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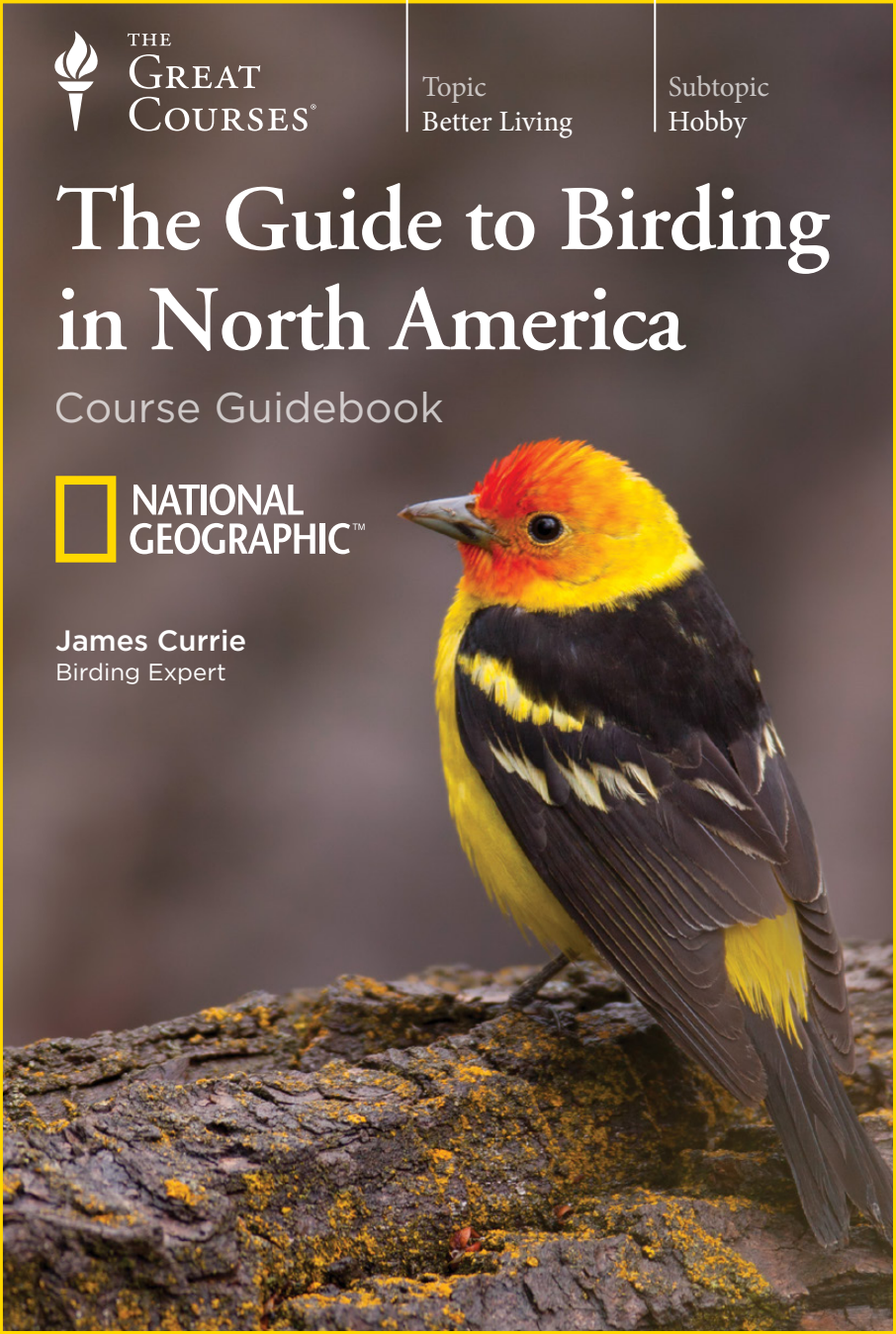
The Guide to Birding in North America

Course Guidebook

NATIONAL GEOGRAPHIC™

James Currie
Birding Expert



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Birding Expert

A lifelong birding enthusiast and native of South Africa, James Currie is one of the most recognizable faces in birding in North America. He hosts Nikon's *Birding Adventures TV*, a popular birding show airing on Discovery Communications' Destination America. Mr. Currie also hosted the action-birding show *Aerial Assassins* on Nat Geo WILD, which aired worldwide in 2012, and appeared in the reality birding show *Twitchers*, which aired on the National Geographic Channel in 2014. He has led professional wildlife and birding tours for many years, and his passion for birding, adventure, and remote cultures has taken him to nearly every corner of the globe. Mr. Currie has appeared as a special guest on various television shows and radio programs, including Martha Stewart Living Radio and WGN-TV, and has been the subject of several newspaper articles in such periodicals as *The Wall Street Journal*, *The Palm Beach Post*, and the *Orlando Sentinel*. He provided footage and consulted for the 2011 Hollywood birding movie *The Big Year*, starring Steve Martin, Jack Black, and Owen Wilson.

Mr. Currie is a highly sought-after public speaker who has spoken to sold-out audiences at various venues, including the prestigious Explorers Club in New York City, The G2 Gallery in Los Angeles, the National

Audubon Society headquarters in New York City, Zoo Miami, humanitarian fundraisers and international conservation conventions, birding shows, the Educational Travel Consortium's Annual Conference, and the Travel & Adventure Show.

Mr. Currie is an expert in the fields of sustainable development and environmental management, holding a bachelor's degree in African Languages from the University of Cape Town and a master's degree in Sustainable Environmental Management from Middlesex University London. His dissertation, which he presented to the Icelandic government in 2001, received a distinction and has been used as a model for assessing the relationships between wildlife areas and local communities. One of Mr. Currie's passions is forging links between local communities, wildlife, and international travelers. From 2004 to 2007, he worked as the managing director of Africa Foundation, a nonprofit organization that directs its efforts toward uplifting communities surrounding wildlife areas in Africa.

Mr. Currie has contributed to several birding and wildlife publications, including the acclaimed *Southern African Birdfinder* and *Wildwatch.* His first book, *When Eagles Roar: The Amazing Journey of an African Wildlife Adventurer*, details his life as a birding guide.

In 2007, Mr. Currie immigrated to the United States with his American wife and three children, and he currently resides in West Palm Beach, Florida. ■

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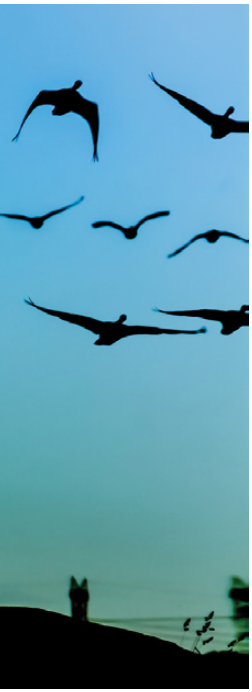


Every year millions of people across North America take out their binoculars or set up their spotting scopes to get a closer look at birds. What is it about birds that intrigues so many people? This course will answer this question in a comprehensive lecture series on the birds of the continent that focuses not only on the identification of the continent's diverse bird species but also on the best birding tools to use to see these birds.

This course will provide you with the tools you need to observe, identify, and enjoy the birds around you. The course begins with the origins of birds and birding, the basics of bird anatomy, and the tools required for basic bird identification. Lectures are also devoted to tips on using optical equipment and bird photography to enable birders to observe birds more closely than ever before. Besides optics, there are many tactics that experienced birders use to observe birds more closely; using sound, blinds, technology, and native gardening are just some of the useful tips that are disclosed.

This course will make your backyard a much more interesting place both for you and for birds. But the course will also expand your horizons with some fun excursions into less familiar territory. You will go birding after dark to observe the nightlife of beautiful birds ranging from the cute northern saw-whet owl to the large and pugnacious great horned owl. And you will set out to sea, where you will encounter a host of pelagic species, including magnificent frigatebirds and whiskered auklets. The series will

also introduce you to some of the best birding sites on the continent—from Amherst Island in Ontario to the Channel Islands off the coast of California.

But your expedition won't stop there. In fact, it will take you all over North America—east, west, north, and south—and in the process, you will meet an astounding array of species, including raptors, hummingbirds, warblers, wading birds, phalaropes, and sparrows. You will delve into the fascinating world of bird migration and explore the close relationship between birds and people, discovering the dichotomous role that humans can play in both bird conservation and bird extinction. Every step of the way, the course will help you hone your skills so that you can meet even the toughest identification challenges. Whether you're a novice birder or someone who's been observing birds for years, this course will give you the skills you need to turn every day into a birding adventure. ■

LECTURE 1

BIRDING BASICS: BIRD ORIGINS AND TAXONOMY

In this course, you will travel across North America and meet hundreds of birds, and you will discover many tools and tips for identifying and enjoying them. The course references the *National Geographic Field Guide to the Birds of North America*, a terrific resource that all birders should consider adding to their libraries. In this lecture, you will learn about the origin of bird-watching in North America as well as the origin of birds themselves. You will also learn a few basics of bird classification, or taxonomy.

THE ORIGIN OF BIRDING IN NORTH AMERICA

- Birding is one of America's most popular pastimes. According to the 2011 U.S. Fish and Wildlife Service's national survey, there are 47 million birders in the United States and 18 million who actually travel away from home with the express purpose of watching or finding birds.

- The father of American birding is often identified as Alexander Wilson, a Scot who arrived in Delaware in 1794. He is best known for the first authoritative work on

ALEXANDER WILSON (1766–1813)

American birds, *American Ornithology*, a 9-volume work that was published between 1808 and 1814.

- Wilson was closely followed by John James Audubon, whose iconic work, *Birds of America*, was published between 1827 and 1838. For decades, this was the most comprehensive guide to North American birds, and the artwork is still considered exceptional. Around the same time, famous explorers such as Meriwether Lewis and William Clark were discovering new bird species as they traversed the continent.

- In the 1860s, after Audubon died, George Grinnell became fascinated with birds after meeting with and being mentored by Audubon's wife, Lucy. She passed away in 1874, and Grinnell founded the Audubon Society in 1886 in honor of Lucy Audubon and her husband.

- Grinnell's goal in forming the society was to protect birds from the growing millinery trade in the United States—a goal that was pursued across the Atlantic just a few years later, when the Royal Society for the Protection of Birds was founded in the United Kingdom. Another birding organization—the American Ornithologists' Union—had been established in 1883.

- Prior to the founding of organizations like these, the identification of birds was thought possible only through shooting them. But then, along with the emergence of bird societies, came advancements in optics, such as the binocular, and field guides, such as Florence Bailey's *Birds through an Opera Glass*.

- First published in 1889, Bailey's work is generally considered the earliest bird field guide. Frank Chapman's *Handbook of Birds of Eastern North America* was published just a few years later, in 1895.

- Most of the early bird-watching in North America was focused on the eastern United States, and authors such as Ludlow Griscom

and Roger Tory Peterson produced major field and bird-finding guides that really popularized birding.

- The invention of the motor vehicle allowed birders to have increased mobility and explore the birds of North America farther afield than their homes. By the late 1950s and 1960s, air travel became more accessible to the general public, and the first bird tourism companies began to make an appearance. These companies allowed North American birders to take their hobby beyond the continent to such exotic places as Africa and the Neotropics of South and Central America.

THE ORIGIN OF BIRDS

- Scientists who study the origins of birds are in general agreement that birds evolved from reptiles gradually and over millions of years. Both birds and reptiles have a single ball-and-socket joint that connects their skulls to their neck vertebrae. Their lower mandibles have about half a dozen bones on either side, whereas mammals only have one. Both reptiles and birds only have a single middle ear bone, whereas mammals have 3. Both birds and reptiles lay eggs.

- There are also some clear differences between birds and reptiles. Birds have feathers, can fly, are warm blooded, and possess beaks. Yet fossils provide solid evidence of the links between birds and reptiles.

- Pterosaurs were reptiles that lived from the Late Triassic Period to the end of the Cretaceous Period, around 65 million years ago. They were the earliest-known vertebrates to have mastered the power of flight, even though their wings were formed by a membrane of skin and muscle that stretched between their ankles and an elongated finger—not that dissimilar to today's bats. But these pterosaurs were true reptiles and showed no evidence of

other bird characteristics—besides the ability to fly and a toothed jaw that looked a bit like a long beak.

- Then, a series of well-preserved fossils from the Late Jurassic Period revealed a startling discovery: the first-known bird—or feathered reptile, depending on how you look at it. Now known from more than half a dozen specimens dating back 150 million years, *Archaeopteryx* was a bipedal creature about the size of a small hawk. It had feathers on both wings and tail and more than likely had smaller feathers on its body, although there is little evidence to support this. It could probably flap and glide but was more than likely not an accomplished flyer.

- Evidence further suggests that *Archaeopteryx* was somewhere in between birds and reptiles but not definitively one or the other. In addition to providing evidence of the world's earliest bird, the discovery of *Archaeopteryx* gave paleontologists their clearest link between the 2 distinct taxa of birds and reptiles.


ARCHAEOPTERYX

- Even so, there is some debate as to the earliest lineages of birds and what reptiles they evolved from. Two theories in particular have duked it out: the Pseudosuchian thecodont theory and the dinosaur theory.

- Proponents of the Pseudosuchian thecodont theory believe that birds are descended from thecodonts, which were the Triassic Period ancestors of crocodiles, the dinosaurs, and the flying pterosaurs. Proponents of the dinosaur theory believe that birds are descended much later from more modern carnivorous dinosaurs around 150 million years ago. The modern discovery of feathered carnivorous but ground-dwelling dinosaurs called theropods appears to back up the dinosaur theory as the most plausible one.

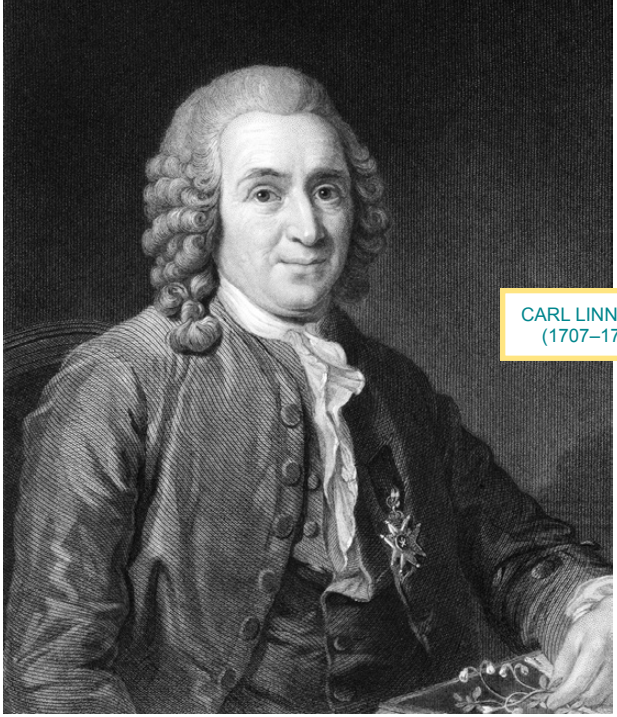
- Likewise, there are 2 theories as to how birds developed the ability to fly: the ground-up, or cursorial, theory and the trees-down, or arboreal, theory. Both theories were developed around the same time, in 1879 and 1880, respectively.

- The cursorial theory proposes that fast ground-dwelling reptiles developed the ability to fly by running quickly and then leaping in the air. Over time, feathers and wings developed to aid in gliding, propulsion, and steering.

- The arboreal theory proposes the opposite. Instead of trying to fly upward, early tree-dwelling reptiles developed the ability to fly over time by leaping from branch to branch or from trees to the ground.

BIRD TAXONOMY

- Ever since the time of the early Greeks, people have been naming birds. But it was not until Carl Linnaeus published his *Systema Naturae* in 1735 that birds were methodically categorized in distinct groups. Earlier, naturalists had



CARL LINNAEUS
(1707–1778)

classified birds into broad groups, such as terrestrial birds and waterbirds. But Linnaeus used a more precise binomial system for classifying living things.

- This binomial system involves giving each species 2 names: a genus name and a specific epithet, or species name. For example, humans are classified as *Homo sapiens*—with *Homo* as our genus and *sapiens* as our specific epithet. The specific epithet sets our species apart from other species in the genus *Homo*, such as *Homo neanderthalensis*.

- Linnaeus, along with naturalists that followed him for the next 100 years or so, grouped birds according to habitat and physical

similarities. It was not until Charles Darwin published *On the Origin of Species* in 1859 that scientists began to look at classifying birds and other living things according to lineage. But even today, there exists some confusion as to exactly what characteristics should be used to classify birds in one group or another.

- The discovery of the makeup of DNA in 1953 allowed for an entirely new set of guidelines to be applied to the classification of birds. Those species most closely related according to DNA could now be grouped together. But with more than 10,000 species of birds on our planet, this is an ongoing process.

- Prior to Linnaeus, birds were known by different names across the globe. This created massive problems for those tasked with identifying and collecting different specimens for science. His binomial system, or Latin-name system, allowed everyone across the globe to refer to a species by one global name, even if a variety of common names continued to be used at the local level.

- Birds, like humans and alligators, belong to the kingdom Animalia and the phylum Chordata. In other words, they are animals with backbones. But, unlike humans and alligators, birds form part of the taxonomic class Aves. The class level separates birds from other living things, such as mammals, which are in the class Mammalia, and reptiles, which are in the class Reptilia.

- The class Aves is further broken down into orders that can be basically classified as Passerines, or perching birds, and non-passerines. The scientific names of all bird orders end in the suffix –iformes. For example, all passerines are classified as Passeriformes.

- Passerines can be generally lumped as songbirds, and non-passerines include birds of prey, cuckoos, penguins, parrots, owls, and woodpeckers.

NORTHERN CARDINAL

- The most important consideration is at the family level, and being able to know the different bird families is a great first step in nailing an identification. All family names end in the suffix –idae, such as Cardinalidae, the family that contains the cardinals, grosbeaks, and American buntings.

- The following is the taxonomic breakdown of a common garden bird, the northern cardinal:

KINGDOM	Animalia (all animals)
PHYLUM	Chordata (animals with a backbone)
CLASS	Aves (all birds)
ORDER	Passeriformes (passerines)
FAMILY	Cardinalidae (cardinals, grosbeaks, and allies)
GENUS	*Cardinalis* (cardinals)
SPECIES	*cardinalis* (northern cardinal)

- The organization of the *National Geographic Field Guide to the Birds of North America* moves from one bird family, with all of its species, to another bird family, with all of its species. At the next level down, it's organized by the various genera within each family.

SUGGESTED READING

Cornell Lab of Ornithology, *Handbook of Bird Biology*, p. H-19–H-34.
Gibbons and Strom, *Neighbors to the Birds*.
Gill, *Ornithology*, chap. 2.
Weisensaul, *Of a Feather*.

ACTIVITIES

1. If you happen to be in Pennsylvania, pay a visit to Mill Grove, the historic home of John James Audubon, or watch this video: https://www.youtube.com/watch?v=mrsvaoIhivs.

2. Look at an artist's impression of *Archaeopteryx* and decide whether it looks more like a lizard or more like a bird.

LECTURE 2

BASIC BIRD ANATOMY

Learning anatomical terms and functions associated with birds is essential because it enables you to identify what you're looking at. The more familiar you become with the parts of a bird, the better you will become at quickly classifying a species. In this lecture, you will learn some identification basics, starting with the anatomy of a bird and ending with types of feathers and flight patterns.

BIRD ANATOMY

- Learning the anatomy of a bird appears to be a daunting task at first, because it seems as though there is so much to know. But in reality, there are terms that we use for the human body that also apply to birds. Just like people, birds have throats, chins, bellies, breasts, and foreheads. And even though people don't have tails, we're used to seeing them on dogs and cats.

- The top of the bird's head is the crown, exactly where a king's crown would go. Crown markings can be plainly seen on some songbirds. Lower down on the bird, past the crown, is the nape of the bird. The term "nape" simply means the back of the neck.

- Continuing down the back of the bird are the scapulars, which are the large shoulder feathers that hang over the inner wing on either side of the mantle. "Mantle" is a broader term for the center

of the back and is positioned just below the nape. The mantle is sometimes a different color than the wings and nape and can therefore be a useful identification tool.

- On the wing are the primaries, which are the outer flight feathers and are located at the end of the wing, and secondaries, which are the inner flight feathers and are located on the half of the wing that is closer to the body. Tertials are the innermost secondary feathers and can be seen on different songbirds, ducks, and shorebirds. The tertials provide protection by covering the top of the flight feathers.

- Moving farther down the bird is the rump, which is the lower back of the bird and often has feathers that contrast with the mantle. The rump is located just above the tail, not on the underside of the bird. Some species, such as ducks and songbirds, have upper-tail coverts between the rump and the tail that cover the base of the tail and are often the same color as the rump.

- Back at the top of the bird and down the front is the bill, which can be broken into the upper and lower mandibles, which are the top half and the bottom half of the bill, respectively. Bills can come in all different shapes and sizes.

- The shape of the bill is very specific to a bird's diet and lifestyle. Some birds have longer lower mandibles for skimming the ocean surface and catching fish. Others have very sharp, curved upper mandibles so that they can rip and tear meat.

- Depending on the bird, there can be many different names for facial markings and other reference points of identification. For example, the tip of a duck's bill is called the nail. Even the bill itself is a point of difference. The word "bill" is typically used for birds such as hummingbirds or web-footed birds, while "beak" is used more for birds of prey. For still other birds, such as crows, finches, sparrows, perching birds, and songbirds, these terms can be

used interchangeably. Another specified word is the incandescent shining spots on the throats of hummingbirds, called a gorget.

- A term that is slightly more common is the iris, which is found in all birds and refers to the color of the eye. Iris color can vary not only from species to species but can also depend on the age and gender of a particular species.

- Some species, such as gulls, have an unfeathered area of skin around the eye called the orbital ring, while many songbirds possess the almost human quality of an eyebrow above the eye called a supercilium. And all birds possess an area slightly below and behind the eye called the auricular region, which is the general area of the bird's ear.

- On the under part of the bird are the breast, belly, and flanks. The flanks are halfway between the belly and the base of the wing. These terms are universal to all birds.

- The tibia is the upper leg, and tarsus is the lower leg. Raptors have feathers at the base of the legs called leggings, which provide warmth during cold weather as well as protection. Some waterbirds, such as ducks and cormorants, have webbed, or palmated, feet. Other waterbirds, such as the semipalmated plover, have partially webbed feet. And still other waterbirds, such as grebes, have lobed feet.

WOODPECKER

- Most species of perching birds, including songbirds, have anisodactyl feet, or 3 toes facing forward and 1 toe facing backward. But other birds, such as woodpeckers, have zygodactyl feet, with 2 toes facing forward and 2 toes facing backward, which is ideal for clinging to vertical trees. The raptorial feet of hawks and raptors are referred to as talons for their lethal sharpness.

TYPES OF FEATHERS

- Just as general body anatomy is important for classifying birds, the feathers hold key pieces of information for identification in terms of physical appearance. There are many different types of feathers, all of which are fine-tuned for a specific function.

- Even though birds are feathered creatures and we are not, both feathers and our hair and fingernails are made of keratin. But for birds, keratin is the building block of an extraordinary adaptation that we lack.

- The general structure of a feather starts with the quill, or calamus. This is the white, hard part of the feather that sticks out from the bottom. Farther up, the main shaft of a feather is called the rachis.

- Stemming from both sides of the rachis is a series of branches called barbs, which make up the soft part of the feather that people tend to touch and stem from the rachis at an angle of about 45°. It is very important that this part of the feather retains its shape so that the feather is both waterproof and as aerodynamic as possible for flight.

- The barbules are positioned along the barbs and have small hooklets attached to the end of them. Hooklets and barbules play the important role of keeping the barbs together so that they remain aerodynamic and waterproof, holding strong and providing protection for the bird.

- The different types of feathers can be broken down into contour feathers, down feathers, semiplumes, filoplumes, and flight feathers.

    - Contour feathers are the shaping feathers of the bird, polishing off the bird's outline to give it a smooth shape. Because these feathers cover most of the bird, they also provide the coloring characteristics of the bird. They also provide protection from sun, rain, and wind as well as objects or animals that could be potentially harmful.

    - Down feathers are located under the contour feathers and do not have the same tidy appearance as other feathers. This is because they do not have the barbules that are responsible for creating that clean ziplock effect, which keeps feathers

waterproof and aerodynamic. This lack of interlocking barbules allows for more air to be captured between the feathers and the skin of the bird, thus creating a pocket of warm air. Down feathers are fluffy and soft and offer excellent insulation.

- Semiplumes can be considered a combination of both contour and down feathers. Semiplumes are found in between the contour feathers and help provide insulation and assist with form.

- Filoplumes are small hairlike feathers that are believed to have a certain sensory function for the birds, such as allowing them to keep their feathers in order. These feathers are smaller in size and only have a minimal number of barbs.

- Flight feathers are the feathers that play the largest role in flight and are found on the wings and the tail. The wing feathers are known as the remiges and can be further broken down into 3 groups: primaries, secondaries, and tertiaries. The tail feathers are called rectrices.

    - When looking at the wing, primaries can be identified as the feathers from the middle of the wing to the outermost part of the wing and are responsible for the forward push of the bird during flight.

    - The secondaries start close to the body and continue to the center part of the wing. They are positioned between the tertiaries and the primaries and are responsible for the lift in flight.

    - The tertiaries are the flight feathers closest to the body on the upper arm of the bird. These feathers are shorter than both the primaries and the secondaries and are not as important when it comes to flight.

    - The tail feathers, or rectrices, act as brakes and rudders, controlling the orientation of the flight. In other words, rectrices are largely involved in the control and stability of the bird in flight. Most birds have 12 tail feathers. Tail shape in birds can vary widely, and males of certain species have modified tail feathers that are used during courtship.

    - The bases of the flight feathers are covered with smaller contour feathers called coverts. There are several layers of coverts on the wing, and they also help streamline the bird in places such as the tail and ears.

FLIGHT PATTERNS

- All birds move differently: faster, slower, arching, swooping, gliding, flitting. The more familiar you become with a bird, the more you will notice these characteristics. Flight patterns vary from species to species and can provide obvious giveaways for identification when other subtle features are trickier to catch.

- When looking at a bird's flight path in terms of vertical movement, some birds possess a much greater range than others. For example, finches quickly flutter up and down as if they are riding on a roller coaster, with intense dips and rises. Even from afar you might have a hint as to what the species could be.

- On the other hand, kingfishers fly in a direct line and with a constantly rapid wingbeat. Woodpeckers appear to bounce in flight as they alternate flapping with gliding. Hummingbirds have the ability to hover, dip, and fly backward like a helicopter.

RED-TAILED HAWK

- Sometimes the easiest way to identify similar-looking bird species is by comparing their flight. For example, falcons, goshawks, and other accipiters tend to fly very swiftly in a straight and level line. By contrast, buteos, such as the red-tailed hawk, fly in a more circular pattern, making wide circles by flapping and then spiraling in a large arch.

- From a distance, you can often spot these flight patterns before you're able to identify color and shape. And as you spend time identifying flight patterns, you will become more familiar and comfortable with them.

- Also keep in mind other factors—such as wing shape, body shape, and other markings—that are visible during flight.

- Another concept that goes along with flight patterns is how the wings are held during flight. The head-on profiles of birds during flight can also give some hints toward identification. For example, a turkey vulture can look similar to a hawk during flight, but turkey vultures' wings are held in a V shape, whereas hawks and eagles tend to keep their wings in a flatter position.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Birding Essentials*, chap. 4.
Cornell Lab of Ornithology, *Handbook of Bird Biology*, chap. 1.
Gill, *Ornithology*, chaps. 4 and 5.

ACTIVITIES

1. Contact a local bird bander through your local bird club or Audubon chapter and ask to volunteer. When holding a bird for the first time, try to familiarize yourself with all the different parts of the bird.

2. Learn where the 3 major flight feathers of a bird (primaries, secondaries, and tertiaries) appear on different types of birds—for example, ducks versus warblers.

LECTURE 3

SIZE, SHAPE, AND COLOR AS BIRDING TOOLS

This lecture will focus on 3 core fundamentals of bird identification: size, shape, and color. At first glance, these characteristics might seem like easy ways to identify creatures that are as varied and complex as birds are, but they can be both subtle and nuanced. Bird identification requires practice and close attention to many characteristics that collectively paint a picture, resulting in a positive identification. An accomplished birder uses a vast array of tools and identification marks to nail down an identification. By gaining a mastery of size, shape, and color, you will be on your way to discovering bird species in your backyard and farther afield.

TOOLS FOR EFFECTIVE BIRDING

- Before mastering size, shape, and color, there are 3 important tools that you can use right away to become a more effective birder: a good pair of binoculars, a reliable field guide, and a notebook and pen.

- The most common mistake that people make when trying to use binoculars is this: They will see a bird, then pause to look where their binoculars are, take their eyes off the subject, and then try to relocate the subject through the binoculars. In most cases, this is next to impossible due to the increased magnification.

- Try this instead: Keep your eyes locked onto the bird, feel for your binoculars without taking your eyes off the bird, and raise them straight up to your eyes. This might feel unnatural at first, but you will not be disappointed with the long-term results.

- Get a great field guide to the birds of your area to assist you in your bird identification. There are many field guides out there, but a terrific option is the *National Geographic Field Guide to the Birds of North America*. Most field guides are organized according to one of the accepted taxonomic lists of birds of the world.

- You might also want to invest in an identification app, such as iBird. App guides are a great complement to book guides in that they're as portable as your mobile device, and they also provide the ability to use sound in the field.

- Along with a comprehensive book like the *National Geographic Field Guide*, you might also want to invest in a guide that is specific to the birds of your area. If you are entirely new to birding, use a guide that is specific to your particular city, if there's one available.

- Narrowing your field guide down to a particular region eliminates many species that you are unlikely to see and allows you to focus on the birds that are most likely to be found in your area. Familiarize yourself with the families of birds in your field guide and get to know your way around the app or the book.

- All new and experienced birders should carry a small notebook and pen when birding. Take careful notes about what you see. What color are the legs? What shape is the bill? What is the plumage color and patterning? How long is the tail? Draw the bird to the best of your ability, or if you have a camera, take a quick picture that you can use should the bird fly away—and then look it up in your guide.

SIZE AND SHAPE

- Getting to know the different families of birds requires effort. You really need to study the physical attributes that are pertinent to each family. Take pigeons and doves, for example. Collectively, they belong to the family Columbidae, and you might observe that pigeons and doves have short legs and bills, are plump in shape, and have relatively small heads in relation to body size.

