TheCornellLab of Ornithology

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Instructor Guide: Ornamentation in Birds

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Introduction

Purpose

Students investigate the connection between competition for mates and the evolution of elaborate ornaments in birds. This relationship is the premise of sexual selection, an evolutionary force. Inspired by plumage variation they see in video specimens of displaying birds, students pose hypotheses and then test them using an authoritative source of life history information (the Birds of North America Online).

Overview

The instructor first *engages* student interest in the phenomenon of sexual dimorphism by showing examples of species where the male is much more elaborate than the female, in contrast to examples where both the male and female look the same. Students then *explore* this phenomenon by developing a coding scheme to rate the extent of sexual dimorphism in video specimens from a number of taxa. This leads to a class discussion of life history or evolutionary factors that might *explain* the observed patterns of sexual dimorphism, and to posing of a small set of hypotheses. After *elaborating* on what they might need to know to test these hypotheses, students groups then research focal species in the online resource Birds of North America Online (BNA). The class will reconvene to present the results of their research, *evaluate* the extent of support for their hypotheses, and discuss potential future investigations related to this topic.

Essential Questions

- Why are some bird species more elaborate than others?
- What causes the varying degrees of sexual dimorphism we see across bird families?
- What happens when natural selection is in conflict with sexual selection?

Learning Objectives

Students will be able to:

- Describe and compare plumage traits in a number of bird species
- Pose and test hypotheses using authoritative online sources of multimedia and scientific literature
- Discuss theories and evidence for the evolution of sexually dimorphic plumage traits

Materials

- 1 laptop per group of 2 - 4 students and one for the instructor
- Internet access
- Flash or QuickTime player installed for viewing videos from the Macaulay Library (http://macaulaylibrary.org)
- Subscription to the Birds of North America Online (most college libraries have access, or temporary and educational licenses are available at http://bna.birds.cornell.edu)
- Computer projector to show videos and demonstrate site navigation
- Student resources, including "Tutorial-MacaulayLibrary" (recommended) and "Mating Systems Definitions", "Mating Systems Activity", and "Hypothesis Testing Flowchart" (all optional)
- Instructor resources, including "Presentation-MatingSystems" for defining key terms and concepts, "Presentation-MacaulayLibrary-RavenViewer" for introducing Macaulay Library navigation, and "Presentation-BNA" for introducing Birds of North America Online navigation (all optional)

Setting

Appropriate for mid- or upper-level courses in evolution, animal behavior, or ornithology. Students should have some familiarity with the scientific method (observation, hypothesis, test, predictions, results, conclusions) and evolution by natural selection. They should also be introduced or already be familiar with key terms and concepts associated with animal mating systems (see optional support materials). For example, one way to incorporate this lesson in an Animal Behavior course would be to cover parental care, mating systems and then sexual selection in that order. This exercise on sexual dimorphism could then be part of the sexual selection lesson. This investigation can be adapted for use as a self-directed assignment in distance education or large lectures.

Preparation

Locate and bookmark the initial Macaulay Library videos you will show in the Engagement portion of the lesson. Make sure to install or update your Flash player or QuickTime if necessary to play these videos. Verify that your institution has access to Birds of North America Online site. Alternatively, information on the appearance of the species may be gathered through bird field guides, but more specific texts will likely be needed to investigate life history and mating systems.

Time

This investigation could be begun in a 50-minute class period with independent student investigations in Birds of North America Online conducted as homework, and the presentation of findings done at the next session. Alternatively, a 90-plus minute period in which students have internet and computer access might allow most of the investigations to be completed and presented.

