EPA # 903-K94-001

PARTNERS
IN A
PARADISE

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A Secondary School Curriculum
on Migratory Birds and Our Habitat
Providing a Focused
Introduction to
BIODIVERSITY and ECOSYSTEM PROTECTION

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(updated 1997)

Dear Fellow Educator:

Thank you for using PARTNERS IN A PARADISE: Migratory Birds and our Habitat curriculum. I hope that the curriculum will help you to achieve your goal of increased understanding of our environment with today's youth, and that you and your students will enjoy the discovery process. Hopefully, this curriculum will be only a beginning, and you and your students will be interested in a lifetime journey of learning about our environment and about migratory birds.

Please note that this curriculum utilizes some prepared maps and diagrams and reading materials that should be ordered prior to the course. A packet of materials is available at the address below.

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DEDICATION: *To you, the educator who values ecosystems and recognizes their worth, and who is devoting time in sharing this key knowledge with others.*

ACKNOWLEDGMENTS: *Special thanks are due to the many people who educated me about the value of natural ecosystems, throughout my youth, especially my parents. Grateful acknowledgment is given to Peter W. Stangel of the Partners in Flight Program. Particular thanks are due to my EPA colleagues Bonnie J. Smith, Susan McDowell, Joe Jackson, Charles Perritt and Donna Bostic, and also Eric Peterson, all of whom assisted in the preparation of this text.*

PARTNERS IN A PARADISE:

Migratory Birds and Our Habitat curriculum

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COURSE GOALS

Next year, then ten years from now . . . twenty years and fifty years into the future, will the students remember this course? Will they have gained anything from it? Will they have an awe, wonder and respect for migratory birds and for the ecosystems that sustain us all? Will they value them, and understand that protection of ecosystems is key to human survival? Will they want to learn more about them?

This is the fundamental goal to think about when organizing the class time.

Some students may not remember the difference between a bluejay and a bluebird. Hopefully, all the students will keep with them their chance to question, to explore and learn more about, and to treasure birds, biodiversity, the natural world and its sustaining ecosystems. But most of all, they will remember you, the teacher. They will remember your interest in migratory birds, in biodiversity, in the environment and humanity's relationship to the natural planetary cycles. They will remember your sincere interest and respect for natural habitats and ecosystems. Your approach is fundamental to the success of this course.

You can use this curriculum to embark on a journey of wonder, exploration and learning about the natural systems of this earth, that can be continued for each of the students throughout their lives.

INTRODUCTION

The in-depth study of migratory birds may well be a subject you have never even considered teaching or learning before. Whether you are a teacher of biology, geography, political science or social studies, the topic of birds is clearly not an ordinary curriculum component in schools today.

The study of migratory birds can be extraordinary, though, because in addition to its novelty, it has the potential to:

1) provide an interesting and focused introduction to the important topic of biodiversity and ecosystem protection; and
2) meaningfully interrelate a variety of school subjects that are usually packaged separately and taught in isolation.

First, learning about migratory birds provides a focused introduction to the crucially important planetary matters of biodiversity and ecosystem protection, and of sustainable survival for us all.

In addition, a focused examination of 'Neotropical' (meaning New World

tropical) migratory birds can link together the fields of:

- biology: including zoology, in studying the birds themselves and their classifications, and techniques of biological observation; and ecology, in learning about the ecosystems in which the birds survive, and recent serious problems in ecosystem protection;

- geography, in exploring patterns of migration of the birds throughout the Americas;

- social studies, in focusing on how various cultures impact the sustainability of bird populations and natural habitats and ecosystems;

- land use planning, and law, civics, economics and political science, in examining how different nations and diverse cultures handle the increasingly important issues of these international birds and of ecosystem protection and biodiversity.

Each of these individual areas, and then the inter-relationship among them that birds create, provides an out-of-the ordinary vehicle for students to approach a meaningful topic in a holistic, in-depth and integrated manner.

For both of these significant reasons, then, the study of those 'ordinary' birds, waiting for you to discover them just outside your window, has truly out-of-the ordinary potential, and offers us all a truly extraordinary opportunity to see and appreciate a paradise around us.

We all can become partners in helping to assure the survival of this paradise around us. Understanding, appreciating and valuing ecosystems and the miracles within them is a key first step in this partnership.

Welcome, to a challenging and rewarding journey of discovery and wonder, for all.

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A WORD ABOUT BIRDS AND BIODIVERSITY

We are losing 'our' Neotropical migratory birds - - many of which are the colorful and familiar songbirds - - at an alarming rate[1]. We are losing intact natural ecosystems and the present era biodiversity of this planet at a rapid and escalating pace[2]. Human activity is now adversely affecting this planet's incredible and fragile ability to sustain human life[3].

Studying migratory birds, then, is not a narrow enterprise. It is a wide opportunity to key into and learn about, and learn from, the natural world around us, and eventually to help learn how to sustain our human civilizations on this planet over the long run.

The hallmark Baltimore oriole, so familiar to us all, but one source reports that numbers of Baltimore orioles have declined about thirty percent between 1980 and 1990[4]. Or who has recently seen a wood thrush or a rose-breasted grosbeak? These birds are incredibly beautiful, glittering in the spring sunlight and offering their haunting melodies. Their recent steep population declines are communicating something to us, also, if we listen.

What are they telling us?

According to another source, population densities of migratory songbirds in the mid-Atlantic United States dropped 50% from the 1940's to the 1980's, and "many species became locally extinct."[5] The recent disappearance of the migratory birds is not keyed to a sole discrete culprit, such as pesticide use, which was the cause of songbird declines several decades ago.

The songbirds are but one relatively easily seen and understood example of the

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[1] Partners in Flight, First International Migratory Bird Day fact sheet, May 8, 1993.

[2] Wilson, Edward O., The Diversity of Life. Selections from Edward O. Wilson, The Diversity of Life are reprinted with the permission of W.W. Norton & Company, Inc., New York. Copyright @ 1992 by Edward O. Wilson. All rights reserved. This material may not be further reproduced without the written permission of the publisher.

[3] "Reducing Risk: Setting Priorities and Strategies for Environmental Protection", U.S. Environmental Protection Agency, Science Advisory Board Report, 1990.

[4] "Silence of the Songbirds", copyright @ June 1993, National Geographic Society (page 81).

[5] Wilson, Edward O., The Diversity of Life, p. 256.

recent decline in the biodiversity of the present era that may threaten the ability of people to survive on this planet. Like the classic canary in a mine cage, the demise of the birds may be telling people something we need to know about our own survival. The birds, then, can be a colorful key to learning broader concepts of biodiversity - - which can be described as the present era variety of life and its processes. Studying migratory birds also leads meaningfully into the broad area of ecosystem protection and ecological sustainability for the human population.

The experiences of the students in this class therefore may be bittersweet, because the truth is that some of the species the students may see or learn about this year could well be extinct by the time the students become adults. And the learning may be bitter, as well, because unfortunately information about the rapid decline of species can be harsh and frightening.

But the class experience can be very sweet, too, as the students see and hear first-hand the beautiful natural habitats and ecosystems right around them, but which they may have not noticed before. The students will be learning key concepts about natural ecological systems, and how humans relate to them, that could be their essential tools in a fundamental enterprise: helping to sustain their own long-term survival, and the survival of their own offspring, amid the magnificent natural systems of this planet.

APPROACH

This curriculum focuses on the students' own experiences and ideas, and attempts to personalize the topic of migratory birds in a way that will have long-term meaning for each student. The in-depth and integrated study of birds is important, but the overriding goal of the course is to develop in each student a curiosity for, a delight and intrigue in, and a respect for, the topics of migratory birds, biodiversity, and human relationships to natural systems that will last a life-time of independent pursuit.

As such, this course does not require an instructor who is trained in zoology. A teacher who is willing to explore, listen to and learn along with the students is all that is fundamental. Lectures on the taxonomy and scientific classification of birds are simply not necessary for this course.

It is important for the teacher to feel secure enough in the essential areas of inquiry to be able to recognize, link and reinforce the main concepts, and to help the students carry on thoughtful and meaningful discussions. Typically, an instructor can do this by becoming familiar with this curriculum package, and by taking the initiative to help obtain materials on particular areas of interest. Of course, any specialized expertise of the instructor can provide an individual enhancement to the course. But since the basic approach is of personalized discovery, it is simply not necessary for the

leader to feel obliged to feed a package of facts to the students.

When I led this course with a group of seventh and eighth graders, I asked them in the beginning who would be teaching the course. After they pointed at me, then they suggested every member of the school faculty and still I shook my head 'no', they had no more ideas. When I called each one of their own names, and identified them as teachers of each other, they weren't sure how to react; they looked at each other in a new and unfamiliar light. But throughout the course, each student was entitled to respect as a teacher of the others, and each person's ideas were listened to and accorded importance. It was a journey of teaching, learning and respect, for all of us together.

It was the birds themselves, though, that taught us the most. They help us recognize that humanity has a journey of learning in front of us, that we can begin if we open our eyes, ears and minds to the natural world around us.

OVERVIEW

This curriculum is organized into several broad, sequenced segment areas: A) The Wonder of Birds, Migration and Survival in Natural Ecosystems; B) Flight to New World Habitats; C) Discovering Birds First-Hand; and D) Problems and Partnership in Biodiversity. Classes are provided in sequenced topics within each of the segment areas.

The themes of these four segments are outlined below. Detailed class plans for each of the 22 classes individually are set out after the discussion of the segments, and following several pages of information about general class preparation and resources.

The curriculum provides numerous focused classes on migratory birds and our environment. Of course, given the breadth of this subject, it is not possible for the students to examine and consider every topic area in depth. Accordingly, this curriculum provides a compass and a road map of the major route to follow. A number of the rewarding side roads and key landmarks of this journey of learning are not set out in depth in this curriculum, but are identified for the students and teacher to explore more fully, perhaps drawing upon traditional texts and source materials that are already in use by the class for areas such as political science and sociology. In those instances, this curriculum identifies these related topics as a "Link" to the general topic area, and the teacher is alerted that these classes and subjects can be integrated with the otherwise available curriculum materials on that specific topic.