DOVE

- By contrast, you might observe that members of the warbler family are small birds with relatively long tails and long legs with slender body shapes. Making these distinctions between different families and orders of birds is a crucial first step in bird identification.

- A commonly used birding term, general impression of shape and size (GISS), is very important in a birder's assessment of what he

or she is looking at. It comes with experience and being around birds a lot. You will probably find that people you know well, such as members of your family, are very identifiable to you, even from a distance. The more time you spend with birds, the same concept will apply.

- Shape alone can be a very powerful tool. Once you familiarize yourself with bird silhouettes or shapes at the group or family level, it will be much easier to focus on the exact species that you are looking at.

- Size is another very important tool that can aid in the identification of birds. But in the field, size can be very difficult to gauge because the bird is often in a tree or in the air. How big is the tree? How can you guess the size of a bird in the air?

- To try to gauge size accurately, compare the bird that you are looking at with a species you know well to get a rough idea of the bird's size. Write it down in your notepad. If the bird is among other birds, it is often useful to compare the bird's size with other birds in your field of view. Always try to compare the bird's size with other birds you know—either with actual birds or birds you can picture in your mind's eye.

- Once you know the bird's size and general shape, you can focus on the size and shape of the individual body parts. Remember to write everything down in your notepad. Look at the shape of the bill, which can tell you what the bird eats and, as a result, where it is likely to be found. Is it thin and sharp or thick and compact? Is it downcurved, upcurved, or spoon shaped?

- Next, try to identify the size of the bill. As with the overall size of a bird, this can sometimes be difficult to judge. So, compare the bill size to the bird itself. Ask yourself if the bill is longer than the head, the same size as the head, or shorter than the head,

and then write it down. The bill is the most important identification characteristic of a bird.

- Now apply the same technique used for the bill to the other body parts of the bird, including the wings, the legs, the tail, the size and shape of the head, and the size and shape of the neck. Note these attributes in your notebook.

COLOR

- Color is perhaps the least helpful of the 3 main identification indicators. This is because color is often different in younger birds and between genders, and color can be affected by light and other environmental conditions, such as mud on a bird's legs.

- Color in birds is a complex concoction of some very specific recipes. There are 2 main ingredients that are essential to these color recipes—pigment and keratin—and the ways in which these ingredients are added to the color cooking pot are what produces the final colors that we see.

- There are 3 main pigments that give feathers their colors.

1. Melanin produces black or dark-brown coloration. Melanin is also very strong and is thus often reserved for the flight feathers.

2. Carotenoids produce red, orange, or yellow feathers. Carotenoids are produced by plants. When birds ingest either plant matter or something that has eaten a plant, they also ingest the carotenoids that produce the colors in their feathers.

3. Porphyrins, which are essentially modified amino acids, can produce red, brown, pink, and green colors. This pigment group is the rarest of the 3 and is found in only a handful of bird families.

- Mixtures of pigments can produce different and unusual color hues and shades.

- In addition to pigments, the second main ingredient that produces color is keratin, which is the tough protein of which feathers are made. It also covers birds' bills, feet, and legs. Keratin is responsible for the iridescent coloring of many spectacular bird species.

- Both keratin and pigments can be combined to produce certain colors. The greens of many parrot species are caused by blue scattered light (produced by keratin) interacting with yellow carotenoids (produced by pigments in the feathers). The gray feathers of many birds are produced by the combination of scattered white light and melanin pigments.

PARROT

- When it comes to bird identification, don't let color be the first and only thing you consider. What comes before color is more important. But color can still be a useful piece of the identification puzzle. There are a few important tips to consider when judging a bird's color.

    - Use color just as a child colors in a picture. The outline (or shape) and the size of your subject have already been established. Now just color in the picture. What color is the bill? What color is the eye, the head, the back, the rump, the vent, the legs, and the wings? But beware of the factors affecting color. Could those legs, which appear to be black, actually be another color? Is light affecting the picture?

    - Taking note of shading can be important in identification. Is the streaking on the breast bold or faint? Is the head all one color, or is the cap lighter than the rest of the head?

    - Look at contrast very carefully, especially when it comes to the wings and tail. Are the wings the same color as the body? Is the tail one color? Is the bill color uniform, or is the top mandible a different color from the bottom? These identification tools are vital when determining the overall color of a bird.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Birding Essentials*, chap. 5.
Cornell Lab of Ornithology, *Handbook of Bird Biology*, chap. 1.
Thompson, *Identifying and Feeding Birds*, chap. 8.

ACTIVITIES

1. Go outside and find a bird that you do not know. Try to identify it using your field guide as well as size, color, and shape as identification tools.

2. Go outside with your binoculars and practice the technique of keeping your eyes on the bird while raising the binoculars to your eyes.

LECTURE 4

BIRD DISTRIBUTION, STATUS, AND ENDEMISM

Arriving at a positive bird identification involves more than physical aspects, such as color, shape, and size. The process of identification can also include factors external to birds, such as where to find a species or how common it is. In this lecture, you will learn about some of these broader factors. Specifically, you will examine 3 key topics: distribution, status, and endemism. Each of these topics will deepen your understanding of where certain birds can be found and how they came to be there.

DISTRIBUTION

- Distribution basically describes the most likely region or places to find a particular species. It is difficult to know the exact factors that have contributed to the history of bird distribution due to many different variables, such as evolution, shifting vegetation, and climate change. Many species of birds once occurred more widely than their current ranges.

- In the past, the Bering Land Bridge linked Asia and North America. This connection and others like it allowed animals, including birds, to travel between landmasses that are separated now. Some birds occurred far outside of the range they currently occupy.

- Factors affecting distribution over time include sea level, climate, and landmass placement. The continental drift could have also

SNOWY OWL

influenced where birds are found because the distance between landmasses is much greater than it once was.

- Over time, species that were once the same evolved separately and formed distinct species as they became cut off from the other geographical population. An example of this can be found between the American wigeon and the European wigeon. Today, they look different and are distinct species, but they can still breed with one another and produce offspring due to their close relationship.

- Although birds are extremely widely distributed over our entire planet and can be found in every corner of the earth, their distribution is anything but consistent. Some habitats, such as the Arctic and the harshest deserts, contain relatively few species, while rich jungles, such as the Amazon, contain a staggering diversity. Some species are very adaptable and can live in many places. Other species are confined to tiny areas.

- Scientists have divided the world into 8 major biogeographical regions: the Palearctic, Nearctic, Neotropical, Afrotropical, Oriental, Australasian, Oceania, and Antarctic regions. Two of these regions are represented by North America. The Nearctic region encompasses all of North America except for coastal Mexico and southern Florida, which are included in the Neotropical region, which encompasses all of South and Central America and the Caribbean.

- The overwhelming majority of birds are restricted to just a few regions. Migratory birds typically utilize 2 regions. In the Americas, most migrate between the Nearctic and the Neotropical regions. In Africa and Europe, most migrate between the Palearctic and the Afrotropical regions.

- Sometimes the limits of distribution are set by climate. For example, northern cardinals sustain themselves by foraging for seeds. If there is constantly deep snow, they will not be able to get enough food to sustain themselves and will perish as a result. Therefore, the range of northern cardinals doesn't extend to regions where deep snow is abundant.

CACTUS WREN

- Climate change can also have an impact on distribution. There are very clear patterns where southern breeders are moving north and northern-breeding birds are retracting farther north. Birds that usually prefer warmer winters in the south, such as northern cardinals and Carolina wrens, are wintering farther north than they were as recently as 20 years ago.

- Distribution can change not only over the course of decades and centuries but also over the course of a single year—as migratory birds move from one region to another. Along the East Coast, for example, most migratory birds fly down the Appalachian Mountain system. Birds breeding in the food-rich far north migrate south in the late summer and fall to the southern United States and Central America, where there is plentiful food for them in the winter.

- During the southward migration, some of these birds, particularly immatures, get blown off course. Cold fronts and westerly winds blow them east from the mountains toward the coast. Interestingly, once off course, instead of continuing to move south, these birds will fly back into the wind to the northwest for the first hour or 2 after dawn. Why they do this is a mystery. Perhaps they are trying to reorient themselves.

- Another word for distribution is range, and field guides have range maps to illustrate where a certain species might be found at a particular time of the year. The distribution, or range, of a bird can be a very useful aid in bird identification because it helps you identify a species based on probability.

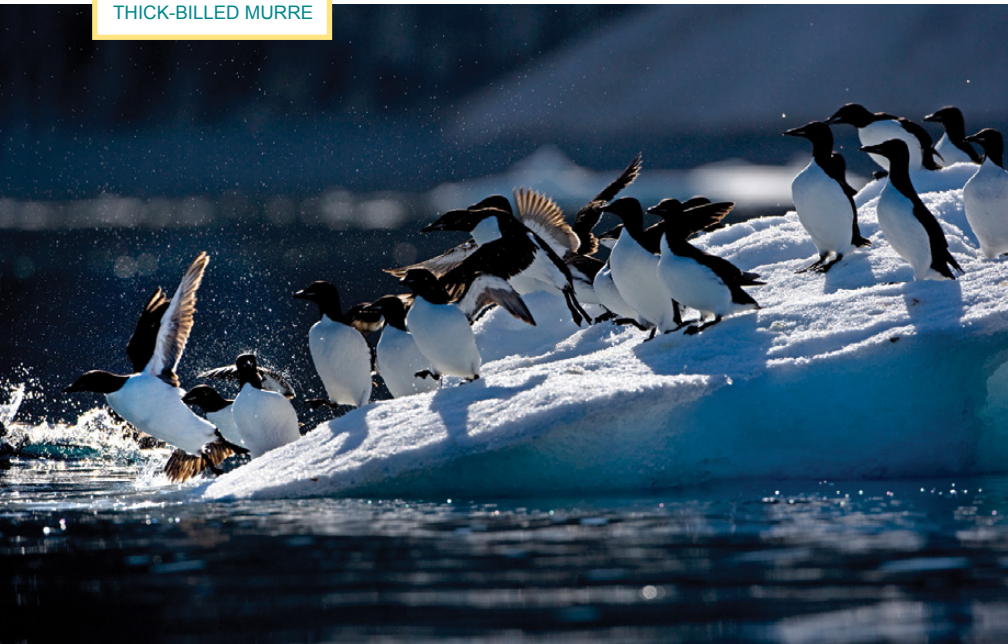
- The online site eBird has developed a number of occurrence maps called Spatio-Temporal Exploratory Model (STEM) maps, which allow the viewer to see where certain species can be found from week to week throughout the year. Another great example is the EuroBirdPortal, which has occurrence maps similar to those of eBird but also includes temperature fluctuations over time.

- As if the distribution of land birds is not complicated enough, the distribution of oceangoing birds can be much more variable. Many seabirds have wider and looser distributions than land birds because their food sources are not as static and predictable as they might be on land.

- Just as scientists have described 8 different biogeographical regions for landmasses, there are similarly 3 different marine regions: the northern marine region, above 35° north; the tropical marine region, between 35° north and 35° south; and the southern marine region, below 35° south. Besides Mexico, extreme southern California, and all of Florida, most of North America's seabirds fall in the northern marine region. But these regions are very fluid.

- Many seabirds can be pushed to the coast and sometimes even inland by large storms, especially hurricanes. A serious seabird watcher will keep a close eye on the weather forecast to know when the conditions are good to find seabirds being pushed closer to shore by onshore winds or bad weather.

THICK-BILLED MURRE



- In contrast to seabirds, many island birds have the most limited and restricted distribution of all birds. To spread its distribution, a bird must not only leave the island but also have a partner to mate with should it be successful in reaching another island. Without the ability to mate, there is no way that the distribution rate can expand.

- Island birds are most vulnerable to extinction because their ranges are often very limited, especially if they are confined to one particular island. For example, Santa Cruz Island off the California coast is the only island in the world where the island scrub jay occurs. Any number of natural and human-made disasters could cause their population to crash, such as a hurricane or a sudden influx of predators.

- Unlike island birds, land birds have the choice to move much more freely because of the extensive size of North America—almost 10 million square miles. With so much room to travel, adaptable land birds have much more opportunity for movement than their island counterparts.

STATUS

- Status is an important subset of distribution and basically refers to how common a particular bird is in a particular area and therefore how likely it is to be seen. Terminology can range as follows in decreasing order of likelihood: abundant, common, fairly common, uncommon, rare, very rare, casual, vagrant, and accidental.

- Status can also refer to a bird's conservation listing as defined by the International Union for Conservation of Nature. In ascending order of rarity, the different categories for evaluated and data-sufficient species are as follows: least concern, near-threatened, vulnerable, endangered, critically endangered, extinct in the wild, and extinct.

- The status of a bird can be constantly changing, given that the environment is also changing—often due to human activity. Sometimes this activity has a negative impact, but sometimes human intervention can be beneficial.

- For example, many areas in North America have been aiding peregrine falcons since the 1970s by monitoring nest sites, fostering laboratory chicks back into the wild, and taking damaged eggs to rear them. This has been crucial in getting them off the endangered list.

- The status of a bird dictates how well the species is doing in terms of its population numbers. But status also correlates indirectly to distribution, because if a bird's status is threatened, then in most cases, its distribution also shrinks.

ENDEMISM

- Endemism refers to a situation in which birds only occur in, or are limited to, one particular region. In most cases, endemism is used to describe a bird that is only found in one particular country. But the term might also be used to refer to an island, a particular ecological zone (such as a rainforest), or even an entire continent.

- No matter how the region is defined, in areas where birds are endemic, it is often because the food and habitat are distinct to that particular area. The species cannot be found anywhere else because its habitat and food does not occur anywhere else. But there are cases, especially with regard to islands, where a particular species gets cut off from similar species by geographical separation and over time develops into a species endemic to one tiny area.

- Because birds are living creatures, they are sensitive to environmental changes. This becomes compounded by human-

MACAWS

made factors such as climate change, pollution, depletion of food sources, hunting, and destruction of habitat.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Birding Essentials*, chap. 3.
Armistead and Sullivan, *Better Birding*, p. 12–17.
Cornell Lab of Ornithology, *Handbook of Bird Biology*, chap. 2.

ACTIVITIES

1. Contact your local bird club and ask which rare birds have been seen in your area recently. Try to go and see one of these rare birds if they are still around.

2. Peruse your field guide and make a list of all the birds that are likely to be found in your area. Alternatively, sign up for eBird and click on the View and Explore Data tab and then Explore a Region. Look at the list of birds found in your local area. Explore which ones are common and which ones are rare.

LECTURE 5

HABITAT AND SEASON AS BIRDING TOOLS

This lecture focuses on the topics of habitat and time of year as useful identification tools. In particular, you will learn about the different types of habitat that can be found in North America. You will discover that habitat specialization is common in birds and can sometimes lead to small, localized populations of bird species. You will also discover how time of year can assist in identifying different species in different parts of North America.

HABITAT

- Habitat is extremely helpful when it comes to finding or identifying different bird species. Knowing habitat well and understanding what birds are found where will help you narrow down the species of a particular habitat, in addition to making it easier for you to search for a specific bird.

- Two important terms often associated with habitat are biome and ecotone. The word “biome” is essentially another word for habitat in the wider sense. A biome is a broad geographical area with distinct animal and plant groups that are adapted for that particular environment. Climate, geography, and soil type are some important factors that dictate where one biome ends and another begins. Biomes in North America include grasslands, desert, coniferous forest, deciduous forest, tropical rainforest, chaparral, and tundra.

- The transitional zone between one biome or habitat and another is called an ecotone. Ecotones can either be a gradual transition from one habitat to the next, as in the gradual blending of a woodland and grassland, or a sharp line, as in the boundary between an agricultural field and a forest. An ecotone can also manifest itself as a wetland between a river and a forest.

- Either way, these areas are often rich in species diversity because they might contain representatives from both habitats as well as edge specialists that benefit from both environments. Many edge species are more common today because they have benefited from the human-made ecotones between forested areas and agricultural fields or developed areas.

- While some birds adapt to many habitats, others are limited to a specific habitat type. Habitat specialization is common in birds and can lead to small, localized populations of a bird species. For example, rock ptarmigans live high up in the mountains, where

ROCK PTARMIGAN PAIR

the winters are cold and snowy. Their habitat specialization has allowed them to be best suited to only one environment type.

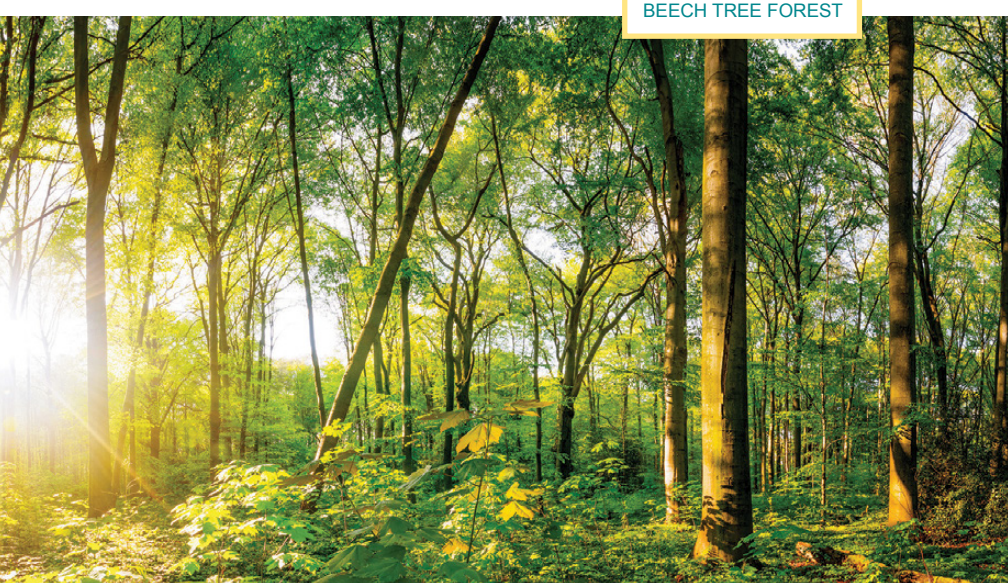
- There are many ways to classify habitats according to how broad or narrow we define them. For example, the grassland biome might consist of several different types of grasslands, such as tall-grass prairie, short-grass prairie, and mixed-grass prairie. These in turn might consist of different individual plant communities. Each of these classifications could be defined as a habitat in its own right.

- Some broad categories of North American habitats include woodlands or forests, grasslands, desert, sagebrush, chaparral, and tundra.

WOODLANDS OR FORESTS

- Woodlands can have a very complex structure, consisting of trees that have diverse heights, leaf characteristics, and seed production. Because of this complexity and variation, birds have adapted to a wide variety of microcosms, or smaller habitats found within larger habitats.

BEECH TREE FOREST



- For example, some species of warblers feed high up in the canopy of trees while others cling to the stems of trees, generally about midway up. Still others prefer to search for food among the leaf litter on the ground and in the forest undergrowth. These preferences can also be reflected by their nesting styles—whether they choose to nest within a cavity of a tree or build a nest close to the ground in the understory or high up in the branches.

- There are 2 basic types of forests: evergreen and deciduous, which essentially refer to whether the dominant trees lose their leaves in winter (deciduous) or retain their leaves year-round (evergreen).

- Deciduous forests are home to many species of songbirds, especially warblers, as well as turkeys, owls, hawks, and woodpeckers. The conifer forests of North America hold many specialist species that depend almost entirely on this habitat type for survival, including crossbills, pine siskins, pine grosbeaks, boreal owls and great gray owls, raptors, certain woodpeckers, and certain warbler species (in the summer).

GRASSLANDS

- Grasslands, or prairies, often occur globally in between deserts and forests and cover about a quarter of the earth's land surface. In the center of North America, there are 3 specific types of grassland: tall-grass prairie, mixed-grass prairie, and short-grass prairie. As you venture from east to west, the rainfall decreases and so does the height of the 3 different types of prairie.

- Tall-grass prairie is typically more than 5 feet tall and receives up to 30 inches of rain annually. Birds that are characteristic of this ecosystem include the Henslow's sparrow, the greater prairie chicken, and the dickcissel.

- Mixed-grass prairie is found just west of the tall-grass prairie in the central Great Plains and typically grows up to 3 feet tall and

receives around 20 inches of rain per year. Birds associated with mixed-grass prairies include the bobolink, the grasshopper sparrow, and the western meadowlark.

BOBOLINK

- Short-grass prairie is found west of the mixed-grass prairie toward the deserts and the Rocky Mountains. This prairie receives less than 10 inches of rain per year and is consequently less than 2 feet tall. Certain prairie birds particularly like the stunted grass afforded by short-grass prairies, including the burrowing owl, the mountain plover, and the horned lark.

DESERTS

- Most deserts receive less than 10 inches of rain per year, but this amount is even less because the rate of evaporation often

SAGUAROS DESERT

exceeds the rainfall. Animals and birds have accordingly adapted to survive these harsh conditions. Some only come out at night to avoid the heat, and others can go for days without water.

- North American deserts can be broken down into 4 major types, each with its own distinct ecosystem. Three of these—the Chihuahuan, Sonoran, and Mojave Deserts—are sometimes called hot deserts, because of their extremely high temperatures during summer and the affinities of their plant communities to subtropical plants farther south. The fourth type is the Great Basin Desert. With its cooler temperatures, it can be called a cold desert.

- The Chihuahuan Desert comprises a small area of southeastern New Mexico and west Texas but extends into a much larger area in Mexico. Common Chihuahuan desert birds include the greater roadrunner, the scaled quail, and the phainopepla.

- The Sonoran Desert is a large dry region covering southwestern Arizona and southeastern California, as well as most of Baja California and the Mexican state of the same name. It encompasses the Colorado and Yuma Deserts and is famous for its tall saguaro cacti. Common birds here include the Harris's hawk and the Gambel's quail. One species that is unique to the Sonoran Desert is the Abert's towhee. Another common hot-desert bird that can be found in the Sonoran Desert is the cactus wren.

- The Mojave Desert is found in southern Nevada, eastern California, and bits of Utah and Arizona. Characteristic birds include 2 range-restricted species of thrashers, the Le Conte's thrasher and the Bendire's thrasher. Other birds found here are the Scott's oriole and the Costa's hummingbird.

- The Great Basin Desert makes up parts of Nevada, Idaho, Utah, and the southeastern part of Oregon and is bordered by the Mojave Desert to the south. Due to the fact that this desert is a cold desert, it represents some birds that do not occur in the hot deserts farther south. Much of the habitat is dictated by sagebrush plant communities.

SAGEBRUSH

- Sagebrush is a sensitive environment that is at risk of being overrun by other plants and destroyed by development and out-of-control fires. Some bird species rely on this particular habitat

type, and this is often reflected by the common name of these birds, including the sage thrasher, sage sparrow, and the 2 different species of sage grouse: the Gunnison sage grouse and the greater sage grouse.

CHAPPARAL

- Chapparal is almost like a mixture of desert, grassland, and woodland habitats dominated by drought-resistant shrubs and stunted woody plants. It relies on infrequent fires for succession. One of the largest areas of chaparral is found in coastal California, running all the way down to the Baja peninsula. But similar habitats can be found in higher elevations in Arizona and the Rocky Mountains. Birds that can easily be seen in this habitat include the California towhee and the California thrasher. The wrentit is more often heard than seen.

TUNDRA

- Tundra is a harsh, cold, windy, treeless environment that is found in both the Arctic Circle and Antarctica. But there is also the so-called alpine tundra, which is located at high mountainous altitudes, above the tree line.

- Rocky Mountain National Park offers a spectacular example of an alpine tundra ecosystem. A characteristic species of this habitat is the smallest grouse in North America, the white-tailed ptarmigan.

- Arctic tundra is home to the Arctic tern.

TIME OF YEAR

- Migration is highly relevant to the broader subject of habitat. Because birds migrate, they are more active in different habitats during different seasons. So, time of year—used in conjunction with habitat—is a helpful piece of the identification puzzle.

- Knowing what kinds of birds occur in each habitat is massively helpful when it comes to identification. If you know what kinds of birds can be found in a woodland or a prairie or a tundra habitat, you can automatically rule out some to narrow down the possibilities.

- But depending on the time of year, some species can occur in the habitat you're observing while others will be absent and may be in an entirely different habitat at that particular time of the year.

- Also keep in mind that during migration, birds that do not usually occur in an area during summer and winter can be found passing through on migration.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Birding Essentials*, chap. 3.
Armistead and Sullivan, *Better Birding*, p. 12–17.
Cornell Lab of Ornithology, *Handbook of Bird Biology*, chap. 2.

ACTIVITIES

1. Compile a list of the birds found in your backyard. Keep adding to it as you see new species with the date that each new species is seen. Over time, analyze which species are seen at which time of the year and see if any patterns arise.

2. Go to 2 very different habitats (such as a lake and a forest) and record the bird species that you see in each. Analyze which species overlap and which species are only found in one or the other habitat.

LECTURE 6

INTRODUCTION TO BIRDING OPTICS

This lecture focuses on optics, one of the most frequently used birding tools. Because our eyes only allow us to see up to a certain distance, we need optics, such as binoculars and scopes, to give us a better view of the birds around us. Being able to see distant details up close is massively helpful in the identification process and will help you become familiar with the important physical traits found in different species.

BINOCULARS BASICS

- Binoculars are essentially 2 small telescopes side by side. When looking at binoculars for the first time, you will see 2 large cylinder-shaped objects that make up the bulk of the binoculars and also happen to be the place your hands grip. These cylinder-like objects are called the barrels or tubes of the binoculars. This is also where the magnification process takes place.

- Located in between the 2 barrels is a central knob called the focusing wheel, which is used to focus both of the barrels simultaneously. The wheel can be moved to the left and right to bring the desired object into focus.

- The objective lenses are the lenses that are closest to the object you are looking at, while the eyepieces, or ocular lenses, are the lenses that are closest to your eyes. Objective lenses are

responsible for gathering light. The larger they are, the more light they will gather.

- Light travels from a distant object through the objective lens, and then, because light bends when it travels through a lens, the light travels through prisms that turn the magnified image right-side up. The ocular lens then magnifies the image and provides focus and clarity. The ocular lenses are covered by the eyepieces, which are either adjustable or have rubber eyecups attached.

- Because the distance between people's eyes varies between individuals, the barrels of the binoculars also adjust accordingly. To get a correct distance, simply push them closer together or pull them farther apart. Continue moving the barrels until the image looks clear and the binoculars feel comfortable.

- If you pull out the focusing wheel, it will allow you to set the diopter and calibrate the binoculars to your individual eyes. Some older models of binoculars have the diopter positioned on the right eyepiece, but the instructions for setting the diopter essentially remain the same.

- The diopter adjusts the focus based on your individual eyesight. Because our left and right eyes often differ, you will need to adjust the diopter individually for each eye. To do this, aim your binoculars at something stationary in the distance. Close your right eye, or cover the right barrel of the binoculars, and focus the left barrel to your left eye using only the center focus control. Next, close the left eye, or cover the left barrel, and pull the focus wheel outward to reveal the diopter. Then, focus the diopter wheel to your right eye until the image is crisp.

- In the case of an eyepiece diopter, follow the same procedure, except the right eyepiece diopter will be used instead of the focus wheel diopter. The diopter only needs to be adjusted once;

once you have adjusted it, the focus wheel will focus each barrel according to your specific eyes.

- Eyepieces are either adjustable or have rubber eyecups attached. This adjustment is described as eye relief. These are designed to accommodate users with or without eyeglasses. If you do not wear glasses, the eyepiece or rubber cup can be pulled out or twisted out to create more distance between the eye and the eyepiece. The twist-out eyepieces generally allow you to stagger the eye relief according to your personal preference.

- If you do wear glasses, you will want to keep the eyepiece twisted in, or the eyecup folded back, so that your eyeglasses are flush with the lens. You want to have your eyeglasses as close to the eyepiece as possible to avoid distortion.

BUYING BINOCULARS

- If you don't already own a pair of binoculars, one of the first considerations is whether to go for a compact or full-size pair. The compact varieties are generally the most inexpensive and, while affordable and lightweight, perform pretty badly in low-light conditions. Because a pair of binoculars is your most important birding tool, spend the extra money and purchase a full-size pair.

- You will also need to consider which of the 2 main types of binoculars to choose: a Porro prism or roof prism system. A Porro system basically means that the light path from the objective lens to the ocular lens is deviated and reflected. The light path of a roof prism is pretty much in a straight line and is not deviated. This means that Porro prism binoculars are generally bulkier and are not as compact as the roof prism variety.

- Lower-end roof prism binoculars perform significantly worse than similarly priced Porro prism systems. Due to advances in technology, the higher-end roof prism models are worth their price.

For lower-end full-size binoculars, go with the Porro variety, and for mid- to high-end binoculars, go with the roof-prism varieties, but read the independent reviews on the different options available.

- Binoculars come in 3 varieties: not waterproof, water resistant, or fully waterproof. If you can, spend the extra money on a pair of nitrogen-filled, fully waterproof binoculars, because you seldom know when weather conditions are going to change when you are out birding.

- Cheaper binoculars use standard glass for their lenses. While these lenses might perform okay in ideal lighting conditions, they will struggle in low light and dappled light. Invest in a pair of binoculars with high-quality glass (high-definition glass, extra-low-dispersion glass, or fluoride glass), which produce noticeable differences in the quality of the image with enhanced resolution and true colors.

- Most binoculars have antireflection coatings on their lenses where they come into contact with air. This applies to the objective

lenses and the ocular lenses. These coatings assist in light transmission and minimize glare. But there are different levels of lens coatings that are outlined in the specifications of a binocular. Avoid binoculars that do not have coatings or that simply refer to their lenses as "coated," which generally refers to a single coating. Multicoated or fully coated lenses are much better.

OPTICS TERMS

- On your binoculars, there are a bunch of numbers, mostly printed on the focusing wheel. The first number—for example, 8, as in 8 × 42—refers to the level of magnification. In this case, the image will appear 8 times closer than you will see it with the naked eye. The greater the magnification, the view tends to be shakier and the image tends to be duller.

- The second number on your binoculars—in this case, 42—refers to the diameter of the objective lens. The greater this number is, the more light is allowed into the binocular. A higher number leads to much better light transmission, which results in a brighter image, especially in low-light conditions. But a higher number also leads to a larger, bulkier binocular.

- The third consideration—for example, 8.3 degrees—refers to the field of view. The greater the field of view, the easier it is to locate your subject without moving the binoculars. Field of view can be defined as the actual distance from left to right of your binocular image versus the image you would see with your naked eye. A wider field of view makes it easier to stay on and track a moving subject, so binoculars with a wide field of view are great for birders.