Extension

- Engage the class in research or discussion on which sex is the more ornamented one in general in birds (the males), and how this compares to humans. What could be some evolutionary explanations for this difference? *(Anisogamy, competition, opportunities for multiple mating, internal vs. external development)*
- Investigate or provide examples from bird species that have reversed sex roles and parental care (e.g., phalaropes, spotted sandpipers, jacanas). What would you predict about mating system and appearance based on parental care, and how does this relate to what is actually seen?
- Extend this research to the highly sexually dimorphic species often found in the neotropics, using the free community-created website Neotropical Birds (http://neotropical.birds.cornell.edu). What evolutionary pressures might be different in the neotropics as opposed to temperate environments?
- Show Science as Inquiry, a four-minute video by WGBH about Marion Petrie's studies of sexual selection in peacocks: www.pbs.org/wgbh/evolution/library/09/1/l_091_41.html
- Introduce Ed Scholes' research on the evolutionary radiation of the birds-of-paradise due to sexual selection and geographic isolation using videos and other resources at the site: http://birdsofparadiseproject.org.
- Show a video segment from BBC's Life of Birds to further underscore how elaborate these plumage ornaments and behavioral displays can be, and how they may reinforce one another: http://www.youtube.com/watch?v=gqsMTZQ-pmE
  Possible discussion questions include:
    - What were some examples of showy bird traits you saw in the video? *General categories - plumage: tails, wings, shoulder epaulettes, iridescence; skin – wattles, etc.; behavior*
    - Did you see examples where plumage and behavior reinforced one another?
    - Who was wearing them? Are there any case where that is the reverse?
    - What appeared to be the function of the plumage and displays?
    - Are there possible downsides to employing these displays?

Procedure

Engagement - *10 minutes*

Begin by showing video clips of two bird species with very different degrees of sexual dimorphism using videos from the Cornell Lab of Ornithology's online archive of animal behavior media: http://macaulaylibrary.org.

1. Hook up your computer to a projector. Show students one or both video clips of the Northern Gannets "billing" each other:
   http://macaulaylibrary.org/video/405047
   http://macaulaylibrary.org/video/56362

2. Ask students what they think the birds are doing, and what evidence they have.
    a. What are they doing?
    b. Why do you think that? (What evidence do you have?)

   (Students may incorrectly assume the birds are fighting over a territory, or correctly assume that this is a pair-bonding activity on nesting grounds.)

3. Show a second video clip, this time of Mallard pre-copulatory displays: http://macaulaylibrary.org/video/18044.
   (Actual copulation begins around 0:55, so try to ask the students what they think the head-pumping displays signify before that time).

    a. What kind of a mating system do you think each set of birds has? Why?
    b. How could we test this hypothesis?
       Optional: The "if… then… and…" format used in the "Hypothesis Testing Flowchart" could be employed as part of the lesson to formalize the process of stating hypotheses and predictions.

4. Poll the class to find out if students were quicker to assume that the birds were a pair (or a male and a female) in the second video as opposed to the first one. Ask for their reasoning.

5. Define the term "sexual dimorphism." Ask the students to brainstorm other examples of sexual dimorphism that they have noticed in birds.
   (Bright red cardinals, a peacock's tail, wing epaulets on Red-winged Blackbirds, the bright throats of hummingbirds. In addition to plumage coloration, and incorporation of iridescence, sexual selection could also involve traits like horned bills or differences of body size).

Exploration – *5 - 15 minutes*

1. Point out to the students that there was quite a difference in sexual dimorphism between the first and second pair of birds. Ask the students, "are there even more extreme cases of sexual dimorphism? How common do you think sexual dimorphism is in birds?"

2. You can then explore variation in sexual dimorphism across the bird world in one of two ways. If time is limited, you could show the students a series of slides prepared by the instructor showing species with a range of sexual dimorphism. Consider selecting at least some birds that the students could see locally.

   Alternatively, involve the class in helping to design an investigation to briefly assess the extent and variation of sexual dimorphism in birds. This investigation should be doable in pairs or small groups using field guides or the Macaulay Library's online archive (http://macaulaylibrary.org). Decide as a class on what kind of scale you will use to score variation in sexual dimorphism. For example, you might want to use a scale of 1 to 5, with 1 showing least dimorphism/most similarity between sexes, and 5 showing most dimorphism. Make sure the class is measuring things on the same scale by agreeing on how the two video examples (gannets and mallards) would each be scored under the class system.