Because of the need to schedule field observations (Segment C) according to the best time for your area, the course leader will need to plan around this, and adjust the timing of the other segments, as necessary. See "Field Trips: Logistics", below.

Segment A) The Wonder of Birds, Migration and Survival in Natural Ecosystems

(Classes #1 - 3)

Initially, the curriculum challenges the students to focus on the life and journeys of the birds that are right outside their window, that the students have likely not even thought much about before. In this way, the students are awakened to look at the world around them in a new and unexpected light. These are things they may have taken for granted, and probably have not really noticed nor appreciated before.

The life of migratory birds is incredible and astonishing, and all the more so when related to the students' own experiences in traveling (Class #1). Bringing concepts down to a personal level can be a way of thinking about how extraordinary the survival of migratory birds is, that students will find hard to forget. It can be a key eye-opener to the natural world around us.

Bring out quarters, one for each student, and flip them to feel the weight of one migratory bird, the blackpoll warbler, which migrates thousands of miles, each way, without a suitcase.

Class #2 continues to focus on the students' own personal view of birds, and begins to develop their individual appreciation of the diversity and wonder of migratory birds. The 'Personal Survey' that is presented in this class can be repeated near the end of the course (Class #22). A comparison between the two surveys can show each student one individual measure of how much their own general understanding of the topic has expanded through the course.

Class #3 is designed to help focus students on some of the mysteries and miracles of migration, and survival of birds throughout their journeys.

Segment B) Flight to New World Habitats

(Classes #4 - 9)

Class #4 is set up to be an immersion into the South American rainforest. The rainforest is looked at as a total habitat, of which birds are an important piece. The rich and colorful beauty of the rainforest is a treasure to explore, even in second-hand pictures. It leads into a mystery to which we do not have the complete answer . . . why would birds ever leave that warm paradise, to come to North America? These and similar questions are posed and considered in Class #5.

These questions stand on their head conventional teaching that the birds are really North American residents that just go south temporarily in the cold winter to 'vacation'. If looked at from another viewpoint, that the birds are really South American habitants, we can better appreciate the color and melody the birds bring to

North America every spring by leaving behind their lush rainforest homes and making incredible journeys to the United States and Canada.

Appreciating the magnitude, length and difference of these journeys, and locating the islands, continents and political countries along the way is the focus of Classes #5, 6 and 7. This segment of the course can be expanded for an in-depth focus and investigation of these countries, if the instructor desires. In addition to opportunities to discuss and investigate the various countries, it is an excellent opportunity to focus on comparative land use and sociological patterns, examining which types of land use and cultures provide habitat in which the birds, and other wildlife, can survive and biodiversity can flourish.

The key work of ornithologist Frederick C. Lincoln provides the important migratory charts which are fundamental to this portion of the course.

The students' own interests can provide the basis for an in-depth examination of particular habitats along the migratory routes. A student who has been to the Gulf Coast or to Florida can be invited to prepare and share personal observations about these habitats, and the current challenges and opportunities posed there to survival of migratory birds. In addition, students can research a particular geographic area and present their own conclusions about how a migratory bird would fare there.

During the spring, the birds' progress to their summer North American habitat and ecosystems can be anticipated and traced by the students. Students can be introduced to the concept of isochronal charts (Class #3). Local news and newspaper reports can be monitored for the sighting of 'the first robin' and for Neotropical migrants.

Classes #8 and 9 are designed to give students appreciation and understanding about how scientists have figured out how and when bird migration happens, and how the students themselves are capable of doing basic scientific work.

Segment C) Discovering Birds First-Hand

(Classes #10 - 16)

Enhanced observation skills, featured in Classes #10 and 11, will make the students' eventual field observations more meaningful. One classroom period, Class #11, is devoted to unstructured exploration of an bird field guide. The students are encouraged simply to discover for themselves the astonishing diversity of birds. For the class I 'led', this flexible hour proved to be a fascinating journey of discovery. The students had never before had the opportunity to explore and examine page after page of pictures and information about colorful, different and diverse birds. A few questions will need to be prompted here, but this experience of discovery may be more memorable to the students than an initial lecture on the taxonomy of birds.

At some point, either in this class period, if there is time, or at a resting spot during a field trip, it is very helpful to focus the students into the organization of the field guide for birds . . . the related avian families, the index and the migratory charts. These are not for purposes of memorization, but for aid in finding out about the particular bird, and how it relates to the themes of the course, and how the book can be used efficiently in the field.

Another important activity is to play pre-recorded tapes of bird songs. This can be scheduled flexibly, among the field trips, and used as a substitute for a trip that is postponed due to weather or other reasons. Listening to tapes of bird songs is intriguing . . . the songs can be charted on the blackboard and help provide students with a new dimension and expertise in natural observation. This activity is scheduled for Class #14, among the field trips.

The 'field trips' to actually observe birds out of doors, in natural habitats, should be scheduled for the most appropriate times for your area. Although some birds can be found virtually anywhere, it is helpful to select nearby spots where a variety of birds may be observed, to reward and challenge the beginning observer. However, the behavior of even one common pigeon, starling or crow can provide interesting material for the beginning bird-watcher, and can help students to notice the natural world around them that they have not looked at closely before, even though the observations may not be of a migratory bird.

Field trips are included in this curriculum as Classes #12, 13, 15 and 16. See "Field Trips: Materials and Logistics", below, for comprehensive information on scheduling field trips.

Segment D) Problems and Partnership in Biodiversity

(Classes #17 - 21)

This segment provokes students to think about broader issues concerning birds as important populations in the earth's natural systems, and to realize that migratory birds raise crucial issues at the local, national and international levels, particularly regarding ecosystem protection. The final classes of the course are designed to be upbeat, focusing students on the existing tools humans have to protect migratory birds and biodiversity, and how the students can use these tools effectively.

Class #17 centers on discussion of two eye-opening articles which are suggested as reading about the serious declines in migratory bird populations. The articles will need to be assigned as homework reading previous to this class.

In Class #18, the focus expands to the general and extensive problem of loss of natural ecosystems and biodiversity. The decline in bird populations is an indicator of this problem. Some of the suggested reading material for this class contains scientific terms with which the students may not be familiar. The teacher should assess this

terminology and the existing knowledge of the students in advance, and prepare definitions for them if needed. Although solid advance coverage of this material is not necessary, some familiarity with the terms will enable the students to read through the suggested homework assignments.

Conversely, the reading materials may reveal to the students the importance of studying these otherwise remote and foreign terms, in order that they may understand the concepts presented.

Class #19 can be a continuation of discussion of biodiversity issues, and it also introduces new reading materials and concepts. "Land use" is the central theme.

Class #20 centers on an introduction of significant, existing tools we have to protect birds and biodiversity, including the Endangered Species Act. Students are encouraged to actually examine provisions of the laws, and to read an interpretive article on the Endangered Species Act, which includes a detailed discussion of the survival of one songbird species.

In Class #21, the focus shifts from the national and international, down to the local level. Newspaper articles dealing with issues in the students' own community are the suggested source materials here. The crucial message is to have students see how broad national and international issues are played out at the community level, and conversely, how community issues on biodiversity are impacted by the umbrella national laws and policies studied in Class #19.

Because it can vary so much from state to state, no specific source materials have been identified in this curriculum for state policies, laws and initiatives dealing with migratory birds and biodiversity. However, this is an important area for the leader or the class to look into, obtain materials on, and weave into the discussions for either Class #19, #20 or #21. States are important players in this area. Even the lack of any laws and policies in your state dealing with protection of migratory birds, biodiversity or encouraging preservation of natural habitat areas is important to find out about. The Partners in Flight newsletters (see Preparation, Section V, below) contain helpful information identifying migratory bird conservation contact people for many states. Be sure you write to them well before the course begins to be placed on their mailing list.

Depending on the group of students you have, the topics covered in this Segment could be discussed and explored in greater depth, and at greater length than provided in this curriculum. You might consider this possibility when scheduling your course.

Course Conclusion and Challenge

Finally, Class #22 is scheduled to be a repeat of the 'Personal Survey' given in Class #2. It can be a good concluding class to remind students of the path they have

taken in learning about the importance of migratory birds and biodiversity.

Hopefully, students' interest in the subject of birds and biodiversity, and ecosystem protection will continue beyond this course. You might consider preparing suggestions for their further reading, and appropriate periodicals to which they might want to subscribe, or to look for in the library when they can. A few are suggested in Resource Information, Section V, above.

Students are embarking on a journey. Be sure the students leave the class with their bird-watching 'life lists', which they may want to continue adding to, on their own, throughout their life-journeys. Challenge students to notice the birds, no matter where they may be.

Bring out a quarter, as was done in Class #1, and encourage students to think about the amazing wonder of migratory bird journeys and survival, and the survival of us all, because of the richness of biodiversity and natural ecosystems, with every quarter they use.

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GENERAL PREPARATION, MATERIALS AND LOGISTICS

This curriculum can help students understand the common natural systems that sustain us in the Americas. In making this journey, the teacher and the students will need to be resourceful.

It can even be difficult to find a map of just the Americas. But this illustrates the potential importance of learning about the natural links and connections between South, Central and North America that sustain us all.

Almost fifty years ago, writer Aldo Leopold observed in Wisconsin that " . . . on cool August nights you can hear whistled signals [of the upland plovers] as they set wing for the pampas [of Argentina], to prove again the age-old unity of the Americas. Hemisphere solidarity is new among statesmen, but not among the feathered navies of the sky."[6]

In order to learn about this topic, the teacher should identify needed classroom materials early on, ideally well before the course actually starts, so there will be sufficient time to locate all the needed materials, and to improvise if important

[6] Leopold, Aldo, A Sand County Almanac, Oxford University Press, Inc., 1949.

materials cannot be obtained. Selected possible source items are presented in the following sections that can give a solid start to any course of this topic.

For example, there is a connected map of just the Americas, with an excellent depiction of migratory routes, published by National Geographic (see Maps, III, below).

The curriculum is structured around a variety of printed materials, most of which are available in a packet by contacting EPA:

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Please allow several weeks for delivery.
Several of the reference materials in the curriculum are articles which should be available in your local library. The articles are referenced in the curriculum text in order that the instructor can locate them in advance of the designated class.