- Although not dictated by a particular number, depth of field refers to how far objects remain usefully sharp in front of and behind the point of sharpest focus. Good depth of field allows the user to not have to refocus constantly as birds make small movements.

Generally, the higher the magnification of the binocular, the shallower its depth of field will be.

CLEANING AND CARE

- Binoculars are quite delicate tools that can be knocked out of alignment, scratched, or even damaged due to extreme heat. Additionally, a sudden change of temperature from a cold, air-conditioned room to a hot, humid outside environment can lead to fogging on the outside of the lenses. Expose your binoculars gradually to these sudden changes by keeping them in a bag, placing the bag outside, and slightly opening the zipper 30 minutes before birding so that they can adjust more slowly.

- Even if you have fully waterproof binoculars, avoid entirely soaking them in water. Wipe off rain or any dampness by hand with a soft optical lens cloth as soon as possible, particularly before putting away binoculars after use. Always store your binoculars in a dry area that is not exposed to dust.

- When cleaning your binoculars, use an oil-free brush to rid the lens surfaces of any dust or sand that may have accumulated. Then, use oil-free lens tissue to remove fingerprints and other smudges from lens surfaces.

SPOTTING SCOPES

- Binoculars are not the only option in optics; there are also spotting scopes. Generally, beginner birders do not require a spotting scope to start out. A perfectly good pair of binoculars will suffice. However, this is entirely a matter of preference and budget.

- Few advanced birders go into the field without a spotting scope. The increased magnification allows you to successfully identify birds at a distance where binoculars would not be sufficiently powerful.

- However, even for general birding, a spotting scope allows you to enjoy much more detail on a bird. But the downside to a scope is the bulkiness of carrying a scope and the tripod that is necessary for its successful operation.

- As with binoculars, there are 2 types of scopes: angled and straight. With angled scopes, the eyepiece is tilted upward. In straight scopes, the eyepiece is on the same horizontal plane as the objective lens. Angled scopes are easier to look through, especially when looking at a bird high up in a tree, and they require minimal body positioning. Straight scopes are less comfortable because you have to significantly adjust your body so that you can look through the scope line of sight. But angled scopes take more practice to find the bird because you are not looking at it in the line of sight.

- Nearly all scopes have zoom capabilities. Most commonly, this is 15–45 times magnification or 20–60 times. As with binoculars, clarity, field of view, depth of field, and brightness can be compromised with increased magnification. When in the field, it is often best to find the bird at a lower magnification and then zoom in.

- An essential accessory for any spotting scope is a tripod. Without a tripod, you simply won't be able to hold your scope still and steady. There are many factors to take into consideration when deciding which tripod to buy.

- For beginners, an aluminum tripod offers durability and stability at an affordable cost but comes with the drawback of being heavy. By contrast, the more expensive carbon-fiber tripods are much lighter to carry and are also better at eliminating vibrations caused by wind or unstable surfaces.

- Similar to the stability of the tripod is keeping the tripod level. Make sure that the tripod is level when it is set up; otherwise, the image will be crooked. Most tripods have a small liquid compartment with

an air bubble to aid in assuring that your image is horizontal. This air bubble will shift into the circle when the tripod is level—and by checking the bubble periodically, you can make sure it remains that way.

- Sometimes tripod heads are sold separately from the tripod body. The head is the part of the tripod in between the legs and the scope and is responsible for how smoothly the scope can be moved. Ideally, your scope should move as smoothly as possible. There are typically 2 adjustable knobs on the head, one for vertical motion and one for horizontal motion. The more fluid the motion, the more expensive the tripod head.

- Clean and store your spotting scope as you would your binoculars.

SUGGESTED READING

Birdwatcher's Digest, "How to Use Binoculars," http://www.birdwatchersdigest.com/bwdsite/explore/optics/how-to-use-binoculars.php.

Nikon, "How to Use CF Binoculars/Nomenclature," http://www.nikon.com/products/sportoptics/how_to/guide/binoculars/using/using_01.htm.

ACTIVITIES

1. Using the information provided in this lecture, calibrate your binoculars specifically to your eyes.

2. Adjust the eyepieces of your binoculars to the best desired eye relief for your specific circumstances.

LECTURE 7

TACTICS FOR BETTER BIRDING

Birding is an incredible pastime, and in this lecture, you will learn how to bring birds closer to you so that you can enjoy this hobby to the fullest. Specifically, this lecture will focus on some tactics you can use in the field and at home to attract birds and on the different methods you can use to record your observations.

STEALTH AND CONCEALMENT

- Stealth is the ability to move slowly and quietly in a birding environment. Birds are very aware of their surroundings, so you never want to approach too quickly or loudly. Try not to make any sudden movements or loud sounds.

- You should also resist the temptation to point out a bird to your friends. If you want to guide someone's attention to a bird, talk in a low volume and, rather than motioning, verbally direct your friends to where you are looking.

- When approaching a bird in leaf litter in a forest, try treading lightly and slowly rolling the outside of your feet inward with each step. This will minimize the volume. Birds have excellent hearing, so try to remain as quiet as possible.

- Reducing your size by crawling or sitting is a great tactic to make you seem less threatening. In fact, when approaching a group of shorebirds on a beach, lay on your belly and slither slowly forward toward the birds. This breaks up your outline and eliminates an imposing silhouette.

- Dressing in neutral colors is also vital, as certain colors in the wild serve as warning signs, such as red, black, and yellow. Birds see color exceptionally well, so when observing them, you want to remain as inconspicuous as possible. Tans, browns, grays, and even subdued shades of greens and blues are typical field wear. Concealment wear, including camouflage and face paint, works, but simple fabric patterns, such as plaid, can also be a big help in concealment.

- You can take concealment to the next level by using blinds, or hides, as they are referred to in the United Kingdom. Using blinds to get close to birds is one of the most underutilized tools by

birders. However, it can be one of the most successful methods to get up close to our avian friends. Blinds are portable tentlike structures that birders can use to observe birds behaving naturally without the birds being aware of human presence. They are especially useful for bird photography and videography.

- Some people even drape animal skins or hides over themselves to blend in. But if you don't want to look like bear food, a better option might be a simple pop-up blind, which can be bought for less than $100, although better quality comes with higher costs.

ATTRACTING BIRDS

- An excellent tactic to attract our feathered friends is the use of sound. Pishing is a sound made by people to attract birds. It mimics the alarm calls of songbirds that gather to mob a potential predator and can be successful in bringing many different species closer. Birds like to see what is threatening them and actually become very bold and gang up with other birds to scold a predator and drive it out of the area.

- Pishing is a very easy-to-learn strategy and does not require any tools other than your mouth. It's called pishing because that's one of the noises you can make—*pish.* Other sounds you might make are *psst*, *sip*, and *seep*. You usually repeat your sound 3 to 5 times in a regular tempo, but you can vary both the sound and the tempo as desired to draw the attention of different birds.

- Some birds are more responsive than others, and their responses to pishing vary in different places. Types of birds that are drawn in by pishing include chickadees, finches, jays, nuthatches, sparrows, warblers, and wrens.

- Some birding purists believe that pishing distracts the bird from its everyday activities and is unnatural, so always be mindful and respectful when birding in a group of people you do not know.

CHICKADEES

- A second sound technique that requires no additional tools is called squeaking, which is achieved by placing a curved finger up to your lips and sucking in air, making a sharp squeaking noise. These noises can vary from quiet to loud, depending on what one desires.

- There are also some squeaking tools in the birding market that can be very successful in calling in a variety of birds. Squeaking will attract many of the same birds as pishing. It can, however, be used to keep birds interested for longer, as they might get bored by consistent pishing.

- Mimicking or playing a recording of an eastern screech owl will often attract hordes of songbirds who seek to mob the invisible predator and drive it out of their territory. If you don't have access

to a recording, this call can be imitated by whistling—specifically by intermittently interrupting the airflow as you blow, making a staggering whistle.

SETTING UP YOUR BACKYARD TO ATTRACT BIRDS

- Whether you live in an urban or rural setting, there's no better place to develop your birding skills than your own backyard. When setting up your backyard to attract birds, the most important thing to remember is that, like any other animal, birds need water. They use water to bathe, drink, and preen, so sources of water, such as a drip, birdbath, or even a pond, are great for attracting birds.

- A drip can be as simple as a dripping hose over a shallow dish or birdbath. Rocks, wood, and branches around water make for good perches. Not only are perches useful for birds, but they also make taking pictures easier and are more aesthetically appealing.

- The sound and movement of dripping water also attracts more birds. Placing plants around water is very important because they provide quick access to shelter, protection from predators, and shade in hot conditions.

- As with birdbaths and drips, bird feeders should also be placed close to shelter. Bird feeders can come in a wide variety of sizes and forms, but some of the most commonly used types are tray or platform feeders, hopper or house feeders, window feeders, and tube feeders. Other options include Nyjer or thistle feeders, suet feeders, and hummingbird feeders.

- Besides feeders, native gardening is an excellent way to attract birds by providing plants that offer natural food sources and shelter. There is a wide variety of vegetation that is excellent for attracting birds to the backyard. Try to stay away from nonnative species and consult a native nursery in your area for assistance in selecting the best vegetation for birds in your particular area. A

AMERICAN ROBIN

few good examples of trees and large shrubs that can be used to great effect in various parts of the country include the flowering dogwood tree, the eastern red cedar, various species of spruces, and staghorn sumac.

RECORDING YOUR SIGHTINGS

- One of the most effective and indispensable tips for becoming a better birder is to learn how to effectively take note of the identification characteristics of a bird while you are looking at it.

- Once you have nailed an identification using the knowledge you have gained thus far, it's useful to record your observations in some form. Note the species, gender, and age of the bird—if you know it—as well as the time of year and location. Keeping a journal, a life list (a list of the total number of birds that a birder has seen or recorded in his or her life), and other records of your birding activities can greatly enhance future birding experiences and can even contribute to birding research.

- Life lists can be recorded in a variety of ways. Some people simply list the species by their common names, while others list them by their Latin names. Some list their total alphabetically, while others use the checklist manner of listing as established by the American Ornithologists' Union. According to this checklist approach, all closely related birds are grouped together in a list.

- Modern technology has allowed for the development of a significant variety of life list software programs. Birders can now use these programs to record yard lists, county lists, state lists, country lists, and world lists. A birder can maintain a year list, a life list, or even a list for a single birding trip. Many software programs allow you to add notes, keep track of the number of individual birds seen, and many other useful functions.

- Arguably the very best birding software program is eBird, which is a website, app, and software program that was developed by the Cornell Lab of Ornithology and the National Audubon Society and launched in 2002. It allows users to make their own lists and share bird sightings, as well as contribute to science and conservation.

- The eBird database is globally accessible for sharing, managing, and collecting information in real time. Observations are shared with a global community of educators, land managers, ornithologists, and conservation biologists.

- To make the data easier for users to understand, eBird has intuitive and user-friendly maps, graphs, and charts. All of the submissions are reviewed by local experts before being posted. Its popularity and usage is growing every year.

- eBird allows users to:

  - record and keep track of the birds you see

  - explore interactive maps and graphs

  - share your sightings with the eBird community

  - discover data through images and sounds, and

  - check local regions for updates on birding activity and species seen by other birders.

- Recording your observations is an indispensable part of becoming a better birder. You will be able to go back and see what birds you saw at what time of the year in what location. You will be able to establish a target list of the birds you still need to see in your backyard, state, or country. But perhaps most importantly, you will be able to contribute to the global birding community through

citizen science and help lawmakers around the world better protect birds and bird habitats.

SUGGESTED READING

Burton, *The National Audubon Society North American Birdfeeder Handbook*.
Thompson, *Bird Homes and Habitats*.
White, *Good Birders Don't Wear White*.

ACTIVITIES

1. Go outside in an area with trees or shrubs and try pishing for several minutes. Take note of any birds that come in for a closer look. Do some of your pishing variations work better than others?

2. Explore what you can do to your own backyard to make it more attractive to birds. If you live in an apartment, explore ways to make your immediate surroundings more attractive to birds. Try setting up bird feeders, planting native vegetation, and installing a drip.

USING BIRD BEHAVIOR TO IDENTIFY BIRDS

You need to use a combination of basic identification tools and advanced identification tools to become an accomplished birder. Your field guide can assist you, but field guides struggle to convey the motion, behavior, or flight of birds in the same way observing bird behavior can. This lecture will focus on bird behavior, which is often referred to as bird habits. The habits of birds vary just as much as their color, size, and shape and can be a very useful aid in bird identification. Bird behavior can be organized into 6 broad categories: typical behavior, feeding behavior, flight behavior, flocking behavior, mating behavior, and nesting behavior.

TYPICAL BEHAVIOR

- Typical behavior includes the individual quirks that a bird has that separate it from other birds. These are the habitual movements that a bird does constantly and not just while engaging in other behavior, such as feeding or flying. Once you spend a lot of time in the field, these individual quirks and subtleties will become apparent.

- Shorebirds are a broad group of birds that can present extremely difficult identification challenges, especially when they are out of breeding plumage. But the way that a sanderling runs along the shoreline, hugging the waves, is unique, and their legs are nothing but a blur of motion.

- Another shorebird, the spotted sandpiper, can be identified immediately by its tail bobbing and unusual teetering walking style. Once you learn this, you will never need to look at any other details of the bird. Tail bobbing, as in the spotted sandpiper, is a form of typical behavior that is unique to only a handful of birds, such as waterthrushes, phoebes, and some sparrows and warblers.

SPOTTED SANDPIPER

- Besides tail bobbing, the amount of activity that a bird exhibits can also give away clues. Vireos can often be difficult to tell apart from warblers, but the former tend to move much slower and don't flit actively and constantly like warblers.

FEEDING BEHAVIOR

- Feeding behavior can be used on 2 levels to assist with the identification of birds in the field. At the macro level, a bird's feeding behavior can assist in categorizing a particular species into a particular family and can also be used to narrow a larger group into a smaller grouping that can aid further in identification. At the micro level, a bird's feeding behavior can be entirely distinct from any other bird in its family or order.

- Feeding behavior can also be useful when observing shorebirds, which are an identification challenge for all birders, new and experienced. Two particular species that can often be found feeding together are stilt sandpipers and long-billed dowitchers. At first glance, these 2 species superficially resemble each other. They are similar in size, have long black bills, and are very similar in color for the most part.

- But if you watch the way they feed, you will notice that the stilt sandpipers—because their bills are shorter than the dowitchers' bills and their legs are longer—have to tilt down farther to probe in the mud. Their tails therefore are more elevated than those of the dowitchers.

- The stilt sandpipers resemble sped-up land oil rigs plumbing for oil, with their tails sticking up in the air. The dowitchers, on the other hand, feed in a more parallel fashion and work their bills much like a sewing machine, probing the mud in quick, short bursts.

- Feeding behavior at a distance or in bad light can be very revealing to distinguish between 2 closely related or similar species.

FLIGHT BEHAVIOR

- Flight behavior is the most useful identification tool when trying to identify birds in the air. All birds have distinct flight patterns, and

learning these can make you look like a pro. Ask yourself these questions: What does the flight look like? Is the flight pattern straight? Is it undulating or bouncy? Are the wingbeats fast or slow? Does the bird hover like a helicopter?

- Woodpeckers and some other birds appear to bounce in flight as they alternate flapping with gliding. In woodpeckers, this leads to a swooping or undulating bounce. In small birds, such as finches, the bouncing is quicker and more jerky. This is caused by the bird holding its wings closed for a brief instant and then quickly flitting the wings again.

- Raptors can pose serious identification challenges. The reasons for this are that many species have several color morphs and age plumages, and raptors also spend much of their time in the air, making a close identification almost impossible.

- Being able to identify raptors in flight is often the best and only way to know what you are looking at. Knowing the flight patterns of different types of raptors can narrow down the identification challenge to just a few species so that size, shape, and color can be supplemented to nail down an identification.

- Some birds of prey, such as falcons and goshawks, fly in a straight line, using speed and the element of surprise to catch their prey. Others, such as red-tailed hawks and bald eagles, circle and soar. White-tailed kites, kestrels, rough-legged hawks, and white-tailed hawks often hover in the air, remaining in one place with their heads and bodies still while their rapid wingbeats keep them stationary. Ospreys plunge-dive for fish, sometimes completely submerging themselves in the process. Harriers are well known for coursing low over fields and marshes in a feeding technique known as quartering.

- Hummingbirds have the ability to hover, dip, and fly backward like a helicopter. No other bird can fly backward.

- Other bird species have entirely unique flight patterns that cannot be confused with any other bird. As with the feeding techniques, you can use flight patterns and behavior to narrow down your identification at the macro level and sometimes even nail an identification straight away at the micro level.

FLOCKING BEHAVIOR

- Whether a bird lives singly or in a flock is a very underestimated but nevertheless important tool, especially for a beginner birder. Flocking behavior is the tendency of certain species of birds to form part of a close-knit group of other birds, mostly of the same species.

- It is highly unlikely to see a cedar waxwing on its own, unless it's sick, injured, breeding, or very lost. It is also very unlikely to encounter a close-knit flock of cardinals.

- The tendency of a bird to flock can be quite useful to beginners. And as you become more experienced, knowledge of flocking behavior becomes almost second nature and serves as an excellent aid in making quick and reliable identifications. Keep in mind that some birds tend to flock more at the end of summer, when they gather for migration.

MATING DISPLAYS

- Mating displays are not readily used as a tool for identifying birds, but these fascinating behaviors differ widely from species to species and can make for interesting birding.

- Birds tend to use day length and weather changes to tell what season it is. When the number of daylight hours increases above a particular level, certain physiological changes occur that dictate that it is time to breed.

- Most types of birds will make sure that they time their breeding with the seasons when food will be most abundant for feeding their rapidly growing babies. But well before they contemplate building a nest and raising young, they need to choose a suitable mate and then select a breeding site.

- Some nonmigratory birds will maintain a territory throughout the year and then choose a mate, either one that they have been with all year or a new one, depending on the species. Other nonmigratory birds will actively select and defend a new territory in the spring and then set about finding a mate.

- But migratory birds, such as many species of warblers, set about maintaining a territory as quickly as possible after their arrival from their wintering grounds. Once a territory has been established, these birds then turn to finding a mate or displaying to an existing one.

- The females of most species will choose a male based on the prowess of his mating display, nest-building ability, breeding plumage, and various other display behaviors, such as dancing or drumming. Males will often bring food to the female to cement the pair bond.

- Some birds, such as albatrosses and swans, mate for life. But many male birds choose a mate for only one season. Still others choose several mates in a season in a system known as polygyny. And there are even a precious few bird species in which it is the female that mates with several males in a system called polyandry.

- Watching and understanding mating displays can be one of the most enjoyable and rewarding aspects of birding.

NESTING BEHAVIOR

- Related to mating behavior is nesting behavior. Nesting can offer a fascinating insight into the private lives of birds. But knowing

which birds build which nests can also assist in locating and identifying a particular species. Approximately 700 species of birds breed in North America, and the variances in their behaviors are awe-inspiring and complex. Birds go about finding mates, building nests, and raising young in surprisingly different ways.


BULLOCK'S ORIOLE

- Nests are designed to provide a safe place for birds to raise their young. They are as diverse as the different mating strategies of birds. Some nests are a simple scrape in the ground. Some are elaborate structures composed of lichen, grasses, and other materials. Others are massive stick structures that are heavy enough to break the bough of a large tree. Nests can be found just about anywhere—from beaches, to buildings, to cavities in trees, to bridges, to caves, and many more.

- The most common type of nest is a simple cup-shaped structure built of some kind of vegetation and other material. Cup structures made out of grass, reeds, or other delicate materials are commonly used by many species of passerines. With some variation, this is the typical nest of sparrows, warblers, vireos, robins, thrushes, cardinals, and more.

- To identify a nest, observe it from a distance first and see if there is any activity. And remember that many female birds look very different from males and can often be more difficult to identify.

Take notes so that you can try and identify the bird later in your field guide.

- Also take note of what time of the year it is. Resident birds tend to breed in late winter and early spring. Migratory species tend to nest in early summer. This is because it takes them a little time to settle in to their new home after their exhausting migration. And remember that migratory birds tend to nest earlier in the South than in the northern United States due to the warmer climate.

- Take notes on the nest itself. Is it on the ground or in a tree? What materials are used? Is there a lining in the nest? Has spider web or mud been used to bind it together? Is there any lichen or moss attached to the side of the nest for concealment? What is the shape of the nest? Is it simple or more complex?

- If there are eggs inside, take careful note of the color, size, and shape of the eggs. The size of an egg is proportionate to the size of the bird. Pointy eggs tend to belong to birds that nest in shallow scrapes in the ground or on the edge of cliffs, such as terns and shorebirds. Always be as quick as possible around an active nest, and never touch or move the nest.

- Once you have taken notes on the nest you're observing, you can turn to field guides and other resources for help in reaching a positive identification.

SUGGESTED READING

Cornell Lab of Ornithology, *Handbook of Bird Biology*, chap. 6.
Gill, *Ornithology*, chaps. 9 and 11–17.

ACTIVITIES

1. Go outside and watch at least 2 different species of birds in flight. Take careful notes on how the birds fly, and then compare the flight patterns of the 2 species. If the 2 are very similar, try to find a third species to compare.

2. Go to a place where you are likely to see birds feeding, such as a wetland or some bird feeders. Compare at least 2 different species of birds feeding and note the differences in behavior.

LECTURE 9

UNDERSTANDING VARIATIONS IN PLUMAGE

The sheer number of bird species presents the birding enthusiast with a lifetime of identification challenges. But even within the same species, there can be multiple variations in the colors and patterns of feathers. In this lecture, you will discover several factors that can cause variations in a single bird's plumage, including sex, age, molt, hybridization, genetic factors, congenital defects, and environmental factors.

SEXUAL DIMORPHISM

- The variation between male and female plumage is a common form of what biologists call sexual dimorphism. Broadly, sexual dimorphism refers to any difference in appearance between males and females of the same species.

- Some animal species have significant dimorphism when it comes to size. For example, male gorillas are considerably larger than females. Or there might be exotic features present in one sex but absent in the other. The peacock's tail is a perfect example. Compared to the peahen's tail, it really stands out.

- There are several reasons for sexual dimorphism in birds. The most common and obvious is sexual selection. This is a process first described by Charles Darwin in which females choose their mates based on some characteristic that isn't directly related to

fitness. Some examples are the bright plumage of male northern cardinals or the large, inflatable throat sacs found on male magnificent frigatebirds.

- Because females favor these traits, males that possess them have greater reproductive success—and therefore pass down their genes. Current scientific thought suggests that females are attracted to these traits because bright colors and elaborate performances show that a male is healthy and has energy to spare, suggesting indirectly that he has good genes.

- However, sexual dimorphism is not always as simple as pretty males performing for choosy females. A few species of birds are polyandrous; that is, females perform most of the courtship, acquiring multiple male partners, while the males incubate the eggs and care for the young. In these cases, the female is the one with the brighter plumage.

- The sex differences between male and female birds can lead to identification confusion in many families of birds. In hummingbirds, tanagers, finches, some wood warblers, and several other groups, females may look more similar to females of other species than to the males of their own species. There is also the fact that some males (and, for that matter, females) have very different plumages for the breeding season and the rest of the year.

AGE

- Age is another factor that can create great differences between birds of the same species. In many species, juvenile birds look distinctively different from adults. Think of an American robin with its spotted breast or the fluffy look of young owls who still have downy plumage.

- Many smaller birds shed this first set of feathers in a few weeks and acquire a second immature plumage that looks similar to that


EASTERN SCREECH OWL

of the adult female before finally acquiring their adult plumage. This process of shedding one set of feathers and replacing it with a new set is called molting. In some cases, immature males molting into a bright adult plumage can appear confusingly mottled.

- Birds may also undergo other physical changes as they age. For example, immature eastern towhees have dull, dark eyes, while adults have bright red or whitish-yellow eyes.

- Larger birds, such as raptors and gulls, may go through a whole series of immature plumages over the course of multiple years before achieving an adult look. The larger species of gulls, such as the herring gull, take 3 or 4 years to transition from a dark gray, heavily mottled juvenile plumage to their largely white adult plumage. During this time, they also change from basic to alternate plumages.

- Because of all these changes, a herring gull has 9 distinctive plumages in its lifetime, not counting the downy fuzz it wears on the nest. During a molt, the gull may change appearance from week to week and have traits from both the plumage it is leaving behind and the plumage it is gaining.

MOLT

- The changes wrought by molt on immature birds are often dramatic, but adult birds also molt regularly. All adult birds molt at least once a year, to replace damaged feathers; some species molt 2 or even 3 times in a single year.

- For birds with distinctive breeding and nonbreeding plumages, molting is what allows them to accomplish the change. The same is true of birds who change colors for better camouflage across the seasons.

- In general, the color scheme that a bird has the majority of the time—for many North American birds, what we think of as the nonbreeding plumage—is called the basic plumage. The other plumage is referred to as the alternate plumage.

- Even in birds that do not change their plumage drastically, a freshly molted bird may appear very different than a worn one.

- Birds do not molt all of their feathers at once under normal circumstances. Doing so would leave them extremely vulnerable, as they would be unable to fly or properly regulate their body temperature. Instead, birds molt over a long period of time, with some feathers not falling out until other feathers have been fully replaced. Usually, they molt in a symmetrical fashion: The equivalent feathers on opposite sides of the body are replaced at the same time.

- Some birds do become flightless during molt. In other cases, a bird that is molting may merely look a bit disheveled or patchy, or show a few gaps in its wings or tail.

- Growing an entire new set of feathers is a very energy-intensive task, so birds do not molt when they are in the midst of breeding. Most also do not molt during migration, although some species molt along their journey.

- A common time period for molting is after fledging the young of the year but before migration begins—a time period that occurs around July or August for many birds in temperate North America. Birds that molt 2 times a year generally have this late-summer molt and a partial or complete molt in early spring before the breeding season begins. As with immature birds molting into adult plumage, a bird experiencing a partial molt from basic to alternate plumage may appear mottled with brown and bright colors.

HYBRIDIZATION

- Hybridization is one of the most confusing issues for birders. In theory, a species is defined as a population of animals that are capable of interbreeding. Among birds, there are many cases where closely related species can create fertile offspring, therefore creating a situation where genes are exchanged across the species line.

- Defining a species is not always a simple task, and birds do not always respect boundaries. For these reasons, birders should learn what to expect and where. Some parts of the country, such as the western plains, where eastern and western species meet, have more opportunities for hybridization to occur. In addition, some species, such as the mallard, are notoriously promiscuous. Other species rarely or never hybridize in the wild.

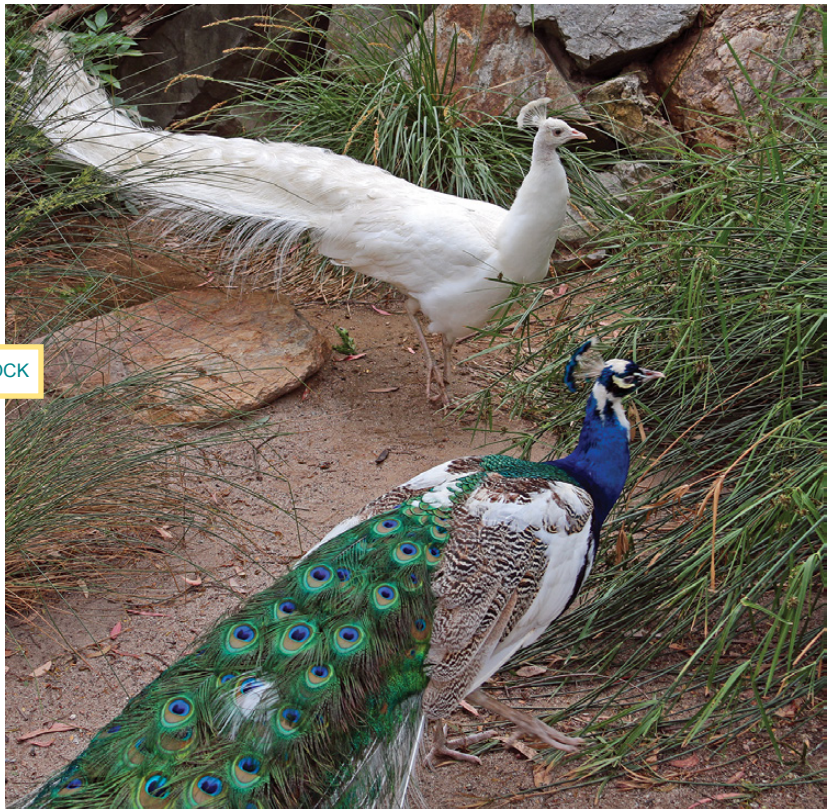
- When you come across an unfamiliar bird and suspect that it may be a hybrid, document it with pictures and notes. Look for traits that point to a particular species as parent. Some common hybrids are very much a combination of the 2 parent birds. On the other hand, some hybrids can show recessive traits that don't immediately bring either parent species to mind. In most cases, this can occur when a hybrid produces offspring with either of the parent species.

- Encountering a possible hybrid is a good time to appeal to the experts for help. With a photo or good notes, you can appeal to your local bird club or an online group for assistance. There is also a substantial overlap between birders and professional ornithologists, and the latter are often very attuned to the subtle signs that can help identify a hybrid. Keep in mind that some hybrids can never be identified with certainty by looks alone.

CONGENITAL AND GENETIC CONDITIONS

- Some congenital conditions can also cause birds to appear odd. Perhaps the best-known congenital condition is albinism, caused by the absence or very low levels of the dark pigment called melanin, which produces black or brown coloration in birds.

- A truly albino bird has no black or brown feathers, but it may still have red, yellow, or orange feathers, because these colors are produced by a different set of pigments, called carotenoids. It also



PEACOCK

has pink eyes and skin. True albinos are relatively rare among wild birds and do not usually survive long because of a lack of camouflage and poor eyesight.

- Partial albinos, or leucistic birds, have a few abnormal white feathers or patches of feathers with otherwise normal plumage and are much more common. Dilute birds have a normal pattern but are lighter overall than a typical member of their species. A bird can lack only eumelanin, which produces black and gray tones, or pheomelanin, which produces brown, chestnut, and buff colors.

- The opposite condition can also occur, in which a bird produces much more melanin than a normal member of its species. This is called melanism, and birds with this condition can range from slightly darker than normal to completely black.