Note: *If it doesn't come up in discussion, introduce the idea of needing to control for evolutionary history. That is, species within a family may have similar or different patterns of sexual dimorphism by virtue of having a common ancestor. In order to conduct a less biased survey of the prevalence of sexual dimorphism, you may want to suggest students only look at one randomly selected species within each family of birds.*

3. Assign pairs of students a certain number of species to research and score, so you get a broad sample and little to no overlap when you pool the class data. You can use the species from **Table 1**, or give the students more freedom in exploring the birds available to them in the Macaulay Library or field guides (which may or may not have detailed information in the Birds of North America relevant to the hypotheses that the class tests). If you are using the Macaulay Library instead of field guides, discuss how they will know the sex of the animals in the videos, and how they will differentiate sexual dimorphism from dimorphism related to age or season. *(Ideas: look at several recordings for the same species, record notes in the "Age/Sex:" field, if any, and note the date and location of the recording, if necessary).*

4. If using the Macaulay Library, it may be a good idea to demonstrate how to use the "Browse by Taxonomy" function to find video examples of specific species (http://macaulaylibrary.org/browse/taxa/aves; see the Macaulay Library tutorial in the **Student Sheets** for more information). If you decide to only look at one species within a family, make sure the students know which Latin ending denotes a family grouping: -*idae*.

5. Pool the class data. This could be done by creating a table or histogram showing the number of species with each dimorphism score (see examples below). At this point the students should be able to see that there is quite a bit of variation among bird species in how sexually dimorphic they are.

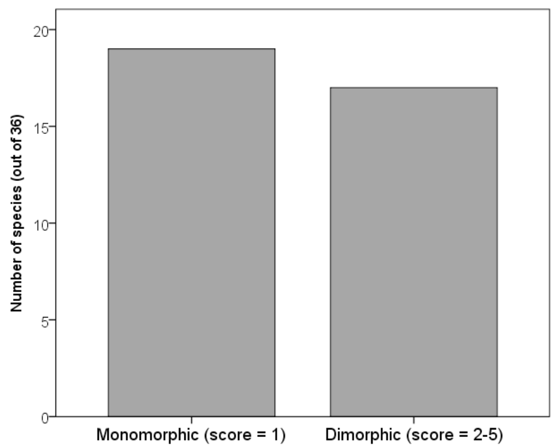
Example table for students to use in their notebooks:

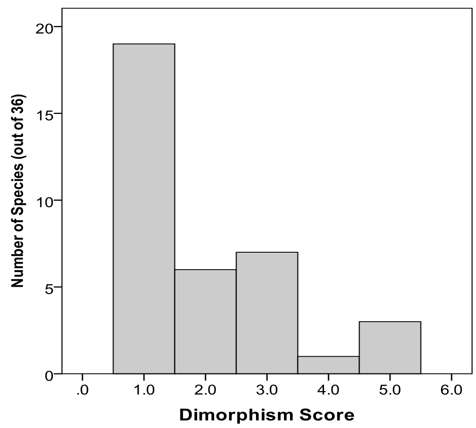
Group ____

Family	Species	Sexual Dimorphism Score

Example summary data

Bar charts or histograms of the number of species versus dimorphism score should be used to demonstrate the extent of variation in sexual dimorphism among bird species. See example graphs below based on 36 of the birds in **Table 1**. You may choose other species.





The general result should be that there is more sexual dimorphism in some bird families than others, and that species differ in how elaborate their plumage ornaments are.

<u>Explanation and Elaboration</u> – *15 minutes*

1. Remind the students that at this point they have investigated *what* variation in sexual dimorphism exists across different bird families, but they haven't yet collected evidence as to *why* this variation exists, or what explains the patterns of dimorphism they are seeing. At this point, you may want to post some form of the question, "What causes the varying degrees of sexual dimorphism we see across bird families?" in front of the class.

2. Ask the students to brainstorm factors that might account for the patterns of sexual dimorphism they see (you may or may not want to formalize these into hypotheses at this point). If students have trouble getting started, ask them what they already know or might need to know about life history or social behavior of these bird families to answer this larger question. Also, what selective pressures might be at work?
   (What they eat, risk of predation, who competes or who does the choosing in courtship and mating, who does the parental care?)

