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# IMPORTANT BIRD AREAS PROGRAM IN WEST VIRGINIA

McNair Scholar's Program

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# IMPORTANT BIRD AREAS PROGRAM IN WEST VIRGINIA

## Introduction

### Background

The Important Bird Area (IBA) program is a national effort designed to compile a list of priority areas that need protection in order to sustain healthy and diverse bird populations. The IBA sites are selected based on standard scientific criteria (1). Once a site is selected, information on the site is gathered in order to determine the appropriate conservation action. The conservation action will allow the currently declining bird populations in West Virginia and other states to increase. The IBA will simultaneously provide protection for other fauna and flora.

The first IBA program was established in 1985 by Bird Life International to create a list of sites that were important habitats for birds, with a focus on land conservation (2). Currently in Europe, over 65,000 $km^2$ of land has protection (3). This IBA land amounts to approximately the size of West Virginia. In 1995, due to the success in Europe, the National Audubon Society launched the first IBA program in the United States. The first state to participate was Pennsylvania, followed by New York (4). The program is currently underway in over thirty states (5).

In the United States there are at least 4,280 species of the 9,700 species of birds found worldwide (6). Of these 4,280 found in the United States, 184 (or 4.3%) are threatened or endangered (6). Many more bird populations are suffering from long-term population declines due to development pressures. Canterbury and Baumgarten write that the most significant long-term threats facing bird populations are habitat loss and degradation (1). While development pressures play an important part in declining bird populations, other factors have also taken a toll on bird populations, for example, water pollution, pesticides, natural predators, and unnatural

predators. Birds are an important part of the ecosystem because they influence all living things including humans via food web interactions (1). Since birds are an important component of the environment, the IBA program of West Virginia could become a part of the fight to promote healthy bird populations both locally and globally. For example, approximately 20% of the entire breeding population of both Golden-winged and Cerulean warblers nest in West Virginia (7). The state also harbors many other species of concern, including the Peregrine falcon and the federally threatened Bald Eagle. The IBA's goal for West Virginia is to preserve habitats that are essential for healthy bird populations, promote environmental conservation, and educate the public on the importance of bird populations.

West Virginia is a state of diverse habitat. The flora and fauna of the state vary dramatically depending on the location. The different types of habitat include heath barrens, sphagnum glades, grasslands, shale barrens, and differing degrees of forestation (8). There are no natural lakes but many rivers, streams, ponds, and riparian areas. A small percentage of the land is used for agriculture and even a smaller amount of the state is classified as urban or industrial (9). However, the state becomes increasingly urbanized each year. There are parts of West Virginia that have been used for mining, especially in the southern portion. These mining sites provide grassland and shrub land habitats for birds. West Virginia is known as "four seasons country" due to the variable climate and distinguishable seasons. The coldest month averages between 18°C and -3°C, while the warmest month is usually above 22°C (9). The state receives adequate rainfall throughout the year but varies dramatically depending on the region. The average rainfall can vary from 64 cm to as much as 174 cm a year (9).

For a site to be chosen as a West Virginia IBA, it must meet only one of five criteria, although many of the sites in West Virginia will meet more than one. The first criterion is that

the habitat must regularly support wintering, or a migratory population of a threatened or endangered species. The second criterion is for the habitat to support a significant population of a species or maintain a "watch list" species. A watch list (or a blue list) is a list of birds published by the National Audubon Society to provide an early warning of birds that appear to be undergoing noncyclic population declines (10). This information allows interested parties to focus on species of concern before they become threatened or endangered. The third criterion is to support a species with a rare, threatened, or specialized habitat. The fourth criterion is to support a substantial portion of the total population of a species, large concentrations of one or more species of birds, or a high diversity of species. The final criterion that a site can meet is to be a habitat where long-term scientific research or education regarding birds is conducted.

**Objectives**

The objectives of this research project were to design and implement a West Virginia IBA program and to foster a communication link between birders and lawmakers in order to conserve bird habitats (IBA Sites). A grant of $105,509 was requested in order to establish and implement the program (1). This grant provides for a state director, a principle investigator, travel to examine nominated sites, subcontracts to steering committee members and citizens science work, publication of an IBA book, newsletters, marketing, and indirect costs (1). Five main goals were pursued. First, a West Virginia IBA web site was developed and maintained in order to promote public awareness (http://students.concord.edu/wviba). Second, a West Virginia IBA site nomination form and guidelines was developed and distributed throughout each county in West Virginia. This leads to the third goal of developing a contact with at least one to three birders in each county of West Virginia. The fourth goal was to obtain at least 150 site nominations from all 55 counties of West Virginia. The fifth goal of this project was to select a

technical committee, which will be made up of top ornithologists of West Virginia. Finally, additional goals were added to the project, which were to use point count data to evaluate potential West Virginia IBA sites and to evaluate data for a highly imperiled neotropical migrant, the Cerulean Warbler.

## Methods

First a West Virginia IBA website was developed using Microsoft Front Page 2000. As the program continues, the website will be modified to meet that stage (identification, designation, protection, and monitoring) of the program. The website contains a description of the IBA program, West Virginia IBA contact information, and a description of the endangered, threatened, and watch list bird species in West Virginia. The website (http://students.concord.edu/wviba) also contains the nomination form, guidelines, and criteria for selecting the West Virginia IBA sites. The West Virginia IBA nomination form, guidelines, and criteria were developed by modifying forms used in Pennsylvania, New York, and Connecticut. These forms were pre-approved by Dr. Ronald Canterbury and Russ McClain, who are the co-chairs of the IBA steering committee. All forms and procedures for West Virginia IBA go through a peer-review process.

The second phase of the project was to obtain at least one birding contact from each of the 55 counties in West Virginia (preferably two or three). These contacts are responsible for filling out the nomination form and supplying all other necessary information needed for the technical committee to review. Contacts are volunteers comprised of professional ornithologists, birders, and students. These contacts are responsible for nominating at least five sites in their county. The goal was to obtain at least 150 nomination forms for the state. The contacts are

critical to the success of the IBA program, without them, the nomination of the sites would not be possible.

The third phase was to assist Dr. R. Canterbury and Russ McClain in developing a technical committee. The committee was proposed by the West Virginia Partners in Flight to consist of twelve of the state's top ornithologists. This technical committee will be responsible for reviewing all the nomination forms and making the final decision on the sites West Virginia IBA status. The technical committee will then work with landowners, both private and public, as well as government and lawmakers to implement conservation strategies on IBA's.

These objectives can be accomplished during the first year of the IBA program; however, the West Virginia IBA program will be ongoing. After the initial site list is compiled, research on the sites will be done to determine what type of conservation action for the land will be needed in order to promote healthy bird populations. Further information will be gathered in order to publish a West Virginia IBA book that will steer conservation activists and government officials to the areas in West Virginia that are in the greatest need of protection. All of this information will also be entered into a global IBA database to reflect the changes of bird populations in order to better understand how human activity affects birds and the natural environment. The website will be modified as needed by members of the West Virginia IBA program.

The final phase of the project was to analyze point count data from sites that could be potential IBA sites. Point counts can be the main method of monitoring the population changes of breeding land birds (11). Some researchers believe that point counts are the best method of tracking while others believe that a combination of point counts and banding is essential for accurate tracking. Point counts are best conducted at daybreak due to the birds being more

active during this time. The observer stands in a designated location and notes the position of the birds (usually males) on a survey. The birds are usually recognized by their individual songs which takes years of practice to master. The state, region, date, temperature, and weather conditions are all noted on the survey. This information is then compiled and entered into a database in order to see population patterns.