- A very rare but dramatic-looking genetic condition is gynandromorphism, in which a bird has both male and female traits. This condition is most evident in birds where the male and female have very different plumages.

ENVIRONMENTAL FACTORS

- Environmental circumstances can change a bird's appearance and make it look out of the ordinary. While birds can make melanin in their own bodies, they only get carotenoids by eating certain foods. For example, flamingoes need to eat pink-bodied shrimp to get their distinctive color. If a flamingo does not get a nutritious enough diet during molt, it may appear pale pink.

- Another instance of environmentally induced appearance change is the case of overgrown beaks. In normal circumstances, each species of bird has a beak that is suited to its own particular method of feeding, and there is usually not much variation from individual to individual within a species.

- Beginning in the late 1990s, however, birders began to report seeing individuals of species that normally had relatively short beaks with very long or curved beaks, resulting in difficulties with feeding and preening and compromising their ability to survive. It was not until 2016 that researchers discovered a virus that seemed to be present in the beaks of all the affected birds.

- In general, unlike unusual plumages, strange changes in a bird's unfeathered parts—beaks, feet, or eyes—indicate a problem for the bird, either due to an accident, a parasite, or a disease. Documenting these kinds of changes can help ornithologists track, prevent, and cure avian epidemics.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Birding Essentials*, chap. 6.
Howell, *Peterson Reference Guide to Molt in North American Birds*.
Kaufman, *Field Guide to Advanced Birding*, chap. 4.
Scott and McFarland, *Bird Feathers*.

ACTIVITIES

1. Look up Brewster's and Lawrence's warblers in your field guide. Analyze the images and note which characteristics of the parent species are more apparent in each hybrid. Decide if there is one parent that appears to be more dominant in the hybrid.

2. Do a google search of the term "albino cardinal" and look at the resulting images. Next try "melanistic cardinal" and look at what comes up. Try doing the same with some other common backyard birds to get a feel for the variety of plumages in aberrant birds.

BIRDING BY EAR

Nearly every birder birds by ear to some degree without thinking about it: A chirp or rustle in the leaves can tell us where to look for a bird, and even many non-birders have subconsciously learned the distinctive calls of familiar species. But with a little knowledge and practice, advanced birding by ear can be a tremendous help in many circumstances, such as when the light is bad, when the bird is distant and inaccessible, when the leaf cover is heavy, or when your binoculars are not close by.

THE BIOLOGY OF BIRD VOCALIZATIONS

- Typically, songs are intricate compilations mainly used for breeding or territorial purposes, whereas calls are mostly single or several notes that are used to maintain contact or alarm fellow birds of danger.

- Physically, birds produce sounds by forcing air through a mechanism based around their respiratory system, much like humans. However, instead of the larynx found at the top of the trachea, as in humans and other mammals, birds have a syrinx at the bottom of their trachea, where it forks into the lungs. The membranes and cartilage in the syrinx produce the sound, and syringeal muscles control its tone.

- Because the syrinx branches and the muscles on each side can operate independently of the other, many bird species can produce more than one note at the same time, producing sounds of a complexity that only specially trained humans can duplicate. In a few species, such as the greater sage grouse, males also have air sacs on their necks, which they can use to produce the deep, booming sounds involved in their mating displays.

- Beyond the syrinx, the bird's brain also plays a major role in the production of sound. How does a bird know what to sing, chirp, or shriek? That depends on the species. Many birds have their calls and songs encoded on a genetic level.

- However, in many birds, learning plays a major role in how they vocalize. This is particularly true of the vast majority of the passerines, commonly referred to as the songbirds on account of their specially developed vocal chords. Youngsters will often mimic their parents as they develop their signature calls and songs.

- For most songbirds, the path to becoming a songster begins with a learning period when the chick is still very young. A genetic template allows it to recognize the songs of its own species, and it will listen and absorb these songs only, but this template does not dictate every single note and detail. Individual birds learn how they will customize their songs by listening.

- The genetic template by itself is not enough; if the bird does not hear its parents or other nearby birds of the same species sing during this period, its ability to learn later will be very limited, and it may never successfully hold territory or mate.

- After this critical early-listening stage, the bird goes through a silent period, and then it begins to practice its song imperfectly. During this subsong period, the young bird may sing an incomplete, rambling, or out-of-order version of its species' song. Practice

during this phase gradually makes perfect, and the bird reaches adulthood able to produce the song of its own kind.

- However, this process is not universal or automatic. Northern mockingbirds and other mimics tend to be able to learn new songs throughout their lives, while rare individuals of any songbird species may learn the wrong song by mistake. Environmental contaminants, such as mercury, can cause brain damage in young songbirds that makes them less able to learn songs and limits their repertoire. And even in songbirds where songs are learned, their simpler calls are often genetic.

NORTHERN MOCKINGBIRD

BIRD COMMUNICATION

- Like humans, birds use sound as one of their most important forms of communication. The complex, melodic songs that we

associate with some of our favorite birds are actually boasts. The birds who produce them—and in North America, that's most often the males—use a lot of energy to generate these tuneful boasts.

- This performance indicates that they are strong and fit, which helps attract females and discourage other males who might try to steal the singer's territory or mate. Songs also play a role in demonstrating fitness. Females prefer the males who demonstrate the broadest repertoire of phrases and the best mastery of songs.

- Although singing is often assumed to be the province of males alone, in some species, the female may sing to defend territory, or the male and female may perform duets to cement their pair bond.

- Simpler calls, some of which are just as charming to the human ear as elaborate songs, play a wide variety of roles in avian communication. In their variety and ability to transmit complex information, they may be considered a very rudimentary form of language. Some of the key types of calls include alarm calls, contact calls, flight calls, and begging calls.

    - Alarm calls are used when a bird is confronted with a threat. The call serves to warn other birds in the vicinity of danger and, in some cases, to help intimidate or confuse a predator. Some species have a variety of different alarm calls to differentiate between different types of threat. Alarm calls are usually loud and carry over a long distance so that they will warn other birds effectively; near their nest, however, parent birds may have a special soft alarm call intended only for their own young.

    - Contact calls are used by birds traveling in pairs or flocks to coordinate their actions or regroup if they are separated. Contact calls are not usually as loud or piercing as alarm calls, but they can still be very loud and, in some cases, quite incessant.

- Flight calls are a subtype of contact calls that are given only by birds in flight. In large flocks, especially at night, these calls may help each bird keep track of the location of other birds around it, helping the birds avoid collisions and coordinate their actions. These calls are particularly helpful to birders, because they can allow them to identify birds that might otherwise pass overhead unseen.

- Begging calls are a very specialized type of call that is given by a young bird (or, in some cases, a courting female) to encourage its parents (or mate) to feed it. These calls are usually not loud, so as not to attract predators to the vulnerable baby, and they are not usually especially distinctive. However, a begging call may quickly attract a parent bird, giving birders the opportunity to identify an adult in more distinctive plumage rather than a drab juvenile.

- Another way that bird songs and calls are like language is that populations of the same species in different geographical areas can develop different dialects. In some cases—perhaps most cases—this is the result of the learning process that birds go through. Over time, if 2 populations of birds rarely interact and new generations of birds in each group learn only from the older birds in the same group, small differences will accumulate and the songs will drift apart, resulting in dialects.

- Perhaps the most extreme example of learning in birds is in the case of birds that mimic. Many birds have some ability to mimic the songs and calls of other species, including northern mockingbirds, European starlings, blue jays, gray catbirds, many species of parrot, and the larger corvids—the latter 2 groups are even known for their ability to mimic human speech.

- Of course, mammals can also mimic, and birding with sound doesn't necessarily mean only listening. Remember to use your own mimicry skills to bring in birds. You can use pishing, which imitates


BLUE JAY

a small bird's alarm call. Using recordings of an individual species' calls can help draw out territorial males or curious birds of either sex. This technique is usually used to get a glimpse of nocturnal birds or of species known for their shyness or skulking habits.

- However, it is important to be self-aware when using this technique, especially in popular, well-birded areas. To use recordings ethically, you must minimize the disturbance to birds. Refer to the American Birding Association Code of Birding Ethics for more information.

LEARNING BIRD SONGS

- With all this complexity, learning bird songs may seem like an impossible challenge. But it can be done. Even if you don't think you're a natural, there are many resources available to help you learn to bird by ear. It can often help to have a more experienced

local birding buddy when learning bird sounds. Learning the songs and calls of the most common birds in your area should be your first priority.

- Written descriptions of calls and songs can be confusing at first. Most field guides include such descriptions, and initially they may seem subjective, but the descriptions are surprisingly useful once you get a feel for how a particular field guide author tends to describe sounds.

- To learn more precisely, and to practice at home or in your car, the traditional option has been audio recordings. From the time of vinyl records onward, a variety of ear-birding guides have been made available for the birder's listening pleasure, including the *National Geographic Guide to Bird Sounds*.

- Today, much like music, bird song has gone digital. Two apps that stand out for learning bird songs are Larkwire and Chirp! Both of these programs use quizzes and interactive features to make a game of learning bird vocalizations, which can be especially helpful if you are a learning-by-doing type.

- There are also apps that serve as libraries of bird sound. They aren't as effective for learning brand-new bird songs, but they can be useful for looking up a specific bird and are especially handy when using sound clips to lure out a bird. The most extensive library app is BirdTunes, which includes more than 650 species.

- A wonderful and free resource for any birder with an internet connection is the Cornell Lab of Ornithology, which is home to the Macaulay Library, the world's largest and most comprehensive collection of biodiversity media, including recordings of bird songs and calls. Many of these recordings are available on www.allaboutbirds.org, where you can play them back to check your identification of a particular species. The Audubon Field Guides website also includes sound clips.

- Recordings of bird sounds can be turned into visual representations called spectrograms that show how the pitch and amplitude of the sound changes over time. Much like sheet music, the markings on a spectrogram can be read to give you an idea of the sound's qualities. The Cornell Lab of Ornithology makes many spectrograms available for free online and has even created an online game, Bird Song Hero, to help interested birders train themselves in reading spectrograms.

SUGGESTED READING

Kroodsma, *The Singing Life of Birds*.
Stap, *Birdsong*.
Young, *What the Robin Knows*.

ACTIVITIES

1. Download or purchase a birding app of your choice and learn the calls of 10 common backyard birds. See if you can call in some common backyard species, such as blue jays or northern cardinals, with the specific calls on your app—but remember to use sparingly so as not to stress out the birds.

2. Venture outside in the early morning and listen to the dawn chorus of the singing local birds. Try to locate a species that is singing or calling and work out whether the vocalizations are calls or songs.

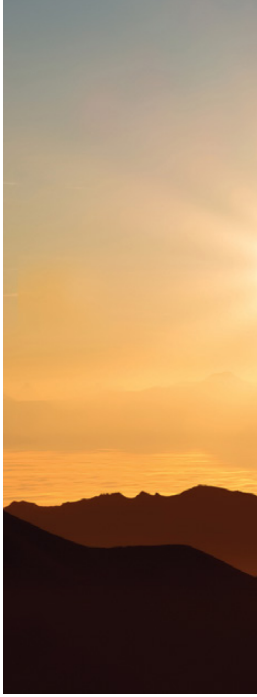
ESSENTIALS OF BIRD MIGRATION

Every fall, several billion North American birds leave their breeding grounds and migrate to other areas to spend the winter. For birders across the continent, the fall and spring migration seasons present an excellent opportunity to see unfamiliar species. This lecture focuses on the mechanics of migration and what you can do to take advantage of this annual phenomenon. Specifically, you will explore the evolutionary origins, physiology, and geographical patterns of bird migration and learn tips for maximizing your sightings of birds during migration.

EVOLUTIONARY ORIGINS AND PHYSIOLOGY

- Birds that migrate take on considerable effort and risk. They burn large amounts of energy and expose themselves to new predators, diseases, and hazards while passing through unfamiliar territory. In the modern world, there are also human-caused dangers that birds never evolved to cope with.

- Migrating birds can be confused and led astray by artificial lights or tricked into landing on wet asphalt that looks like open water. Birds in migration are also especially vulnerable to window strikes and collisions with other structures, such as wind turbines. In 2009, National Geographic reported that migration-related mortality is responsible for up to 85% of all songbird deaths.



- If migration is so dangerous, why has evolution crafted the migratory instinct in so many species? In general, a species of bird that migrates does so because there are advantages to breeding in the summer on territory that would be inhospitable in the winter.

- But then why migrate north at all during the summer? The answer lies in the predictability of favorable conditions during summer in the temperate zone of North America. In the Neotropics, although there are fruiting trees and insects year-round, there is also a high density of resident birds competing for the same food source and a higher density of potential predators.

- In North America during the summer, there is a very high insect load and fruiting and flowering trees with comparatively lower densities of birds and predators. There are also longer days to take advantage of this abundance of food. These conditions are perfectly suited to raising a brood of hungry offspring.

- One theory on the evolutionary origin of long-range migration is that it dates to the end of the last ice age. As the glaciers retreated, tropical birds ventured farther north for the longer days and seasonal increase of insects and other foods. Over time, the distances involved became longer and longer, stretching to hundreds or thousands of miles. Some species of resident birds decided to remain year-round while others evolved to migrate, creating a balance and reducing competition between bird species.

- Some birds can live year-round in one area—although even these birds, such as black-capped chickadees and American crows, often leave their breeding territories and join foraging flocks in winter. Short-distance migrants are not much more mobile; these include

species like the rosy finches, which travel down mountain slopes from higher to lower elevations to avoid the worst winter weather.

- There are midrange migrants, such as the eastern bluebird, that travel from Canada or the northern United States to more southern states.

- Long-distance migrants make intercontinental journeys. About 350 North American species are long-distance migrants, including iconic summer birds, such as swallows, orioles, and warblers.

- These are not hard-and-fast categories. In general, many migratory species are flexible and continually adapting to new conditions. Over recent decades, changes such as milder winters and a rise in the number of bird feeders have allowed some migratory species to winter farther north than they used to.

- Despite this flexibility, long-distance migration involves complex routes and patterns that have developed over thousands of years. To get the most out of migration as a birder, you must understand the factors that influence the timing of migration and where migratory birds stop along their journeys.

- Changes in food supply, weather, and day length can trigger the migratory impulse in some species. Other species appear to be genetically set to migrate at certain times, with a powerful travel instinct that can appear even in captive individuals who are well fed and protected from the weather. Overall, the mechanisms that determine the timing of migration are still imperfectly understood by science.

- Whatever gets them started, once they are underway, many long-distance migrants follow predetermined routes that their ancestors have traveled for thousands of years. Even first-year birds of many species can make it to their destination flying on their own.

- In fact, in some species, migration is rigidly segregated by age. Immature osprey typically migrate later than their parents and follow different routes, sometimes taking detours or making epic overwater journeys that the more experienced adults prefer to avoid. Other birds, such as snow geese, migrate in family groups so that older birds can help the youngsters avoid potentially fatal mistakes.

- The precise mechanism that birds use to find their way is also still unknown, but most evidence points to a multipart system in which the details vary from species to species. Some factors that have been shown to influence migration include the earth's magnetic fields, star patterns, and learned landmarks.

- While many long-distance migrants use these clues to perform navigational feats of astonishing accuracy, every year a few individual birds fail spectacularly. When migration goes wrong, birds

YOUNG OSPREY

show up at the end of spring or fall migration in places far outside of their normal ranges—sometimes even on the wrong continent.

GEOGRAPHICAL PATTERNS

- Some species, such as waterfowl and shorebirds, have preferred pathways that they follow every year, down to the locations of their rest stops. These tracks are so ingrained because the stopovers provide crucial food supplies.

- Other species are a bit more flexible in their migration patterns. Because they don't need to arrive at predetermined areas at a strict time, birds such as passerines and raptors instead tailor their timing and stops to weather conditions.

- For land birds that must make long water passages during their journey, such as across the Great Lakes or the Gulf of Mexico, it's especially important to choose a moment with favorable winds before embarking. A strong headwind could mean exhaustion and death for a hummingbird or warbler over the Gulf.

- Because weather patterns change throughout the year, these birds often use different routes in the spring and the fall. However, even these birds have constraints on their routes. For example, many raptors follow ridgelines and other geographical features that produce updrafts, allowing them to soar for long distances without flapping and using energy.

- The combination of constraint and flexibility, along with the slightly different needs of each migratory species, result in a pattern of broad migratory corridors called flyways, each of which includes several lanes of travel.

- There are 4 main flyways in North America: the Atlantic, Mississippi, Central, and Pacific. While the flyways may overlap at the edges, they serve distinct populations of birds. Because specific breeding populations use specific flyways, many conservation organizations and even the U.S. Fish and Wildlife Service organize their migratory bird protection efforts by flyway.

- No matter which flyway you live in or are close to, getting the most out of migration means gaining a good knowledge of your region's stopover points and likely areas for fallout. Stopover points are places where birds stop to gather strength or wait on good weather before they undertake a particularly arduous leg of their migration journey.

- Some of the best-known stopovers are points of land that extend into large bodies of water, such as Point Pelee in Lake Erie. For birds that need to cross the lake heading south in the fall, this is the last rest area before they commit to the crossing.

- A fallout is a phenomenon that in some ways is a mirror image of a stopover point. Fallouts occur when exhausted birds reach the first available land after an overwater crossing or when they run into inclement weather despite their best efforts at timing.

- On these occasions, large flocks of birds may be forced to land in areas that wouldn't normally appeal to them, even fairly urban areas. Some islands and coastal areas, especially on the Gulf Coast, see fallouts nearly every spring as birds make the water crossing and then stop immediately to rest.

- A common hot spot for fallout is city parks. From a bird's perspective, an urban park with even a small amount of greenery can look like an oasis after a long stretch of flying over paved and built-up areas. Unsurprisingly, some of the best-known city fallout points are in the highly developed and densely inhabited Atlantic flyway. In New York City, for example, Central Park has become justly famous as a birding destination during spring migration.

- Nearly any location can see a fallout if a flock of birds runs into an unexpected weather front, especially one with precipitation. Although a fallout of this kind can be a bonanza for birders, it's important to remember that this is a very vulnerable time for birds, and harassing them when they are hungry and tired can lead directly to their deaths. Observe these birds from a distance and try to respect the incredible ordeal that they are going through.

MAXIMIZING YOUR SIGHTINGS OF MIGRATING BIRDS

- For many years, the migration routes of even common birds were mysterious, and birders learned to predict when migratory species would appear using guesswork, tradition, and basic weather reports. Today, researchers and hobbyists alike can use technology that helps them get a better handle on bird migration and predict where and when species are likely to be seen in transit.

- Radar, which uses reflected electromagnetic radiation to detect distant objects, was one of the first technologies to produce a nearly complete picture of bird migration. Today, advanced radar systems can detect the location, direction, and speed of biological targets such as birds, bats, and even insects. Using radar has given ornithologists a much clearer picture of migration—particularly how it interacts with weather systems, allowing migration reports, much like weather reports.

- Another modern tool that has given us a much better understanding of migration is radio tracking. The simplest form of radio tracking is called very high frequency (VHF) tracking and involves placing a small transmitter on a bird. Signals from the transmitter are then tracked by an individual using a receiver and a directional antenna. This type of tracking requires the scientist to stay relatively close to the animal being tracked to pick up the radio signal, so it is of little use for studying long-distance migration, especially over water.

- Satellite tracking is much more flexible, because the signal emitted by the tracking device is picked up by a satellite and can be tracked from anywhere in the world. The most modern iteration of radio tracking is GPS tracking. In this form of tracking, a small GPS receiver is placed on the bird. The receiver picks up signals from special satellites and performs all the calculations necessary to determine where the bird is before relaying this information to other satellites.

- Although the advantages of technology for predicting migration are very helpful, some of the best strategies for getting the most out of migration are the tried-and-true ones. Besides knowing where the key stopovers and likely sites for fallout are in your region, keep an eye on the weather—especially with regard to wind and precipitation.

- Especially in areas where development has reduced the available habitat, birders can try to proactively attract migrants rather than

just waiting for them to show up. You can turn your backyard into an attractive stopover point by providing feeders during migration instead of only during the winter. Better still are native plants that provide both shelter and food—in the form of seeds, berries, and habitat for insects. Add a water source, such as a birdbath or drip, and your yard will look like a haven to tired migrants.

SUGGESTED READING

Gill, *Ornithology*, chap. 10.
Kerlinger, *How Birds Migrate*.
Weidensaul, *Living on the Wind*.

ACTIVITIES

1. Contact your local bird club and enquire which areas are the best for migrating birds. Ask if you can join a trip to one of these spots during spring or fall migration.

2. Find out which migration flyway is closest to your home and research which are the most likely birds for you to see in your local area.

LECTURE 12

BIRDING AT NIGHT

There is a growing segment of committed birders who choose to go birding at night. It can be one of the most rewarding forms of birding and encompasses the need for additional birding skills along with the thrill of being out in the field during darkness. In this lecture, you will discover some birds that are active primarily at night. This lecture will equip you with the skills and techniques to venture out after sundown.

TIPS TO EFFECTIVELY BIRDING AFTER DARK

- When birding after dark, an excellent flashlight is the most important tool. Not only will the flashlight be used to illuminate your surroundings so you can see where you are going, but it will also be essential for illuminating your subject. There are hundreds of tactical flashlight brands that are small and relatively inexpensive. Do your research and choose an option that is affordable but of good quality.

- Be prepared to take along a pair of binoculars that allows for excellent light transmission. A smaller magnification is good for night birding, but the main factor is to use a pair of binoculars with a large objective lens diameter. A 42-millimeter objective lens should be the minimum size you use, and the higher you go, the brighter your image will be. Larger objective lenses mean bulkier and heavier binoculars, so there is a trade-off.

- There are a few reasons not to carry a scope while night birding: Light transmission and finding the subject is often a problem at night through a spotting scope, and scopes can be pretty cumbersome and clumsy to walk around with at night. But this is a matter of personal preference.

- The use of sound is an important tool for night birding. If you are focusing specifically on owls, calls are a vital part of your success. Most owl species only call occasionally and are extremely difficult to track down. The best way to see them is to call them in.

- There are typically 3 ways to call in an owl. The first is to imitate the call. Some calls are very simple while others are more difficult to replicate, but some accomplished birders can be surprisingly good mimics with practice.

- The second—and easiest—way to call in owls is with recordings. Owl recordings are very easy to purchase through birding apps that feature calls and sounds. You can also download them

from citizen-science audio sites, such as www.xeno-canto.org. Whichever calls you choose to use, make sure that you have good speakers that can transmit the sound effectively from your phone or sound device.

- Lastly, if you are a very serious birder, you may want to use playback—the practice of using a directional microphone to record a bird's call and then play the exact call back to the bird—to call in an owl. This is arguably the most effective tool for calling in an owl but requires the presence of a calling owl in the area and some pretty advanced equipment.

- There are some important safety considerations and further tips for birding in the field at night. Always scout the area that you're going to so that you know what birds to look for and so that you don't get lost in the area after dark.

- Do your research ahead of time to know what night birds can be expected in the area and learn the calls. If you are going into the field for the first time at night, it may help to join an experienced birder so that you can learn the tricks of the trade.

- Always carry a fully charged mobile device and let relatives and friends know exactly where you are going. If you are birding in a remote area, especially in the winter, it's a good idea to carry a small survival kit just in case.

- When calling an owl with playback, imitation, or recordings, try to be as quiet as possible and keep the lights off while you attempt to lure it in. It helps to find a tree near a relatively open area and play the call close to the tree in the hopes that the owl will land there. This will greatly increase your chances. Watch for silhouettes against the sky and listen for its feet landing on a branch.

- Every so often, scan your surroundings with the light if you don't see the bird flying in. Beware not to overplay tape recordings and

harass the bird, especially if you have already seen it and it has flown off. Try not to recall a bird that has flown off simply for the sake of gaining a better or longer view. Also, be very alert. Some owls are incredibly territorial, and there are cases of birders being attacked by owls when playing calls.

- A useful tactic to locate an owl's call is to cup your hands behind your ears. This will assist in concentrating the sound. Watch for eyeshine when using your flashlight. Sometimes it also helps to move around to triangulate where a sound is coming from. Patience is essential when night birding. As with daytime birding, be aware of your surroundings at all times. This is especially relevant at night, when stumbles and falls are more likely. And be as quiet as possible. Most nocturnal bird species have excellent hearing.

- Besides owls, there are a number of other species that call at night, such as cuckoos and rails. Additionally, on migration, birds frequently call as they are flying over, and occasionally a few will sing.

- To view night flights of birds during spring and fall migrations, start by checking your local Doppler weather radar, because flocks of migrating birds will often be picked up by radar and depicted as rainstorms. This is especially obvious during periods of no rain.

- If there happens to be a full moon during migration time, aim a spotting scope at the moon and watch for flocks of migrating birds to pass by in silhouette. With some practice, you may even be able to learn the basic shapes and sizes of birds as they pass the moon at night. But the majority will be difficult for even professional birders to identify—except, that is, by sound.

- Most birds migrate at night, and most call while they are flying. Experienced birders know that many birds give specific flight calls during migration. Knowing the calls of these birds as they fly at night will greatly enhance your spring or fall night-birding experiences.

NIGHT BIRD IDENTIFICATION

- All of the owls in North America are in the family Strigidae, or true owls, except for one representative in the family Tytonidae, the barn owl. Within these families, there are 11 genera that regularly occur in the United States and Canada. There are some additional species that are only found in parts of Mexico and southward.

- The barn owl is the sole representative of the family Tytonidae and the genus *Tyto*. It has a heart-shaped face that appears white when you shine a light on it. When the silhouette of the barn owl is visible, it is clear that the wings are longer and more pointed than most other owls. Often found close to human habitation in rural areas, this species is unlikely to be confused with any other.

- There are 2 species in the genus *Asio*, the short-eared owl, which has very short tufted ears that are seldom visible, and the long-eared owl, which looks very similar but has an orange face and long ear tufts. The short-eared owl is one of the only owls that can be seen hunting during the day, particularly at twilight, and is the most aerial owl. Unlike its cousin, the long-eared owl does not fly during the day and only makes an appearance in absolute darkness. This owl is uncommon but can be seen deep within forests.

- There are 3 species in the genus *Strix* in North America: the barred owl, the spotted owl, and the great gray owl. The first 2 species are loosely described as wood owls and are medium- to large-sized owls. Unlike many owl species, the eyes of the barred owl are dark. The closely related spotted owl is the most threatened owl species. The great gray owl is the tallest owl in North America but is very slender.

- The largest North American owls are the 2 species found in the genus *Bubo*. The great horned owl is huge and intimidating, even preying on other large owls, such as the great gray owl. The snowy owl has large yellow eyes that stand out against its white

body, and their legs have very heavy feathering to keep them extra warm in snowy weather.

- The smaller owls include 2 species in the *Aegolius* genus: the northern saw-whet owl and the boreal owl. Each of the next 4 species belongs to its own separate genus: the burrowing owl, the northern hawk owl, the elf owl, and the flammulated owl. There are 3 members of the *Megascops* genus in North America: the whiskered, western, and eastern screech owls. The 2 species of pygmy owls found in North America are the northern pygmy owl and the ferruginous pygmy owl.

EASTERN SCREECH OWL

- Three of the best locations for viewing the North American owl species are the Santa Rita and Chihuahua Mountains of Arizona, where you can find elf owls, spotted owls, western and whiskered screech owls, great horned owls, northern pygmy owls, and

even the occasional flammulated and barn owl; Sax-Zim Bog in Minnesota, which is one of the best owling sites in the country and is excellent for northern species, such as the great grey owl, the northern hawk owl, and occasionally the boreal owl; and Amherst Island in Ontario, Canada, which is arguably the best owling site in North America, because it is possible to see 10 species of owl, including the great gray owl and the boreal owl.

- Owls aren't the only birds to look for at night; there are also night herons, nighthawks, and nightjars. The 2 species of night herons—the yellow-crowned and the black-crowned night heron—roost in thick vegetation during the day and forage in ponds and marshes at night.

- The common nighthawk varies in overall color from gray to brown, depending on the region. This nighthawk can be identified by its small head, wings that are longer than its tail, a white bar on the primaries, and a forked tail. The Antillean nighthawk is smaller than the closely related common nighthawk but with a bigger head and brown feathers. The lesser nighthawk has a smaller body, bigger head, and shorter wings than the common nighthawk.

- Closely related to the nighthawks, the common pauraque is actually a nightjar. Other species of nightjar within North America include the chuck-will's-widow, the whippoorwill, and the common poorwill.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America.*
Kaufman, *Field Guide to Advanced Birding*, chap. 21.

ACTIVITIES

1. Contact your local bird club and enquire which sites in your area are good for owling or night birding. Ask if there are any upcoming trips and try to join an excursion.

2. Find out which owl species is common in your area and try to learn to imitate its voice. Northern pygmy owls and northern saw-whet owls are relatively easy to imitate. More challenging species, but possible with a bit of practice, include barred owls and eastern screech owls.

LECTURE 13

PELAGIC BIRDING

Pelagic birding in North America explores the world of birds that spend most of their time on the Atlantic and Pacific Oceans, away from the shorelines. These birds do return to land to lay eggs and raise their young but otherwise can mostly be found over open water, so taking a boat trip into the open water can be the only way to see them. This lecture will provide advice on special equipment and techniques for birding at sea and will introduce you to a wide array of North America's seabird species.

PREPARING FOR BIRDING ON A BOAT

- The ocean is a magnificent place, but its beauty conceals the possible danger and power that it holds, so it's important to be well informed before going out on a boating trip. To start, you should consider the size of the boat you would like to be on. The smaller the boat, the easier it is for waves to knock it around. This not only impacts the chances of you getting seasick but also affects the quality of the view you can get through your binoculars.

- In recent years, birding from cruise ships has become popular. These large ships offer steady views, little risk of seasickness, and plenty of room to bring a scope. Repositioning tours, when the ships are moving back to their home port and not stopping at tourist destinations, are a budget-friendly option. However, the

decks of these large ships are far above the water, which can make it difficult to see smaller birds that stick close to the surface.

- If you don't have much nautical experience and want to test out how well your sea legs work, you might want to try going out on a whale-watching boat. This is also a great way to start pelagic birding. Many coastal cities now have regularly scheduled whale-watching tours, and the guides on board these boats often have some knowledge of seabirds as well as cetaceans.

- Scopes are useful for watching pelagic birds from land, but on water, binoculars are the way to go. Focusing a scope on a moving target from the deck of a rocking boat can be almost impossible, and the space taken up by a scope and tripod are at a premium on a smaller boat. A 7x or an 8x binocular with a high degree of field of view is recommended for seabirding purposes.