I) General Course Scheduling and Logistics

This course is designed for the middle or high school level.

The curriculum is designed for a spring semester of once a week class meetings of approximately an hour in length. It can easily be adapted, however, for other structures such as more frequent meetings, or longer class periods, either covering several classes at once, or covering material for a particular class in greater depth. It could even be structured as a one-week intensive course.

Or, it could be expanded as a once a week course to meet over an entire school year. In that event, field trips could be added and scheduled to observe the interesting fall migrations of geese, hawks and other birds of prey. Even teenagers are awed by these impressive large birds.

Other curricula are available dealing with the migratory bird topic in a different manner, such as adding isolated topics on birds to already existing standard school subjects. If the

approach or structure set forth in this curriculum doesn't work for your school, consider looking at these other curricula as well in order that this topic can be included in a way that works for your school.

When trying out this curriculum, I led a group of approximately ten students. This was an excellent group number, although you may have a larger group. The in-school activities should work fine, but organizing and supervising the field trips will be more complicated.

II) Field Trip Materials and Logistics

A) Materials

1) Field guides

Ideally, each student should have their own field guide to birds. A reputable source, such as North American Birds, (Peterson, 4th ed.), costs about $16. Students and their families could be asked to pay for this directly, or other funding sources could be considered, such as community sponsors, an allowance from a parent-teachers association, or a fund-raiser.

The course will still work fine if students share the field guides in pairs.

2) Binoculars

Binoculars or field glasses are more expensive, typically beyond modest course fees, fund raising or stipends. If needed, an acceptable course can be taught without them at all. So don't give up on leading a migratory birds course because you or your students don't have binoculars.

In one of the first classes, you can ask each of the students if they or their family has binoculars that they will be able to use for the field trips, although you may not want students to bring expensive or special binoculars to school, unless your school has the ability to assure the safety of this equipment.

With the several old or inexpensive pairs the students are likely to have, along with your pair or two, and an old extra that an assistant leader or field trip guide may have, there will be enough for everyone to have a chance to see the birds close-up. Other

school staff may also have binoculars they may be willing to contribute.

3) Life lists

The students will be intrigued by the idea that they can begin recording a list of all the birds that they see, a 'life list', their own personal list of all the birds they see throughout their life. And when they first start bird-watching is the best time to start a life list. Call a local nature center in your area for free or inexpensive copies of a checklist of the birds students are likely to see in the area, that can be used as a first life-list record. Each student will need their own copy.

B) Logistics

1) Trip scheduling

Decide how many trips you want to include in your course, and find out the time you will have available for them. In this course, I planned for four trips, each to take a double class period. Even though the trip locations were all within a mile of the school, there just wasn't enough time in one standard 50-minute class period to get to the trip destination, get oriented and organized, to carefully explore the area for wildlife, and then to return in time for the next class period. The double-period solution worked well.

Four trips was a good number, because it allowed flexibility in the event of bad weather, and it provided opportunity for important reinforcement of identification of birds observed and ideas learned, from one trip to the next.

2) Trip timing

Discuss with an experienced local bird-watcher the best time during the spring to observe migratory birds in your locality. In the Mid-Atlantic area, for example, trips are best scheduled for after the weather gets warm, but before the leaves come out on the trees.

Trips are ideally scheduled for as early in the morning as feasible, given your school schedule. That is when the birds are actively feeding and singing.

3) Trip locations

The destinations of your field trips will of course be determined by your locality. But be sure to look beyond the obvious. Birds can be observed in urban areas, where there are nearby natural areas that might be inhabited by an interesting and rewarding array of birds. A small park close by may offer opportunities to observe in-depth the behavior of common crows, pigeons or starlings in a new light. Also, don't overlook the zoo as a field trip location. But, be sure you focus on the birds. The zoo may even offer speakers on birds or bird walk leaders.

In contrast, a rural or suburban area presents different challenges to successful field trips. The most well-known areas may have steep entrance fees or leaders who, although bird experts, don't relate well to the students. Aim for areas and leaders that will relate to and interest your students.

Be sure, if you are going to an area that is not a public area, that you have made appropriate arrangements with the property owners to visit their property.

Also, keep in mind that nearby areas may be best to visit on your trips, because students will be able to go back to them themselves, well after your course is over. The field trips can serve as an important introduction of students to nearby natural area locations that they will be interested in returning to, to observe wildlife, and can easily go back to themselves or with their families.

4) Trip preparation

Be sure your transportation is confirmed and the directions to the destination are completely clear. Know how long it will take to get there. Signed standard school permission slips are essential, of course. Confirm with the students exactly when and where to meet.

Advise the students as to appropriate field attire. In many areas, appropriate protection against ticks and Lyme disease are very important. Follow advisories issued for deer ticks and other local problems, including staying away from areas that deer go to, and keeping on established paths.

5) Trip leaders

You may want to ask experienced bird-watchers from the community to help you lead a trip. Many people have a wealth

of bird-watching knowledge and experience, gained over a life-time, that they are very gracious to share. This is an invaluable human resource, that is important for students to recognize. The knowledge of experienced birders is impressive, and it provides inspiration for the beginning student that it is possible to become expert in this subject.

The teacher/coordinator of this course should screen potential speakers and leaders to find those who are genuinely interested in working with students, and who relate well to them. A highly experienced leader who is not interested in the students or who does not relate well to them may not be the best choice.

In any event, try to have enough adults to accompany you so that you have a 1:4 or 1:5 students ratio. The assistants need not be birding experts. If they are responsible, and familiar with how to approach using binoculars and field guides, and if they are enthusiastic, that is the key concern.

The best field trip my class had was on a cold, misty day that indeed did deteriorate into intermittent drizzle, and the nature center leader was stuck out in the woods with another group. Confined to the porch of a small log cabin, this became our special observation deck, as the students were encouraged to discover for themselves, and themselves find in their field guides about, the colorful variety of birds that ventured, with songs that warmed us, into the small natural area clearing.

6) Trip protocol

It should go without saying that in no event should bird observers harrass or disturb the birds that are being observed. Intentional malicious acts are clearly inappropriate. Over and above that, be aware that even well-meaning activities are inappropriate, such as disturbing a nest, eggs or young birds. In some cases, these activities are even illegal. Demonstrate to the students that they can learn a great deal by observing, and by not interfering with the activities of the birds.

III) Maps

This course provides the opportunity to use maps as close-up keys for learning.

The instructor can purchase a few inexpensive world maps (they

cost about $3 apiece in general bookstores or paper supply stores) so they can be actively marked up and explored by the students during each class. The world maps can be used to show all the Americas in relationship to each another.

Additionally, a large map of the Americas, with the reverse side featuring a detailed depiction of dozens of migratory routes, has been published by National Geographic [1-800-638-4077]. Vol. 156, No. 2, August 1979.

See Classes #5 - 9 for how the maps can be used.

IV) Recorded Tapes of Bird Songs

For Class #14 (Listening to, and Hearing, Biodiversity), you will need a pre-recorded tape of bird songs. These are generally available at nature center stores and museum stores, or you may find them or be able to order them from a local bookstore. What you are looking for is a cassette tape containing about twenty segments of recorded songs and calls of individual, identified birds. Look for a tape that features birds found in your area. These tapes generally come in a package that contains a booklet identifying the birds featured on the tape. The booklet will be useful for the teacher in preparing the class, and it is not necessary to distribute to the students.

These tapes typically run in the $10 to $20 range.

If you are unable to find a source in your area, the Cornell Laboratory of Ornithology (address in (V)(D), below) is one possible source from which you could order a tape.

V) Resource Information on Migratory Birds

There is ample information currently available on migratory birds and issues surrounding them. Below is a list of some helpful possible sources, and sources of further information. If you are considering obtaining any of these, it is a good idea to try to get them before the course begins. Or, if they are to be used as specialized student research materials, allow enough time for the students to obtain them.

This curriculum does not recommend or require use or reading of any of the identified possible sources. Rather, it is left up to the course instructor to choose and decide on appropriate source material. The sources identified below are provided as possibilities solely for the convenience of the instructor.

There are an increasing amount of publications on ecosystem protection, biodiversity issues, and about migratory birds, and it is simply not possible to include them all in an introductory course. The teacher is cautioned against trying to include too much, and overwhelm the students. This course curriculum schedule is designed to focus on particular aspects of this large topic, so that the issues are presented in an interesting and integrated progression.

The teacher can always recommend other materials for the supplementary reading of interested students.

A) General periodicals

There are many possible sources; here is a sampler.

American Birds magazine

American Birding Association (quarterly newsletter, A Birds eye View, aimed at middle school students. Also various other educational materials. Student memberships are available at $18.00/year.)
Write to:

American Birding Association
P.O. Box 6599
Colorado Springs, CO 80934-6599

(tel. 719-578-9703)

Audubon magazine

Bioscience magazine

National Geographic magazine

Nature Conservancy magazine

Bird Conservation magazine:

American Bird Conservancy
1250 24th St., NW, suite 220
Washington, DC 20037

1-888-BIRD-MAG (toll free)
E-mail: abc@abcbirds.org

B) Books

Great

Elphick, Jonathan, ed., Atlas of Bird migration: Tracing the Journeys of the World's Birds, Marshall Editions Development Limited (Random House and the Smithsonian Institute) 1985.

Griffin, Donald R., Bird Migration, Dover Publications, Inc., New York, 1974.

Lincoln, Frederick C., The Migration of American Birds, Doubleday, Doran & Co., NY, 1939 (ill. Louis Agassiz Fuertes).

Mead, Chris, Bird Migration, Facts on File Publications, 1983.

Wilson, Edward O., The Diversity of Life, W.W. Norton & Company, Inc., 1992.