3. After you have brainstormed factors that might come into play, define concepts and terms that may have arisen if these are concepts you have not already covered in class. See the instructor resource, "Presentation-MatingSystems" and the student resource, "Mating Systems Definitions" for help. Some terms you may need to define explicitly include **mating systems**, **monogamy**, **polygyny**, **intra-** and **intersexual selection**, and **extra-pair paternity**. This is best done as a Socratic style discussion: e.g., Ask "Are all monogamous birds truly monogamous in that they mate only with their social partner?" as a lead-in to defining extra-pair paternity. If you wish to spend the time, you could do a matching activity where students match bird species to mating system terms, doing additional research in as needed for unfamiliar terms and species (see, "Mating Systems Activity").

4. Use these concepts and terms to guide the formulation of testable hypotheses and predictions (and see also Webster 1992's table of hypotheses and predictions as an example).

   Refer to the following suggestions for coming up with hypotheses that will be testable using information that can be found in Birds of North America (BNA), and the best supported hypothesis for variation in sexual dimorphism, which is variation in the degree of mate competition as described by mating system.

   Mating Systems Hypothesis: *The best-supported hypothesis for the evolution of sexual dimorphism and elaborate traits is that such traits serve to help males compete for or attract a mate (see Suggested Additional Readings below). Discuss how competition for mates varies among different types of mating systems (social and genetic), with which the students are already familiar.*

   Predictions:
   - *Socially Monogamous without extra-pair paternity = least competition, predict least sexual dimorphism*
   - *Socially Monogamous with extra-pair paternity = more competition, predict more sexual dimorphism*
   - *Polygyny (almost always with extra-pair paternity) = most competition, predict most sexual dimorphism*
   - *Polygynandrous species could be added to this list, those where both males and females have multiple mates with no long-term associations.*

   This is a good opportunity to have the students test among a set of alternative hypotheses.

   Other hypotheses and predictions*:*
   - *Selection for males to be dull to avoid predation while on the nest. This would involve looking at who provides parental care. Since in most bird species females primarily provide care, we would expect them not to be very colorful, since bright colors would increase their chances of predation while at the nest.*

If males also provide care, then natural selection may act against sexual selection to avoid bright males drawing attention to the nest.

- *The length of the breeding season or degree of breeding synchrony could influence competition for mates: longer, more asynchronous breeding seasons could lead to less competition and hence less dimorphism than shorter, more synchronous breeding seasons with intense competition.*

Minimally, the students could test whether mating system or parental care type are better predictors of the degree of sexual dimorphism.

5. Demonstrate how to access BNA Online (http://bna.birds.cornell.edu), and what general information it contains in the species accounts. Highlight sections that will be particularly relevant based on the hypotheses chosen. (e.g., Distinguishing Characteristics, Appearance, Behavior and Breeding). See Instructor Resource "Presentation-BNA" for slides that can be used to introduce students to using BNA.

6. Decide as a class what information to collect from BNA Online species accounts, and come up with a list or table format (as shown below) to keep the group's researching and reporting this information in consistent ways.

   Optional: Demonstrate researching this information on a species or two that is not on your list to investigate.

   For example, if the class is testing between the power of mating systems and parental care systems in predicting the degree of sexual dimorphism, the students would need to gather the following information for each species:

   - *Sexual Dimorphism - Quantify the relative dimorphism of males and females, from 1 being identical to 5 being extremely different.*

   - *Mating System - Determine the mating system and whether there is extra-pair paternity (EPP). Students could decide to categorize the mating systems as described above, or quantify the competition in terms of the % of broods with EPP or the % of males that are polygynous.*

   - *Parental Care – Because parental care can be divided between males and females at various points in avian development, it is best to have the students examine incubation, brooding and feeding separately. One way to do this is to have the students determine whether males, females or both provide care at each stage and then to create a score for parental care. For example, if only females incubated, brooded and fed the young then the score would be 1+1+1 = 3. If both sexes fed the young but only females incubated and brooded, the score would be 1+1+2 = 4. This way you can capture more variation in parental care than if the students just qualify a species as having only uniparental or biparental care. You may also want to use midpoints between 1 and 2 if for* *example, both males and females feed the young but females provide the majority of food.*