- If you wish, you can also bring a field guide, or perhaps 2, along with a notebook and pen. But be careful not to overload; otherwise, you'll have to carry around a heavy burden all day.

- Just as important as binoculars and a field guide when you are out on a boat for hours at a time is sun protection. On the water, you are getting twice as much sun as you expect thanks to the power of reflection. Bring a hat, sunscreen, sunglasses, lip protection, and anything else you might need to keep from burning, even on overcast days.

PELAGIC BIRDS

- Because there is no land out at sea—and therefore no landmarks to use as references—we instead use the direction of the boat and a clock to reference a bird's location. Imagine that the boat is in the center of a clock. The bow, or front of the boat, is pointing directly ahead at 12 o'clock, while the stern, or the back, is at 6 o'clock. The left and right sides, respectively, are pointing at 9 and 3 o'clock. Use the horizon as a vertical reference line.

- Perhaps no family of birds is more associated with the open ocean than the albatrosses. They spend most of their adult lives far out

LAYSAN ALBATROSS

at sea and are rarely, if ever, seen by most people. They are large birds with long, narrow wings adapted for long-distance gliding.

- The Laysan albatross is sometimes seen in the Pacific Ocean off the western coast of the United States and Canada, but the most likely albatross to see in North America's Pacific waters is the black-footed albatross. Although this species is small for an albatross, it is still a large seabird. It can be told apart from other albatrosses in the area by its all-dark color and from other families of seabird by its size and long-necked, heavy-billed profile.

- Although they belong to a different family, petrels and shearwaters are closely related to the albatrosses. Like albatrosses, they are tubenoses, meaning that they have a special gland on their bill for excreting salt, which allows them to drink seawater rather than having to return to shore and find freshwater. The elaborate bills of the tubenoses also give them arguably the best sense of smell of all birds, allowing them to track down food sources over long distances.

- Petrels and shearwaters are found off both the Atlantic and Pacific coasts of North America and range from tropical to Arctic waters. In general, they can be distinguished from gulls and terns by their stocky shape, thick bills, and stiff-winged flight.

- The next group of birds are the storm petrels, which are in the Hydrobatidae family. These are the smallest and most delicate tubenoses; nevertheless, they are exquisitely adapted to life on the open ocean. They are also distinctive in their movements, often fluttering close to the water's surface and even extending their feet to hop on the waves. This behavior lets them feed on small floating food items.

- While it is easy to tell a storm petrel from any other seabird, the various storm petrels can be difficult to distinguish from one another. Subtle differences in rump pattern, tail shape, and behavior can be necessary to separate the common species.

- Tropic birds, from the family Phaethontidae, are birds of warmer waters. All 3 North American species are primarily white with some black streaking, and adults have long, narrow tail streamers that give them an exotic look.

- The family Fregatidae is represented in North American waters by one species: the magnificent frigatebird. This large, dark, fork-tailed bird is unmistakable, and a treat to see on its breeding ground; males have a bright-red throat pouch that they inflate to impress would-be mates.

- The family Sulidae includes the gannets and boobies. These birds have heavy, spear-like bills and feed by diving from high above the water to catch fish well below the surface. The northern gannet is the only member of the family typically found in cold waters;

BLUE FOOTED BOOBIES

they live in the Atlantic and breed as far north as the Gulf of Saint Lawrence.

- The 4 booby species that occur in North America are accidental north of southern California and the Florida coast; they are distinguished from each other by the extent of brown coloration on their head and back and by the colors of their legs and feet.

- Pelicans are closely related to gannets and boobies. However, the 2 North American pelicans are more coastal birds than true seabirds; the American white pelican even has extensive inland territory along the large rivers and prairie potholes of the Great Plains. The American white pelican is primarily white with black wingtips, while the brown pelican is dark brown to black.

- The cormorant family includes inland, coastal, and sea island species. All are large dark birds with long bodies, goose-like necks, and heavy hook-tipped bills. They are strong flyers but also often swim on the surface of the water, sometimes partially submerged, with only their necks and heads sticking out. Cormorants are distinguished from each other by subtle differences in facial pattern and coloration, as well as by the presence or absence of white flank patches.

- The family Laridae is a large and familiar group of birds that includes the gulls, terns, and skimmers. Like pelicans and cormorants, these birds are not strictly pelagic, and some species routinely occur right across the continent. Nevertheless, they are staples of a pelagic trip or sea watch.

- Gulls are loosely divided by size: Small gulls, including the kittiwakes, ivory gulls, and black-headed gulls, are easily separated from the larger white-headed gulls, but within each group, identification can be tricky. Entire field guides are written just on the subject of gull identification, which often comes down to very small or subjective details. The best strategy for any

would-be gull watcher is to become extremely familiar with all the plumages of the most common gulls in your area.

- Terns can be mistaken for gulls at first glance, but a typical tern has a black cap rather than the full-black hood of the black-headed gulls. Terns are also pointier than gulls; they have more sharply tapered beaks, longer and more pointed wings, and a direct, rather than circling, style of flight. To tell one species of tern from another, look at the color and proportions of the beak and the wing pattern, especially the color of the primary feathers.

- The black skimmer is closely related to the terns, but it is so distinctive that it can be mistaken for no other bird. Unique among all North American bird species, the skimmer has a lower mandible that sticks out far beyond its upper mandible. It uses its bizarre bill for a specialized style of feeding: Black skimmers skim along the surface of the water with their beak open and the long lower mandible just below the surface. When they encounter a fish, they snap their beaks closed.

- Skuas and jaegers are heavy-bodied birds that may look like immature gulls at first because they are overall dark brown in coloration, but they're actually the raptors of the open sea. They feed on the eggs and chicks of other seabirds at their nesting colonies and rob gannets, gulls, and other seabirds of fish that they catch.

- The family Alcidae, also known as alcids or auks, includes the puffins, murres, murrelets, auklets, guillemots, dovekies, and great auks (extinct). Unlike many other seabirds, such as the albatrosses, alcids fly with rapid wingbeats and a great deal of effort; as a result, they spend much of their time sitting on the surface of the water rather than flying. Once they dive, however, they are extremely efficient and graceful in their movements, and they can pursue fish much deeper than many other seabird species.

PUFFINS

- Most alcids are best distinguished from each other by bill shape and the extent of the black versus white in their plumage. While some species, such as the Atlantic puffin in breeding plumage, are distinctive, others form species pairs that require careful examination.

WHERE TO LAUNCH AN OPEN-SEA EXCURSION

- All seabirds are heavily dependent on ocean currents and underwater geography, which determine where schools of fish and populations of plankton can be found. On the Atlantic coast, the Gulf Stream comes closest to land off of Cape Hatteras, North Carolina, and brings warm-water birds. Cape Hatteras is famous for rarities such as the black-capped and Bermuda petrel, as well as more southern species, such as the tropic birds.

- Along the East Coast, Cape Cod is the wintering ground for large numbers of shearwaters, jaegers, and alcids. The fish-rich waters extend up to 100 miles offshore, so there's plenty to explore in this part of the ocean.

- On the opposite side of the continent, the Pacific Ocean is known for its nutrient-rich waters and an abundance of seabirds. From western Alaska to the famous waters of Monterey Bay south to San Diego and down along the Baja peninsula, Pacific Ocean birders have access to a phenomenal variety of exciting species, such as the ashy storm petrel, the black-footed albatross, and the rhinoceros auklet.

- The continental shelf along the West Coast is much shorter than that on the East Coast, meaning that fish and thus birds are often found much closer to shore. As a result, day trips and even shore watches can produce a fascinating array of pelagic species.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America.*
Behrens and Cox, *Peterson Reference Guide to Seawatching*.
Howell, *Petrels, Albatrosses, and Storm-Petrels of North America*.
Howell and Dunn, *Peterson Reference Guide to Gulls of the Americas*.
Kaufman, *Field Guide to Advanced Birding*, chaps. 11 and 17–20.

ACTIVITIES

1. To prepare yourself for a pelagic trip in the future, practice the clock technique mentioned in the lecture to point out birds. It may help to do this in a stationary car. Directly ahead of the steering wheel is 12 o'clock and directly behind is 6 o'clock. Practice this before you take a pelagic trip so that you can point out birds to others effectively.

2. Go through your field guide and familiarize yourself with each family of seabirds. Ask yourself what characteristics make each family unique. A solid understanding of each family will prepare you well for your next pelagic birding trip.

LECTURE 14

WATERBIRDS, SHOREBIRDS, AND GAME BIRDS

This lecture marks the launch of a series of 6 that will cover nearly the entire range of bird families in North America. Each lecture will provide useful information and helpful tips for identifying a variety of species that are typically grouped together in birding field guides. Specifically, the organization of these lectures will closely follow the structure of the *National Geographic Field Guide to the Birds of North America*. This lecture will cover 4 groups of birds that nearly everyone in North America can find close to home: waterfowl, wading birds, shorebirds, and game birds.

WATERFOWL

- The term "waterfowl" is typically used to refer to some of the most familiar North American birds—the ducks, geese, and swans of our public parks and waterways. But for the purposes of this lecture, waterfowl will also include other duck-like birds, such as cormorants, grebes, and loons. The single trait that all these birds have in common is that they spend much of their time swimming in freshwater or close to the ocean shore.

- Loons are collectively known by the family name Gaviidae, in which there are 5 species, and all are seen regularly in North America. Loons make their living by diving after fish, and they are very well adapted to that task. Loons have more elongated bodies than ducks and are also distinguished by their spear-like bills. They're rarely

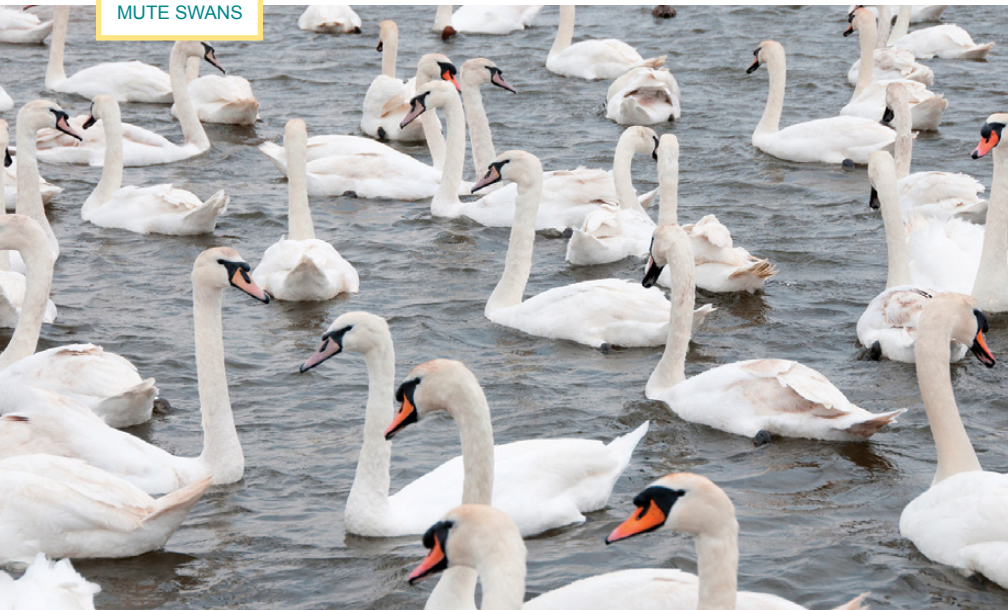
seen on land because their legs are set far back on their bodies, making them very efficient swimmers but bad at walking.

- Telling the 5 species of loons from one another in their juvenile and nonbreeding plumages can be a difficult challenge. Not only are they similar looking, but they are also often observed in poor weather conditions and on rough water. Most difficulties come from distinguishing between Pacific and Arctic loons; however, Arctic loons have more white on their flanks in all plumages. Distribution can also provide clues.

- Another family of waterfowl is commonly known as the grebes. At first glance, grebes can look similar to loons, and they're also accomplished divers. However, they are smaller and have proportionally longer, thinner necks. The 7 species of grebe found in North America vary widely in looks, from the tiny gray-black least grebe of southern Texas to the brightly colored horned grebe, which breeds primarily in Canada and winters on both coasts.

- The Anatidae is a large family of waterfowl containing all swans, geese, and ducks. The one characteristic that all of these birds

MUTE SWANS



share is that they are typically found on water, ranging from small ponds to bays and estuaries and even open ocean. They all have distinctive webbed feet.

- The swans include 3 different species that breed in North America. All 3 fit the stereotypical swan image: They are large and white. The mute swan, an introduced species that now breeds on the East Coast and around the Great Lakes, carries its neck in a distinctive S curve. The 2 native species, the tundra and trumpeter swans, are very similar and often flock together, although the tundra is much more common, has a wider range, and is significantly smaller than the trumpeter swan. If not seen together, they are best distinguished by their bills.

- Geese are also well-known birds. Geese as a group are sized between swans and ducks. When not in the water, they are frequently found grazing on vegetation in grasslands or fields.

- Two other subcategories of the Anatidae family are the dabbling ducks and the diving ducks. Dabbling ducks are capable of diving but are most often seen feeding by dipping their bills in the water or by tipping up—sticking their heads into the water and their bottoms in the air. They are typically found in freshwater habitats. Diving ducks make their living primarily by diving. They often occupy deeper waters than the dabbling ducks, and many species even take to the ocean in winter.

WADING BIRDS

- The larger members of the wading birds include herons, egrets, bitterns, ibises, and a few others known for their long legs and wetland habitats. Though they belong to different families, all of these birds follow a similar body plan, with long legs, necks, and beaks, giving them a distinctive profile.

- The Ardeeadae is the family name of the herons, night herons, egrets, and bitterns—all of which share a few distinctive features, including a long, straight, pointed bill that they use to spear prey, such as fish and frogs. Feeding behavior is a valuable clue to the identity of herons and egrets, especially those with plain white plumages.

- The ibises are superficially similar to the herons. However, these birds are easily recognized by their slender, downward-curved bills, which they use to probe in the mud. In the United States, the most likely ibises are the white-faced ibis or the nearly identical glossy ibis, both birds with dark, iridescent feathers. They must be separated by subtle clues, such as face and eye color. Fortunately, their ranges barely overlap, so in many cases, a map can tell you which species you are probably looking at.

- Two other wading birds are each the only members of its family found in North America: the American flamingo and the wood stork. The American flamingo has long legs; a curved neck; and a heavy, sharply curved beak and may range in color from pale gray in young birds to vivid pink in adults with a healthy diet. They are primarily found in South America and the Caribbean.

- The wood stork, from the family Ciconiidae, is a large, heavy-bodied white bird that has black wing edges that are visible in flight and a distinctive vulturelike bald head. Once on the endangered species list, it was upgraded to threatened in 2014.

- The next group of birds, which, for simplicity's sake, will be included in the broader category of wading birds, belongs to an order called the Gruiformeese. This is a very diverse order that is linked by a preference for shallow waters and swampy habitats but is quite varied in looks and habits.

- The coots, gallinules, and moorhens could superficially be mistaken for ducks when they sit on the water, but instead of

AMERICAN COOT

webbed feet, they have long toes. They also have stubby, pointed bills. The American coot is a small black bird that confidently mingles with ducks and geese in public parks, while the purple gallinule and common moorhen are shyer and more solitary.

- The cranes and limpkin, on the other hand, might trick an inexperienced birder into thinking they are herons. However, they are distinct from that group in their behavior and habitat. The severely endangered whooping crane is a large white bird with black wing tips and a red mask that carries its neck extended forward in flight. The sandhill crane is smaller and grayer than the whooping crane but otherwise similar in body plan.

- The limpkin is a Florida specialty with brown speckled plumage and a wailing voice, both of which set it apart from the other large waders.

- The rails stay low to the ground and, though they appear plump in profile, are narrow when viewed straight on and easily blend into

their preferred habitat of marshy vegetation. All of the rails tend to be shy and difficult to see.

SHOREBIRDS

- When it comes to nailing down an identification, the shorebirds are a particularly tricky group. These birds all share a basic body plan of small to medium size; long, thin legs; and thin bills. They also tend toward dull colors and confusing plumages. On the positive side, most of these species prefer open habitats and will allow long observations if approached cautiously. The key to understanding shorebirds is diligence and patience, and there are advanced field guides that are devoted specifically to this subject.

- The Scolopacidae is a vast family that includes sandpipers, turnstones, curlews, snipes, and phalaropes. Most are associated with the seashore, but the snipe and woodcock are found in marshy areas, while the spotted sandpiper is common along rivers and pond edges, and the upland sandpiper and the curlews favor dry fields. Most are brownish and speckled.

- The most challenging to identify are the so-called peeps, a group of 5 sandpiper species that share a general size, body type, and coloration. They are small, active birds that are mottled brown and gray, and they often occur in mixed flocks during migration. To sort them, one must look at body structure factors such as the length of the wings and shape of the beak.

- The Karadryidae, or plovers, are similar to sandpipers at first glance, but they tend to be more rounded and, with a few exceptions, have smoother, less mottled coloration. They range from the strictly coastal Wilson's plover to the mountain plover of the High Plains and from the stocky, dark black-bellied plover to the tiny, pale piping plover. The killdeer is a particularly widespread species of plover, ranging over nearly all of North America.

- The family of shorebirds known as the oystercatchers are large shorebirds with heavy daggerlike red bills, which they use to pry open shellfish. They are strictly ocean-side birds and are easy to distinguish: The black oystercatcher is an all-dark bird that is found only on the Pacific Coast, while the American oystercatcher is brown and white with a black head and is found mainly on the Atlantic and Gulf Coasts.

- The Recurvirostridae also contains 2 North American species that you can tell apart at a glance: the American avocet and the black-necked stilt. The avocet is a long-necked, black-and-white bird with a rusty-tan head during breeding season. Its most distinctive feature is its bill, which is very slender and curves distinctly upward. The stilt is pure black and white and extremely slender, with very long, thin red legs and a needlelike bill.

STILT

- Only one jacana, in the family Jacanidae, occurs in North America: the northern jacana, a vagrant that sometimes appears along the

Gulf Coast and has nested in Texas. In structure, it resembles a gallinule more than its fellow shorebirds. The most distinctive trait of the northern jacana is its bright-yellow flight feathers.

GAME BIRDS

- The group known as upland game birds are a varied lot, but they, like their waterfowl counterparts, tend to be robust in body shape. They favor walking or running along the ground and generally will only fly when disturbed.

- The Odontophoridae, or New World quail, are only distantly related to the quail of Europe and Asia, despite their similar appearance. Small and short-legged, they tend to have plump, almost teardrop-shaped bodies and typically travel in groups known as coveys.

- The most difficult identification problem among the quail is distinguishing between the closely related California and Gambel's quail, but they are not that tricky once you know what to look for: The Gambel's has a plain, cream-colored upper belly and the male has a dark forehead, while the California quail has a scaly pattern on the belly and the male has a small light spot on his forehead. For additional help, consult a map; they have distinct ranges in the American West that overlap in only a few areas.

- The Phasianidae family is a subject of lively taxonomic debate, but—according to the American Ornithologists' Union—it includes turkeys, grouse, prairie chickens, and ptarmigans.

- Turkeys are the largest game birds and are difficult to confuse with any other North American species. They have dark plumage, bulky bodies, and bare heads.

- The grouse, sage grouse, and prairie chickens are all brownish birds, ranging from the size of a chicken upward. For the most part, the grouse are solitary woodland birds. They can pose tricky

identification problems, not only because they are difficult to find, but also because some of the species are very similar.

- The sage grouse and prairie chickens favor more open habitat, where they can perform their fascinating mating rituals. The overwhelming majority of grouse, sage grouse, and prairie chickens are found in the western and central states of North America, with some species extending into Canada.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America.*
Baldassarre, *Ducks, Geese, and Swans of North America*.
Chandler, *Shorebirds of North America, Europe and Asia*.
Hayman, Marchant, and Prater, *Shorebirds*.

Johnsgard, *A Chorus of Cranes*.
Kaufman, *Field Guide to Advanced Birding*, chaps. 8–10, 12, and 15–16.
O'Brien, Crossley, and Karlson, *The Shorebird Guide*.

ACTIVITIES

1. Learn the differences between a greater and a lesser scaup in your field guide.

2. Go through your field guide and familiarize yourself with each family of waterbirds, shorebirds, and game birds. Ask yourself what characteristics make each family unique. A solid understanding of each family will prepare you well for your next field outing.

LECTURE 15

DIURNAL RAPTORS

Raptors, sometimes called birds of prey, include many dramatic and iconic species. Between them, the various species of raptors found in North America occupy almost every kind of habitat. The diurnal raptors—those that are active in the daytime—include the New World vultures, osprey, kites, eagles, hawks, and falcons. Although the raptors are a very diverse group of birds, in general they are larger than most songbirds, possess hooked beaks and talons, and can often be found flying overhead or perched in prominent places, where they can use their keen eyesight to scan the vicinity for prey.

VULTURES

- The New World vultures are a curious group of birds. They are more closely related to the hawk family than to the Old World vultures you might know from nature programs about the savannah of Africa. However, due to convergent evolution, they have the stereotypical vulture look, with featherless heads, an adaptation to help them keep clean when they eat messy carrion.

- Because they almost never take live prey, vultures have weak talons and beaks compared to other raptors, and their hunting strategy consists of soaring in broad circles, conserving energy while using their eyesight, and in some cases their sense of smell, to locate decomposing animals.

- North America is home to 3 vulture species: the turkey vulture, black vulture, and California condor. The turkey vulture and black vulture can be a bit tricky to separate at first glance. The turkey vulture is larger, and adults of that species have red or pink fleshy heads, compared to the black vulture's black head, but size and head color can be difficult to distinguish when the bird is silhouetted against a backdrop of sky.

CALIFORNIA CONDOR

- A more reliable identification feature for birds in flight is the difference in wing patterns. Turkey vultures have a division between light and dark feathers that spans the entire length of the wing, whereas the black vulture is light at the tip of the wing only. Turkey vultures also hold their wings in a slight V shape when viewed head-on, often tilting back and forth. Black vultures, by contrast, usually soar with their wings held flat.

- Range can also be a clue: The turkey vulture is found throughout the continental United States, while the black vulture is mainly a bird of the southeast with a small population in the southwest. However, in recent years the black vulture has expanded its range dramatically northward into areas where it was once unknown.

- If you see a California condor, you will not mistake it for anything else. This massive bird has the largest wingspan of any in North America, and its white wing linings show to dramatic effect against its black flight feathers as it soars above the coast of California and the mountains of Arizona and Utah.

OSPREYS

- The osprey is the only member of the family Pandionidae. Found on every continent except Antarctica, this tough and adaptable bird is sometimes colloquially called the fish hawk or sea hawk, because it is a fish specialist and is almost never found far from bodies of water large enough to provide it with a meal.

- Behaviorally, it is known for its habit of hovering with a strong flapping motion, then plunging straight down into the water for its prey. Inexperienced observers sometimes confuse the osprey with the bald eagle, which also has a light head (in its adult plumage) and is also often found near bodies of water.

- But the osprey can be distinguished by its white belly, barred underwings, and the dark streak through its eye. The osprey also has proportionally longer and narrower wings compared to the eagle and flies with its wings angled back at the "wrists," or carpal joints.

KITES

- The term "kite" is generally used to refer to midsized birds of prey in the subfamilies Milvinae, Elaninae, and Perninae. There are 5

kites in North America: The Mississippi, swallow-tailed, and white-tailed kites are the more common, while the snail kite and the hook-billed kite are rare, with limited ranges.

- The snail kite is a dark-colored, curve-billed kite that eats primarily apple snails. While it is still widespread in the Caribbean and South America, a decline of its prey base has left it with a very restricted range in the United States (south or central Florida). The heavily barred hook-billed kite is similarly restricted, occurring only in the Rio Grande Valley in southern Texas. Both of these species rarely stray from the areas where they are usually found.

- The 3 remaining kite species are all birds with pointed wings and, in their adult plumage, white bodies. They wander widely during migration and may occur in surprising locations far from their usual ranges. The swallow-tailed kite has a deeply forked tail, which is distinctive.

- The Mississippi and white-tailed kites may be mistaken for each other at first glance. To separate them quickly, check their tails: The Mississippi kite has a tail that appears black from below, while the white-tailed kite's tail is white and pale gray on the upper surface. These kites can also be superficially similar to the male northern harrier.

EAGLES

- Only 2 species of eagle breed in the continental United States; 2 others, Eurasian vagrants, may rarely breed on the islands off Alaska. For birders not on a special holiday to the Aleutians or thereabouts, the eagles to expect are the bald eagle and golden eagle. Both are much larger than any other bird of prey, except the California condor, and have massive, heavy talons that set them apart from smaller hawks.

BALD EAGLE

- In the bald eagle's adult plumage, it is one of the most distinctive American birds, with its white head and tail and sturdy brown body. Once endangered, it can now be found along both coasts and many large rivers and lakes throughout the continent.

- Young bald eagles present more of an identification challenge. They take up to 4 years to reach the adult plumage, and in the meantime may appear allover brown like a golden eagle or mottled about the head and face in a pattern reminiscent of the osprey. However, a young bald eagle is a messy bird. Its face pattern will not be as crisp as an osprey's, and while it may show white on its wing or tail, especially in the "armpit" area, it won't show the well-defined white wing patches of a juvenile golden eagle or the clean bands of the adult golden eagle's tail.

- Golden eagles, although larger and more robust than bald eagles overall, also have a proportionally smaller head. They are mainly found in the western half of the continent and prefer drier habitats, where they prey on rabbits and other medium-sized mammals as well as on the carcasses of deer and other larger creatures.

HAWKS

- The northern harrier, also known as the marsh hawk, is a fascinating raptor with distinctive looks and habits. In looks, it is one of the most sexually dimorphic birds of prey. But all harriers

do share one distinctive field mark: a white rump patch. They are also distinctive in their behavior: They soar low across open grasslands and marshes to scan by ear for rodents and other small prey and only venture to great heights during migration or when engaged in courtship displays.

- *Accipiter* is a genus of hawk that is found throughout the United States. There are 3 North American *Accipiter* species, and they all have short, rounded wings and long tails, features that help them dodge deftly among trees and brush in pursuit of small birds, their main prey. The sharp-shinned hawk, Cooper's hawk, and northern goshawk can almost be said to form a matched set in various sizes, like measuring cups.

- Even experienced birders may have difficulty telling the difference between a large female sharp-shinned hawk and a small male Cooper's hawk. Examine the head and tail: A sharp-shinned hawk will show a square, sometimes notched, tail and a small head with a slender, evenly colored neck, while the Cooper's hawk has a broad-shouldered look, rounded tail, and pale nape that can make it look as though it has a dark cap.

- The northern goshawk is much larger, favors more remote northern areas and lacks the rust-colored breast bars of the sharp-shinned and Cooper's hawks. Juvenile goshawks in their brown-and-white plumage can sometimes look like buteos, but their accipiter profile—in particular, the long, narrow tails—are distinctive. Their large size and overall gray coloration also sometimes trick an unwary and optimistic birder into mistaking a goshawk for a gyrfalcon, but the goshawk has a less rounded head and more rounded wings.

- Another group of hawks is the *Buteo* genus. Buteos, referred to as buzzards in Britain and Europe, are high-soaring hawks with broad wings and short, wide tails. They generally favor small

AMERICAN KESTREL FALCON

mammals as prey but will also take birds, amphibians and reptiles, and even fish and crustaceans, depending on what is available.

- Almost all have primarily brown plumage, often combined with shades of rusty red and some amount of white. Aside from these basic facts, this is a widely diverse group that includes remarkable species, including the red-tailed hawk, broad-winged hawk, red-shouldered hawk, ferruginous hawk, Swainson's hawk, zone-tailed hawk, gray hawk, and rough-legged hawk.

FALCONS

- Falcons are adapted for speed and deadliness with sleek bodies; pointed, swept-back wings; and notched beaks that easily deliver a killing blow to the back of the neck. Five species of falcon are established in North America, while one more species, the aplomado falcon, once bred here before being extirpated.

- Perhaps the best known of North America's falcons is the peregrine falcon. This roughly crow-sized bird, widespread throughout much of the world, is often cited as the fastest animal in existence. The peregrine can be identified through a combination of its size and facial markings, which include a heavy dark cap and moustache that give the bird a hooded or helmeted look.

- Smaller falcons include the American kestrel, which has a unique rusty and blue plumage, and the merlin, which is a blue-gray or brown jay-sized bird with pointed wings. America's largest falcon is the gyrfalcon, a bird of the far north that is highly sought after by ambitious birders. It comes in brown, gray, and white plumages but can always be distinguished by its size and shape.

- Biologically akin to the falcons but very different in looks and behavior, the crested caracara is an interesting halfway bird. It has a distinctive deep-brown and white plumage, bare pink skin visible on its face, and long, slender legs.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America*.
Crossley, Liguori, and Sullivan, *The Crossley ID Guide*.
Dunne, Sibley, and Sutton, *Hawks in Flight*.
Kaufman, *Field Guide to Advanced Birding*, chaps. 13–15.
Liguori, *Hawks at Every Angle*.
MacDonald, *H is for Hawk*.

ACTIVITIES

1. Learn the differences between a merlin and an American kestrel in your field guide.

2. Go through your field guide and familiarize yourself with each family of raptors. Ask yourself what characteristics make each family unique. A solid understanding of each family will prepare you well for your next field outing.

FROM DOVES TO KINGFISHERS

This lecture will address several diverse groups of birds that include both familiar species found in nearly everyone's backyard and exotic creatures sought after by birders everywhere, as well as a few species that are sadly gone forever. There is one thing that binds all of these birds together: They are all non-passerine birds. Even though the pigeons and doves, parrots, cuckoos, woodpeckers, trogons, swifts, hummingbirds, and kingfishers are all distinctive orders or families of birds, there are still some complicated identification challenges associated with them.

PIGEONS AND DOVES

- Pigeons and doves, or the family Columbidae, are some of the most familiar birds on the planet. This is largely thanks to one species, the rock pigeon, which is adapted to both agricultural lands and urban environments and thrives on food waste generated by any large congregation of humans.

- The wild-type rock pigeon is gray with a dark head, white rump, and wing bars. However, thanks to many generations of captive breeding, rock pigeons in North America may show a wide variety of plumages, from pure white to jet black to rusty red, mottled, or patched.

- The passenger pigeon was a large, long-tailed bird; the male was gray with iridescence about the neck, while the female was browner. The species once numbered in the billions, outstripping its rock pigeon cousins. However, thanks to constant, unregulated hunting pressure and the destruction of habitat, the passenger pigeon went into a steep decline and could not recover.