This recent book also contains reference to other source materials on birds and biodiversity, including:

Forsyth, Adrian, Portraits of the Rainforest, (Ontario: Camden House, Camden East, 1990);

"The Last American Parakeet", Doreen Buscami, Natural History, 87(4):10-12 (1978);

"Where Have All the Birds Gone?" Essays on the Biology and Conservation of Birds that Migrate to the American Tropics, (Princeton University Press, 1989);

David S. Wilcove and J.W. Terborgh, "Patterns of Population Decline in Birds," American Birds, 38(1):10-13 (1984);

The Last Rain Forest: A World Conservation Atlas, Oxford University Press, 1990. (Described by Edward O. Wilson as a "beautifully illustrated book . . . the best

popular reference work of its kind");

Wilson, E.O. and F.M. Peter, eds., Biodiversity, National Academy Press, 1988;

Philip A. Fearnside, "Extractive Reserves in Brazilian Amazonia," Bioscience, 39(6):387-393 (1989);

Leonard Berry et al.,Technologies to Sustain Tropical Forest Resources, (Office of Technology Assessment, U.S. Congress, 1984).

C) Other Written Sources

Birds in the Balance, Action Packet, National Audubon Society, 666 Pennsylvania Ave, SE, Washington DC 20003 (small cost).

Boyle, Robert H., "The Killing Fields", Sports Illustrated, March 22, 1993 (Reports that "toxic drainwater from irrigated farmland in California and other Western states has created an environmental calamity")

Gulf of Mexico Program
Department of Interior
U.S. Fish & Wildlife Service
Building 1103 - Room 202
Stennis Space Center, MS 39529

(various publications)

Lincoln, Frederick C., Migration of Birds, circular 16, U.S. Dept. of Interior Fish & Wildlife Service (original edition 1950; updated edition 1979).

Habitat Establishment, Enhancement and Management for Forest and Grassland Birds in Illinois, J.R. Herkert, R.E. Szafoni, V.M. Kleen, J.E. Schwegman. A comprehensive guide for private landowners. Free. (IL DOC, Division of Natural Heritage, 524 S. 2nd Street, Springfield, IL 62701, tel. 217-785-8774).

"Migratory Songbird Conservation" informational brochure on Partners in Flight and how you can help (being reprinted) Free. (USFWS, Office of Migratory Bird Management, 1849 C Street, ms 634 ArlSq, Washington, DC 20240, tel. 703-358-1838; 703-358-1711 (publications)).

Schneider, K.J. and D.M. Pence, eds., Migratory Nongame Birds of Management Concern in the Northeast, U.S. Department of the Interior, Fish & Wildlife Service, 1992 (Region 5, Newton Corner, Massachusetts 02158).

Status and Management of Neotropical Migratory Birds, eds. D.M. Finch and P.W. Stangel. Symposium Proceedings from the Estes Park National Training Workshop held September 1992.. USFS Rocky Mt. Forest and Range Expt. Station, Publication Division, Craddock Bldg., 3825 Mulberry, Ft. Collins, CO 80524-8597.

"U.S. Fish and Wildlife Service Cooperative Programs with Mexico", a 32-page report describing cooperative efforts for conservation of migratory birds, endangered species, wetlands, and law enforcement and training. Compiled by Doug Ryan, International Affairs- FWS. USFWS Publication Unit, 130 Webb Bldg., 4401 N. Fairfax Drive, Arlington, VA 22203.

Wetlands: A Celebration of Life. Final report for two-year study of the current status of Canadian wetlands. Single copies of this 67-page report are available free. ("Wetlands Publication", North American Wetlands Conservation Council, Suite 200, 1750 Courtwood Crescent, Ottawa, Ontario, Canada K2C 2B5, tel. 613-228-2601).

"Will We Lose Our Songbirds" full-color brochure providing general information on Partners in Flight. Free. Contact: "Songbird Brochure," U.S. Fish and Wildlife Service, MBMO, 4401 North Fairfax Drive, room 634, Arlington, VA 22203 tel. 703-358-1821.

D) Audio-Visual Materials

"Birds of Two Worlds - Tropical birds of the Midwest" poster. Free. (Brad Jacobs, MO DOC, Box 180, Jefferson City, MO 65102, tel. 314-751-4115).

"Out of the Blue" video. Ten and a half minutes describing the annual spring migration of songbirds along the upper Texas coast. Small cost. Also available is the 45-minute "Birding Texas" video, which includes the "Out of the Blue" segment. $15 (plus tax for Texas). Contact: Susie Gonzalez, TPWD, 4200 Smith School Road, Austin, TX 78744, tel. 512-389-4994.

Partners in Flight Slide Show. 13 minutes, with accompanying cassette tape and text depicting the plight of neotropical migratory birds and what PIF is doing to help. $53.95 (includes S&H). Contact: Meg Ghallagher, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, NY 14850, tel. 607-254-2440.

Note: the Cornell Laboratory of Ornithology is a valuable source for ordering books, videos and other study aids on migratory birds. Write or call them for a brochure.

"Songbirds of forest and field" full-color poster featuring 11 neotropical migratory songbirds by Louis Agassiz Fuertes, $6.50, Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325, tel. 202-783-3238. Please reference stock #024-010-00699-4.

E) Contacts for Further Current and Local Information

Your state may have local information on migratory birds and resource protection issues. There are specialized educational programs on migratory birds in several states. For example, contact:

Wisconsin:

One Bird - Two Habitats
DNR Research Center
1350 Femrite Drive
Monona, WI 53716

New Jersey:

The New Jersey Conservation Foundation
300 Mendham Road
Morristown, NJ 07960

(tel. 201-539-7540)

The Bird conservation magazine listed above also contains information on migratory bird contacts in many states.

***BE SURE YOU HAVE ORDERED PRINTED MATERIALS FOR THE CLASSES, AS SET FORTH ON PAGE 1 OF THIS TEXT.

DETAILED CLASS PLANS FOR EACH OF THE TWENTY-TWO CLASSES IMMEDIATELY FOLLOW.

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SEGMENT A
THE WONDER OF BIRDS, MIGRATION AND SURVIVAL IN NATURAL ECOSYSTEMS

Class #1

The Miracle of Migration and Survival in Natural Ecosystems

****

OBJECTIVE: Awaken curiosity about, and wonder at, the amazing miracle of bird migration.

THEME: Long distance journeys pose difficult challenges to meeting basic needs such as food, water, clothing and shelter, and finding your way, for people and the birds.

CLASS ACTIVITIES:

I. Identify how people obtain basic necessities while travelling:

A. On a map, locate long-distance locations to which each of the students in the class have traveled.

B. Ask the class members to identify what they took with them on their trip in order to stay warm, protect themselves from the weather, have a place to sleep, have enough to eat and to drink. Record this list on the blackboard, overhead projector, or a large flip-chart pad (a permanent list may be advantageous for future reference).

In addition to obvious items, encourage the students to think about less obvious articles, such as:

- maps (to know where they were going)

- compass (to know direction they were going in)

- water (they probably took this for granted)

- food (if they didn't carry it all, they needed to bring money to buy it)

If a class member went hiking or on a camping trip, this experience may warrant detailed discussion of how difficult it was to obtain basic necessities for survival and comforts that they may take for granted around their home.

Encourage class members to identify other unique complications or problems that they faced in travelling away from their home.

C. Open up a pre-packed suitcase or backpack (see "Preparation", below) and identify each item that you have packed for a long trip, and the purpose of the item. You can run quickly through items that the class has already identified in (B), above, and dwell on those they hadn't thought of.

Another approach, quite a bit more dramatic, is to begin the class by making an entrance with the suitcase or backpack, and go through the contents before doing the exercise in (B), above.

D. Illustrate how heavy the suitcase is, and how it holds only a small portion of the travel items the class identified, and how it holds only enough food and shelter materials for a very short journey.

II. Identify basic facts about migratory bird journeys:

A. Ask students to take out a quarter; hand out quarters to each student who doesn't have one. (Expect the students to toss and flip their quarters.)

B. Hand out pictures of small birds in flight to each student. Tell them that one small bird, the Blackpoll warbler, flies over 2,000 miles in its migration and it weighs about a quarter.

C. Focus attention on the over 2,000 mile journey of this quarter-weight bird, which doesn't carry any suitcase or backpack, but which finds ways to survive.

D. Ask the class to think about how the bird survives and how the bird gets basic necessities such as water, food, shelter and warmth, without bringing anything with it, or carrying a suitcase. Explain that these are the kind of questions we will try to explore in this course.

E. Suggest that, each time they handle a quarter, the students think about

the amazing journey of migratory birds.

III. Course introduction:

Explain to the students that this will be a course on migratory birds, and they will learn about birds and the environment. Explain other general course information, including that this subject area can link together a number of topics, including science, sociology, geography and political science.

PREPARATION:

A. Pack suitcase;

B. Obtain quarters for each student;

C. Cut out or copy a picture of a small bird in flight (could be one for each student).

RESOURCES NEEDED:

A. Suitcase or backpack, packed with various items representative of survival necessities while on travel, such as the following:

LIST OF SUITCASE ITEMS

- sweater
- warm jacket
- hat
- gloves
- change of clothes
- shirts (warm, and warm-weather)
- shorts
- pants
- dress clothes (for dinner!)
- alarm clock
- toothbrush
- wash cloth
- pillow (if room for it)
- shoes
- boots
- sandals (for warm weather)
- sunscreen

- sunglasses
- pajamas
- socks
- raincoat
- food
- water
- money
- maps (South America, North America, and local)
- compass
- alarm clock
- band-aids (for injuries)
- umbrella
- flashlight (to see at night)
- phone book and address book (to find your friends)

Use your experiences to include additional useful items from your own journeys.

B. A quarter for each student;

C. Copies or cutouts of birds in flight (see "Handouts", below);

D. Blackboard, or overhead projector and sheets, or large flip-chart pad.

HANDOUTS:

Picture of a bird in flight (could be one for each student).

HOMEWORK TO ASSIGN:

Have students write about:

1. What is a migratory bird? (no research needed, just identify the current state of their understanding); and

2. If migratory birds don't carry suitcases, how do they keep warm, stay cool, get enough to eat and drink, and find places to rest and to sleep? (Again, no research needed, just have students write down their own thoughts).

FOLLOW-UP:

Put away suitcase items, or repack for another class.

LINKS: Science and ecology.