- *Below is a table that could be shown to the students on a slide and could be modified to include other hypotheses.*

Species Name and Family:
Sexual Dimorphism Score: *[from 1 (identical) to 5 (very different)]*
Mating System: • *Monogamy without EPP* • *Monogamy with EPP* • *Polygyny*
Who (male, female or both) does each of the following: • *Incubation* • *Brooding* • *Feeding*

7. Assign species either to individuals or small groups, with data to be collected outside of class as homework or in class, depending on how you have structured the exercise. The species assignments can be determined by the instructor prior to class and shown on a slide that lists the students' names and which species they should research (see **Table 1** below). If students collect the data outside of class, it is helpful to assign some points to their response, to ensure they get the data to the instructor in a timely manner.

<u>Evaluation</u> - *10 minutes in class, with optional additional instructor time outside of class*

Note: *While the "5E" constructivist model of instructional design* suggests that an important step at this stage is to engage students in evaluating their own knowledge of the concepts, depending on the learning objectives of the course and the level of the students, you may choose to omit or simplify some parts of the analysis.*

1. Once all of the data have been collected, decide as a class how to test the hypotheses and present the students' findings. If in-class time is limited and students have varying degrees of familiarly with statistics, the instructor may want to do the

* For more information, see Biological Sciences Curriculum Study and the work of its former executive director Rodger Bybee: http://www.bscs.org

complicated analyses outside of class. The students can email the instructor the data they collected for homework for each species, the instructor can analyze the data outside of class, and then the following class period can be used to briefly summarize the analytical methods used and view and discuss the results.

Ways to consolidate and present the data:

Technically speaking, sexual dimorphism scores are not going to meet the assumptions of parametric tests (like ANOVA or t-tests) because the scores are unlikely to be normally distributed. The best options would be to use non-parametric tests, as suggested below.

Plot and use a non-parametric Kruskall-Wallis ANOVA to compare the mean dimorphism score for species with different types of mating systems.

Use a non-parametric correlation to examine the relationship between dimorphism and % of polygynous nests or % of broods with EPP if the students collect those data from BNA.

Look for a difference in dimorphism among groups with biparental care versus only maternal care or if care was scored as described above, then a non-parametric correlation would be appropriate.

Similar types of analyses could be conducted for testing other hypotheses, such as whether sexual dimorphism varied among groups with different types of nests or different lengths of breeding seasons.

You should see that in general, the degree of sexual dimorphism increases with the level of competition for mates (as determined by the social mating system, in combination with EPP).

Compare the relative support for the alternative hypotheses. Does mating system or parental care (or nest type, etc.) best relate to dimorphism? This could be done by just comparing the conclusions drawn separately from each hypothesis, or by putting together a more complex generalized linear model that includes sexual dimorphism as the dependent variable and data collected for each of the hypotheses as predictor variables.

<u>Closure</u> - *5 minutes*

1. Ask the students to summarize in pairs what the class found, then ask one pair to describe the findings to the entire class. Involve others in describing why, in evolutionary terms, they see this pattern – i.e., as competition intensifies, males that are more elaborate are more successful at acquiring mates than those that are not elaborate. At the same time, there are costs to being elaborate *(energy, predation risk, etc.)* and so selection will not favor elaborate females or elaborate males if they

provide extensive parental care. Also discuss any exceptions to this pattern and what factors might account for these exceptions.

2. If this is a 90-minute class, the students can begin the assessment questions given below, working either individually or in their groups. Otherwise they can do them for homework.

Assessment Strategies

1. Assessment will take place before the investigation via the class discussions.

2. During the investigation you can assess student understanding by circulating around the room and asking questions.

3. After the investigation the students will complete homework questions that assess their understanding of the material and evolutionary theory in general.

Answers to Student Questions

Assign these questions as homework for this investigation, to extend into future lessons, or use them as exam questions.

1. Why is it important to control for evolutionary history in this type of analysis?

   Some species might look and behave similarly because they share a recent common ancestor. Including closely related species is a type of pseudo-replication because they are not independent samples.

