuring talks, bird walks, banding demonstrations by qualified banders, display of bird books, etc.
8) Work with local Audubon Society chapters or bird clubs to develop special emphasis activities.
9) Conduct USFWS official Breeding Bird Survey.
10) Conduct bird walks on a regular basis.

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BIRD SLIDES

I consider **VIREO** (Visual Resources for Ornithology) as the best source for purchasing bird slides. They are creating a centralized research collection of photographs of birds of the world. Duplicates of slides are available for both North American and foreign birds. Currently North American bird slides sell for $2.00 each and foreign birds for $3.00 each.

VIREO will send you a free catalog upon request; ask for their "North American Bird Slides Catalog." The bird slides available are listed by species and then subdivided into the following categories: male, female, immature, nest/care of young, flight, foraging, and display. Foreign birds are not available in a catalogue, but should be listed by common and scientific name.

For your catalogue and other information, please contact:

VIREO
The Academy of Natural Sciences
19th & The Parkway
Philadelphia, PA 19103
215/299-1069

APPENDIX

LIST OF NEOTROPICAL MIGRANT LANDBIRDS

The following is a list of neotropical migrant landbirds which winter entirely or almost entirely south of the United States. Almost every one of these species either breeds in or migrates through various units of the National Park System. Check this list for those species which breed in or migrate through your park.

Pigeons and Doves
- White-crowned Pigeon
- White-winged Dove

Trogons
- Elegant Trogon

Cuckoos
- Yellow-billed Cuckoo
- Black-billed Cuckoo

Owls
- Flammulated Owl
- Elf Owl
- Burrowing Owl

Goatsuckers
- Chuck-wills-widow
- Whip-poor-will
- Common Poorwill
- Common Nighthawk
- Antillean Nighthawk
- Lesser Nighthawk

Swifts
- Black Swift
- Chimney Swift
- Vaux's Swift
- White-throated Swift

Hummingbirds
- Buff-bellied Hummingbird
- Berylline Hummingbird
- Lucifer Hummingbird
- Broad-billed Hummingbird
- White-eared Hummingbird
- Violet-crowned Hummingbird
- Blue-throated Hummingbird
- Magnificent Hummingbird
- Ruby-throated Hummingbird

Black-chinned Hummingbird
Costa's Hummingbird
Calliope Hummingbird
Broad-tailed Hummingbird
Rufous Hummingbird
Allen's Hummingbird

Flycatchers
Eastern Kingbird
Gray Kingbird
Thick-billed Kingbird
Western Kingbird
Cassin's Kingbird
Tropical Kingbird
Couch's Kingbird
Scissor-tailed Flycatcher
Sulphur-bellied Flycatcher
Great Crested Flycatcher
Ash-throated Flycatcher
Dusky-capped Flycatcher
Greater Pewee
Olive-sided Flycatcher
Eastern Wood-Pewee
Western Wood-Pewee
Eastern Phoebe
Say's Phoebe
Vermilion Flycatcher
Gray Flycatcher
Dusky Flycatcher
Least Flycatcher
Hammond's Flycatcher
Acadian Flycatcher
Willow Flycatcher
Alder Flycatcher
Yellow-bellied Flycatcher
Western Flycatcher
Buff-breasted Flycatcher
Northern Beardless-Tyrannulet

Becards
Rose-throated Becard

Swallows
Tree Swallow
Violet-green Swallow
Purple Martin
Bank Swallow
Northern Rough-winged Swallow
Cliff swallow
Barn Swallow
Cave Swallow

Wrens
- House Wren
- Sedge Wren

Thrushes and Allies
- Blue-gray Gnatcatcher
- Wood Thrush
- Veery
- Swainson's Thrush
- Gray-cheeked Thrush

Mimic Thrushes
- Gray Catbird

Vireos
- Black-capped Vireo
- Yellow-throated Vireo
- Bell's Vireo
- Gray Vireo
- Solitary Vireo
- Red-eyed Vireo
- Black-whiskered Vireo
- Warbling Vireo
- Philadelphia Vireo

Wood Warblers
- Prothonotary Warbler
- Blue-winged Warbler
- Golden-winged Warbler
- Tennesse Warbler
- Orange-crowned Warbler
- Bachman's Warbler
- Nashville Warbler
- Virginia's Warbler
- Colima Warbler
- Lucy's Warbler
- Northern Parula
- Black-and-White Warbler
- Black-throated Blue Warbler
- Cerulean Warbler
- Cape May Warbler
- Chestnut-sided Warbler
- Blackburnian Warbler
- Magnolia Warbler
- Black-throated Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- Black-throated Green Warbler
- Golden-cheeked Warbler
- Yellow-throated Warbler
- Grace's Warbler
- Kirtland's Warbler

Prairie Warbler
Bay-breasted Warbler
Blackpoll Warbler
Palm Warbler
Yellow Warbler
Mourning Warbler
MacGillivray's Warbler
Connecticut Warbler
Kentucky Warbler
Canada Warbler
Wilson's Warbler
Hooded Warbler
Worm-eating Warbler
Swainson's Warbler
Ovenbird
Louisiana Waterthrush
Northern Waterthrush
Common Yellowthroat
Yellow-breasted Chat
American Redstart
Painted Redstart
Red-faced Warbler
Olive Warbler

Grosbeaks and Sparrows
Rose-breasted Grosbeak
Black-headed Grosbeak
Blue Grosbeak
Indigo Bunting
Lazuli Bunting
Painted Bunting
Varied Bunting
Green-tailed Towhee
Grasshopper Sparrow
Lark Sparrow
Botteri's Sparrow
Chipping Sparrow
Clay-colored Sparrow
Black-chinned Sparrow
Lincoln's Sparrow
Dickcissel

Blackbirds and Orioles
Bobolink
Scott's Oriole
Orchard Oriole
Northern Oriole
Hooded Oriole

Tanagers

- Scarlet Tanager
- Western Tanager
- Summer Tanager
- Hepatic Tanager