- North America still has a quite a few species of native pigeons, and some of them can be mistaken for the rock pigeon by a casual observer. The band-tailed pigeon, found in coniferous habitats in the West, is the most common example; the white nape and gray tail band are diagnostic.

- The term “dove” is usually used to refer to the smaller members of the pigeon family; North American dove species are primarily pale sandy brown or rufous rather than dark gray or black. The most widespread is the mourning dove, a common garden bird with a long, tapered tail and a familiar 4-note call that is frequently seen foraging on lawns and open patches of ground.

- The rapidly expanding Eurasian collared dove is an invasive species with a black ring on the back of its neck and a squared-off tail. Initially introduced in the Bahamas, the Eurasian collared dove spread first to Florida and then north and west to occupy much of the United States.

- The other North American dove species occur mainly in the southern United States. The white-winged dove is similar to the mourning dove but has a rounded tail and white wing patches; it is found from southern California to Florida. The south Texan white-tipped dove is darker above and whiter along the face and throat, without conspicuous wing patches.

- The common ground dove is a very small bird with a scaly appearance caused by dark-edged feathers around its breast and head and rufous wing patches. It can be found locally in California,

Arizona, Texas, and the Southeast. The Inca dove, a southwestern specialty, is also scaly but is distinguished from the common ground dove by a longer white-edged tail. Other species that may occur casually in North America include the Zenaida dove, ruddy ground dove, and Key West quail dove.

PARROTS

- There is some debate among scientists as to the relationship between the Columbidae and the parrots. Some have suggested that they are only distantly related while others suggest a closer affinity.

GREEN QUAKER PARROT

- Parrots are an interesting and rather sad case in the North American avifauna. Once, 2 members of the family Psittacidae occurred naturally in North America: The green-and-red thick-billed parrot bred along the southern border of what is now New Mexico, while the multicolored Carolina parakeet ranged from the Gulf of Mexico north as far as southern New York and west as far as Colorado. Today, the Carolina parakeet is extinct, and the thick-billed parrot now survives only in Mexico, where it is endangered.

- One of the most successful feral parrots is the monk parakeet, sometimes called the Quaker parakeet. These gregarious, noisy birds have established colonies in urban areas from Florida and Texas to New York and Illinois. These green birds with gray faces and breasts are easy to spot.

- Red-masked parakeets, with their red heads and shoulders, have established themselves in several cities of southern California and in the Miami area. White-winged parakeets once bred in the same areas but have decreased in recent years.

CUCKOOS

- The family Cuculidae, the cuckoos, suffer from an unfair reputation. While cuckoos are associated with nest parasitism in literature and lore, the North American members of the family build their own nests and tend to their own young. The black-billed cuckoo and yellow-billed cuckoo are both common, though secretive, in the eastern United States, and the yellow-billed cuckoo is also found, though in declining numbers, in the West.

- These 2 species are similar-looking slender brown-and-white birds that are best separated not by their beaks but by the pattern of white spots on their tails. The underside of a yellow-billed cuckoo's tail shows large, rounded white spots, while the black-billed cuckoo has much smaller spots. The mangrove cuckoo looks very similar to the yellow-billed cuckoo but has buff-colored underparts and lives only in southern Florida in the United States.

- Three other birds related to the cuckoos do not look at all like members of this family at first glance: the greater roadrunner and the 2 species of ani. The famous greater roadrunner is a large bird that is streaked brown and white all over, with a long tail, heavy bill, and bristly crest. The groove-billed and smooth-billed anis are comical-looking black birds with long tails and extremely large, bulky bills.

WOODPECKERS

- Woodpeckers collectively belong to the order Piciformes, which includes all woodpeckers and woodpecker-like birds, such as barbets and toucans.

RED-HEADED WOODPECKER

- Woodpeckers are in the family Picidae. They are a large group of birds distinguished by their chisel-like bills, stiff tails, and strong feet. They use these tools in pursuit of insects that live beneath the bark of trees and, in the case of the sapsuckers, the sap of the trees.

- Besides using their drilling skills to obtain food, woodpeckers also peck to build nest sites in the soft wood of dead trees and to stake out territory using distinctive patterns of drumming. They perch

clinging to the trunk or large limbs of a tree, and most fly with a distinctive flicking wingbeat. Most woodpeckers are patterned in some combination of black and white with small patches of red or yellow.

- Woodpeckers of the genus *Melanerpes*, including the red-headed woodpecker and the red-bellied woodpecker, are midsized birds found in a wide variety of wooded habitats and, between them, inhabit nearly all of the continental United States. The genus *Picoides* contains small, hardy woodpeckers. The most familiar member of the genus is probably the downy woodpecker, a widespread bird that frequently visits suet feeders from Alaska to Florida.

TROGONS

- The trogons are primarily tropical birds that occasionally venture into our region along the southern border of the United States. The elegant trogon, our only breeding species, can be found in the southeastern corner of Arizona and sometimes in southern Texas.

- The male has a bright green head and back, while the female is bronze and brown. Both sexes have a red belly, but the male's belly is much brighter.

- Elegant trogons have a long tail with a black terminal band and a short, curved yellow bill. The eared quetzal, which occasionally strays into Arizona as well, is superficially similar, but the underside of its tail is clean white, while the trogon's is barred.

SWIFTS

- Swifts and swallows, although superficially very similar, are not closely related at all. Swallows belong to the passerines, and swifts are placed squarely within the non-passerines. Swifts belong to the family Apodidae and are small birds with long, pointed wings.

- Visually, they are similar to the swallows, but their wings are swept back more severely and most species have very short tails. They are talented aerialists known for their fast, acrobatic flight and are rarely seen perched during daylight hours. They have very small, weak feet that are nearly invisible as they zip by high overhead.

- In the eastern United States and across much of the Great Plains, the only regularly occurring swift species is the chimney swift, sometimes nicknamed the flying cigar for its dark-brown color and body shape. This bird vocalizes frequently in flight, giving an atonal chattering call.

- From the Rocky Mountains west, there are 3 possible species of swift. The Vaux's swift looks very much like the chimney swift but is smaller and paler, with a higher-pitched insect-like call. The cliff-nesting white-throated swift is more likely to be mistaken for a swallow due to its pale underparts but has narrower wings and a dark "vest" that extends onto the belly. The black swift is a large all-dark swift that nests beneath waterfalls and on sea cliffs and, as a result, is uncommon except in areas of suitable habitat.

HUMMINGBIRDS

- The fantastic hummingbirds are closely related to swifts but are very different in looks and habits. Most are bright green or rusty brown above, and the males of many species display brilliant iridescent throat patches. Female and immature birds may be difficult to separate by species without close, careful observation of the wings and tail.

- These are the smallest North American birds, more likely to be mistaken for large moths than for other avian species. They are brilliantly adapted to feeding on nectar, from flowers or from special bird feeders. Their long, thin bills probe deep into flowers, acting as pollinators along the way, and their incredibly rapid wingbeats allow them to hover in place while feeding.

- Despite their miniscule size, many species of hummingbird are bold and pugnacious, chasing larger competitors and potential predators without fear. The amount of energy they burn in flight requires near-constant feeding to maintain their metabolism.

- In the eastern and midwestern United States, the only common hummingbird is the ruby-throated hummingbird. Southern California, with its warm climate and rich botanical diversity, is rich in hummingbirds. The rufous, Allen's, black-chinned, Anna's, calliope, and purple-helmeted Costa's hummingbird can all be found there. An even more important hummingbird hot spot is southeastern Arizona. All of the widespread western hummingbirds pass through this area in migration.

RUBY-THROATED HUMMINGBIRD

KINGFISHERS

- Kingfishers are found in wet habitats, where they feed on fish, amphibians, and similar small prey and nest in burrows excavated from muddy banks. They are thickset birds with long, spear-like bills. Typically, they hover above the surface of the water or watch from a perch before falling onto their prey from above.

- In most of North America, the only kingfisher is the belted kingfisher, a species with a blue back and breast band and a high, shaggy crest. Females of this species also have a rufous band across the belly. They favor freshwater habitat, such as rivers and ponds, but can also be found in estuaries. Wherever they occur, they are often spotted thanks to their loud rattling cry, as well as their large size and conspicuous habits.


RINGED KINGFISHER

- The ringed kingfisher, found in south Texas, is blue and crested and may appear similar to the belted kingfisher at first glance. Both sexes have a bright-red belly, while the female also has a white band across the breast, but the ringed is substantially larger. Another south Texas specialty, the green kingfisher, is green rather than blue above; the male has a rufous breast and white belly while the female has a speckled-green breast band. This species is also significantly smaller than the other 2 North American kingfishers.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America*.
Shunk, *Peterson Reference Guide to Woodpeckers of North America*.
West, *North American Hummingbirds*.

ACTIVITIES

1. Learn the differences between a rufous and an Allen's hummingbird in your field guide.

2. Go through your field guide and familiarize yourself with each family. Ask yourself what characteristics make each family unique. A solid understanding of each family will prepare you well for your next field outing.

PASSERINES: FROM FLYCATCHERS TO THRUSHES

This lecture begins the 3-lecture exploration of the order Passeriformes, or passerines, also called perching birds or songbirds. This is a vast order that contains more than half of all the bird species on the planet. Even though these birds have a wide variety of lifestyles, passerines share some key anatomical features. Perhaps the most important of these features is the structure of their anisodactyl feet—3 toes facing forward and 1 toe facing backward—which are perfectly suited to perching. This lecture begins the journey through North America's songbirds by examining the flycatchers, shrikes, vireos, corvids, larks, swallows, chickadees, nuthatches, wrens, Old World warblers, and thrushes.

FLYCATCHERS

- The Tyrannidae, or tyrant flycatchers, are a large family of mostly dull-green and brown birds, including some of the trickiest identification problems in all of North American birding. The name "flycatcher" is derived from the fact that many species feed by flying repeatedly out from a favorite perch to catch insects in midair.

- Species in the Tyrannidae family range from the 4.5-inch-long northern beardless-tyrannulet to the hefty nearly 10-inch great kiskadee and the scissor-tailed flycatcher, which clocks in at 13 inches long, thanks to its ornate, streaming tail feathers.

GREAT KISKADEE

- An especially puzzling group of flycatchers are those found in the genus Empidonax. Each of the 11 empid species can be accurately described as a small, dull-green to gray bird with a pale eye-ring and wing bars. Separating them depends on correlating a number of factors, but the most important clue is their voices.

- Scarcely less confusing are the Myiarchus flycatchers. Larger, browner, and more prominently crested than the empids, they are separated from each other by factors such as their tail pattern and the brightness of the yellow on their bellies. But these differences can be difficult to discern, because they feed high in the forest canopy. Fortunately for North American birders, range provides a valuable clue to their identities.

SHRIKES

- The Laniidae, or shrikes, provide an interesting demonstration of evolution in action. Although they are songbirds, they have adopted a raptor lifestyle of hunting and eating live prey, such as smaller birds, rodents, lizards, and large insects. They have strong, hooked beaks, but lacking a raptor's talons, they often impale their meals on thorns or wedge them into the forks of branches to hold them in place while tearing them apart.

- Two species of shrike breed in North America: the loggerhead and northern shrikes. Both are predominantly gray and white birds, with black masks and black-and-white wings; in flight, they may be mistaken for each other or for the northern mockingbird. However, mockingbirds have no masks, and a careful observer can separate the shrikes with a good look at their faces and by considering breeding regions.

VIREOS

- The Vireonidae, commonly known as vireos, are closely related to shrikes but could not be more different in lifestyle. They are

small insect gleaners that are found in similar habitats to the wood warblers and sometimes flock with them in migration. Vireos can also look superficially similar to wood warblers, with most species being primarily green and many showing some yellow, but vireos are slightly heavier birds and tend to be less active.

- Sorting the 16 species of vireo found in North America requires checking for the presence of wing bars and examining their facial patterns, which may include eye-rings, spectacles, or stripes.

- All of the vireos require practice to identify, but the Hutton's vireo adds a wrinkle by having an uncanny resemblance to a ruby-crowned kinglet, a bird from a different family. In woodlands of the West Coast, Arizona, and the areas of south Texas where the Hutton's vireo occurs, these 2 species must be separated with careful attention. The vireo is larger, with a more robust bill than the kinglet, and does not show a solid dark area below the lower wing bar as the kinglet does.

CORVIDS

- The Corvidae include nutcrackers, jays, magpies, crows, and ravens. Corvids share a reputation for being bold, clever, and adaptable. Some members of the family, such as the Florida scrub jay, have elaborate social structures; others, especially the crows and ravens, are often used in studies of avian intelligence.

- One interesting North American corvid is the Clark's nutcracker, sometimes referred to by the folk name woodpecker crow. It subsists mostly on pine seeds and uses its strong beak to chisel apart cones to get them. It is superficially similar to a shrike or mockingbird, with a gray body and black wings. However, it is distinguished by being gray all over its body, rather than having a lighter breast and belly, and by having only a very limited amount of white on the trailing edges of its wings.

BLACK-BILLED MAGPIE

- There are many kinds of jays other than blue jays, including the exotic-looking green jay and the much plainer brown jay, both found in the Rio Grande valley and Mexico. The jays that are primarily blue include not only the flashy suburban blue jay but also the relatively plain pinyon jay of the interior West.

- The 2 North American species of magpie cannot be mistaken for anything but each other. They are both large, long-tailed birds with black heads and backs; white bellies and shoulders; and loud, raucous calls reminiscent of parrots. The key to separating the 2 species is in their bills: The black-billed magpie's bill is black, and the yellow-billed magpie's bill is bright yellow.

- Crows and ravens, robust all-black birds with harsh voices and scavenging habits, cause a lot of confusion in part because non-birders sometimes use the terms interchangeably. In general, crows are smaller than ravens. For many birders, the problem is separating the American crow, found over most of the continent, from the common raven, which is indeed common in many parts of Canada and the western United States. These 2 species are

separated by size, by voice—the raven has a much hoarser call than the crow—and in flight by tail shape. The common raven has a wedge-shaped tail while the crow has a squared-off or slightly rounded one.

LARKS

- Larks are brownish ground-dwelling birds found throughout Europe, Africa, and Asia, where they play an important role in culture and folklore because of their elaborate songs. In North America, there is only one native species, the horned lark, named for the small black tufts of feathers the male sports on his head during breeding season. In all plumages, the adults of this species have strong black facial markings and a black bib; the throat is usually yellow, but some subspecies are so pale it appears white.

- The horned lark breeds on the tundra and in open fields and in winter often flocks with other grassland birds, such as snow buntings, pipits, and longspurs. The only other true lark regularly found in our region is the sky lark, which was introduced to Vancouver Island in the early 1900s and maintains a small breeding population there.

SWALLOWS

- Swallows and martins are collectively called hirundines. They are similar to the swifts, but their wings are broader and their "wrist" joints have a more forward point. They are all accomplished aerialists and eat primarily insects that they catch in flight.

- Distinguishing the North American species of swallow is mainly a matter of getting a good look, but this can be challenging. When dealing with a rapidly circling flock of swallows in flight, the easiest species to pick out is the barn swallow—no other North American swallow has the deeply forked "swallow tail," despite the name.

CHICKADEES

- The Paridae include the chickadees and titmice and are bird-feeder favorites. These small, plump birds, mostly clad in shades of gray, black, and white, are known for being confiding and entertaining to watch, often coming right down to a patient observer and even landing on a human hand or head. What they are not known for is being easy to identify.

- All titmice are primarily gray and white, with pointed crests on their heads. The most common and widespread species in North America is the tufted titmouse, which as an adult has a black forehead and buffy flanks. It is found from Florida north to Maine and west to the middle of Oklahoma. The other titmice are primarily southwestern birds.

TUFTED TITMOUSE

- The Carolina chickadee of the southeast and the black-capped chickadee of the northern United States and Canada are nearly twins and are best separated by their calls. The rest of the chickadees are a bit easier: The mountain chickadee has a distinctive white eyebrow, the boreal chickadee is capped with brown instead of black, and the gray-headed and chestnut-backed chickadees look like their names suggest they do.

NUTHATCHES

- The nuthatches, of the family Sittidae, are also popular bird-feeder favorites. Their large heads and short tails give them an almost teardrop-shaped appearance, and they climb up and down tree trunks and along limbs with a hitching gait. They're foraging—probing the bark for insects and seeds. And you might see them sideways or even upside down on a tree trunk.

- The white-breasted and red-breasted nuthatches are both widespread across the continent; they are distinguished not only by breast color but by size and by the fact that the red-breasted nuthatch has a distinct eye stripe while the white-breasted nuthatch's face is plain. The brown-headed nuthatch is found in southeastern pine forests, and the pygmy nuthatch, which has a gray cap, lives in the mountain West and California.

WRENS

- The Troglodytidae, or the wrens, are small brown birds with slightly down-curved bills that are usually found at ground level or in low vegetation. Many species carry their tails tilted up, even over their backs. They are known for their trilling songs, often delivered at a volume that seems out of proportion to the small, plain bird that is singing.

- Among the 11 species of North American wrens, 2 pairs pose particular identification challenges: the Carolina and Bewick's

wrens and the winter and Pacific wrens. The Carolina wren and Bewick's wren are both long-tailed birds, roughly the same size, with bright white eyebrows. Where their ranges overlap, in the Great Plains, you must examine their underparts; the Carolina wren is a warm buffy color underneath while the Bewick's wren is grayish white.

- The winter and Pacific wrens look nearly identical. The Pacific wren is darker and richer in color than the winter wren, but for most birders, it's sufficient to know that their ranges do not overlap.

OLD WORLD WARBLERS

- The Old World warblers are a widespread and diverse group, but only one member is found in the Americas. The wrentit, found in chaparral and brushland in Oregon and California, is a plain brownish-gray bird with a lightly streaked breast and a long tail. In profile, it looks a bit like a larger version of the gnatcatchers, another closely related family of birds. But these species are a bluer, cooler shade of gray and have dark rather than light eyes.

THRUSHES

- Perhaps the most iconic member of the thrushes (family Turdidae) is the American robin, the familiar red-breasted bird of lawns and parks. The thrushes also include the 3 species of bluebird.

- The most challenging thrushes for birders are those found in the genus *Catharus*. The 5 North American *Catharus* thrushes are known for being beautiful singers, with elaborate songs that echo through woodlands all over northern North America. They are not, however, known for their distinctive looks. Each of these 5 species is brown above with a speckled breast below. The veery and the hermit thrush are relatively common species and are easy to separate from the others with some practice.

- The gray-cheeked and Bicknell's thrushes are a challenge even for serious birders. Both have gray cheeks and flanks, as well as incomplete, faint eye-rings. The Bicknell's thrush is smaller than the gray-cheeked thrush and is a warmer shade of brown, but in practice, many birders will not make an identification of these 2 species with confidence unless the bird in question sings.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America*.
Marzluff, *Gifts of the Crow*.
Skutch and Gardner, *Life of the Flycatcher*.

ACTIVITIES

1. Learn the differences between a brown-crested and a great-crested flycatcher in your field guide.

2. Go through your field guide and familiarize yourself with each family. Ask yourself what characteristics make each family unique. A solid understanding of each family will prepare you well for your next field outing.

LECTURE 18

PASSERINES: FROM THRASHERS TO WARBLERS

The previous lecture began examining the enormous order of birds known as the passerines—more commonly called songbirds or perching birds. This lecture continues with the passerines by addressing the mockingbirds and thrashers, bulbuls, starlings, wagtails and pipits, waxwings, longspurs and snow buntings, and wood warblers. This list includes some of the birds that birders worldwide associate with North America and others that you may never have heard of.

MOCKINGBIRDS AND THRASHERS

- Perhaps the best-known member of the mockingbirds and thrashers family, Mimidae, is the gray-and-white northern mockingbird, one of the continent's most distinguished imitators of other birds' songs. Mockingbirds will sometimes sing throughout the night, especially on moonlit evenings, and they continue learning new songs throughout their lives.

- The thrashers are all brown birds with relatively long, downward-curved bills. They are most often found in hedges or low brush and usually forage on the ground. They get their name from the fact that they thrash their bills from side to side through leaf litter to secure their insect prey. Some species are so shy that they are difficult to spot.

- In southern California, Arizona, New Mexico, and western Texas, where the ranges of several different thrasher species overlap, they must be separated by the length and shape of the bill, the breast pattern, and the color and pattern of their under-tail coverts and tail tips.

BULBULS

- The only North American member of the bulbul family is the red-whiskered bulbul, a species that established itself in the suburbs of Miami in the 1960s after escaping from captivity. This striking black-and-white bird, about the same size as a bluebird, has a tall black crest, a white cheek, and red under-tail coverts; the males also have a red spot in the ear area, from which the species gets its name. The red-whiskered bulbul is still a popular aviary bird, sometimes sold under the name red-eared bulbul, so escaped individuals can also turn up in other locations.

RED-WHISKERED BULBUL

STARLINGS

- The starlings, or Sturnidae, are another family represented in North America by immigrants. The European starling is the best known of these. It was introduced to New York in the 1890s and is now found from coast to coast and from the tip of Texas to the southern edge of Alaska. It can be separated from our native blackbirds by the white speckles on its fall and winter plumage, the bright-yellow beak it sports in breeding season, and its triangular wings and short tail in all seasons.

WAGTAILS AND PIPITS

- The wagtails and pipits are best represented in Alaska. The yellow wagtail and white wagtail—both primarily Eurasian birds with long, constantly bobbing tails—breed regularly in western Alaska, as does the red-throated pipit.

YELLOW WAGTAIL

- Outside Alaska, birders can hope to see the aptly named American pipit, a sandy-colored bird with a thrushlike profile that can be found in open fields all over the continent in the fall and winter. Different subspecies of the American pipit have different amounts of streaking on their breast, depending on the subspecies. The Sprague's pipit is strictly a bird of the prairies; it is rarer than the American pipit and visually paler, with heavy streaking on its back and fainter streaking on its breast.

WAXWINGS

- The Bombycillidae, or waxwings, are often spotted in the fall and winter, when the 2 North American species gather in large sociable flocks and travel widely in search of berries and other fruit. Their common name derives from the red, waxy tips on their secondary feathers; however, these tips are often difficult to see in the field. Instead, you can tell you are looking at a waxwing by its pointed crest and yellow-tipped tail.

LONGSPURS AND SNOW BUNTINGS

- The longspurs and snow buntings are a group of superficially sparrowlike birds that most North American birders encounter in the fall and winter. When off their breeding grounds, they are often found feeding in mixed flocks in open fields, sometimes associating with horned larks and pipits.

- Because they are most often encountered in their basic plumage, most species of longspurs must be separated by details such as tail pattern and the length of their primary feathers. The exception to this tail studying is the snow bunting, which even in its brownest plumages is a paler bird overall than its cousins and shows large white wing patches in flight.

SNOW BUNTINGS

WOOD WARBLERS

- The Parulidae, or wood warblers, are one of North America's larger and more colorful families, occurring anywhere on the continent where forests can be found. European birders accustomed to relatively drab Old World warblers often speak with envy of brilliant birds such as the American redstart and black-throated blue warbler.

- Many North American birders consider the spring warbler migration the highlight of the year, as these highly migratory birds return from points south and fill the woods with bright breeding plumage and high-pitched songs. Most members of this family are small—around 5 inches in length—and highly active, foraging continuously for insects and caterpillars as they move through the foliage.

- In migration, they tend to travel in mixed flocks, and in urban parks or at points where they become geographically concentrated along their migration routes, favorable spring days can produce a dizzying array of species.

- Fall migration is a different story: In basic or immature plumage, these same birds can be headache-inducing identification challenges with their muted shades of green and brown, adapted for camouflage, and no longer singing now that breeding is concluded for the year.

- Although we can organize warblers by genus, our scientific understanding of the relationships between warblers is in flux even today, and there is always a chance that new studies will cause species to be shuffled into new groupings.

- The *Vermivora* warblers contain 2 species: the blue-winged warbler and the golden-winged warbler, both birds of overgrown pastures and brushy second-growth forests. The blue-winged warblers of both sexes have a narrow black eyeline on a yellow face, while the golden-winged warbler has heavy, dark facial markings and a golden crown on a white face. However, they are closely related, and when they occur in the same area, they often hybridize, producing birds of mixed features that look like entirely different species.

VERMIVORA WARBLERS

- Another genus, the *Oreothlypis* warblers, are rather drab, for warblers. Most show some green and yellow tones but also gray or brown. The orange-crowned warbler, which is common throughout the West and is present, though scarcer, in the East, is especially plain. To separate this species from the Tennessee warbler and other female and immature warblers, look for yellow under-tail coverts, blurry streaks on the breast, and a slightly downward-curved bill.

- The *Setophaga* genus includes both the rarest and some of the most common warblers in North America, as well as some particularly thorny identification challenges. There are few places in North America where you cannot expect to see the bright, cheery yellow warbler at some point during the year, or hear its song. Some immature birds may be much duller than adults and predominantly green or brown, but all plumages show yellow in the tail.

- On the opposite end of the spectrum, the Kirtland's warbler is a *Setophaga* warbler with an incredibly restricted range; it breeds only in stands of young jack pine, a habitat that depends on wildfire to exist. Problems in identifying *Setophaga* warblers usually arise in the fall, when immature birds are numerous and adults are in basic plumage.

- A warbler conundrum that can be baffling even in the spring is the case of the 2 species in the genus *Parkesia*, the water thrushes. Both the northern water thrush and the Louisiana water thrush are brown birds with pale eyebrow stripes and streaked underparts, and both share a habit of foraging in damp earth along the sides of streams or ponds.

- The Louisiana water thrush has a 2-toned or white eyebrow, a large bill, and a clear or slightly spotted throat. The northern water thrush often has a buffy eyebrow and a buffy cast to its belly and breast, as well as a streaked throat and a smaller bill. Behavioral clues can also help: The Louisiana water thrush migrates earlier

in the spring and fall than the northern water thrush and when foraging bobs its tail more slowly.

- While not as large or as varied as the *Setophaga*, the genus *Geothlypis* also contains some highly prized but potentially puzzling warblers. The mourning warbler and MacGillivray's warbler, for example, are nearly identical except for the fact that the MacGillivray's warbler has a bold broken eye-ring while the mourning warbler has either a faint complete eye-ring or none at all. To separate female and immature birds of these species in areas where their ranges overlap in migration, it is best to rely on their distinctive call notes rather than their looks.

- The *Cardellina* warblers are more likely to be confused for birds from other genuses than for each other. The yellow-and-gray Canada warbler has a strong yellow eye-ring and a "necklace" of black streaks, ranging from bold in adult males to very faint in immature females, that make it look like no other North American warbler.

- The Wilson's warbler is also unique in its adult male plumage, with a small, round black cap above a plain yellow face. Immature birds without caps can resemble the female hooded warbler, which has white outer tail feathers, or the yellow warbler, which has yellow tail spots in all plumages.

- The red-faced warbler, though rare and restricted in its range, is unmistakable with its bright-red face and black cap that runs down the sides of its head.

- A number of warblers are currently the only North American representatives of their genuses, thanks to the constantly shifting sands of warbler taxonomy. These include the unmistakable black-and-white warbler, a striped bird that clings to tree trunks like a nuthatch or creeper. Then there's the yellow-breasted chat, our largest warbler, which is brown above and yellow below with white spectacles. The ovenbird looks and acts a bit like a tiny thrush

and has a prominent rufous and black-striped crown as well as a piercing song that rises in volume.

- Another genus with only one representative is the *Protonotaria* genus, with its swamp-dwelling prothonotary warbler. This beautiful bird has a head, breast, and belly that are luminous yellow even by warbler standards and contrasting blue-gray wings.

- Also in its own genus, and prized by birders, is the brown-and-cream Swainson's warbler, a secretive bird of southeastern moist forests and cane brakes.

- The olive warbler, with its yellow or tawny head, narrow black mask and ear patch, and gray back, is so different from other warblers that it was put in its own family, the Peucedramidae, in the 1980s.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America*.
Gilfillan, *The Warbler Road*.
Stephenson and Whittle, *The Warbler Guide*.

ACTIVITIES

1. Learn the differences between a prairie and a pine warbler in your field guide.

2. Go through your field guide and familiarize yourself with each family. Ask yourself what characteristics make each family unique. A solid understanding of each family will prepare you well for your next field outing.

LECTURE 19

PASSERINES: FROM TANAGERS TO FINCHES

This lecture concludes the tour of North American songbirds, which refers to the vast order of birds known scientifically as the Passeriformes or commonly as the passerines, or even perching birds. This third and final lecture on the passerines examines the tanagers, cardinals, towhees, sparrows, juncos, blackbirds, orioles, finches, and Old World sparrows.

THRAUPIDAE

- The Thraupidae, or tanagers, are one of the largest families of birds, but scientifically this family is in a state of confusion. Recent genetic research has moved groups of birds out of the Thraupidae as DNA analysis supersedes old guesses about avian relationships that were based on physical traits and shared behaviors.

- The most relevant result for North American birders is that all the species we refer to as tanagers in our territory are now classed in the family Cardinalidae. The remaining members of the family Thraupidae in North America, the western spindalis and bananaquit, are both rare visitors to Florida. The bananaquit is interesting because some field guides, such as the National Geographic guide, do not place it with the tanagers, as its exact relation to this family is unclear.

EMBERIZIDAE

- The Emberizidae is another large family, and it's very well represented in North America. The emberizids include the New World sparrows, towhees, juncos, and the Old World buntings. Though diverse in size, markings, and habitat, all the species in this family have sturdy conical bills for cracking their primary diet of seeds. For organizational purposes, they can be divided into 7 loose subgroups: the towhees, the *Spizella* sparrows, the Ammodramus sparrows, the Melospiza sparrows, the Zonotrichia sparrows, the juncos, and the oddballs.

TOWHEES

- Towhees are the largest emberizids, with some species reaching 9 inches in length—due in part to the fact that they all have long, narrow tails. Most towhees favor dense, brushy habitat, and all forage on the ground.

- There are 2 species of towhee with dark backs and contrasting rufous flanks in their adult plumage: the eastern towhee and the spotted towhee. Distinguishing these birds as adults is fairly easy, but the brown-streaked juveniles are very similar and must be separated by their tail pattern: The eastern towhee juvenile has a white-cornered tail.

EASTERN TOWHEE

- The remaining species of North American towhee are somewhat plainer, such as the

green-tailed towhee, California towhee, canyon towhee, and Abert's towhee.