2. Are there correlations among body size, mating system and ornaments? What role might body size play in competition for mates?

   Instead of developing elaborate plumage some males might use their size to compete for mates. Males may be larger than females when mate competition is intense.

3. How could variation in parental care influence sexual dimorphism?

   If not proposed earlier, predation pressures could select for individuals that provide parental care to be dull, so they are not easily observed on the nest. The degree to which males and females provide care is related to their social mating system and therefore also related to sexual dimorphism. For example, in species where females provide most of the care (polygynous species) predation pressures may select against female but not male elaboration, whereas in monogamous species with biparental care, predation pressures would also select against male elaboration.

4. What would you expect to happen when different populations of the same species have different mating systems?

You would expect some variation among populations in sexual dimorphism that coincides with variation in their mating systems. Often, however, we do not study multiple populations of the same species. As an independent project students could investigate studies of geographic variation in morphology and behavior within a species.

Alternatively, we may see morphological similarity among populations with different mating systems because of an evolutionary time lag. For example, the mating system may change more rapidly than the birds' plumage.

5. What other traits do birds use to attract mates and what predictions would you make about how these relate to mating systems and to sexual dimorphism?

    Some species have multiple signals that they use in mate competition, like song and behavior, instead of or in addition to plumage. For example in some species males may use song and behavior to attract mates rather than elaborate plumage.

6. Pick one of the above questions and use your answer to outline a hypothesis and how you would test it. Make sure to include the data you would need to collect, your predictions, and how you would evaluate the hypothesis with your data.

    Answers will vary.

Suggested Additional Readings

Michael S. Webster. 1992. Sexual Dimorphism, Mating system and body size in New World blackbirds (Icterinae). Evolution, 46: 1621-1641.

Harem size is shown to be positively related to sexual size dimorphism.

A. P. Moller and T. R. Birkhead. 1994. The evolution of plumage brightness in birds is related to extrapair paternity. Evolution, 48: 1089-1100.

Male showiness but not female showiness (sexual dimorphism) was positively related to rates of extra-pair paternity.

Ian P. F. Owens and Ian R. Hartley. 1998. Sexual dimorphism in birds: why are there so many different forms of dimorphism? Proc. R. Soc. Lond. B, 265, 397-407.

Size dimorphism associated with social mating system, whereas plumage-color dimorphism is associated with extra-pair paternity. The correlation between overall plumage-color dimorphism and the rate of extra-pair paternity is due to structural colors, whereas melanin-based dimorphism is associated with sex differences in parental care.

Peter O. Dunn, Linda A. Whittingham, Trevor E. Pitcher. 2001. Mating systems, sperm competition, and the evolution of sexual dimorphism in birds. Evolution, 55, 161-175.

In this review of 1000 bird species, testis size (genetic mating system) and social mating system are both shown to be related to sexual dimorphism, with social mating system a better predictor than extra-pair mating.

Table 1. Example species with information on parental care (as described above) mating systems and dimorphism collected from Birds of North America (BNA) Online.

- Additional species could be added to this table. The key is to focus on hypotheses for which you can collect data consistently across all of the species you include, which may require examining the species account of any candidate species.
- Other details are usually available for the mating systems of each species.
- The students may score appearance slightly differently than it is presented here.
- It is best to assign an equal number of species from each mating system type. Sample size will be limited by the groups with polygyny (only 2% of bird species) and monogamy without extra-pair paternity.
- To control for non-independence, select only one species from any given family.