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SEGMENT A
THE WONDER OF BIRDS, MIGRATION AND SURVIVAL IN NATURAL ECOSYSTEMS

Class #2

There is a Lot to Think About and Explore Concerning Migratory Birds

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OBJECTIVES:

1. To help students refresh themselves on the various bits of information they have learned about birds so far in their lives;

2. For the instructor to gain an understanding of the students' currents knowledge of birds, in order that the instructor can more closely tailor the remainder of the classes to the level of the students;

3. For the students to tie concepts about birds closer to their own personal experiences and frame of reference;

4. To identify areas of inquiry that the students may be interested in exploring.

THEME: Every student is starting on a journey of questioning and discovery about the natural world and our relationship to it.

CLASS ACTIVITIES:

I. Give a brief refresher (1 - 2 minutes) of the last class.

II. Collect Homework assignment from Class #1. Explain that it will be discussed

during the next class period.

III. Conduct the Personal Survey (attached, below)

IV. Discuss each students answers to the Personal Survey. Encourage students to discuss and share their answers, and their questions.

PREPARATION: Review survey questions; possibly add others that are appropriate to stimulate the students' interest.

RESOURCES NEEDED:

Paper and pencils

HOMEWORK TO ASSIGN:

Have students think and write about what they think birds do all day. This should include their own personal observations, if any.

FOLLOW-UP:

1. Carefully review students' answers to the Personal Survey;

2. Compare and adjust the activities planned for future classes to the needs and learning level of the students;

3. Weave the students questions (item #13 on the survey) into the topics covered for the course, if possible.

4. Save the students' individual answers to the Personal Survey. They will be handed out again in the last class, #22.

LINKS: Science and ecology.

PERSONAL SURVEY QUESTIONS

1. Write down the names of all the birds you know.

2. Go back to the list you wrote down for question #1, and put a little star down next to the name of each bird you listed that you have actually seen.

3. Put down an "x" next to the names of birds you know about, but have never seen.

4. What is your favorite bird? (If you have more than one, you can rank them, #1, #2, #3).

5. Why is the bird you picked your favorite?

6. Are there any birds you don't like? (Name them).

7. Why don't you like them?

8. If you were a bird, which one would you like to be? (this can be different than question #4).

9. Why?

10. If you were a bird, where would you like to live?

11. Do birds live by themselves?

12. Do they have groups of friends with other birds? Explain.

13. What would you like to learn about birds, in this course? (Write down as many things as you can think of).

14. A true/false question: All birds migrate, true or false?

    (May require some discussion of what migration basically is, and then some thinking. This question may help the students focus on the idea that migration may not be as clear a concept as they initially thought).

15. Why do birds migrate?

16. When birds migrate, how do they know where to go?

17. Where do birds go when they migrate?

18. Why do they go there?

19. Have you ever been birdwatching?

20. Do you know any people who are birdwatchers?

21. If you wanted to watch birds, where would you go to find them?

22. Do birds have jobs? (Explain your answer)

23. (If this is an elective course)
Why did you decide to take this course?

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SEGMENT A
THE WONDER OF BIRDS, MIGRATION AND SURVIVAL IN NATURAL ECOSYSTEMS

Class #3
Starting the Migratory Journey

****

OBJECTIVE: Organize and prepare the students for beginning to learn specifics of migratory journeys.

THEME: There are many challenging questions about migratory birds, that still remain to be explored.

CLASS ACTIVITIES:

I. Review of Homework from Class #1:

Redistribute Homework papers from Class #1. Ask students to share their ideas and thoughts from this Homework assignment. Remember, every thought and idea is a useful one! Reassure students that, although they may not have all the answers, this course will give them the chance to help find the answers to these questions.

Discuss the answers.

II. Review of Homework from Class #2:

Ask students to take out the Homework assigned from Class #2. Ask students to share their thoughts from the Homework assignment from Class #2. Discuss them.

III. Discuss Course Logistics:

Provide the students with a clear overview of the course, and an individual printed calendar schedule of the classes, and discuss with them the dates for which the field trips are scheduled. Identify and discuss logistical concerns related to field trips.

IV. Introduce that Spring Bird Migration is Beginning:

Hand out copies of the isochronal map provided in "Handouts", below, and lead the class in discovering that it depicts the general times that particular species of birds are found in certain areas on their spring migratory journeys. Be sure to identify where the birds are at this particular time.

V. Introduce Research into Habitat Areas:

A. Introduce the students' Homework assignment. Students will be choosing to focus on specific habitat areas along the migratory paths for their individual research:

- Tropical rainforest

- Gulf Coast

- Caribbean

- Your local area (ask the students to explain, if they can, what kind of a habitat they live in)

- Northern United States

- Canada (including Canadian forests)

- Other geographic areas the students may be interested in examining along the migratory routes

B. Make assignments. Students working on the rainforest will need to prepare their research for next week.

C. The students will need to research several key questions for each area, set out below in the "Handouts" section.

You may want to copy the page identified in "Handouts" and provide it to each student.

PREPARATION:

1. Bring Homework papers from Class #1.

2. Organize a calendar schedule of the course, and bring a copy for each student.

3. Make copies of the isochronal map identified in "Handouts", below.

4. Make copies of the research questions for each student.

5. Collect and bring information on the tropical rainforest, for the students who will need to make their presentation in the next class.

RESOURCES NEEDED:

Any available information about the rainforest. See possible sources in "Resource Information on Migratory Birds" in General Preparation, Materials and Logistics, above.

With the increased attention on the rainforest in recent years, there is a wealth of information available, right in your local and school libraries. Consult natural history periodicals, environmental journals, and current world atlases. Rainforest interest groups may have members in your area who could serve as an information resource; also community members may have traveled to the rainforest, and could offer their personal observations. Don't overlook the science section of local video stores and libraries. Local science museums in your area will also have information on this topic.

One particular interesting topic is the rubber tappers who live in the rainforest. A source for this information is identified in "Resource Information on Migratory Birds", above, in General Preparation. Another source is Wilson, Edward O., The Diversity of Life, pp. 322-329.

Along with other information presented, be sure to provide a large map on which American rainforest areas can be identified.

HANDOUTS: Attached page on "Questions to Focus on For Each Habitat Area".

Isochronal maps (for discussion during class). These will be in the packed pre-ordered from EPA.

HOMEWORK TO ASSIGN:

Students assigned the rainforest area will need to complete their research and make their presentations in the next class. Students with other topic areas will have more time to prepare their presentations, scheduled for Class #7, but can be encouraged to get started.

FOLLOW-UP: Be available, ideally at identified times, to assist the students who will be preparing their rainforest presentations during this week.

LINKS: Science and ecology.

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QUESTIONS TO FOCUS ON FOR EACH HABITAT AREA

1. Where is the particular topic area located, and what are special characteristics of the climate?

2. Discuss types of plants in the specific area.

3. Discuss types of animals in the specific area.

4. Find and discuss interesting information about the people who live in the area, particularly their relationship to the habitat around them.

5. Explain the climate(s) of the area.

6. Describe the natural vegetation zones of the area.

7. Which activities by people affect the natural vegetation zones of the area?

8. What are the identified land uses of the area, and how do they compare with the natural vegetation zones? Contrast these two, and identify conflicts and opportunities for harmonizing both.

9. Identify the major economic and commercial activities for the area.

10. Identify the relationship, if any, between the land uses, economic and commercial activities of the area, and if this could affect the ability of the migratory birds to survive in the area.

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SEGMENT B
FLIGHT TO NEW WORLD HABITATS

Class #4
The Tropical Rainforest Habitat

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OBJECTIVE: Gain an appreciation of the habitat in which Neotropical migratory birds spend the winter months.

THEME: All about the American tropical rainforest, where many Neotropical migrants spend our winter months.

CLASS ACTIVITIES:

I. 'Travel' to the American tropical rainforest:

1. Present information about the rainforest and its inhabitants, including native peoples, focusing on the topic areas and issues identified for research in Class #3.

2. Be sure to locate rainforest areas on a map.

PREPARATION:

The teacher will need to collect and organize materials, unless the students fully take on this responsibility. Materials can focus on the beauty and uniqueness of the tropical rainforest environment and habitat, as well as the birds living in it.

RESOURCES NEEDED:

See discussion in "Resources" section for Class #3.

HOMEWORK TO ASSIGN:

Have each student write their own thoughts about: Why would birds want to leave the rainforest and migrate to North America? Why do birds leave the rainforest?

FOLLOW-UP:

Make note of good resources to use for next year's class on this topic; return videos and other borrowed materials.

LINKS: Science, ecology, sociology, economics, land use planning, geography and anthropology.

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SEGMENT B
FLIGHT TO NEW WORLD HABITATS

Class #5
Migration Routes

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OBJECTIVE: Gain an appreciation of the long journeys made by Neotropical migratory birds, and the vast ranges throughout the Americas that they travel and live in, when they leave the rainforest.

THEME: Examine migratory routes of a number of birds, mostly Neotropical.

CLASS ACTIVITIES:

I. Ask students to share their thoughts from the Homework assignment from Class #4. Discuss the important questions raised in the Homework assignment.

II. Learn about migration routes through migration charts:

Examine a sequence of migration charts. For each of them, discuss:

a. the countries and places each bird spends the winter;

b. the time when the bird starts migrating north;

c. how the birds of each species know when to migrate north?

d. have birds started migrating north yet, this spring? Which ones?

e. how far north have they reached yet?

f. what are particular problems the birds face in flying over specific land areas, or large expanses of water? (ie. hunters, high mountain ranges, exhaustion, lack of food, predators)

g. relate the number of miles the birds are shown to have traveled on the map to how far each student has traveled, as discussed in Class #1.

h. do the students have any ideas as to why different birds would choose different migration routes?

i. how do birds know how to find the same route, year after year?

2. Ask the students to make observations about each chart, and from comparing the charts (ie. some routes are shorter than other, some go over land, while other routes are over water), and take down all the observations on the blackboard, flip-chart or overhead projector. Remind the students that <u>all</u> observations are important, and that is how field biologists get new ideas and theories.

3. Introduce and explain fully the concept of "Neo-tropical" migrant, ie. that the bird lives in the American tropics for at least part of the year. Contrast this with the Canada Goose (copy of isochronal chart provided in "Handouts"), which does migrate in the Americas, but not to the tropics.