SPIZELLA SPARROWS

- The *Spizella* sparrows are small, slender birds, mostly under 6 inches in length; most favor habitat with a mixture of grasses and woody vegetation, such as overgrown fields and forest edges.

- Three of the more widespread species, the chipping sparrow, American tree sparrow, and field sparrow, are superficially similar in adult plumage because all have rusty-colored crowns and an eye stripe.

- Two more *Spizella* sparrows, the clay-colored and Brewer's sparrows, are even trickier: Both have streaked brown backs and streaked brown-to-black crowns, with a contrasting gray nape in between.

- The black-chinned sparrow, with its dark-gray overall head and breast color and contrasting rufous back, plus the breeding adults' black throats, is relatively easy to identify.

AMMODRAMUS SPARROWS

- The *Ammodramus* sparrows are no easier to sort out and make things even worse for birders by being shy and secretive. When glimpsed, they tend to have large heads and heavy bills, even for a sparrow. Most of the species in this genus favor wet, grassy habitats, from damp fields to salt marshes.

- Both the saltmarsh and Nelson's sparrows inhabit tidal marshes along the Atlantic coast and have a flat-headed profile, buffy faces with gray cheeks, and streaked breasts. The Le Conte's sparrow, primarily found in Midwestern marshes and fields, is similar to both the Nelson's and saltmarsh sparrows but has a streaked or

spotted nape and broad, buffy streaks on its back. The seaside sparrow shares its strict preference for tidal marshes with the saltmarsh sparrow but is an overall darker bird with a white throat and dark moustache line.

MELOSPIZA SPARROWS

- Sparrows of the genus *Melospiza* are plump, mostly dark and streaky birds that tend to be found in brushy habitat. The species of this genus are wide-ranging birds; the swamp sparrow, with the most limited range, breeds from West Virginia to the Northwest Territories and winters throughout the southeast West to Texas.

- Almost any park or streamside thicket south of Alaska could be home to a song sparrow, a vociferous bird with highly variable plumage; however, all subspecies have thick, streaky breasts, often converging into a central spot, and heavy moustache stripes.

ZONOTRICHIA SPARROWS

- Each species in the *Zonotrichia* genus has distinctive head markings in its adult plumage, and many are conveniently named after their field marks. They are also among the more confiding sparrows, often feeding in open areas and visiting feeders in the winter months.

- The Harris's sparrow has a dark chin and forehead in breeding plumage. All plumages show a dark breast combined with a large pink bill.

- The white-throated and white-crowned sparrows both have bright white-and-black markings on their head in breeding plumage. But the white-throated sparrow has a distinct white throat and yellow lores, which is the area between the eye and the beak.

- The golden-crowned sparrow of the far West has some yellow on its head in all plumages and a dull brown breast, streaked in juveniles.

JUNCOS

- Juncos are small, gregarious, ground-feeding birds. They are separated from the sparrows by the fact that they are some combination of gray or black and rufous-brown and, in adult plumage, have no streaking or strong facial striping. In flight, all *Junco* plumages show strong white borders down both sides of a long tail.

- Only 2 species of juncos occur in North America, and the yellow-eyed junco is confined to the southwestern border where Arizona and New Mexico meet. Throughout the vast majority of the continent, the species to expect is the dark-eyed junco, which comes in an array of different-looking subspecies that were once considered full species.

OTHER IMPORTANT EMBERIZIDAE

- Outside of the major genera addressed so far, other important Emberizidae include the savannah sparrow, another common and highly variable species that combines a yellow or off-white eyebrow with a dark eyeline and moustache. Then there are the 4 southern species in the genus *Peucaea* that used to be in the genus *Aimophila*, shy buff and rusty birds that are best separated by voice. Finally, there is the un-sparrowlike black-and-white lark bunting of the plains.

CARDINALIDAE

- The Cardinalidae is a very diverse family that includes not only the cardinals but also the North American tanagers, the New World buntings, some (but not all) of the grosbeaks, and the superficially sparrowlike dickcissel.

TANAGERS

- North America's 4 breeding species of tanagers are all midsized songbirds that prefer wooded habitat. The aptly named western tanager has the West Coast and the Rockies mainly to itself. In breeding plumage, the male's bright-red head and contrasting yellow-and-black body are unmistakable, while winter birds, females, and immatures can be separated from the other tanagers by their wing bars.

- The scarlet tanager of Eastern and Midwestern deciduous forests has contrasting dark wings in all plumages—black on red in the breeding male and black or dark gray on yellow-green in other birds.

- The final 2 species, the hepatic tanager of the southwestern mountains and the summer tanager found throughout the South, are both all red in their male breeding plumage and overall dull yellow in the female. The species are separated from each other in all plumages by bill color, wing bars, and the grayish cheek patch on the hepatic tanager.

SCARLET TANAGER

CARDINALS

- The Cardinalidae family's namesake is the northern cardinal. This is a familiar bird in the East and Midwest where the male's bright-red plumage enlivens otherwise dull winter forests and gardens. No other all-red bird has a pointed crest; it is this combination that gives the species its name. Female and juvenile birds show variable traces of red on their overall brown plumage.

DICKCISSEL

- The breeding male dickcissel is reminiscent of a yellow-washed house sparrow or a tiny meadowlark, with a yellow chest and triangular black bib. Females and winter males may have faint or no black bibs but still sport a yellow chest. Dickcissels breed in the grasslands of the central United States but wander widely in winter and often join flocks of house sparrows at feeders or in parks.

GROSBEAKS

- The grosbeaks of the family Cardinalidae are, at first glance, not so different from the grosbeaks now classed with the finches. They are stout birds with large, conical, seed-cracking bills. Male grosbeaks are identifiable by the bold colors of their breeding plumage. Females and immature birds can be a bit trickier and one needs to look carefully at factors such as breast streaking to distinguish between species.

BUNTINGS

- The New World buntings are smaller and less heavy billed than the grosbeaks in general, but otherwise they conform to a similar pattern—bright, distinctive males paired with drab, brownish females. Many species favor thickets and brush as habitats.

PAINTED BUNTING

- The painted bunting is a strong candidate for North America's most vivid bird, with its blue-headed, green-backed, red-breasted adult male plumage. This bird is found along the Atlantic coast from North Carolina south, throughout the Gulf Coast states, and as far north as Kansas and Missouri. The female and immature painted buntings are plain greenish birds, with the immature showing gray or white below.

ICTERIDAE

- The fourth passerine family is the Icteridae, which includes the meadowlarks, blackbirds, cowbirds, and orioles. Members of this family tend to have long, pointed bills and (except for the

meadowlarks) rather long tails, giving them an overall appearance of large size.

MEADOWLARKS

- There are 2 species of meadowlark in North America, labeled eastern and western meadowlark for convenience, although their ranges overlap in the Midwest and the South. A large songbird with a bright yellow breast marked with a black V, singing from a fencepost or a telephone wire above a grassy field, is definitely a meadowlark. Separating them by species usually requires listening to their voices.

- Another grassland icterid, the bobolink, has a highly unusual look when in male breeding plumage. Instead of being lighter below and darker above, like most birds, this species has a black belly and breast, a white rump and shoulders, and a buffy or yellowish-white patch on the back of its head. The female is a streaked yellow-brown bird with a dark crown and eyeline.

BLACKBIRDS

- The blackbirds and grackles are a surprisingly lovely and varied group of birds. They often winter in large mixed flocks that forage in fields, open woodlands, and suburban lawns. Grackles have longer tails than blackbirds, and all have longer tails than the European starling, which may travel with them.

- While many blackbird and grackle species are abundant, 2 species are of special conservation concern: the tricolored blackbird and the rusty blackbird.

- When sorting through a mixed flock of blackbirds, a few species are trickier than the others. The red-winged blackbird is simple enough in most of its range, but in California, it can be confused with the tricolored blackbird.


RUSTY BLACKBIRD

- The rusty blackbird shows distinctly brownish feather edges just after its molt in the fall, but over the course of the winter, these wear away until the birds are nearly solid black or dark gray in the spring. Worn rusty blackbirds can only be told apart from Brewer's blackbirds where their ranges overlap by subtle clues.

GRACKLES

- The 3 species of grackle, with their iridescent plumage and very long keel-shaped tails, can also be difficult to sort out. The common grackle is the smallest of them, and it has a relatively slender tail compared to the other 2. The boat-tailed grackle is the most restricted in range; except for in Florida, it is seldom found away from its preferred breeding habitat of saltwater marshes. In Florida, it is separated from the common grackle by its larger size, and in the small part of coastal Texas that it shares with the great-

tailed grackle, it is separated by its smaller size, duller eye color, and rounder head.

COWBIRDS

- Cowbirds are visually similar to blackbirds and sometimes flock with them in the winter but have a very different lifestyle in the summer. All the cowbirds are nest parasites, leaving their eggs to be reared by other birds; as cowbirds expand their range into newly fragmented forest habitats, their breeding behavior has been a factor in the decline of many native species. A large, dumpy brown bird being fed by a harried adult warbler or sparrow is almost certainly a juvenile cowbird.

ORIOLES

- New World orioles are the brightest icterids, with a plumage palette of oranges and yellows and bold black markings. Most species are found in the South, although the famous Baltimore oriole breeds north into Canada, and the Bullock's oriole and orchard oriole reach at least to the Canadian border. At the tip of south Texas, adult Altamira orioles have a large orange shoulder bar to set them apart. The female hooded and orchard orioles are very similar and have to be separated by bill shape.

FRINGILLIDAE

- The fifth passerine family is the Fringillidae, which contains most of North America's finches, the crossbills, and the 2 grosbeak species not included in the Cardinalidae. All of the Fringillidae are seed-eating birds, and many are prone to wandering outside of their usual ranges during winters, when their usual food supplies have failed. Such events, called irruptions, make winter more exciting for many birders in southern Canada and the northern United States.

FINCHES

- The rosy finches are birds of treeless high elevations, though they descend somewhat during cold weather. All rosy finches show a flush of pink on their wings and body, from which they get their name, but have overall dark plumage, which distinguishes them from the next 3 species that will be addressed.

- The 3 small red finches of North America—house finches, purple finches, and Cassin's finch—often confuse beginning birders. All 3 can be loosely described as brown-and-white birds with bright-red markings on the head and upper body of the males. However, with patience and care, they can be reliably distinguished from each other.

CROSSBILLS AND GROSBEAKS

- The 2 crossbills and the pine grosbeak are larger than red finches. The crossbills are unmistakable due to their namesake: bills with crossed tips. The birds use these pliers-like appendages to pry open pine and spruce cones, their main food source. Currently, identification of the crossbills is simple: the white-winged crossbill has 2 broad white wing bars, and the red crossbill does not.

- The pine grosbeak could be mistaken for a white-winged crossbill, but only if you did not see its short, stubby beak or note its substantially larger size.

GOLDFINCHES

- The goldfinches are yellow, and all 3 North American species are often seen perching on annual plants, such as grasses and thistles, to pluck the seeds. The female American and lesser goldfinch look very similar but are separated by the American goldfinch's plain-white under-tail coverts. The male Lawrence's goldfinch has a black throat, black forehead, and grayish head.

Two other members of the Fringillidae also show significant yellow: The evening grosbeak is much larger than any goldfinch, and the pine siskin is heavily streaked all over its body.

REDPOLLS

- The 2 redpolls are both birds of the Arctic, named for the bright-red caps that contrast with their otherwise plain plumage. In most of Canada and the northern United States, these birds are seen only sporadically during the winter, although in irruption years, common redpolls can come as far south as Virginia and often turn up at feeders along with more common finches.


REDPOLL

OLD WORLD FAMILIES

- The last 4 birds are all introduced species from Old World families. The Passeridae family, or Old World sparrows, has given us one of our most common neighborhood birds: the familiar brown-and-chestnut house sparrow.

- While the house sparrow has managed to conquer most of the continent, traveling wherever humans drop food, the Eurasian tree sparrow has never spread very far from Missouri, where it was first introduced. Birders may undertake pilgrimages to certain neighborhoods and parks in St. Louis, where this modest bird, distinguished from its more successful cousin by the black spot on its cheek, still breeds.

- The orange bishop and the nutmeg mannikin also have limited ranges near where they first arrived on the continent; for both of these species, the point of entry was Los Angeles, California, where they are found in weedy habitats with plenty of grass seeds.

SUGGESTED READING

Alderfer and Dunn, *National Geographic Field Guide to the Birds of North America*.

Beadle and Rising, *Sparrows of the United States and Canada*.

———, *Tanagers, Cardinals, and Finches of the United States*.

Byers, Olsson, and Curson, *Buntings and Sparrows*.

Todd, *Sparrow*.

ACTIVITIES

1. Learn the differences between a song and a savannah sparrow in your field guide.

2. Go through your field guide and familiarize yourself with each family. Ask yourself what characteristics make each family unique. A solid understanding of each family will prepare you well for your next field outing.

PHOTOGRAPHY FOR BIRDERS

In this lecture, you will learn how to enhance your birding experience with photography. The lecture begins with some basic photography terms and then delves into what gear to use, what tactics to employ while photographing birds, and what digiscoping can offer as an alternative to traditional photography.

BASIC PHOTOGRAPHY TERMS

- While most cell phones include some pretty advanced photographic capabilities, the information in this lecture is based on the assumption that you're willing to invest in a digital single-lens reflex camera (DSLR).

- Your camera lens has an aperture hole that can open either a lot, a little, or somewhere in between, depending on how much light there is—or depending on how much light you want to let into the camera body.

- The f-stop controls the size of the aperture hole. It is almost wide open at a low f-stop of f/1.4, f/2, f/3.5, or f/5.6, depending on the camera, which means that more light is entering the camera. Lower f-stops are better for photography in darker, low-light conditions. At a higher f/stop, such as f/22, the aperture hole is

tiny, letting less light in. Higher f-stops should be used in brighter, lighter conditions.

- The f-stop also controls the depth of field. A shallow depth of field, where only the subject is in focus, will result from a lower aperture number. A full depth of field, with everything in focus, will result from using a higher f-stop.

- Shutter speed controls how fast the lens opens and closes when capturing an image. More light can reach the sensor of the camera with a slower shutter speed, meaning that the picture will also be brighter. Less light will reach the image sensor with a fast shutter speed, resulting in a darker image.

- Whenever possible, it is better to use a fast shutter speed because it freezes the action, creating a sharper and clearer image. Slower shutter speeds often result in blurry images, particularly when capturing fast-moving subjects, such as birds in flight.

- ISO, which stands for International Standards Organization, is the level of your camera's sensitivity to available light. And like shutter speed and f-stop, it can be adjusted. ISO numbers typically range from 100 to 6400, or even higher.

- The lower the ISO number, the less sensitive your camera is to light. So, if you're in a low-light situation, you'll need a higher ISO for greater sensitivity to the dim conditions. By contrast, a lower ISO can be used effectively when it is bright outside because there is already a significant amount of light.

- Ideally, it's best to shoot at as low an ISO as possible, because higher ISOs add graininess to your images. On the other hand, the compromise of shooting at a low ISO is that then you also have to shoot at a slower shutter speed.

- Light plays a very important role in photography, affecting everything from aperture to shutter speed and ISO. Lighting can set the mood of an image along with how well the image is captured. Natural light is always the most desirable, changing from day to day and hour to hour, depending on Mother Nature.

- Morning and late afternoon produce the warmest lighting with the most saturated colors. These are also the times that create longer shadows—which can be good or bad, depending on what you are trying to accomplish with your picture.

- Overcast and cloudy days often make for a softer photo that doesn't have as much emphasis on detail. For many professional photographers, this weather condition makes it impossible to get really good photographs. High overcast with just a hint of sun peeking through can be great light to photograph in, particularly for wildlife when you want to get accurate colors and still be able

to have fast shutter speeds. You typically want to shoot with the sun behind your back for the best lighting.

- As with many of the aforementioned settings, most DSLR cameras have autofocus settings, but there may be times when you will want to set the focus manually. With small lenses, such as a 50mm, it is relatively easy to have a high f-stop, thereby ensuring that the whole image is in focus.

- But the long lenses that are typically used for wildlife photography have a very shallow depth of field, which means that most of the image is out of focus. It is therefore vitally important to select a feature on your subject and to bring that feature into sharp focus. For the purposes of bird photography, that feature is the eye of the bird. Autofocus often focuses on the shoulder or some other part of the bird and not the eye, so you will get the best results using manual focus if you are using a long lens.

EQUIPMENT FOR PHOTOGRAPHING BIRDS

- For the purposes of bird photography, you will need to invest in a good, fast DSLR camera. And you'll also want to buy one or more long lenses of at least 200mm. If you want to successfully capture birds in action, you will need a camera that can shoot at 1/2000th of a second or faster and one that shoots at a minimum of 5 frames per second.

- When it comes to camera bodies, all the top brands have excellent and reasonably affordable options for bird photography. The major expense comes with the lenses required to obtain good close-up images. Most serious bird photographers shoot with 600mm or even 800mm lenses. But the price of these lenses is high.

- A better option is to buy a smaller good-quality zoom lens and try using a 1.4 or 1.7 teleconverter. Teleconverters increase the zoom capability of a lens, but they also simultaneously increase

the f-stop of the lens, which makes it more difficult to take crisp images in lower-light conditions.

- A good tripod is a very important for bird photography and is a necessity for the heavier and larger lenses. While many DSLR cameras and lenses have vibration-reduction settings, a tripod is essential when shooting in low light, even with a smaller telephoto lens. A tripod will allow you to shoot at lower shutter speeds instead of cranking up the ISO and compromising the quality of the image.

- It is especially important in bird photography that the utmost detail is retained. Raising the ISO to shoot at higher shutter speeds will result in a noticeable loss of detail. If you have a smaller lens and light is sufficient, you should be able to shoot handheld very successfully. Heading out in good light without a tripod will also enable you to cover more ground and approach subjects easier.

- A general rule to follow when shooting handheld is to set the shutter to a speed that is at least the focal length of the lens. For example, if you are photographing with a 200mm lens, your shutter speed should be at least 1/200th of a second.

- If your camera has an automatic ISO setting, this can be very useful because your camera will adjust according to the available light. If you are trying to shoot birds in flight, the minimum shutter speed should be 1/800th of a second, but if the available light allows, it is preferable to try double this, to 1/1600th of a second.

- Most cameras allow you to set a minimum shutter speed in conjunction with the automatic ISO setting, and this should create your desired result. In this way, your camera will adjust to the light but will keep your fast shutter speed. Also, remember to shoot with your aperture wide open, especially when shooting action or shooting handheld. This will let in the most light, and in most cases for bird photography, you do not require a large depth of field.

- Shooting in RAW format will allow you to do a lot when you get down to editing your images, but it does take up a lot of space, so buy a large memory card with the highest rating. Poorer-quality cards can affect the frame rate when shooting in RAW.

BIRD PHOTOGRAPHY TIPS

- Approaching birds with a camera can be a challenge. If you are new to bird photography, start with common backyard or city birds, such as pigeons and sparrows, which are often tame and more approachable. Practice taking pictures of these birds doing different behaviors and under different light conditions so you can assess how light affects your images.

- Early morning is usually the best time for bird photography, as it coincides with when birds are most active. Colors are most vivid just after dawn and before dusk. Photographing at this time will provide the most pop in detail and color.

- When approaching birds in the field, as with general birding, do not wear clothes with bright colors and try to blend in with the environment as much as possible. Concealment wear, such as hunting camouflage, can make approaching birds easier.

- Try to anticipate the movement of the bird. If you can watch its behavior and predict where it may go, you can have your lens and settings ready and waiting for the perfect shot.

- As tempting as it is to chase a bird as soon as you see it, remember that patience is key. Sudden movements or noises will flush a bird, but stay still and quiet long enough and sometimes it will move closer.

- As with general birding tactics, don't make sudden movements and keep volume to a minimum.

- Watch the bird and try not to approach if the bird is looking straight at you. It also helps to never walk directly up to a bird but rather to approach as though you are going somewhere else.

- Take photos from far away first so that you at least have a few images; then, gradually stagger your approach, taking shots as you stop at intervals. This way, the bird will gradually get used to you and may even allow a closer approach than its traditional comfort distance.

- Experiment with using a flash. This can produce very good results in dark, forested areas, but the general rule is that natural light always works best and produces the most desirable and iconic images.

- The best ways to improve are knowing your subject, taking a lot of pictures (because many will not turn out), and spending plenty of time in the field. It helps to set up feeding stations, blinds, and watering points to draw in birds. At feeders and birdbaths, make the surrounding perches and vegetation as natural as possible.

DIGISCOPING

- Digiscoping is a more recent form of bird photography that involves placing a small digital camera lens or phone camera up against the eyepiece of a spotting scope. It is often less expensive than traditional photography because it eliminates the need for pricey lenses. And because various companies have now developed adapters and mounts that fit cameras to scopes, it's more seamless than ever to take excellent images through digiscoping.

- These adapters and mounts have resulted in much more accurate focusing. There is less shaking and blurring of the image from movement. Also, with the advent of phone cameras, adapters have added an exciting new dimension along with convenience. Instead of having to buy a professional camera, birders can just connect their cell phones to a scope.

- When digiscoping, it is better the keep the scope magnification lower, around 20–25x. Even though the magnification is what you need to keep the bird close up, small movements from the wind and a shaky trigger can blur the image. To minimize this problem, a stable tripod is desired, and the use of the camera's timer can be helpful in reducing blur, because the camera moves when the photographer pushes the button to take the photo.

- Another reason for a blurred image can be a lack of light. When there is not enough light, the shutter speed slows down, making everything that moves in the meantime lose its edge. Zooming in will also reduce the amount of available light, so try to keep the

zoom to a minimum. Using 85mm scopes can let in more light and produce a brighter picture than some 65mm scopes.

- It is important to keep the camera lens and the scope eyepiece as close together as possible. Otherwise, a dark circle around the image, called a vignette, will appear at the edges of the picture. It is also important to keep the 2 close together because if light filters in, it can produce unwanted shadowing of the image. The recent advent of various adapters has greatly reduced these problems that were common with early digiscoping.

SUGGESTED READING

Bannick, "10 Tips for Photographing Birds," http://www.audubon.org/news/10-tips-photographing-birds.

Leonard, "5 Basics of Good Bird Photography," https://www.allaboutbirds.org/5-basics-of-good-bird-photography/.

Mansurov, "How to Photograph Birds," https://photographylife.com/how-to-photograph-birds.

ACTIVITIES

1. Find a bird in your neighborhood. Try staggering your approach using some of the tactics addressed in this lecture. Take pictures at various distances as you get closer and closer to the bird.

2. Take photographs of birds in your neighborhood under different lighting conditions and from different angles. Assess your images to ascertain which angles and lighting conditions produce the most pleasing images.

LECTURE 21

BIRDING SITES IN EASTERN NORTH AMERICA

Birding is an activity you can enjoy wherever you live. But maybe the birding is slow where you are right now, or maybe you're just looking for a change of pace. The next 2 lectures explore some of the best birding destinations on the continent. This lecture will focus on 11 terrific sites in the eastern United States and Canada.

MONHEGAN ISLAND

- Monhegan Island in Maine is a migrant trap—a place that, thanks to quirks of geography and weather, serves as a stopping place for an unusual number or variety of migrants. Monhegan Island is 10 miles out to sea and home to fewer than 100 year-round human residents. It is rich with different habitats—including balsam fir and spruce forests, meadows, rocky shores, and sea cliffs—despite its small size.

- This place is an appealing way station for birds who find themselves tired and in need of a meal over the open water of the Atlantic. These include not only the expected eastern Neotropical migrants but also western vagrants, such as the lark sparrow and Say's phoebe.

- You might also spot southern birds that have wandered north of their usual range, such as the orchard oriole and maybe even

the swallow-tailed kite. Ocean birds, such as alcids, gulls, and shearwaters, are also common around the island. The official checklist for Monhegan Island stood at 275 bird species in 2013.

- The largest variety of migrants and best chance of rarities is in September, but the island is also productive during spring migration, and winter is the best time for seabird-watching.

AMHERST ISLAND

- Amherst Island in Ontario, located in Lake Ontario 6 miles southwest of Kingston, is known for offering determined birders closeup daytime looks at a variety of owls that make the island their winter home, drawn by an abundant population of meadow voles.

- On the island's eastern side is a grove of jack pines known as the Owl Woods; a winter walk through these woods might give you a glimpse of multiple owl species. Amherst Island offers visitors the opportunity to spot 10 different owl species, including the great horned owl, northern saw-whet, great gray or boreal owl, and snowy owl.

- The fields also feature diurnal raptors, such as the rough-legged hawk and northern harrier. Brushy areas may host northern shrikes.

- The best time to visit Amherst Island is in later winter, when the owls have settled in and established their routines.

POINT PELEE

- Point Pelee, also in Ontario, is mainland Canada's southernmost point and notable for its mild climate. Thrusting dramatically into Lake Erie, this peninsula features a variety of habitats, including open marshes; forested swamps; brushy, overgrown fields; and sandy beaches.

- Because of its southern reach and the temperature-moderating effect of a large body of water all around, Point Pelee is warm enough to be home to species more commonly associated with southern latitudes, such as the brilliant-yellow prothonotary warbler.

- Even more exciting for birders, the peninsula's shape and location make it a potent migrant trap in autumn, as southbound birds travel down it as far as they can before waiting for favorable winds to head out over open water.

- Most of the 372 bird species recorded at Point Pelee have been seen during autumn migration, and some common species, such as blue jays, show up in mind-boggling numbers. Rarities at Point Pelee are usually birds from farther west, such as mountain bluebirds, Townsend's solitaires, and American white pelicans.

- The autumn migration begins with shorebirds in July, peaks for most land birds in September, and by November consists mostly of waterfowl forced south as bodies of water farther north freeze over. Spring migration, although less spectacular, is also a time of rich diversity at Point Pelee.

NIAGARA FALLS

- Whether you are viewing Niagara River from Niagara Falls, New York, or Niagara Falls, Ontario, this is one of the best spots in North America for watching gulls. Considered a somewhat esoteric pleasure even by many birders, gull-watching can nevertheless be quite exciting at Niagara Falls.

- Keep your eyes open for a slaty-backed gull, a predominantly Asian species that sometimes turns up here, or a black-legged kittiwake, a small gull that is normally only found in the most extreme northern parts of the continent. Out-of-range California gulls make regular appearances, and even the occasional Ross's gull turns up.

- These rarities mingle with flocks of hundreds of thousands of the more common ring-billed, herring, Bonaparte's, and great black-backed gulls in the winter months, taking advantage of the fact that the river's churning waters remain open when all around is covered in ice. The Niagara River plays host to the largest variety of gulls found anywhere in North America. The largest concentrations of gulls and the best chances of rarities occur in November and December.

JAMAICA BAY WILDLIFE REFUGE

- The rich variety of habitats found in Jamaica Bay Wildlife Refuge, located next to New York City's John F. Kennedy International Airport, make it an important habitat for a huge variety of birds. It has hosted 332 species in total, including European vagrants such as curlew sandpipers and tufted ducks. Meanwhile, North American vagrants spotted here include the white-faced ibis and black-bellied whistling duck. Even the expected species here are

often birds that are difficult to find elsewhere in the region, such as barn owls.

- The refuge features almost 70 species that nest there regularly, including many species of heron. Among these are 2 charismatic species that reach the northern limits of their range here: the yellow-crowned night heron and the tricolored heron.

- There is no bad time of year to visit Jamaica Bay: Passerine migrants are common throughout the spring, the summer is the best time of year for wading birds and wetland breeders, autumn brings a wide variety of shorebirds, and winter offers large flocks of waterfowl.

CAPE MAY

- Cape May, New Jersey, is one of the names that resounds through North American birding. This crossroads for migrants has long been a favored haunt of famed birders and authors and is the location of the Cape May Bird Observatory. It also serves as the finish line for teams competing in the World Series of Birding, perhaps the world's foremost competitive birding event.

- Located along the biologically rich waters of the Delaware Bay, Cape May, like Point Pelee, gains some of its bird cachet from being a peninsula that concentrates and "traps" migrants on their journeys north and south. Shorebirds, passerines, and raptors all pass through Cape May in significant numbers on their journeys, including local rarities, such as the golden eagle and Franklin's gull. It is also an important location for breeding birds, notably the piping plover.

- May, when the World Series of Birding is held, is the best month for species diversity at Cape May and offers a kaleidoscope of Neotropical migrants in bright breeding plumage; September

and October offer the best hawk-watching and a strong chance of vagrants.

MAGEE MARSH

- Magee Marsh in Ohio, along with the adjoining Ottawa National Wildlife Refuge, is a legendary birding spot. It is located across Lake Erie from Point Pelee and is in spring roughly what Point Pelee is in fall—a place where birds who need to get to the other side of the lake congregate and wait for the wind to head in their direction.

- Around 30 warbler and vireo species can be found in Magee Marsh over the course of a typical May. The checklist for Magee Marsh contains 338 species in total, or about 80% of all the species ever seen in Ohio as a whole. Rarities that have been

found here include the Townsend's warbler, burrowing owl, and Kirtland's warbler.

- The Biggest Week in American Birding, a 10-day festival organized by the Black Swamp Bird Observatory, has drawn some 80,000 birders to the area in recent years. Despite this crush, mid-May is the optimal time to visit Magee Marsh.

CAPE HATTERAS

- Cape Hatteras National Seashore, in North Carolina's Outer Banks, is a vital breeding area for a number of shorebirds and seabirds, including American oystercatchers and black skimmers, as well as a migration rest stop for many others, such as red knots and black-bellied plovers. It is also productive for songbirds in migration and has a list of about 300 species seen from shore in total.

- But what sets this hot spot apart from the others is that it is the launch point for some of the most productive pelagic birding trips to be had on North America's Atlantic coast. Day trips from Cape Hatteras have yielded such prizes as the first North American records of the Cape Verde shearwater, a bird that normally only occurs off the coast of Africa and in the Atlantic Ocean off of South America, and the formerly thought-to-be-extinct Zino's petrel. More to be expected, but still exciting, are near-certain sightings of the threatened black-capped petrel and large numbers of shearwaters, storm petrels, and terns, along with chances of boobies and tropic birds.

- Mid-May through September is considered the most productive time frame for pelagic birding off of Cape Hatteras, although hardy birders are increasingly undertaking winter trips for alcids and more northern seabirds.

GRAND ISLE

- Grand Isle in Louisiana is a barrier island situated south of New Orleans in the Gulf of Mexico. Partly developed, its remaining wild areas offer some of the best surviving examples of oak-forested chenier habitat, which provides a critical rest point for migrants who need to refuel after crossing the Gulf of Mexico.