For this research, fourteen sets of point count data were examined (Table 1). The data included counts from Slab Fork, Peachtree Ridge, Indian Creek, Little Bluestone River, Big Creek, Crane Creek, Dawson, Lacey Branch, and Panther State Forest. The data was analyzed by entering observer, county, date, and number of species into SPSS. We used analysis of variance (ANOVA), multivariate analysis of variance (MANOVA), and regression analysis to analyze these data. The amount of computer memory limited a single test of general factorial ANOVA, so multiple tests had to be performed, and thus, increasing our chances of type I error. We minimized for type I error during multiple tests by dividing the expected 0.05 significance by sample size and by using multiple regressions for predicting trends or dependent variables from a suite if independent variables.

**Results**

The website was developed first (http://students.concord.edu/wviba). As Breeding Bird Survey data, nomination forms, guidelines, criteria, and pictures were obtained or finished they were added to the website. The website address was sent out to West Virginia birders to promote awareness. The nomination forms (appendix A) are currently being distributed, along with the guidelines (appendix B) and criteria (appendix C) in order to select potential IBA sites. The third goal of obtaining at least one contact for each of West Virginia's fifty-five counties is still ongoing. At the time of this writing, there are twenty-three contacts for twenty-two counties.

The fourth goal of obtaining 150 nominations was not accomplished. The fifth goal of selecting a technical committee was also not accomplished.

The sixth objective of analyzing the point count data produced many results. The number of species across sites differed substantially, Figure 1 ($F = 6.13$, $P < 0.031$). The number of individuals per species and the number of species varied across sites (MANOVA results, see Table 2). The frequency of species detected across sites is shown in Figure 2. This figure shows relationships among species present, total number of each species for the 14 point counts, and frequency (how many out of the 14 sites each species occurred). The total number and frequency were positively related, (Table 3, $r = 0.67$, $P < 0.01$).

The number of species detected across the 14 sampling points may vary with locality or site (see above), observer ($F = 16.80$, $P < 0.001$), and county ($F = 8.45$, $P < 0.006$), but these results should be interpreted with caution because of the potential for type I error. Further, the number of species observed was correlated with site (locality of point), county, and observer (see Table 4). The fact that observers covered certain counties each time, and probably gained experience with those counts, is revealed by correlation in Table 4 ($r = 0.68$, $P < 0.01$).

Analysis of Cerulean warbler point count data indicated that the number of birds detected did not vary with elevation, locality (site), and observer (ANOVA results, Table 5). However, a regression analysis ($r^2 = 0.20$, $F = 2.71$, $P < 0.043$) showed that the number of Ceruleans in a given area could be predicted by these independent variables. Examination of Table 6 shows that the most significant predictor was county ($t = -2.04$, $P < 0.047$), which is indicative that we need more coverage in other counties.

## Discussion

The website has had over five hundred hits by the November 20 2001. This number will continue to increase as the website is used more for obtaining forms and contacting other West Virginia IBA members. The nomination form, guidelines, and criteria are peer reviewed and ready for dissemination (http://students.concord.edu/wviba).

Obtaining a contact for each county proved to be difficult. We believe the program will receive more volunteers and support when full funding is obtained. The 150 nominations were not obtained due to lack of approval from the Division of Natural Resources on the nomination form, criteria, and guidelines.

The goal of obtaining a technical committee was not accomplished due to ongoing discussions with the Division of Natural Resources on who and how the IBA program should be conducted in West Virginia. The lack of funding also played a role.

The point count data showed that sites can be evaluated by the species found, but other factors also need to be considered such as, observer, number of sites per county, type of habitat, etc. For example, we found only thirty-four Northern Cardinals across eleven of fourteen sites. This evidence suggests that the species is habitat generalists because it is found across so many sites. Nevertheless, why such a small number of birds were found across the eleven sites will have to be studied further. With the incorporation of all of the counties point count and banding data into a West Virginia database, we will gain invaluable information about bird populations.

Because most states are pursuing an IBA program and at least two states having published an IBA book, the program definitely appears to be manageable. The program cannot be a success if support is not generated. This should not be a problem for West Virginia, as many individuals and organizations have expressed an interest in the program, including Partners

in Flight, West Virginia Division of Natural Resources, National Audubon Society, and Brooks Bird Club.

The IBA program has already become a global tool for conservation of essential bird habitats. With plenty of interest and support the West Virginia IBA program will also become a powerful state tool for conserving essential bird habitats. The West Virginia IBA program also has the advantage of protecting West Virginia flora and non-avian fauna that inhabit the IBA sites. Although the IBA site designation does not offer complete protection, it does draw the attention of the public and local lawmakers. Without the landowner's willingness to contribute to environment conservation, the IBA programs would not be possible. Above all, we need to realize that we have the power to protect our natural environment. With the collaboration of land owners/managers, the public, government officials, organizations, educators, and students, the West Virginia IBA program will have an enormous impact on the environment and our future.

**Table 1**: The 14 point counts analyzed in this research.

| Route ID | Observer | County | Date | Number of Species |
|---|---|---|---|---|
| Big Creek | Allen Waldron | McDowell | 20-Jun-00 | 34 |
| Big Creek | Dollie Stover | McDowell | 06-Jun-99 | 43 |
| Crane Creek | Allen Waldron | Wyoming | 04-Jun-00 | 32 |
| Crane Creek | Dollie Stover | Wyoming | 06-Jun-98 | 28 |
| Crane Creek | Allen Waldron | Wyoming | 05-Jun-99 | 34 |
| Dawson | Dollie Stover | Greenbrier | 11-Jun-00 | 34 |
| Dawson | Allen Waldron | Greenbrier | 13-Jun-99 | 34 |
| Dawson | Dollie Stover | Greenbrier | 14-Jun-98 | 43 |
| Lacey Branch | Allen Waldron | Boone | 20-Jun-99 | 26 |
| Panther State Forest | Allen Waldron | McDowell | 19-Jun-97 | 34 |
| Peachtree Ridge | Ron Canterbury | Raleigh | 02-Jun-97 | 47 |
| Slab Fork Strip | Dollie Stover | Wyoming | 30-May-98 | 39 |
| Little Bluestone River | Ron Canterbury | Summers | Jun-July 1998 | 58 |
| Indian Creek | Ron Canterbury | Summers | Jun-July 1998 | 53 |