4. Ask the students where the information on the migration charts comes from. (You may not want to definitively answer this question, but it is a useful question to raise, that will be dealt with in detail in class #9).

PREPARATION:

Copy enough of each of the migratory charts to allow one per student.

RESOURCES NEEDED:

Copies of migratory charts are essential. These should be

ordered in advance of the class, as set forth on page one of this text.

Additionally, the National Geographic map identified in General Preparation, above (Section III, Maps) would be an excellent tool for this class.

HOMEWORK TO ASSIGN:

No specific Homework for this class; students should continue their research into individual habitat areas for presentation in Class #7.

FOLLOW-UP:

At some point around this time, the students may break for spring vacation. Challenge the students to find and observe birds wherever they may go in their travels, or even if the students remain right in the area. Suggest that the vacationing students look to observe migrating birds. Find out where students may be going in their travels, and ask them, if they possibly can, to bring back easily obtainable information on habitat conditions, particularly those that may be important to bird survival. Remind them that this does not need to involve any real expense: they can make their own observations, take their own pictures, buy inexpensive postcards or get free travel pamphlets. These can fit into the areas of research for class #7, or students can report on their observations when they return from vacation.

Remind the students of the first class, and the difficulties in travel, as they set about on their individual vacations. Encourage them to think about the birds beginning to migrate north now, and the travel challenges they face.

HANDOUTS: Migration charts

LINKS: Science, ecology and geography.

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SEGMENT B
FLIGHT TO NEW WORLD HABITATS

Class #6
Migration Routes

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Class #6 can be a continuation of examination of the migratory charts presented in Class #5. It is set apart here as a separate class for schedule planning purposes.

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SEGMENT B
FLIGHT TO NEW WORLD HABITATS

Class #7
North American Habitats

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OBJECTIVE: Gain appreciation of the diversity of habitats occupied by the migratory birds (other than the tropical rainforest habitat) including your local habitat area, and the particular survival challenges of each area.

THEME: Each habitat and ecosystem poses its own different opportunities and challenges for survival and success. Habitat areas and ecosystems cross political boundaries.

CLASS ACTIVITIES:

I. Habitat investigations:

A. Present information on the various habitat areas investigated by the students as the homework assigned for Class #3. Have the students make their own presentations, either individually or as teams. Be sure, during each presentation, to locate on a map where the area is on one or more of the migratory bird charts introduced in Class #5. Focus on the topic areas and issues identified for research in Class #3.

B. Organize the presentations so they follow a general northward migratory pattern: Caribbean, Gulf Coast, Mississippi Basin, Northern United States, Canada.

C. Discuss differences in the habitats for the birds, and discuss advantages and disadvantages of each, for the birds, and for people. Discuss how birds and people can accommodate their mutual interests. Ask students for each habitat area: which of people's activities there adversely affects the birds ability to

survive there?

D. Identify and discuss the various countries and states in each habitat and ecosystem area. Focus on that observation that, in many instances, the habitat area (also could be called an "ecoregion") is not confined to political boundaries. What are the consequences of this to a migratory bird?

PREPARATION:

The teacher will need to collect and organize research materials for each habitat area, unless the students fully take on this responsibility.

RESOURCES NEEDED:

See discussion in "Resources" section for Class #3.

HOMEWORK TO ASSIGN:

Ask students to choose, of all the habitat and ecosystem areas they have learned about, which they would prefer to live in. They should explain why. Advise them that, as some birds do, they can choose to move among areas. They should explain what their choices are, and why.

Ask students to keep a continuing watch for in-depth information about local habitat conditions, ecosystems and land use patterns, such as that occasionally printed in local newspapers.

FOLLOW-UP:

Monitor local newspapers for interesting articles about local habitat conditions and land use. These will be needed for Classes #19 and 21.

LINKS: Ecology, geography, anthropology, sociology, political science.

NOTE: Depending on the number of students in the class, and their interest in examining and comparing each habitat area in depth, this topic could take more than one class. You could adjust the schedule to allow another class for this purpose, and make scheduling adjustments to later classes.

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SEGMENT B
FLIGHT TO NEW WORLD HABITATS

Class #8a
Why and How do Birds Migrate?

****

OBJECTIVE: Help students appreciate the importance and depth of basic scientific questioning and research.

THEME: There is an immense amount that we don't know about bird migration and the mysteries of natural systems. First-hand observations by people form the basis of what we do know.

CLASS ACTIVITIES:

I. Discuss students' preferences for habitat in the Homework assigned for Class #7.

II. Conduct Group Survey #1:

Ask the class to think about what they have learned in the class so far, and as a group to think of answers to the following:

1. Why do birds migrate?

2. Why do birds leave the rainforest to come to North America?

3. Given all the problems with the habitat areas in North

America that we have identified in recent classes, why do migratory birds continue to come here?

4. Then, why do birds then leave North America to go back to South America?

5. What do birds do during the time they spend the summer in North America?

6. How do birds know <u>when</u> it is time to migrate?

7. How do birds find their way when they are migrating?

8. What problems do birds have when they are migrating?

9. How do <u>you, personally,</u> know that birds migrate?

10. Have you ever seen a bird migrating and ending up in South or Central America?

11. Where does the information on the migratory charts examined in previous classes come from?

12. How and when did bird migration begin?

13. What is the home of migratory birds?

14. What do these birds need to survive?

15. Describe your home.

16. Describe what you need to survive.

Record the various ideas of the students below the questions. Remember, all sincere ideas are good ones.

When discussing some of these questions, you can mention that people used to think that when birds disappeared in the winter the birds had gone to the moon! The philosopher Aristotle thought that the birds hid in the local bushes all winter, and reappeared in the spring. These historic items, as well as much other interesting information about migration, are set forth in <u>Migration of Birds</u>, circular #16 of the U.S. Fish and Wildlife Service, identified in "Resources", above.

PREPARATION:

Write out the questions ahead of time, either on separate sheets of a large flip chart, on individual overhead projector sheets, or spaced out on the blackboard. Leave enough space to write in students' ideas below the questions.

RESOURCES NEEDED:

Large flip chart pad, overhead projector and supplies, or blackboard.

HOMEWORK TO ASSIGN:

Ask students to write their own ideas about some of the questions asked during this class, such as:

1) How do you, personally know that birds migrate?

2) How do birds find their way when they are migrating?

FOLLOW-UP:

No specific follow-up needed.

LINKS: Science, ecology.

NOTE: This exercise is not designed to take a full class period. A good idea is to start Class #8b during this class period as well.

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SEGMENT B
FLIGHT TO NEW WORLD HABITATS

Class #8b
How Do You Know Migration Occurs?

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OBJECTIVE: Help students appreciate the importance and depth of basic scientific questioning and research.

THEME: There is an immense amount that we don't know about bird migration, and first-hand observations by people form the basis of what we do know.

CLASS ACTIVITIES:

I. Mapping Migration Patterns:

Use the referenced group exercise in "Resources Needed", below, to have students learn 'first hand' how we find out about bird migration, and about the problems birds face along the way.

More than one class period will be needed for this complete exercise. It can be started during this class period, and completed during the next class. It works well to get it organized and started during one class, and then students will be ready to begin right in on it and complete it in the next class.

PREPARATION:

For the mapping exercise, a large map of North America is needed. The migration information (provided in "Resources Needed", below) should

be cut into strips ahead of time, and the teacher should bring a hat or another container to the class into which the slips can be placed.

RESOURCES NEEDED:

The needed excerpts from Migratory Birds Issue Pac, Activity #2, Migratory Mapping (U.S. Fish and Wildlife Service, 1992) are materials that should be ordered in advance, as set forth on page one of this text. This packet contains an interesting exercise of mapping of the migration of Canada Geese. This exercise is only part of a larger comprehensive packet, that could be ordered in its entirety. See "Course Logistics", above, for ordering information.

The teacher will need to bring a large map (preferably mounted, for ease of working), marking pens, and a hat or other container.

HOMEWORK TO ASSIGN:

One creative assignment could be for students to brainstorm and identify other possible ways that people could find out specific facts about bird migrations. For example, the New York Times reports in "New Technique May Clear Up Mystery of Vanishing Songbird" that chemicals in feathers may help trace birds to winter grounds (New York Times, May 31, 1994, p. C4). Students could come up with a variety of other ideas, too.

FOLLOW-UP:

No specific follow-up is needed.

LINKS: Science, ecology.

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SEGMENT B
FLIGHT TO NEW WORLD HABITATS

Class #9
How Do You Know Migration Occurs?

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This Class period is a continuation of the exercise in Class #8b. It is set apart here as a separate class for schedule planning purposes.

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SEGMENT C
DISCOVERING BIRDS AND BIODIVERSITY
FIRST-HAND

Class #10
How to Identify Birds

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OBJECTIVE: Learn the basics of how to recognize birds, in preparation for interesting and rewarding trips of field observation.

THEME: Identify basics of bird observation.

CLASS ACTIVITIES:

I. Depict the basic features of birds that will be helpful for students to know in the field:

1. Ask the students to draw an outline of a bird on a clean sheet of paper, and to mark on it the identification features that they already could recognize (ie. beak, tail, etc.) Spend only about five minutes on this.

2. Using the blackboard, overhead projector or large drawing pad, sketch out the outline of a bird, and mark the key features of the bird, particularly those that are helpful to field observation. For reference, use a standard chart depicted in the front of a bird identification book. See "Field Guides", in General Preparation, above).

   Have the students copy the chart and the identification names and markings as you go along.

3. Collect the students papers, hand them a blank paper, and challenge them to write from memory a bird outline and as many

of the markings as they can remember.

4. After #3 is attempted, hand the students back their original notes, and ask them to complete those things on their second sheet that they could not remember.

   Note: this is not meant to be a graded exercise, but rather a little short-term memory reinforcing trick for trying to remember as much as possible. Explain this to the students. They won't remember all the markings anyway, but they will remember some of them when you get out into the field, and at least they will be familiar with the standard marking names, such as 'crown' or 'wing-bar', that otherwise they have never heard before.

II. Finalize field trip logistics:

The bird identification activity should be completed in enough time to discuss the final plans for the field trips: exact logistics of where and when to meet, contingency plans related to the weather or other individual student activities (such as school orchestra, play rehearsals, tests, etc.), appropriate field gear, including pants, boots and hats, and arranging for bird identification books and binoculars.