- Grand Isle has a 60-acre birding trail and a 3-day festival, the Grand Isle Migratory Bird Festival, that takes place every spring, in mid-April. The island's more than 150 species include not only widespread Neotropical migrants but also Gulf Coast specialties, such as the Inca dove and the bronzed cowbird. Grand Isle is at its best in spring migration.

SANIBEL ISLAND

- Sanibel Island is not just a terrific place to bird but also a monument to a key figure in the history of North American conservation and a bastion of natural beauty in general. This curved barrier island is home to multiple wildlife refuges, of which the biggest and best known is the J. N. "Ding" Darling National Wildlife Refuge. Ding was a major advocate for conservation during the FDR administration and helped establish the National Wildlife Federation.

- This refuge is home to more than 245 species of birds, including such highly sought-after species as the mangrove cuckoo. You might also spot the reddish egret, known for its vigorous foraging behavior, or a roseate spoonbill, with its distinctive bill and bright-pink coloring.

- Birding in Sanibel Island is better in the winter than in the oppressive heat of the summer. Spring migration starts in March and declines by mid-April, while fall migration starts in October,

and a wide variety of species overwinter here from December to early March.

DRY TORTUGAS NATIONAL PARK

- Dry Tortugas National Park, in the Florida Keys, encompasses 7 small islands about 70 miles west of Key West. Like Monhegan Island, this is often a way station for exhausted migrants. It also features colonies of species that breed nowhere else in the continental United States, including magnificent frigatebirds.

- Additionally, 2 species of noddies can be found: the more common and lightly colored brown noddy and its rare and slightly smaller relative, the black noddy. Sooty terns, seldom seen anywhere else in North America, abound here, as well as North America's only nesting colony of masked boobies. Brown boobies occur in fair

numbers, too, and there has even been the odd record of a red-footed booby, a species normally associated with more tropical waters farther south.

- Good days in the spring can bring 70 species of migrants to the islands, and the total checklist for the park stands at about 300 species. Spring migration at Dry Tortugas National Park peaks in March, but the nesting seabirds provide plenty to interest birders through June. From July onward, the birding is significantly slower, although fall migration sometimes brings good flights of raptors that navigate over the Tortugas during migration.

SUGGESTED READING

Chipley, Fenwick, Parr, and Pashley, *The 500 Most Important Bird Areas in the United States*.

Connor, *Season at the Point*.

National Geographic, *National Geographic Guide to National Parks of the United States*.

Sobczak, *Living Sanibel*.

White and Lehman, *National Geographic Guide to Birding Hot Spots of the United States*.

ACTIVITY

1. Contact your local bird club or Audubon chapter and enquire about trips to the birding hot spots of your area.

LECTURE 22

BIRDING SITES IN WESTERN NORTH AMERICA

The previous lecture examined a number of outstanding birding sites in the eastern United States and Canada. This lecture will explore the other half of the continent, with fantastic birding sites from Alaska to the southernmost part of Texas and into Mexico, allowing you to discover some of North America's most unique birds and landscapes along the way. This lecture will focus on 12 main sites, but there are many wonderful North American destinations that aren't covered in this lecture or the previous one. If you'd like to explore some of them, an excellent resource is the *National Geographic Guide to Birding Hot Spots of the United States*.

ALASKA MARITIME NATIONAL WILDLIFE REFUGE

- Alaska Maritime National Wildlife Refuge's geography ensures that it is a destination for competitive birders every year. The refuge encompasses several of the Aleutian Islands, only a short jaunt from Asia, and species native to that continent show up routinely. Birds such as the whooper swan and rubythroat are near-annual visitors, and species such as the Siberian blue robin and Chinese egret have appeared here and nowhere else on the continent.

- In addition to vagrants, 40 million seabirds nest along the coast of Alaska Maritime each year, including Bering Sea specialties, such as whiskered auklets. The islands also have their own suite of endemic species, including the Aleutian cackling goose, a

subspecies of cackling goose. The refuge is also home to several subspecies of rock ptarmigan.

- Spring is the best time to catch Asian vagrants, and early summer is the breeding season for seabirds; some of the auklets are already leaving their breeding colonies by early August.

ROCKY MOUNTAIN NATIONAL PARK

- Rocky Mountain National Park, designated a Globally Important Bird Area, features mountain-dwelling species such as the white-tailed ptarmigan, dusky grouse, American three-toed woodpecker, pine grosbeak, and Townsend's solitaire. Aspen and ponderosa pine forests, alpine tundra, and willow thickets are some of the habitats that provide homes for 270 species of birds in this national park.

- The most sought-after species in this park are either year-round residents or breeding birds, so late spring and early summer are the ideal times to visit.

WAUNITA WATCHABLE WILDLIFE AREA

- Unlike most of the other sites, the Waunita Watchable Wildlife Area, near Gunnison, Colorado, doesn't boast a massive list of species or vast flocks of migrants. This hot spot was set up to view only one species: the Gunnison sage grouse, a threatened grassland species with a population of less than 5000 and a range restricted to tiny portions of Colorado and Utah. This patch of open sagebrush is the only place in the world where the public is invited to see this rare and cryptic bird perform its breeding displays.

- In an effort to manage crowds, viewing opportunities at Waunita are strictly by reservation only between April 1 and May 15. If you are lucky enough to visit, it is imperative that you obey all of

the rules and recommendations for safe grouse viewing, such as arriving before dawn and maintaining strict quiet.

CHASE LAKE NATIONAL WILDLIFE REFUGE

- Chase Lake National Wildlife Refuge in North Dakota is a premiere spot for birds of the continent's central plains. It was established in 1908 by Theodore Roosevelt, in part to protect its large breeding colony of American white pelicans. The more than 4000-acre refuge is approximately half water and half grassy uplands, offering habitat for birds as different as the glossy ibis, Baird's sparrow, sharp-tailed grouse, and loggerhead shrike—308 species in total. Whooping cranes are known to pass over Chase Lake in migration.

- When the pelicans are breeding, the area around their colony is closed to human access to avoid disturbing the birds; however, the colony and lake can still be viewed from the roadside at Chase Lake Pass. Pelican breeding typically starts in May; fall migrants and waterfowl are abundant in autumn.

POINT REYES NATIONAL SEASHORE

- Point Reyes National Seashore in California has a massive bird list even by hot spot standards: almost 490 species—more than many birders have seen on the continent as a whole. A variety of factors contribute to this amazing statistic, including the fact that Point Reyes is a peninsula that extends nearly 10 miles out into the Pacific. Point Reyes also offers a wide array of habitats, such as estuaries and wetlands, coastal scrub, dry grasslands, and forests.

- Five species of albatross, 13 species of alcid, 7 species of hummingbirds, and 44 species of wood warblers have occurred here, along with notable vagrants such as the brown shrike and Mongolian plover. Local favorites, such as the snowy plover and northern spotted owl, can also be found here.

- During peak whale-watching season, from December to April, the park can become congested. Spring and early summer are the best times to find vagrants at Point Reyes, but there is a rich abundance of birdlife year-round.

CHANNEL ISLANDS NATIONAL PARK

- Farther south in the Pacific, Channel Islands National Park offers another unique slice of California birding. This park consists of 5 out of a string of 8 islands in the Santa Barbara Channel, a bit north of Los Angeles.

- Isolated from the mainland for thousands of years, the island chain is inhabited by an array of endemic species and subspecies, such as the island scrub jay (only found on Santa Cruz Island), the island loggerhead shrike, and an island subspecies of the rufous-crowned sparrow. Colony-nesting seabirds, such as the ashy storm petrel, Scripp's murrelet, and California brown pelican, also draw birders to the islands, as do 30 recorded species of shorebirds.

- Every season except winter offers some migrating or nesting birds on the islands.

PATAGONIA-SONOITA CREEK PRESERVE

- Arizona's Patagonia-Sonoita Creek Preserve is an important piece of birding history, because it was nearby that a group of birders stumbled on North America's first black-capped gnatcatcher in 1971. Shortly afterward, another group of birders looking for the gnatcatcher discovered North America's first yellow grosbeak.

- Aside from its importance in the history of the birding tribe, the Patagonia-Sonoita Creek Preserve is also a vital habitat for a number of southwestern riparian species, including the vermillion flycatcher, Arizona woodpecker, magnificent hummingbird, and Mexican jay.

- The best times to visit the preserve—and Patagonia, Arizona in general—are from late April through May and from late August through September, when spring and fall migration bring the greatest diversity of species. But many of the local specialties can also be seen in the summer if you can stand the heat.

GRAND CANYON NATIONAL PARK

- Grand Canyon National Park is one of North America's greatest natural wonders and draws more than 4 million visitors annually. But with so much dramatic geology in view, many people fail to realize that it is also a unique habitat and home to a wide variety of bird species. The Grand Canyon's rocky slopes and cliffs,

brushy streamsides, desert scrub, and pine forests all have their own species to offer the visitor.

- This park has been designated a Globally Important Bird Area for its role as home or migration stop for 373 species of birds. California condors now soar over the park after a reintroduction program that began in the 1990s, and the humble but critically endangered southwestern willow flycatcher breeds in thickets along the Colorado River. More common but still desirable birds include the American dipper, black rosy finch, and zone-tailed hawk.

- For the best birding in Grand Canyon National Park, avoid the hot months of high summer as well as the dead of winter. Not only are there fewer birds than during the spring and fall migrations, but both hypothermia and heat exhaustion have claimed numerous unwary lives in the park.

BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE

- Established in 1939 by Franklin Delano Roosevelt, Bosque del Apache National Wildlife Refuge in New Mexico is managed to preserve wetland habitat along the Rio Grande. It serves as a wintering ground for thousands of snow geese and hundreds of sandhill cranes, which provide birders with a much-sought-after spectacle as they fly out from the wetlands at dawn to spend the day foraging in nearby fields.

- Southwestern specialties such as the greater roadrunner, juniper titmouse, pyrrhuloxia, and 3 species of quail are present year-round. Peak season for waterfowl at Bosque del Apache is from November to February.

BROWNSVILLE, TEXAS

- Nearly every bit of preserved habitat in the Rio Grande floodplain offers something of interest to the birder, and nowhere is this more evident than in south Texas. At the southern tip of the state and near the edge of the Gulf of Mexico, the area around Brownsville, Texas, is the home of Resaca de la Palma State Park and Sabal Palm Sanctuary, within easy driving distance of other excellent birding sites. These include Laguna Atascosa National Wildlife Refuge, South Padre Island, and Arroyo Park.

- The whole region is loaded with Central American birds at the northern edge of their range as well as hundreds of species of migrants that funnel through the area rather than crossing the Gulf of Mexico. The green jay, great kiskadee, black-bellied whistling duck, and ringed kingfisher are just a few of the species that are common in suitable habitat.

- The Rio Grande Valley Birding Festival, based out of Harlingen, is held annually in early November.

ARANSAS NATIONAL WILDLIFE REFUGE

- Farther up the Gulf, north and east of Corpus Christi, lies Aransas National Wildlife Refuge. This refuge, situated on a shallow bay, offers a variety of salt, brackish, and freshwater marshes that provide habitat for species such as the Neotropic cormorant, reddish egret, and white-tailed hawk.

- Aransas is the winter home of the last remaining wild flock of whooping cranes in the world. Almost 300 of these enormous, beautiful, and highly endangered birds spend their winters here, up from an all-time low of only 21 individuals in the 1940s.

- The whooping cranes are usually on their wintering grounds from mid-October to mid-March, and while it is possible to see them on your own, several local operators offer tours designed to maximize your chances and also provide views of other interesting coastal birds and wildlife. Another option is to attend the annual Whooping Crane Festival, which takes place in late February. This celebration of survival offers tours to see the whooping cranes and lectures and classes on subjects of interest to birders.

RIVIERA NAYARIT, MEXICO

- If you want to venture a bit outside of the American Birding Association area, which only recognizes the United States and Canada, but still within what the American Ornithologists' Union considers our region, you can look to Mexico. The Riviera Nayarit region along the Pacific coast is not only rich with Central American birds and migratory Neotropical species, but it's also a hotbed of endemic species.

- The golden-cheeked woodpecker, yellow-winged cacique, elegant quail, and citreoline trogon are among the 20 new Mexican endemics you can hope to find within half an hour's drive of San Blas. This charming port town is also a good departure point for Isla Isabela, a national park sometimes referred to as Mexico's Galapagos. This island is a refuge for nesting seabirds, including 3 species of boobies, magnificent frigatebirds, red-billed tropic birds, and brown noddies.

- Winter is the best time for migrants in the Riviera Nayarit, but the endemics are present year-round.

SUGGESTED READING

Chipley, Fenwick, Parr, and Pashley, *The 500 Most Important Bird Areas in the United States*.

Evens, *Natural History of the Point Reyes Peninsula*.

Homel, *Birds of Northern Arizona including Flagstaff, Sedona, and Grand Canyon National Park*.

National Geographic, *National Geographic Guide to National Parks of the United States*.

White and Lehman, *National Geographic Guide to Birding Hot Spots of the United States*.

ACTIVITY

1. Contact your local bird club or Audubon chapter and enquire about trips to the birding hot spots of your area.

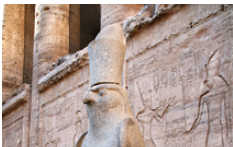
LECTURE 23

BIRDS AND PEOPLE

Birds have served as livestock, status symbols, and beloved companion animals; they appear in the folklore, art, and literature of nearly every culture on the planet. This lecture will explore the deep and long-standing relationship between birds and people. In this lecture, you will travel back in time and across multiple civilizations to examine some of the many astounding ways that birds interact with human culture. You will also learn about the ways that people can interact with birds in today's rapidly changing world.

OUR COMPLICATED HISTORY WITH BIRDS

- Our knowledge of interactions between birds and people extends back to ancient history. Birds have played a role in human culture for almost as long as there has been such a thing as human culture. For example, a 40,000-year-old flute made from the leg bone of a vulture is the first-known musical instrument in human history. Birds also appear in Egyptian hieroglyphics, Native American petroglyphs, Maori rock art, and the art of countless ancient cultures from around the world.



- Birds have long played a critical role in many religions. Horus, the Egyptian sun god, was often depicted in the form of a falcon. The Eye of Horus

was, and still is, perceived throughout Egypt as a powerful symbol of protection.

- The ancient Mayans of Central America revered birds, too. The resplendent quetzal, associated with the god Quetzalcóatl, was a dominant feature in Mayan art and still plays a role in the folklore of Guatemala to this day: It is the national bird and a symbol of liberation from colonial rule. Birds also took on more sinister forms in Mayan lore. A demon that took the form of a scarlet macaw was an important enemy of the Hero Twins, who became the sun and moon.

- The Aztecs, the Mayans' neighbors to the north, also included birds in their pantheon. Huitzilopochtli was generally regarded as the god of battle, and those he killed became transformed into hummingbirds like himself. According to another legend, Huitzilopochtli was also the god who commanded a group of Aztecs to build a city where they saw an eagle eating a snake. This city would eventually become Mexico City, and today the eagle and snake are depicted on the Mexican flag.

- On Easter Island, seabirds were revered because of the vital role their eggs played in supplying food to the islanders. One of the most important religious events of the calendar was the annual competition to swim to Motu-Nui, a smaller island off the coast, and return with the first sooty tern egg of the season.

- Greek and Roman legends did not directly portray birds as gods, but gods could turn into birds or turn people into birds, creating

a rich body of folklore around European species. Some of this folklore persists in European culture in the present. For example, the owl is thought to be wise because it was associated with Athena, the Greek goddess of wisdom.

- For early and even modern Christians, the dove is a symbol of peace. In the Old Testament, a raven and a dove were sent by Noah to determine whether the water had receded after the great flood. In the New Testament, the dove is associated with the Holy Spirit.

- Even as birds were seen as gods and symbols, they were also put to much more pragmatic uses—first as a food source. Humans have hunted and eaten birds since the earliest days. As proof, archeologists have unearthed the skeletal remains of hundreds of different species in middens, ancient garbage pits where our ancestors dumped the remains of their meals.

- Birds that nested in colonies were not only hunted for meat but also robbed of their eggs and young to feed human appetites—a practice that led to the decline of the more accessible colonies as human populations increased.

- When humans began to domesticate animals, meaty birds such as the rock pigeon and the red junglefowl (today known as the barnyard chicken) were among the species we brought into our world.

- Food was not the only reason to hunt birds. A great many cultures across the planet have exploited birds for their feathers and still do today. The feathers are mostly used for adornment and to signify status. For example, bald and golden eagle feathers are used in Native American headdresses to signify honor, courage, and bravery.

- Birds have been useful to humans alive as well as dead. A huge variety of birds, from finches to parrots to mynahs, have provided companionship and entertainment to humans as pets. And some birds, rather than being hunted, have been trained to assist human hunters.

- Some species do not need to be domesticated or hunted; they provide benefits to humans just by going about their regular business. For example, honeyguides in Africa feed on beeswax and have learned that they can obtain it by leading humans to bee colonies.

- The role of insect-eating birds and raptors in controlling pests and the role of hummingbirds in pollinating wildflowers should not be underestimated. And every bird contributes in some way to the rich, irreplaceable tapestry that is our ecosystem.

CITIZEN SCIENCE

- The rapid pace of environmental destruction and the fact that we are now in an era of mass extinction, caused largely by the actions of humans, has served as a wake-up call to people across the globe. Driven by urgent environmental concerns, more and more

people are devoting themselves to conservation and the scientific understanding of birds.

- For the average birder, citizen science is an excellent way to give back to birds. Citizen science is a relatively new term, although a version of it extends back to the Victorian era when men and women without formal scientific training would devote themselves to closely observing the birds in their own gardens or backyards to learn about the life history of common species.

- With the benefit of modern technology, ornithologists can now gather and correlate the reports of hundreds or thousands of amateur birders. They then use the gathered data to track bird migration, monitor populations, and determine how birds are affected by factors such as habitat loss, pollution, hunting, domestic cats, and disease. The results of citizen science efforts have even been used to help create formal management guidelines for at-risk species.

- Perhaps the longest-running citizen science effort in North America is the Christmas Bird Count, which is under the auspices of the National Audubon Society. It takes place annually from December 14th to January 5th, and more than 30,000 people worldwide take part. The count provides invaluable data for monitoring the long-term health and status of bird populations across North America.

- The Cornell Lab of Ornithology is one of the leaders in modern citizen science. This is primarily thanks to eBird, an online tool that is a terrific resource for individual birders but also enables you to share your knowledge for the greater good. Scientists use observations from eBird users to learn where and when different species are being seen and to integrate the information into larger databases, such as the Global Biodiversity Information Facility.

- A variety of other citizen science projects, often focusing on a particular issue, species, or local area, take place every year in

North America. From the Annual Midwest Crane Count to the House Finch Disease Survey, to the Magpie Monitor program in California, to the Beaver Creek BioBlitz in Wisconsin, these efforts allow birders and other concerned citizens to contribute their bit to science and conservation.

- There are plenty of citizen-science opportunities for novice and experienced birders alike. If you haven't gotten involved already, reach out to local wildlife refuges, bird clubs, or colleges to see what type of efforts they may be planning near you.

BIRD BANDING

- Bird banding, the technique of attaching a metal band to a bird's leg to permanently identify it, is an activity that started out as a type of citizen science long ago but has evolved into a much more sophisticated and coordinated scientific technique.

- Bird banding began in the Middle Ages, when it was used on falconry birds. Bird banding was one of the first techniques used to learn about the migration patterns of birds; it is also used to track other forms of behavior and movement, such as post-breeding dispersal and nest-site fidelity.

- Some birds, particularly intensively managed endangered species, are banded at their nesting sites. However, most birds are trapped and banded during migration. For small birds, from hummingbirds up to the smallest raptors, banders generally use mist nets, which are extremely fine nylon nets that are set up between 2 poles. A bird flying into the net drops into the pocket and becomes entangled; then, the bander retrieves it.

- For larger and fiercer birds, a common technique is to use bow nets. Some kind of bait—often a live bird—is placed in an open area, with a spring-loaded net concealed nearby. When the bird

comes to the bait, the net is released and launches over the bird, trapping it.

- Once the bird is in your hand, there is still a lot of work to do. First, the bird must be identified accurately, and the correct-size band must be selected. Then, a series of measurements are made and recorded; details such as the bird's wing length, weight, body condition, age, and sex are carefully noted alongside the unique code on that particular bird's new band. After the bird is released, all of this data is submitted to the North American Bird Banding Program's master database.

- You will need a permit if you want to participate in bird banding. This is because it is now illegal to capture or handle most North American birds without such a permit. Unless you are running your

own research projects with a recognized institution, the best way to get involved is by volunteering under a master bander through your local bird observatory or conservation organization.

- You can also contribute to bird-banding efforts simply by reporting banded birds that you find in the wild. You may be able to read the band on a large bird in the field. For smaller birds, you are most likely to find a band if you run across a dead or injured bird. In either case, you can submit information about the band online at the Patuxent Wildlife Research Center's Bird Banding Laboratory website. You'll receive back information about your bird, including where it was banded.

SUGGESTED READING

Collar, Long, Gil, and Rojo, *Birds and People*.
O'Connor, *Why Don't Woodpeckers Get Headaches*.
Strycker, *The Thing with Feathers*.

ACTIVITIES

1. Take a moment to consider how prevalent birds are in our everyday lives. Try to name at least 10 sports teams or organizations that feature birds in their names, such as the Baltimore Ravens.

2. Volunteer at a local bird-banding station.

LECTURE 24

BIRDING ETHICS AND CONSERVATION

Birding is usually seen as a benign, low-impact way to enjoy the outdoors, and for the most part that's true. Even so, there are some ethical issues that every birder should be aware of. Some of these involve courtesy to our fellow humans, and others involve protecting the birds and habitats that make our hobby possible. This lecture will address both the specific behaviors you should keep in mind in the field and the broader issues of conservation that could impact bird populations in the future.

ETHICAL BIRDING

- Several birding organizations, such as the American Birding Association and the National Audubon Society, have put together guidelines for ethical birding that every beginning birder should consult. Many of these guidelines are simply common sense, common courtesy, and a reminder to follow existing laws.

- It's important that you appreciate the perspective of people who may not be as into the birding experience as you are. Keep in mind what your actions may look like from the outside. For example, if you spot a rare bird along a suburban street and pull out your binoculars to have a better look, consider whether residents will think you're a Peeping Tom looking in their window. If you're with a large crowd of birders, consider whether your crowd is blocking traffic or creating a hazardous condition by carelessly crossing the road.

- When traveling to a new area to bird, try to patronize the local businesses and identify yourself as a birder. This can be as simple as bringing your binoculars into a restaurant with you or having a bird-related bumper sticker on your car. In general, by being friendly and respectful of non-birders, you can create a positive impression, and you may even lead people to be more aware of birds and their welfare in the future.

- Treat your fellow birders with respect. This is also an area where basic kindness and awareness go a long way. Many birders have a healthy sense of competition, but don't overdo it trying to get the best photograph or the closest view—stand back and let others get a look, too. If you use recorded birdcalls, be careful not to annoy or trick your fellow birders.

- Always know the rules of your location. Some parks and sanctuaries have rules against playing recorded birdcalls. Flash photography and artificial light can also disturb both birds and birders.

- If birding with a group, keep your voice low and unnecessary conversation minimal so that others can hear bird songs or comments from the group leader. Also, stick with the group, especially if you're in an unfamiliar area.

- As you become a more experienced birder, make sure to have patience with the newbies; everyone makes identification mistakes, especially when starting out. Gentle guidance and a measure of Socratic method are often the best way to respond.

INTERACTING WITH INDIVIDUAL BIRDS

- While birders are pursuing a hobby, for birds, your interactions can be a matter of life or death. Learn the signs of a stressed-out bird, such as erect posture and alarm calls, and back off if you see or hear these signs. Deliberately flushing a bird, as some birders do to get better views of shy species, is very disruptive and should be avoided completely. If you do flush a bird by accident, do not pursue it aggressively.

- When watching birds during migration, keep in mind that they may have just flown vast distances and are in unfamiliar territory. They are likely to be tired, hungry, and stressed. Do not approach them closely even if they seem to allow it—they may simply be too tired to move on.

- Birds on breeding territory are on high alert for anything that might be a rival or threaten their young. Avoid using recorded calls during breeding season. Never closely approach, much less handle, a nest with eggs or young birds in it. You could inadvertently lead a predator to the nest.

- If you find young birds on the ground, keep in mind that this could be a normal part of their fledging process; keep curious children and pets away and watch to see if a parent bird is tending the baby. In the case of a visibly injured bird or one that is in a dangerous location, call a licensed wildlife rehabber, who can give it the specialized care it needs.

- Rare birds and vagrants are a special case. When many birders gather to watch a single bird, the stress on the bird increases tremendously. This makes it especially important to keep a respectful distance. When the well-being of birds and the curiosity of birders conflict, the birds should always come first. This means that in some cases, such as nesting sites of rare species, it may be better not to publicize a find to every birder you know.

THE IMPACT OF HUMAN BEHAVIOR ON BIRD SPECIES

- Sadly, many bird species in North America have already become extinct. The passenger pigeon, great auk, Labrador duck, and Carolina parakeet are among the species that are gone forever. Others, such as the ivory-billed woodpecker and Bachman's warbler, have not been seen for many years. If they still exist, their populations must be extremely small.

- The causes of extinction are often complex, but 3 common factors crop up again and again: overhunting, habitat loss, and introduced species.

- In North America today, most hunting is strictly regulated, and there is little chance that overhunting alone could have a huge

impact on a species. However, for species that are already rare, poaching and mistaken identity still pose risks. Better law enforcement and education are needed as prevention.

- Habitat loss is still going on today at a brisk pace. In North America, species that require open grasslands are especially at risk—as are species who depend on wildfires for their habitat. Birds may be affected by the loss of breeding habitat, wintering grounds, or important stopovers on their migration routes.

- Invasive species, such as feral cats, rats, pigs, goats, and even rabbits, are still a major threat as well. Island species, because of their naturally limited ranges, are especially vulnerable to competition or predation from invasive species. However, even relatively common mainland species can be harmed by rampant invasive species.

- While some competition between species is an important part of natural selection, human interference can also cause native species to expand their ranges more rapidly than their neighbors can adapt. We see this in the spread of all 3 native North American cowbird species. In some instances, despite the usual importance of letting nature take its course, conservationists have resorted to trapping or killing cowbirds to give populations of other native birds a chance to recover. Situations like these are ethically complex and often controversial.

- In addition to overhunting, invasive species, and habitat loss, pollution has been another major source of danger for birds. Many pollutants can cause major problems for birds that consume contaminated prey. Despite the success of the ban on the pesticide DDT in helping once-endangered raptors recover, other pollutants still threaten populations of predatory and scavenging birds.

- Global warming is a wide-ranging unintended environmental consequence. No North American bird species has yet become

extinct specifically because of anthropogenic climate change, but it is likely to have a number of negative impacts on our birdlife in the near future.

- Global warming accelerates habitat loss, especially for cold-adapted species. Birds of the saltwater marshes and estuaries are also likely to lose their home as sea levels rise. Global warming also changes the timing of events that birds depend on for their life cycle, such as the hatching-out of insects in temperate forests. Warming-related changes in sea currents that bring food to small fish have already been suggested as a cause of widespread nest failure in pelagic birds.

- The disruption caused by climate change is also likely to accelerate the spread of new avian diseases and create more catastrophic weather events and could even increase levels of hunting and poaching by causing crop failure and famines.

- For these reasons and others, a number of species of North American birds are currently declining and at risk. The U.S. Fish and Wildlife Service, as of October 2016, lists 100 species, subspecies, or distinct geographical populations of birds as endangered or threatened. And just because a bird species has a large population now doesn't mean that it is safe forever. Ornithologists are also alarmed by a trend of dropping numbers among birds we think of as common.

WHAT YOU CAN DO

- Every birder should have an awareness of both global and local environmental issues that he or she can act on. On a local scale, be respectful of the places where you bird. Do not litter. If there are no garbage cans, remove all the trash you create. In parks and refuges, stay on the designated trails and do not trample or tear down the vegetation the birds depend on for their homes. Know what is going on with your local parks, and if you have time,

consider volunteering to help improve them with activities such as invasive weed management and tree planting. When traveling to more distant birding sites, carpool or use public transit whenever you can.

- To help on a larger scale, you can join one of the many organizations dedicated to preserving birds and their habitats. The North American Bird Conservation Initiative includes the American Birding Association, American Bird Conservancy, Cornell Lab of Ornithology, National Audubon Society, and The Nature Conservancy, all of which encourage individual membership or participation in their conservation efforts.

- Today, there is a widespread awareness that we need to preserve entire ecosystems to truly save a species. Birders can contribute to habitat preservation in a number of ways. Those who own real estate can make the land they own friendlier for birds with careful management.

- Preserving or creating water sources is a major boon to birds and can also make bird-watching easier. When landscaping, choose native plants, especially ones with berries or seeds that provide food as well as shelter. Leave a few dead trees or snags standing to provide habitat for cavity-nesting birds, or add bird boxes to your living trees. And do your best to keep your property clear of dangerous introduced species, such as rats and wandering cats.

- If you have no land of your own, or if you want to do more, you can contribute to the habitat preservation efforts of others. Organizations such as The Nature Conservancy and many local land trusts across the continent work to acquire property for nature reserves or collaborate with landowners to preserve important habitat.

- In the United States, it's also possible to support federal habitat preservation efforts by buying a duck stamp. Originally intended

for hunters, the revenue from these stamps is used by the U.S. Fish and Wildlife Service to acquire and manage wetlands.

- Every day, regardless of personal circumstances, every birder can raise awareness. Share your love of birds and concern about wildlife and habitat with your friends, family, and neighbors. Help build connections between people and nature. These connections are vitally important for human health and happiness, as well as being the basis of all successful conservation efforts.

SUGGESTED READING

Chipley, Fenwick, Parr, and Pashley, *The 500 Most Important Bird Areas in the United States*.

Cokinos, *Hope Is the Thing with Feathers*.

Lebbin, Parr, and Fenwick, *The American Bird Conservancy Guide to Bird Conservation*.

Wells, *Birder's Conservation Handbook*.

ACTIVITIES

1. Research national birding conservation organizations and join one or more of these. Examples to choose from include the National Audubon Society, the American Bird Conservancy, Partners in Flight, The Nature Conservancy, and the World Wide Fund for Nature (WWF).

2. Purchase the annual duck stamp as part of your commitment to preserving bird habitats in North America.

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