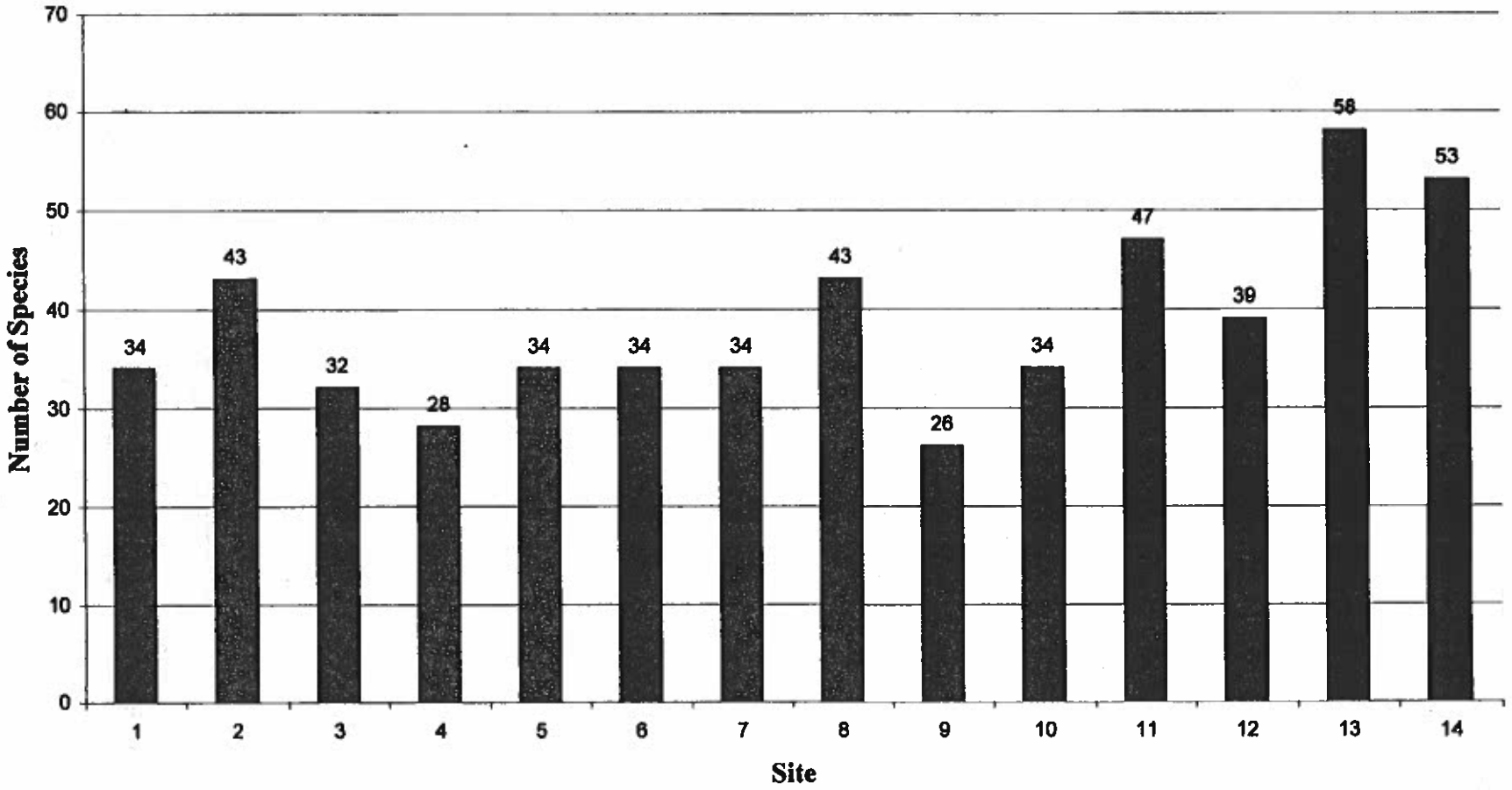


**Figure 1:** Indicates the number of species found at each site differs substantially.

Sites 1 & 2 = Big Creek Sites 3, 4 & 5 = Crane Creek Site 6, 7, & 8 = Dawson
Site 9 = Lacey Branch Site 10 = Panther State Forest Site 11 = Peachtree Ridge
Site 12 = Slab Fork Strip Site 13 = Litle Bluestone River Site 14 = Indian Creek .

**Table 2:** MANOVA test showing the number of individuals per species and the number of species varied across the point count sites.

| Effect | | Value | F | Hypothesis df | Error df | Sig. |
|---|---|---|---|---|---|---|
| Intercept | Hotelling's Trace | 220.083 | 220.083 | 3.000 | 3.000 | 0.001 |
| Site No. | Hotelling's Trace | 63.784 | 4.429 | 24.000 | 5.000 | 0.052 |

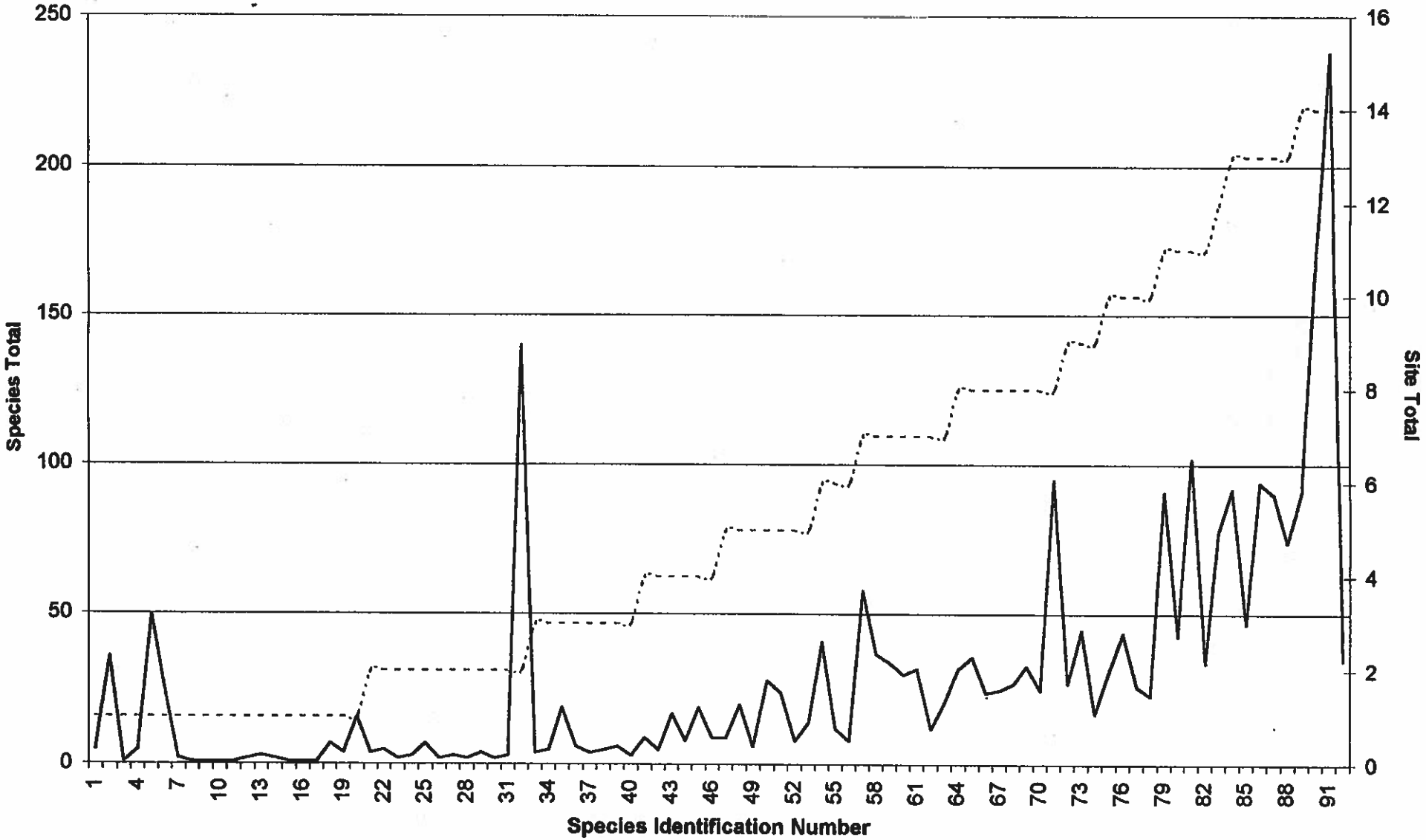


**Figure 2**: The x-axis represents the 93 different species of birds found in the point count data. The left y-axis represents the total number of that species found across the sites. The right y-axis represents the number of sites that specific species was found out of the 14 sites.