If enough time is available, the students can be asked to find the location of the field trips on a local map.

PREPARATION:

Obtain a diagram of bird identification features from the introductory sections of your bird identification field guide. Review the diagram so that you will be familiar with it.

RESOURCES NEEDED:

1. Reference for bird identification marks, for the teacher to copy from;

2. Paper for each student, pencils, blackboard, overhead projector or large marker board;

3. Printed information sheets concerning the logistics and details of the field trips;

4. Local area map for pinpointing field trip locations.

HOMEWORK TO ASSIGN:

No specific Homework for this class.

FOLLOW-UP:

Make adjustments and final preparations for the field trips.

LINKS: Science and geography.

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SEGMENT C
DISCOVERING BIRDS AND BIODIVERSITY
FIRST-HAND

Class #11
Discovering Diversity

****

OBJECTIVE: Have students begin to discover for themselves the incredible diversity of life, as reflected in the many different types of birds.

THEME: The rich variety of bird life is fascinating for those who explore it.

CLASS ACTIVITY:

This class period is designed to consist primarily of unstructured individual exploration of a major bird field guide. The students, either individually or in teams of two, should be handed a bird field guide, and told they will have the class period to explore it.

This can be a very successful and fascinating exercise, because the diverse depictions of birds, and comparisons among them, are probably something that the students have never taken the time to explore before. The variety of bird life is itself amazing and extraordinary.

At first, the students may be a little sheepish about exploring the guides, but allow them enough time to really get started.

If necessary, the class can be prompted by challenges to find their favorite bird, or to try to locate birds that they have seen before, and read about them. Additionally, they can be challenged to find different types of features about birds, particularly their bills, and obviously their plumage. Ask the class to start thinking about why do birds have so many different color feathers and types of bills?

Challenge the students also to find important features about the books, such as: how the index works; how the guide is organized; and the migratory mapping feature, and how to find the right map.

Be careful not to overwhelm the students with too much lecture at this time. They should be given enough time to explore the book productively themselves, without rushing. Features of the book that aren't covered during this class can be discussed during a field trip.

Discovering the diversity of bird life can be a good introduction to prompt the class to think about the importance and beauty of diversity in all forms of life.

Note: be sure to confirm the final details of a field trip, if it is planned for the next class. Remind the students to bring their field guides, if they have their own individual copies.

PREPARATION:

Obtain bird field guides.

RESOURCES NEEDED:

Obtain as many field guides as possible. (See discussion in Course Logistics, above, concerning selection of field guides). Ideally, there will be one identical field guide per student. However, this is not necessary, and students can be asked to share. If field guides are not identical, be sure to observe this and be prepared to help students in the field to locate birds in their particular guide.

HOMEWORK TO ASSIGN:

Ask the students to think and write about:

1. Why do birds have so many different color feathers?

2. Why do birds have different shapes and types of bills?

3. What would the world be like if all the birds looked the same?

If the students have individual copies of the books, they can be asked to look through the books again, as much as possible, at their leisure.

FOLLOW-UP:

Collect field guides, unless they belong to the students, and bring them to next weeks' field trip.

LINKS: Science

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SEGMENT C
DISCOVERING BIRDS AND BIODIVERSITY
FIRST-HAND

Class #12
Field Trip

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OBJECTIVE: Have students observe and begin to appreciate natural ecosystems and biodiversity first-hand, through direct observations of birds in their natural surroundings.

THEME: Explore a local area to discover the diversity of birds there, and find out about the types of ecosystems in which birds live.

CLASS ACTIVITY:

I. Field trip to local area to observe birds and our habitat. See in-depth discussion in Course Logistics, above.

In the field, help students learn field identification and observation techniques, including focusing on where particular birds are found (forest, field, wetland, suburban yard); behavior of the birds, and field markings (using identification techniques introduced in Class #10). Lead students to appreciate the wonderful variety of colors in the different birds they are seeing.

Also, it is important to focus on other components of the particular ecosystem visited. This can be done, for example, by finding out about the type of food eaten by the various birds, by observing their type of bill. Field identification of different types of bills is introduced in standard field guides, such as Birds, (Peterson, 4th ed), at p. 34. Focusing on the bills and the type of food eaten by each bird in the wild is a key concept in helping to understand the importance of each bird in the natural cycles, and in observing other life forms of the particular

ecosystem. Lead students to appreciate the rich variety of life and color throughout the ecosystem, using the birds as a focal point.

II. Record any birds observed on the students' individual life list.

III. Find out and discuss other areas in the Americas where the birds you have observed live. For example, for each bird observed, find out where it spends the winter months, and find out whether the bird is migrating through your area to a certain more northern territory, or is establishing itself in your locality for the summer. The bird field guides can be a start to this.

The National Geographic map referenced in General Preparation, Maps (III), can be a very valuable tool for referencing migratory routes of birds observed.

Students may have to do more research on this, which can be their homework for each field trip class. For each field trip class, locate on a map of the Americas the winter home of each type of bird observed, and its summer location. You can do this as each bird is observed, if you have the information available, or as a focused segment of each field trip class, using the homework research that the students have done.

When identifying the various areas, be sure to remember and discuss highlights of the individual habitat explorations from Classes #4 and #7.

PREPARATION:

See in-depth discussion under "Course Logistics", above.

RESOURCES NEEDED:

Field guides and binoculars. See in-depth discussion under "Course Logistics", above.

Map(s) to mark on.

HOMEWORK TO ASSIGN:

1. For each field trip, ask students to record their key first-hand observations about birds and habitat areas in a note-book. Encourage them to write about the things that they personally find interesting on the field trip. Explain that scientists need to record observations directly in the field as they are occurring, but that a daily journal can be useful as well.

2. As necessary, research the locations of the winter and summer territories of the birds observed in that class. Each student can be assigned to find out about one bird that was observed, and the findings can be shared with the class and plotted on a map during the next class.

3. Prepare a Glossary of Words that your students will need to recognize in order to read the Homework to be assigned in Class #14.

FOLLOW-UP:

Write thank-you notes to any guest field leaders, or owners of the natural areas you have visited.

HANDOUTS:

Glossary of Words (prepared by teacher according to needs of students)

LINKS: Science, ecology, geography.

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SEGMENT C
DISCOVERING BIRDS AND BIODIVERSITY
FIRST-HAND

Class #13
Field Trip

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This class is scheduled for another field trip to a local natural area. It is set out separately here for schedule planning purposes.

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SEGMENT C
DISCOVERING BIRDS AND BIODIVERSITY
FIRST-HAND

Class #14
Listening to, and Hearing, Biodiversity

****

OBJECTIVE: Have students appreciate that biodiversity and the natural world is reflected in, and can be discovered by, listening to it.

THEME: Bird songs can be appreciated and learned by comparing their differences.

CLASS ACTIVITY:

I. Listen to, and diagram, bird songs:

Play a pre-recorded tape of a variety of bird songs. "Chart" the bird songs on the blackboard, and ask the students to make their own charts, to help them see the differences among the songs, and to help them learn to recognize them. Play the songs one at a time, chart each one and discuss it, and then go on to the next one.

PREPARATION:

Obtain and review a pre-recorded tape or CD of bird songs. See "Course Logistics", above for a discussion of the type of tape to obtain. Be sure to consult any instructions accompanying the pre-recorded tape for assistance in learning how to chart the songs. The introduction to standard bird field guides also may contain this information.

RESOURCES NEEDED:

A pre-recorded bird song tape or CD is needed, and a portable player is necessary to play the tape or CD. See "Course Logistics", above for a discussion of the type of tape to obtain.

HOMEWORK TO ASSIGN:

At this point in the course, either for this class or at the end of one of the field trips, the students could be assigned to read one or more of the following possible sources:

1. The booklet, "Birds over Troubled Forests", which is contained in the Migratory Bird Information Kit identified in "Course Logistics", above;

2. "Silence of the Songbirds", National Geographic, June 1993;

3. Wilson, Edward O., The Diversity of Life, pp. 228-231 (excerpts concerning endangered birds); and

4. The Diversity of Life, p. 265.

These articles will be discussed in Class #17.

FOLLOW-UP:

Continue keeping an eye out for interesting articles about local habitat conditions, or about the spring migration, in your local area.

LINKS: Science

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SEGMENT C
DISCOVERING BIRDS AND BIODIVERSITY
FIRST-HAND

Class #15
Field Trip

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This class is scheduled for another field trip to a local natural area. It is set out separately here for schedule planning purposes.

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SEGMENT C
DISCOVERING BIRDS AND BIODIVERSITY
FIRST-HAND

Class #16
Field Trip

****

This class is scheduled for another field trip to a local natural area. It is set out separately here for schedule planning purposes.

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SEGMENT D
PROBLEMS AND PARTNERSHIP
IN BIODIVERSITY

Class #17
Threats to Survival of Migratory Birds

****

OBJECTIVE: Challenge students to begin thinking about some of the problems faced by migratory birds, and the reasons behind those problems.

THEME: Neotropical migratory birds currently face serious problems to their survival.

CLASS ACTIVITY:

I. Discuss reasons for recent declines in Neotropical migratory bird populations, using the articles assigned as Homework reading in Class #14:

1. "Birds Over Troubled Forests", focusing on discussion on the concepts in pages 24-32;

2. "Silence of the Songbirds"; National Geographic, June 1993;

3. Wilson, Edward O., The Diversity of Life, pp. 228-231 (excerpts concerning endangered birds); and

4. The Diversity of Life, p. 265 (forest diagram).

II. Focus on the key concept of forest fragmentation. Illustrate this by drawing two areas, both classified as 50% forest, but with different patterns of use: 1) a checkerboard, and 2) divided in half between development and forest.

Discuss the advantages and disadvantages of each pattern, for survival of birds, biodiversity and forest ecosystems. Discuss common patterns of human land use, such as that depicted in "Birds Over Troubled Forests", p. 28, and 'Silence of the Songbirds", pp. 70, 82-90.