Common Name	Scientific Name	Family	Incubation	Brooding	Feeding	Parental Care Sum	Sexual Dimorphism
Monogamous no EPP							
Bald Eagle	*Haliaeetus leucocephalus*	Accipitridae	1.0	1.0	2.0	4.00	1.0
Blue-headed Vireo	*Vireo solitaries*	Vireonidae	2.0	2.0	2.0	6.00	1.0
California Towhee	*Melozone crissalis*	Emberizidae	1.0	1.0	2.0	4.00	1.0
Carolina Wren	*Thryothorus ludovicianus*	Troglodytidae	1.0	1.0	2.0	4.00	1.0
American Crow	*Corvus brachyrhynchos*	Corvidae	1.0	1.0	2.0	4.00	1.0
Eastern Screech-Owl	*Megascops asio*	Strigidae	1.0	1.0	1.5	3.50	1.0
Florida Scrub Jay	*Aphelocoma coerulescens*	Corvidae	1.0	1.0	2.0	4.00	1.0
Mute Swan	*Cygnus olor*	Anatidae	1.0	2.0	2.0	5.00	1.0
Northern Gannet	*Morus bassanus*	Sulidae	2.0	2.0	2.0	6.00	1.0
Monogamous w/ EPP							
Bank Swallow	*Riparia riparia*	Hirundinidae	2.0	2.0	2.0	6.00	1.0
Black-capped Chickadee	*Poecile atricapillus*	Paridae	1.0	1.0	2.0	4.00	1.0

Common Loon	*Gavia immer*	Gaviidae	2.0	2.0	2.0	6.00	1.0
Common Yellowthroat	*Geothlypis trichas*	Parulidae	1.0	1.0	1.0	3.00	3.0
Dark-eyed Junco	*Junco hyemalis*	Emberizidae	1.0	1.0	2.0	4.00	2.0
Eastern Kingbird	*Tyrannus tyrannus*	Tyrannidae	1.0	1.0	2.0	4.00	2.0
House Finch	*Haemorhous mexicanus*	Fringillidae	1.0	1.0	2.0	4.00	2.0
House Wren	*Troglodytes aedon*	Troglodytidae	1.0	1.0	2.0	4.00	1.0
Indigo Bunting	*Passerina cyanea*	Cardinalidae	1.0	1.0	1.0	3.00	5.0
Mexican Jay	*Aphelocoma ultramarina*	Corvidae	1.0	1.0	2.0	4.00	1.0
Northern Cardinal	*Cardinalis cardinalis*	Cardinalidae	1.0	1.0	2.0	4.00	5.0
Prairie Warbler	*Setophaga discolor*	Parulidae	1.0	1.0	1.0	3.00	1.0
Tufted Titmouse	*Baeolophus bicolor*	Paridae	1.0	1.0	2.0	4.00	1.0
Western Bluebird	*Sialia mexicana*	Turdidae	1.0	1.0	2.0	4.00	3.0
White-throated Sparrow	*Zonotrichia albicollis*	Emberizidae	1.0	1.0	2.0	4.00	2.0
Wood Thrush	*Hylocichla mustelina*	Turdidae	1.0	1.0	2.0	4.00	1.0
Yellow Warbler	*Setophaga petechia*	Parulidae	1.0	1.0	1.5	3.50	3.0
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Icteridae	1.0	1.0	1.5	3.50	3.0
Polygynous							
Bobolink	*Dolichonyx oryzivorus*	Icteridae	1.0	1.0	1.5	3.50	5.0
Dickcissel	*Spiza americana*	Cardinalidae	1.0	1.0	1.0	3.00	3.0
Eastern Meadowlark	*Sturnella magna*	Icteridae	1.0	1.0	1.5	3.50	2.0
Marsh Wren	*Cistothorus palustris*	Troglodytidae	1.0	1.0	1.0	3.00	3.0
Red-winged Blackbird	*Agelaius phoeniceus*	Icteridae	1.0	1.0	2.0	4.00	4.0
Savannah Sparrow	*Passerculus sandwichensis*	Emberizidae	1.0	1.5	2.0	4.50	1.0
Wild Turkey	*Meleagris gallopavo*	Phasianidae	1.0	1.0	1.0	3.00	3.0
Winter Wren	*Troglodytes hiemalis*	Troglodytidae	1.0	1.0	1.5	3.50	1.0
Ring-necked Pheasant	*Phasianus colchicus*	Phasianidae	1.0	1.0	1.0	3.00	3.0
Greater Sage-Grouse	*Centrocercus urophasianus*	Phasianidae	1.0	1.0	1.0	3.00	3.0