**Figure 2**

| Identification | Abbreviation | Species Name | Total Count | Site Occurrence |
|---|---|---|---|---|
| 1 | BAOR | Baltimore Oriole | 5 | 1 |
| 2 | BAOW | Barred Owl | 36 | 1 |
| 3 | BCCH | Black-capped Chickadee | 1 | 1 |
| 4 | BLPW | Blackpoll Warber | 5 | 1 |
| 5 | BTNW | Black-throated Green Warbler | 50 | 1 |
| 6 | CAGO | Canada Goose | 25 | 1 |
| 7 | CHSW | Chimney Swift | 2 | 1 |
| 8 | COHA | Cooper's Hawk | 1 | 1 |
| 9 | EABL | Eastern Bluebird | 1 | 1 |
| 10 | EAKI | Eastern Kingbird | 1 | 1 |
| 11 | EAME | Eastern Meadowlark | 1 | 1 |
| 12 | EUST | European Starling | 2 | 1 |
| 13 | GRHE | Green Heron | 3 | 1 |
| 14 | HOWR | House Wren | 2 | 1 |
| 15 | LEFL | Least Flycatcher | 1 | 1 |
| 16 | MOWA | Mourning Warbler | 1 | 1 |
| 17 | RTHA | Red-tailed Hawk | 1 | 1 |
| 18 | SCJU | Slate-colored Junco | 7 | 1 |
| 19 | TRES | Tree Swallow | 4 | 1 |
| 20 | YSFL | Yellow-shafted Flicker | 16 | 1 |
| 21 | BRTH | Brown Thrasher | 4 | 2 |
| 22 | BWHA | Broad-winged Hawk | 5 | 2 |
| 23 | GBHE | Great Blue Heron | 2 | 2 |
| 24 | GRSP | Grasshopper Sparrow | 3 | 2 |
| 25 | MALL | Mallard | 7 | 2 |
| 26 | OROR | Orchard Oriole | 2 | 2 |
| 27 | PRAW | Prairie Warbler | 3 | 2 |
| 28 | SSHA | Sharp-shinned Hawk | 2 | 2 |
| 29 | TUVU | Turkey Vulture | 4 | 2 |
| 30 | WIFL | Willow Flycatcher | 2 | 2 |
| 31 | WIWR | Winter Wren | 3 | 2 |
| 32 | WOTH | Wood Thrush | 140 | 2 |
| 33 | BEKI | Belted Kingfisher | 4 | 3 |
| 34 | CORA | Common Raven | 5 | 3 |
| 35 | EWTU | Eastern Wild Turkey | 19 | 3 |
| 36 | LOWA | Louisiana Waterthrush | 6 | 3 |
| 37 | RSHA | Red-shouldered Hawk | 4 | 3 |
| 38 | RTHU | Ruby-throated Hummingbird | 5 | 3 |
| 39 | RUGR | Ruffed Grouse | 6 | 3 |
| 40 | YWAR | Yellow Warbler | 3 | 3 |
| 41 | BHCO | Brown-headed Cowbird | 9 | 4 |
| 42 | BWWA | Blue-winged Warbler | 5 | 4 |
| 43 | GRCA | Gray Catbird | 17 | 4 |
| 44 | NRWS | Northern Rough-winged Swallow | 8 | 4 |
| 45 | RWBL | Red-winged Blackbird | 19 | 4 |
| 46 | VEER | Veery | 9 | 4 |
| 47 | BBCU | Black-billed Cuckoo | 9 | 5 |
| 48 | CHSP | Chipping Sparrow | 20 | 5 |

| | | | | |
|---|---|---|---|---|
| 49 | HAWO | Hairy Woodpecker | 6 | 5 |
| 50 | NOPA | Northern Parula | 28 | 5 |
| 51 | RBGR | Rose-breasted Grosbeak | 24 | 5 |
| 52 | RBWO | Red-bellied Woodpecker | 8 | 5 |
| 53 | WBNU | White-breasted Nuthatch | 14 | 5 |
| 54 | COYE | Common Yellowthroat | 41 | 6 |
| 55 | YTVI | Yellow-throated Vireo | 12 | 6 |
| 56 | YTWA | Yellow-throated Warbler | 8 | 6 |
| 57 | AMRE | American Redstart | 58 | 7 |
| 58 | BGGN | Blue-gray Gnatcatcher | 37 | 7 |
| 59 | BTBW | Black-throated Blue Warbler | 34 | 7 |
| 60 | CEDW | Cedar Waxwing | 30 | 7 |
| 61 | FISP | Field Sparrow | 32 | 7 |
| 62 | GCFL | Great-crested Flycatcher | 12 | 7 |
| 63 | WEVI | White-eyed Vireo | 21 | 7 |
| 64 | ACFL | Acadian Flycatcher | 32 | 8 |
| 65 | AMRO | American Robin | 36 | 8 |
| 66 | CERW | Cerulean Warbler | 24 | 8 |
| 67 | CSWA | Chestnut-sided Warbler | 25 | 8 |
| 68 | EAWP | Eastern Wood-Peewee | 27 | 8 |
| 69 | GWWA | Golden-winged Warbler | 33 | 8 |
| 70 | MODO | Mourning Dove | 25 | 8 |
| 71 | WEWA | Worm-eating Warbler | 95 | 8 |
| 72 | BHVI | Blue-headed Vireo | 27 | 9 |
| 73 | CARW | Carolina Wren | 45 | 9 |
| 74 | EAPH | Eastern Phoebe | 17 | 9 |
| 75 | DOWO | Downy Woodpecker | 31 | 10 |
| 76 | KEWA | Kentucky Warbler | 44 | 10 |
| 77 | PIWO | Pileated Woodpecker | 26 | 10 |
| 78 | SOSP | Song Sparrow | 23 | 10 |
| 79 | BAWW | Black-and-white Warbler | 91 | 11 |
| 80 | BLJA | Blue Jay | 43 | 11 |
| 81 | HOWA | Hooded Warbler | 102 | 11 |
| 82 | NOCA | Northern Cardinal | 34 | 11 |
| 83 | ETTI | Tufted Titmouse | 78 | 12 |
| 84 | AMGO | American Goldfinch | 92 | 13 |
| 85 | CACH | Carolina Chickadee | 47 | 13 |
| 86 | EATO | Eastern Towhee | 94 | 13 |
| 87 | OVEN | Ovenbird | 90 | 13 |
| 88 | SCTA | Scarlet Tanager | 74 | 13 |
| 89 | AMCR | American Crow | 91 | 14 |
| 90 | INBU | Indigo Bunting | 166 | 14 |
| 91 | REVI | Red-eyed Vireo | 238 | 14 |
| 92 | YBCU | Yellow-billed Cuckoo | 35 | 14 |

**Table 3:** Pearson-product-moment correlations among species, number of individuals, and the frequency of each taxon (N = 93 species).

| | | SPECIES | NUMBER | FREQ |
|---|---|---|---|---|
| Pearson Correlation | SPECIES | 1.000 | -0.059 | -0.086 |
| | NUMBER | -0.059 | 1.000 | 0.668** |
| | FREQ | -0.086 | 0.668** | 1.000 |
| Sig. (2-tailed) | SPECIES | . | 0.574 | 0.410 |
| | NUMBER | 0.574 | . | 0.000 |
| | FREQ | 0.410 | 0.000 | . |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 4:** Pearson-product correlations among species, site, county, and observer (N = 14 sites).

| | | SPECIES | SITE | COUNTY | OBSERVER |
|---|---|---|---|---|---|
| Pearson Correlation | SPECIES | 1.000 | 0.680** | 0.682** | 0.817** |
| | SITE | 0.680** | 1.000 | 0.900** | 0.664** |
| | COUNTY | 0.682** | 0.900** | 1.000 | 0.722** |
| | OBSERVER | 0.817** | 0.664** | 0.722** | 1.000 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 5:** ANOVA of Cerulean warbler point count data indicating that the number of birds detected did not vary with elevation, site, and observer.

| | | | Unique Method | | | | |
|---|---|---|---|---|---|---|---|
| | | | Sum of Squares | df | Mean Square | F | Sig. |
| CEWA | Covariates | ELEVATION | 38.006 | 1 | 38.006 | 0.740 | 0.480 |
| | Main Effects | (Combined) | 1540.061 | 43 | 35.815 | 0.698 | 0.750 |
| | | SITE | 1401.068 | 41 | 34.172 | 0.666 | 0.765 |
| | | OBSERVER | 105.845 | 2 | 52.923 | 1.031 | 0.492 |
| | Model | | 1562.190 | 44 | 35.504 | 0.692 | 0.753 |
| | Residual | | 102.661 | 2 | 51.330 | | |
| | Total | | 1664.851 | 46 | 36.192 | | |