Discuss which pattern has more forest edge, which poses threats to survival of forest birds, and which area contains more deep forest. Explain key research into biodiversity, such as Edward O. Wilson, who reports in The Diversity of Life, that "as a rule of thumb, a tenfold increase in area results in a doubling of the number of species" (p. 205).

PREPARATION:

Carefully review the articles to be discussed, in preparation for coordinating the discussion.

RESOURCES NEEDED:

Blackboard, projector or flip-chart pad to illustrate the forest fragmentation concept.

HOMEWORK TO ASSIGN:

Read excerpts from the Environmental Protection Agency's 1990 Science Advisory Board report, provided as a course resource. This should be ordered in advance, as set forth on page one of this text.

Read chapter 14 in The Diversity of Life, pp. 311 - 351. (See "Course Logistics", above)

FOLLOW-UP:

Make note of discussion themes that need to be picked up in the several remaining classes.

HANDOUTS:

"Reducing Risk: Setting Priorities and Strategies for Environmental Protection", U.S. Environmental Protection Agency, Science Advisory Board, September 1990 (excerpts). This will be contained in the packet that has been ordered from EPA in advance.

LINKS: Biology, sociology, geography, land use and political science.

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SEGMENT D
PROBLEMS AND PARTNERSHIP
IN BIODIVERSITY

Class #18
Biodiversity and Natural Ecosystems Are Basic to Our Survival

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OBJECTIVE: Encourage students to realize that natural ecosystems and the present era biodiversity of this planet, of which migratory birds are a key part, are fundamental requirements for the long-term survival of people.

THEME: People rely on the natural systems of the present era for all our human enterprises. Protecting and maintaining the existing biodiversity of such ecosystems helps ensure a future and opportunity for us all.

CLASS ACTIVITY:

I. Discuss the EPA Science Advisory Board report excerpts assigned as Homework from Class #17, focusing on the recognition that maintaining the present era biodiversity of this planet helps to preserve the ecosystems on which our own survival depends.

II. Discuss the opportunities for helping to preserve the present era biodiversity of this planet that The Diversity of Life chapter 14 recommends.

III. Discuss how Neotropical migratory birds are one component of the larger world-wide issue, problem and challenge of maintaining the

biodiversity of the present era, and how the decline in their numbers reflects a general decline in the extent of present era biodiversity and destruction of ecosystems.

PREPARATION:

Read and become familiar with the materials assigned as Homework reading from Class #17.

RESOURCES NEEDED:

Blackboard, overhead projector or flip-chart pad for writing down students ideas.

HOMEWORK TO ASSIGN:

Possible reading:

"Carving Up Tomorrow's Planet", Interview with John G. Robinson, International Wildlife, Vol. 24, No. 1 (Jan./Feb. 1994), pp. 29 - 37 (published by National Wildlife Federation).

FOLLOW-UP:

Make note of discussion themes that may need to be picked up in the remaining classes.

LINKS: Biology, sociology, geography, land use and political science.

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SEGMENT D
PROBLEMS AND PARTNERSHIP
IN BIODIVERSITY

Class #19
How Can People Live With the Land to Help Our Own Long-Term Survival?

****

OBJECTIVE: For students to understand that the concept and subject of "land use" is an important area that bears upon the interrelationship between biodiversity and human enterprise.

THEME: Our land use decisions are important factors in the ability of migratory birds to survive, upon biodiversity, and in the ability of humans to survive in the long-run.

CLASS ACTIVITIES:

I. Review the concept of "forest fragmentation" discussed in Class #17. Explain that it centers on the concept of "land use".

II. Discuss the article assigned as Homework reading from Class #18, "Carving Up Tomorrow's Planet". Encourage students to discuss whether they agree or not that the planet should be "carved up" as set forth in the article. Encourage students to suggest alternatives. Note the suggested alternatives on the blackboard, flip chart or overhead projector. Discuss the students suggestions.

Possibly, organize students into debate teams to advocate different positions on these issues, ie. taking the side of the Robinson interview,

and taking the position of different alternatives offered by the students.

III. If there is enough time, discuss articles from the local newspaper centering on land use issues. Discuss how they may relate to protection of migratory birds, local ecosystems and biodiversity.

PREPARATION:

Read and become familiar with the articles assigned as Homework reading from Class #18.

Select local newspaper articles on land use, from the articles you have been collecting this spring.

RESOURCES NEEDED:

Blackboard, flip-chart pad or overhead projector.

HOMEWORK TO ASSIGN:

Possible reading:

Weissman, Arthur, "Why Save Neotropical Migratory Birds?", Partners in Flight newsletter, Vol. 3, No. 2, pp. 10-11 (provided with materials ordered from EPA); and

Babbitt, Bruce, "Protecting Biodiversity", Nature Conservancy, Vol. 44, No. 1 (Jan./Feb. 1994); pp. 16-21.

FOLLOW-UP:

Make note of discussion themes that may need to be picked up in the remaining classes.

HANDOUTS:

Articles from local newspaper on land use issues.

LINKS: Sociology and geography.

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SEGMENT D
PROBLEMS AND PARTNERSHIP
IN BIODIVERSITY

Class #20
Key Tools We Have to Protect Migratory Birds and Biodiversity

****

OBJECTIVE: Introduce students to key tools we have to protect Neotropical migratory birds and biodiversity: the Endangered Species Act and the 1993 Biodiversity Convention.

THEME: We have important legal tools that can be used to help protect migratory birds, biodiversity, and ensure our own long-term survival.

CLASS ACTIVITY:

I. Introduce the Endangered Species Act, pointing out the specified purpose, and the framework of the law. This law involves some complicated provisions. It is not necessary to delve into the details of the law. It may be one of the first times, however, that students have examined the actual text of a law, and so it is a useful activity to even see what is there, and how it is organized. Similarly, the 1993 Biodiversity Convention can be examined and considered by the class.

II. Discuss the article assigned as Homework reading from Class #19, "Protecting Biodiversity", which can be used as an illustration of current issues under the Endangered Species Act.

III. Hand out copies of the "Pan American Day and Pan American Week, 1993", proclamation by the President (copy in "Handouts", below).

Discuss this type of document, as contrasted with the laws examined earlier. Discuss how the recognition of the linkage of the Americas affects the issue of migratory birds.

PREPARATION:

Read and become familiar with the article assigned as Homework for Class #19.

Review the excerpts provided in "Handouts" on the Endangered Species Act and the Biodiversity Convention, and select points you wish to bring up during the class discussion.

Copy the "Proclamation" identified in "Handouts", below.

RESOURCES NEEDED:

Copies of: the Endangered Species Act (excerpts)

the "Pan American Day Proclamation"

the Biodiversity Convention identified in "Handouts", below.

These materials will be included in the packet pre-ordered from EPA.

HOMEWORK TO ASSIGN:

Articles to be discussed during the next class can be handed out to the students as homework reading. Alternatively, the teacher may decide to hand them out during the next class, for reading during the class.

FOLLOW-UP:

Identify any discussion items that need to be covered in the next class.

HANDOUTS:

Proclamation, "Pan American Day and Pan American Week"

Endangered Species Act (excerpts)

Biodiversity Convention

LINKS: Law, political science, civics and geography.

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SEGMENT D
PROBLEMS AND PARTNERSHIP
IN BIODIVERSITY

Class #21
Local Issues and Opportunities in Ecosystem Protection and Biodiversity

****

OBJECTIVE: Encourage students to understand national concepts and themes by bringing them to a familiar and local level that they can see first-hand.

THEME: Biodiversity is an issue, it is currently threatened, and there are opportunities for ensuring national and international success by protecting ecosystems and biodiversity at the local and community level.

CLASS ACTIVITY:

I. Identify and discuss local issues relating to biodiversity and protection of migratory birds and of local ecosystems, by reviewing and discussing the newspaper articles collected on these topics throughout the spring.

Analyze the articles, and relate them back, to the key points concerning the importance of biodiversity preservation discussed in Class #18.

II. Identify and discuss any policies your state has for protecting biodiversity and encouraging ecosystem protection.

PREPARATION:

Collect local newspaper articles for each student. The articles can be handed out, one at a time, for reading during the class followed by discussion, or they can be assigned as homework from Class #20.

Find out any policies your state has concerning ecosystem protection and biodiversity.

RESOURCES NEEDED:

Articles for each student.

HOMEWORK TO ASSIGN:

Have the students write their own thoughts about:

1. What are the main threats to biodiversity, and natural ecosystems, including survival of migratory birds, in their local area?

2. What can they, individually and as a community, do to help preserve natural systems and biodiversity?

3. Ask students to bring their field trip journals to the next, and final, class.

FOLLOW-UP:

No specialized follow-up from this class.

HANDOUTS:

Newspaper articles.

LINKS: Science, sociology and political science.

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SEGMENT D
PROBLEMS AND PARTNERSHIP
IN BIODIVERSITY

Class #22
Measuring a Journey

****

OBJECTIVE: Have students realize how much they have discovered, learned and thought about during the course, and that the course is only a beginning.

THEME: Repeat the Personal Survey first given in Class #2, and discuss students' other personal observations about the material covered in the course.

CLASS ACTIVITY:

I. Ask the students to share their thoughts from the Homework assigned from Class #21.

1II. Repeat the Personal Survey given in Class #2.

Then, give the students back their original copies of the first Personal Survey, so they each can contrast their answers, and realize some of the things they have learned about.

III. Have students take out the journals of their field trip observations, and encourage them to share and remember the interesting observations and experiences of the field trips.

IV. Be sure students have their individual life-lists, and encourage them to look for hawks in the fall, and to look for birds and biodiversity throughout their lives.

V. Take out quarters, and flip them, as was done in Class #1, and encourage students to think about the amazing journeys and survival of migratory birds, whenever they use a quarter.

PREPARATION:

Collect and bring to class the original copies of the students' answers to the Personal Survey from Class #2.

Review the "Overview, Course Conclusion" (above).

RESOURCES NEEDED:

Quarters

HOMEWORK TO ASSIGN:

None

FOLLOW-UP:

Advise students as to possible continued reading on this topic area (See "General Preparation, Materials and Resources" above.)

HANDOUTS:

Original responses to the Personal Survey (from Class #2).

LINKS: Biology, sociology, and ecology.

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