**Table 6:** Standardized regression coefficients and their probabilities of predicted numbers of Cerulean warblers from site, county, quadrant, and elevation.

| | Beta | t | Sig. |
|---|---|---|---|
| (Constant) | | 2.410 | 0.020 |
| SITE | -0.270 | -1.668 | 0.103 |
| COUNTY | -0.325 | -2.042 | 0.047 |
| QUAD | 0.102 | 0.588 | 0.559 |
| ELEV | 0.143 | 1.009 | 0.319 |


# Important Bird Areas in West Virginia

## Nomination Form

The West Virginia IBA Program is conducting an inventory of habitats that may qualify as Important Bird Areas. T qualify, a site needs to meet only *one* of the IBA criteria, although many sites will meet several. Please tell us about areas that you think may meet the criteria. Complete as much of this form as possible, by referring to the accompanying guidelines and criteria. Thank you for participating in the West Virginia Important Bird Area Project Please type or print the entries and return to **Dr. R. Canterbury at Concord College, P.O. Box 1000, Campus Box 87, Athens, WV 24712.** If further assistance is needed, please contact canterburyr@concord.edu

****** To Print Please Set ALL Margins to 0.25 ******

### 1. General Information

Site Name _____ Submission Date ___/___ /___

Town(s) _____ County _____

Latitude_____ Longitude _____ Approx. size (acres)_____

Approx. elevation (ft.) if a range, give low-high_____

General description of the site (habitat, location, prominent features, ownership, and any other helpful information):

_____

### 2. IBA Criteria (Check *all* that apply): *PLEASE READ CRITERIA FOR SITE SELECTION IN GUIDELINES FIRST*

Why is this site important for West Virginia Birds?

- ☐ 1. Endangered or Threatened Species _____
- ☐ 2. High Conservation Priority Species _____
- ☐ 3. Rare, Unique, or Representative Habitat _____
- ☐ 4a. 100+ waterfowl (winter)/ 300+ waterfowl (staging) _____
- ☐ 4b. 10 + breeding pairs wading birds/50+ indiv. Staging, feeding _____
- ☐ 4c. 3,000+ raptors (seasonal)_____
- ☐ 4d. Exceptional concentrations of migratory land birds_____
- ☐ 4e. Single-species Concentrations (>1%)_____
- ☐ 5. Long-term research and/or monitoring_____

# West Virginia Important Bird Areas

## Nomination Form

**Name of Site:** _____ **Submission Date**____/____/_____

### 3. Contact Information

Name _____ Phone ___(___)_____

Address _____ Fax ____(___)_____

City _____ State _____ Zip Code _____Email _____

Audubon Chapter or Other Affiliation _____

County_____ Organization (if applicable)_____

Title (if applicable) _____

### 4. Ornithological Importance

List the species for which this site is important, the season(s) for which the site is important, average or maximum numbers (rough estimates are okay), the years on which this count or estimate are based, and sources of information. *Please refer to the Guidelines.*

| Species | Season | Avg. Numbers/Season | Max. Numbers/Season | Year | Sources |
|---|---|---|---|---|---|
| | | | | | |
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| | | | | | |
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| | | | | | |
| | | | | | |

Specify Sources:

_____

_____

_____

_____

_____

# West Virginia Important Bird Areas

## Nomination Form

Site Name: _____ Submission Date: ___/____/____

### 5. Habitats and Land Use

Please indicate by percent of the total area or with a P for primary (>50%) and S for secondary (<50%).

_____ Conifer Forest (White Pine/Hemlock/Other)

_____ Deciduous Forest (Oak/Hickory/Maple/Other)

_____ Active Farm

_____ Riparian or Floodplain Forest

_____ Shrub

_____ Field

_____ Grassland /Mine State

_____ Ridge Tops/Knobs

_____ Swamp

_____ River/Stream

_____ Pond/Lake

_____ Urban/Suburban

_____ Other (specify): _____

_____ Nature and Wildlife Conservation

_____ Hunting/Fishing

_____ Other Recreation or Tourism

_____ Agriculture/Livestock

_____ Forestry

_____ Water supply

_____ Utility/Right-of-way

_____ Suburban/Residential

_____ Research

_____ Underdeveloped

_____Urban/Commercial

_____ Other (specify)_____

### 6. Land Ownership/Management: Check all that apply

____ State ____ Federal ____ Municipal ____ Private

# West Virginia Important Bird Areas

## Nomination Form

Site Name: _____ Submission Date: ___/___/____

### 7. Conservation and Other

Primary Conservation Issues: Please note serious (S) Minor (M), and potential (P) threats to the site. Describe primary conservation issues, seriousness, any steps being taken.

_____ Invasive or Non-native plants _____

_____ Introduced Animals _____

_____ Cowbird Parasitism _____

_____ Predators _____

_____ Pollution _____

_____ Habitat Conversion _____

_____ Development _____

_____ Disturbance to Birds or Habitat _____

_____ Hydrologic Changes _____

_____ Other (specify) _____ _____

_____ Other (specify)_____ _____

### 8. Other Resources

Please describe any significant flora non-avian fauna, social, religious, cultural, economic,or historic issues associated with this site:

_____ _____

_____ _____

_____

_____

_____

_____

West Virginia Important Bird Areas

# Nomination Form

**Name of Site:** _____ **Submission Date**____/____/_____

## 9. Local Groups with an Interest in the Site

Name/Group_____ Address _____

City _____ State_____Zip_____ Phone (____)_____

Name/Group_____ Address _____

City _____ State_____Zip _____ Phone (____)_____

## 10. Landowner/Manager Contacts

Please provide the name, address, and phone numbers of the landowner or land manager(s) for the site, and indicate whether they have been contacted and/or given permission for the site to be nominated.

Name _____ Name_____

Address _____ Address_____

City _____ State _____ Zip _____ City _____ State _____ Zip_____

Phone _____ Phone_____

Contacted _____ Permission _____ Contacted _____ Permission _____

Remarks _____

_____

_____

_____

_____

**ATTACH SUPPORTING DOCUMENTATION (MAPS, PHOTOS, FIELD NOTES, CHECKLISTS, ETC.) AND RETURN TO:**

*Dr. Canterbury @ Concord College*

*P.O. Box 1000*

*Campus Box 87*

*Athens, WV 24712*

***Thank You for your Participation!!***

**Appendix B**

*West Virginia Important Bird Areas Program*

# Nomination Form Guidelines

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***READ ALL GUIDELINES AND CRITERIA BEFORE SUBMITTING THE NOMINATION FORM***

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An important Bird Areas Nomination Form should be completed as accurately and completely as possible. Please attach any additional information (published or unpublished reports, survey data, field notes, photographs, slides, etc.) about the site. Please label all information with your name and the site name.

Obtain a map of the area where the site is located. Send the original map (note approximate boundaries) with the nomination form and keep a copy for yourself. A USGS Topographic Map (7.5 Series, 1:24,000) is preferable. These maps can be ordered by calling 1-800-USA-MAPS or on line at www.usgs.gov.

**General Information**

- Site Name - Give the name of the site that is most common (give alternate names in brackets).
- Town/County - Give the town and the county where the site is located.
- Latitude/Longitude - Write the approximate latitude and longitude of the center of the site in degrees, minutes, and seconds if possible. Use a map to help determine the center of the site and its coordinates.
- Approximate Size - Write the approximate size of the land in acres or hectacres.
- Approximate Elevation - Write the approximate elevation of the site in feet or meters. If the site has a wide range of elevations give the approximate range of elevations, e.g., 500-1000 feet.
- General Description - Give a general physical description of the site. Possible features worthy of notation can include topography, geology, historical, and man-made structures.

**2. IBA Criteria *(Very Important)***

- Please read the WV IBA Criteria Sheet to determine site eligibility. Check all that apply to the site.

- Also give an explanation of why you believe the site is important in the space provided to the right of the criteria checklist.

**3. Contact Information**

- Please enter the information as indicated. This information may be needed to contact you for additional information or for updates.

**4. Ornithological Importance**

- Species Name - List the appropriate bird species or species group (for example, waterfowl). Please use only one line per species or group. The species listed should correspond to the criteria checked in part two of the nomination form.
- Season - List the season for which the site is important. Write (B) for breeding season, (W) for winter, (SM) for spring migration, or (FM) for fall migration. If a site is important for a species in more then one season, please indicate the season for which the quantitative data is based.
- Average Numbers/Season - Write the best available estimate for the maximum number of individuals (or pairs) using the site during the season for which it is important, over a given period of time. For example, for a raptor species meeting criterion, 4c, you would write "3,000/season". .
- Maximum Numbers/Season - Write the best available estimate for the maximum number of individuals (or pairs) using the site during the season for which it is important, over a given period of time using the format above.
- Year - Write the approximate year (s) for which the numerical estimate is based.
- Sources - Write the code number that best indicates where the data for this species comes from. Choose from (1) Published Reports, (2) Surveys such as Christmas Bird Count or Breeding Bird Survey, or (3) personal observations. If possible, please provide the author, title of article, title of publication, date of publication, and page number (s) in the space provided below the chart.

**5. Habitat and Land Use**

- Major Habitat Types - Mark the appropriate box (s) by using P-primary (>50% of cover vegetation), S-secondary (<50% of cover vegetation), or provide the approximate % cover of the major habitats of the site.
- Major Land Use - Mark the appropriate box (s) by using the P-primary and S-secondary land use types that best describe the IBA site. A primary land use activity is one in which large portions of the sites resources and /or space are utilized.

**6. Land Ownership/Management**

- Indicate the category (s) that best describe the ownership status of the nominated site.

**7. Conservation and Other**

- Primary Conservation Issues - Please clarify the threats as S (serious), M (minor), or P (potential) according to the percentage of the resource that is predicted to be affected negatively if current trends continue; Serious =>50% of the resources, Minor = 10-50%, and Potential =<10%.
- Give details of any conservation measures that have been taken, are in progress, or are proposed that directly affect the potential IBA site. This can include proposals for legislation, protection, or

management. Give details of any protection for nature conservation established at or around the site. State whether an officially approved management plan exists and whether it has been or is being implemented and by whom. Also note any other conservation measure taken at the site such as restrictions on development, closure of hunting, or management practices beneficial to the wildlife. An assessment of the effectiveness of measures should be given whenever possible.

**8. Other Resources**

- List any significant plants, non-avian fauna (especially rare and/or endemic) located on the proposed site. Give the species scientific and English name, followed by a brief description of the importance. Also indicate if there is any social, cultural, religious, economic, or historical issues associated with the site.

**9. Local Groups with an Interest in this Site**

- List any local groups that may have an interest in the proposed IBA site. Please give as much contact information as possible.

**10. Land Owner/Manager Contacts**

- Supply the name, phone number, and address of the landowner or manager of the proposed IBA site. Also note whether the person was contacted and if they gave permission for the site to be nominated. All of this information is public record and can be researched at the county courthouse, library, or university.
- Before making any final IBA sites selection, the landowners and managers will be contacted for consent. The parties will then be involved in the conservation projects needed to promote the declining bird populations. We encourage all compilers to contact the landowner or managers when there is near certainty of gaining understanding and cooperation. If the compiler believes that the IBA nomination will not be received well by the landowner or manager, **DO NOT** attempt to contact the party.
- Fill out the landowner/manager information and indicate any potential problems in the comment section at the end of the nomination form.

**11. Questions**

Please Contact Dr. Canterbury: **email**: canterburyr@concord.edu **Mail**: Dr. Canterbury, Campus Box 87, Concord College, P.O. Box 1000, Athens, WV 24740-1000. **Phone**: (304) 384-5214

**Appendix C**

# *Important Bird Areas of West Virginia*

## Criteria for Site Selection

### 1. A site that regularly holds significant numbers of one or more endangered or threatened species in the state.

Description: The site sustains a local population, breeding or non-breeding, of an endangered or threatened species, or readily identifiable population in the state. Definition of significant numbers will vary from species to species, as decided by current scientific evidence and agreement of the technical committee.

### 2. A site that regularly holds a significant population, or exceptional diversity, of one or more species that are of high conservation priority in the state.

Description: The site sustains significantly large population (e.g., 20% of the entire species population) of one or several species of high conservation priority, which include, for example, species such as the Golden-winged Warbler, Cerulean Warbler, and or Loggerhead Shrike. A site can also be deemed an IBA if it regularly harbors high avian diversity, where a typical morning count could produce 90+ species.

### 3. A site that regularly holds a significant suite of species associated with a habitat type that is representative, rare, or threatened in the state.

Description: The site sustains a group of species whose presence in significant numbers indicates that the area is an outstanding natural habitat. This category is reserved for sites that are distinct habitat types, exceptional in size and/or intactness, rare or threatened in the state or the best representative habitats within a physiographic region.

### 4. A site that regularly holds significant concentrations of one or more species.

Description: The site contains significant numbers of individuals (or pairs) of one or more species, breeding or

non-breeding, including migration. This category may also be applied in exceptional circumstances to sites of high diversity. Numerical thresholds are guidelines, not absolute, and should be based on total counts of birds made over a single period of time (e.g. one day) rather than on cumulative totals - except for raptors.

**4a. Concentration of a single species.** The site is known or thought to hold 1% or more of the state population of a species in a given season. This criterion may be used to identify important source population for a species.

**4b. Concentration of waterfowl.** The site regularly supports at least 250 waterfowl wintering (at one time) or supports at least 500 waterfowl staging (at one time).

**4c. Concentration of raptors.** The site is regularly an important migratory stopover site, "bottleneck", of migratory corridor where 3.000 or more raptors (seasonal total) pass through the area .

**4d. Concentration of shorebirds.** The site regularly supports at least 12 species of shorebirds (at one time) or supports at least 100 shorebirds staging (at one time).

**4e. Concentration of wading birds.** The site regularly supports at least 4 species of wading birds (at one time) or supports at least 20 wading birds staging (at one time).

## 5. A site important for long-term research and/or monitoring projects that contributes substantially to ornithology, bird conservation, and or education.

Description: These sites are distinguished by a long record of avian research and/or monitoring that has made a significant contribution to bird conservation. Indicators of such sites will be published articles in peer-reviewed journals and/or agreement of the technical committee on the merits of the site.

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# SANDSTONE FALLS AS A WEST VIRGINIA IMPORTANT BIRD AREA

McNair Scholar's Program

Submitted by: Sarah Belcher

Mentor: Dr. Ronald Canterbury

1 May 2002

# SANDSTONE FALLS AS A WEST VIRGINIA IMPORTANT BIRD AREA

## Introduction

### Background

The Important Bird Area (IBA) program is a national effort designed to compile a list of priority areas that need protection in order to sustain healthy and diverse bird populations. The IBA sites are selected based on standard scientific criteria (1). Once a site is selected, information on the site is gathered in order to determine the appropriate conservation action. The conservation action will allow the currently declining bird populations in West Virginia and the other states an opportunity to increase. The IBA will simultaneously provide protection for other fauna and flora.

The first IBA program was established in 1985 by Bird Life International to create a list of sites that were important habitats for birds, with a focus on land conservation (2). Currently in Europe, over 65,000 km squared of land has protection (3). This IBA land amounts to approximately the size of West Virginia. In 1995, due to the success in Europe, the national Audubon Society launched the first IBA program in the United States. The first state to participate was Pennsylvania, followed by New York (4). The program is currently underway in forty-one states (5). Washington IBA was recently completed and other countries are using the IBA conservation tool, for example, Africa's IBAs were recently published.

In the Unites States there are at least 4,280 species of the 9,700 species of birds found worldwide (6). Of these 4,280 found in the Unites States, 184 (or 4.3%) are threatened or endangered (6). Many more bird populations are suffering from long-term population declines due to development pressures. Canterbury and Baumgarten write that the most significant long-term threats facing bird populations are habitat loss and degradation (1). While development

pressures play an important part in declining bird populations, other factors have also taken a toll on bird populations, for example, water pollution, pesticides, natural predators, and unnatural predators. Birds are an important part of the ecosystem because they influence all living things including humans via food web interactions (1). Since birds are an important component of the environment, the IBA program of West Virginia could become a part of the fight to promote healthy bird populations both locally and globally. For example, approximately 20% of the entire breeding population of both Golden-winged and Cerulean warblers nest in West Virginia (7). The state also harbors many other species of concern, including the Peregrine falcon and the federally threatened Bald Eagle. The IBA's goal for West Virginia is to preserve habitats that are essential for healthy bird populations, promote environmental conservation, and educate the public on the importance of bird populations.

West Virginia is a state of diverse habitat. The flora and fauna of the state vary dramatically depending on the location. The different types of habitat include heath barrens, sphagnum glades, grasslands, shale barrens, and differing types and degrees of forestation (8). There are no natural lakes but many rivers, streams, ponds, and riparian areas are common. A small percentage of the land is used for agriculture and an even smaller amount of the state is classified as urban or industrial (9). However, the state becomes increasingly urbanized with each passing year, and may have the highest percentage of suburban sprawl per land cover (J. Manzo, personal communication). Regions of West Virginia have been used for mining, especially in the southern portion of the state. These former mining sites provide grassland and shrub land habitats for birds. West Virginia is known as "four seasons country" due to the variable climate and distinguishable seasons. The coldest month averages between 18°C and –3°C, while the warmest month is usually above 22°C (9). The state receives adequate rainfall

throughout the year but the amount varies dramatically depending on the region. The average rainfall can vary from 54 cm to as much as 174 cm a year (9).

The Sandstone Falls community in West Virginia is unique. The area consists of flat sandstone bedrock along the New River that is rather dry and receives full sunlight. The area is above the normal river floodplain but is hypothesized to been impacted by catastrophic floods in the late 1800's (10). Due to the building of the Bluestone Dam, flooding is not likely to occur now. This alteration of the environment has allowed succession of plants into the community. The community is made up of woodlands with a diverse understory of shrubs and herbs with mosses and lichens covering the ground.

For a site to be chosen a West Virginia IBA, it must meet only one of four scientific criteria, although many of the sites in West Virginia will meet more than one. The first criterion is the habitat must regularly support wintering, or migratory populations of a threatened, endangered, or a significant population of a "watch list" species. A watch list (or blue list) is a list of birds published by the National Audubon Society to provide an early warning of birds that appear to be undergoing noncyclic population declines (11). This information allows interested parties to focus on species of concern before they become threatened or endangered. The second criterion is that the site supports a species with a rare, threatened, or specialized habitat. The third criterion is that the site supports a substantial portion of the total population of a species, large concentrations of one or more species of birds, or a high diversity of species. The final criterion that a site can meet is to be a habitat where long-term scientific research or education regarding birds is conducted.

## Objectives

The objectives of this research project were to nominate Sandstone Falls as an West Virginia Important Bird Area based on the research conducted at the location and continue website development as the West Virginia IBA program gained support. The West Virginia IBA website (http://students.concord.edu/wviba) was developed in 2001 (12). Sandstone Falls has served as a research area for the Monitoring Avian Productivity and Survivorship (MAPS) project for six years (1996-2001). Four main goals were pursued. First during May, June, and July of 2001 bird banding and point counts were conducted at Sandstone Falls. Second, the data was analyzed and compared to the five previous years of MAPS research. The third goal was to evaluate Sandstone Falls as a potential West Virginia IBA site based on the research. The last goal was to continue with West Virginia IBA website development (http://students.concord.edu/wviba).

## Methods

Point Counts

Some researchers believe that point counts are the best method of tracking bird population while others take the view that banding is the most accurate method for assessing bird populations (13). Both banding and point counts have essential features that work well in certain spatial and temporal conditions, but pitfalls such as habitat differences persist (14). This project will compare data obtained from banding and point counts from the same year, summer 2001. Point counts are best conducted at daybreak due to the birds being more active during this time. The observer stands in a designated location and notes the position of the birds (usually males) on a survey. The birds are usually recognized by their individual songs which takes years of practice to master. The state, region, date, temperature, and weather conditions are all noted on

the survey. This information is then compiled and entered into a database to note population changes over time.

Banding

Banding birds takes a more of "hands on" approach. The monitoring project at Sandstone Falls follows the MAPS protocol for banding. Field assistants and sub permit banders work under the license of the principal investigator, Dr. R. Canterbury. Ten mist nets made up of black nylon 12-m by 30-mm are set up in designated locations. The nets are typically run from 6:00 am to noon being checked for birds approximately every 30 minutes. The data were collected on May 21, 31, June 10, 20, 30, July 10, 20, and 30 during each year.

The birds captured were marked with an aluminum leg band from the Bird Banding Laboratory, (BBL), Laurel, Maryland. After the bird is banded, information is taken on the bird such as the band number, captive status (new or recapture), age and sex based on ageing and sexing criteria (extent of skull pneumatization, cloacal protuberance, brood patch, body and flight feather molt, primary feather wear, and plumage), date, time, and net number.

Data Analysis

This report summarizes the sixth year of data collection at the Sandstone Fall MAPS station, compares this sixth year (2001) to the earlier five years (1996-2000) of data, and compares the banding data with the point count data for 2001. The Sandstone Falls MAPS station is one of three MAPS stations in West Virginia. It was also the first MAPS station established in West Virginia and represents one of a few datasets with long-term research and monitoring. Objectives, goals, methods, and significance of the Sandstone Falls MAPS station have been documented in previous reports (15).

Website

The website has been developed and modified using Microsoft Front Page 2000. Modifications to the website have included updated nomination form (Appendix A), criteria (Appendix B), guidelines (Appendix C), minutes from steering committee meetings, additional page for children, and updated county contacts list. As the program continues, the website will be modified to meet the stage (identification, protection, and monitoring) of the program. At the time of this writing, the website has received over 750 hits.

## Results

Tables 1-4 summarize the Sandstone Falls MAPS data for 2001 with comparison to previous years, except for recapture data (on-going analyses). For example, Table 1 shows the number of birds captured and yearly net hours. Table 2 shows the number of birds captured per species during the six years of the study, as well as the total number of individuals captured. Table 3 shows recapture data for 2001, while previous reports (13) disclosed recapture data for earlier years. Table 4 shows preliminary trend analyses (least-squares regression of number captured across years).

During 2001 MAPS, birds captured were 292 birds during 444 net hours (Table 1). Of the 292 captures, 50 birds were unbanded (those that escaped from nets or banders, Ruby-throated Hummingbirds that are released unbanded), 50 were recaptures, and 192 were new banded birds. Of the 292 individuals handled, 39 species were represented.

Of the 192 new birds banded during the 2001 MAPS season, 18 were recaptured. These included one White-eyed Vireo, one Carolina Wren, four Gray Catbirds, two Cedar Waxwings, two Worm-eating Warblers, one American Redstart, one Ovenbird, two Common Yellowthroats,

one Hooded Warbler, and three Song Sparrows. Twenty-three birds from previous years were recaptured, but 17 of these were from year 2000. One bird was recaptured from 1999, two from 1998, and one from 1997 (Table 3). Two recaptured birds (a Carolina Wren and an Ovenbird) could not be traced to a band origin in our database (of over 40,000 tagged birds by Southern West Virginia Bird Research Center or SWVBRC staff since 1993) and may represent birds banded by another bander.

During the six years (1996-2001) of this study, the number of species captured ranged from 39 (this year) to 47 in 1997 (Table 1). The number of birds captured per 100 net hours ranged from 64.15 (year 2000) to 86.50 in 1997. This year's capture ratio per 100 net hours (65.17) was slightly higher than in 2000 (Table 1). The American Redstart (n = 213) was the most numerous species banded during the six years (Table 2), but has shown a negative population trend ($R^2 = 0.89$, $p < 0.005$) probably due to advancing succession (Table 4). The American Redstart appears to be declining by about 5.6 birds per year (regression analysis). This was followed by the Gray Catbird with 168 birds captured during the six breeding seasons. The Gray Catbird population at Sandstone Falls appeared to have recovered slightly this year (n = 30 captures), and nearly approached the number of birds captured in 1997 (Table 2), but an insignificant negative trend is evident (Table 4). A record high number (n = 38) of Ruby-throated Hummingbirds were captured this year. Of 29 species analyzed for trends, only two showed significant population trends (from banding data at this time), and these included the American Redstart noted above and the Yellow-breasted Chat (regression analysis, slope = -1.86, $p < 0.002$, see Table 4). Both these birds are long-distance (Neotropical) migrants and typically breed in shrublands of eastern North America (11). The American Redstart winters from Mexico and the West Indies south to Brazil, while the Yellow-breasted Chat winters in

Central America as far south as Panama (11). No significant population change was noted in 27 of the 29 species, which indicates the difficulty of estimating trends from a single, local area and within a short duration (six years). Typically, 10+ years are needed for predicting population trends. Yet, it is plausible that these nonsignificant trends (no significant change in MAPS banding numbers) are typical of local subpopulations, where the numbers of individuals for many species fluctuate from high to low over several years. Therefore, they may indicate typical, natural cyclic changes in populations.

The sign and magnitude of the slopes of the regression lines for the 27 species with nonsignificant trends indicate which direction their populations may be heading (Table 4). Trend analysis in forest species (Eastern Wood-Pewee, Downy Woodpecker, Carolina Chickadee, Wood Thrush, Red-eyed Vireo, Louisiana Waterthrush, Worm-eating Warbler, and Ovenbird) at Sandstone Falls showed that only two (Eastern Wood-Pewee and Red-eyed Vireo) of these eight species, or 25%, are heading in the negative direction, while the rest are increasing slightly (all insignificantly at this time). Trend analysis in shrub and edge species (Eastern Phoebe, Northern [Yellow-shafted] Flicker, Carolina Wren, Blue-gray Gnatcatcher, Ruby-throated Hummingbird, American Robin, Gray Catbird, Cedar Waxwing, White-eyed Vireo, Yellow Warbler, Common Yellowthroat, Northern Cardinal, Indigo Bunting, Eastern Towhee, Song Sparrow, Common Grackle, Baltimore and Orchard Orioles, and the American Goldfinch) disclosed more (10 of 19 or 52.6%) species heading in the negative than the positive direction. Shrubland and grassland birds are currently declining more rapidly than most forest-interior species, where the latter have recovered slightly with advancing forest succession (16). Management of shrubland and grassland (disturbance-dependent) bird species is needed across eastern North America (17; 18).

Table 5 demonstrated four point counts conducted in the summer of 2001. Table 6 shows by date the number of species of birds. Thirty-nine species were represented in the data from the 2001 MAPS banding season while the data from the four days of point counts represented 31 species (Table 7). The point count showed 9 species that were not demonstrated during banding while the banding showed 17 species that were not shown in the point counts (Table 8).

Data about the Sandstone Falls site was gathered and compiled onto a West Virginia IBA nomination form (Appendix D). Sandstone Falls met three criteria. The site was important to West Virginia birds because conservation priority Golden-winged and Cerulean Warblers are located there. Second, the site is important because 100+ waterfowl (winter) and 300+ waterfowl (staging) can be found there. Lastly, long-term research and monitoring is conducted at the site.

## Discussion

Additional years of MAPS data, comparison with trend analyses held at the Breeding Bird Survey (BBS) and the SWVBRC, and analysis of counts by song at Sandstone Falls will help predict which species are increasing, decreasing, or remaining stable.

Additional years of data will also be needed in order to account for differences in species found only during banding or point counts. Although there was a substantial difference in species found using the two different methods, more years of data will determine if the results are significant or due to a small sample size (Table 8). Pagen found in previous research that there is significant difference in species found during point counts and mist nets, which he attributed to seasons and the type of habitat (14). He suggests a combination of methods to achieve the most accurate bird population trends.

The website has had over 750 hits since April 17 2002. This number will continue to increase as the program gains more support and the website is used for obtaining forms and contacting other IBA participants. The nomination form, guidelines, and criteria are in their final stages of revision and are ready for dissemination as soon as funding for the program is secured.

Because most states are pursuing an IBA program and at least three states having published an IBA book, the program definitely appears to be manageable. The program cannot be a success if support is not generated. This should not be a problem for West Virginia, as many individuals and organizations have expressed an interest in the program, including Partners in Flight, West Virginia Division of Natural Resources, the National Audubon Society, and Brooks Bird Club.

The IBA program has already become a global tool for conservation of essential bird habitats. With plenty of interest and support the West Virginia IBA program will also become a powerful state tool for conserving essential bird habitats. The West Virginia IBA program also has the advantage of protecting West Virginia flora and non-avian fauna that inhabit the IBA sites. Although the IBA site designation does not offer complete protection, it does draw the attention of the public and local lawmakers. Without landowners' willingness to contribute to environment conservation, the IBA programs would not be possible. Above all, we need to realize that we have the power to protect our natural environment. With the collaboration of land owners/managers, the public, government officials, organizations, educators, and students, the West Virginia IBA program will have an enormous impact on the environment and our future.

Acknowledgements

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Table 1. Summary of captures per year.

| Year | Days of Operation Total | Range | Total Net Hours | B[1] | U[2] | R[3] | TC[4]. | Number of species |
|---|---|---|---|---|---|---|---|---|
| 1996 | 10 | 5/21 - 8/19 | 566.65 | 286 | 49 | 63 | 398 (70.24) | 42 |
| 1997 | 8 | 5/21 - 7/30 | 456.67 | 292 | 34 | 69 | 395 (86.50) | 47 |
| 1998 | 8 | 5/21 - 7/30 | 422.81[a] | 214 | 48 | 61 | 323 (76.39) | 37 |
| 1999 | 8 | 5/21 - 7/30 | 481.67 | 236 | 24 | 59 | 319 (66.23) | 41 |
| 2000 | 8 | 5/21 - 7/30 | 481.67 | 229 | 30 | 50 | 309 (64.15) | 40 |
| 2001 | 8 | 5/21 - 7/30 | 444.0 | 192 | 50 | 50 | 292 (65.77) | 39 |

[1] Banded birds, [2] unbanded birds, [3] recaptures, and [4] total captures and total captures per 100 net hours in parentheses. [a] Net hours decreased due to rain spring seasons in 1996 and 1997.

Table 2. Number of birds captured at Sandstone Falls during MAPS.

| Species | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|---|---|
| Black-billed Cuckoo | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Eastern-wood Pewee | 2 | 3 | 1 | 0 | 0 | 1 | 7 |
| Acadian Flycatcher | 1 | 1 | 3 | 1 | 0 | 0 | 6 |
| Willow Flycatcher | 2 | 0 | 0 | 0 | 0 | 1 | 3 |
| Traill's Flycatcher | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Great-crested Flycatcher | 1 | 0 | 2 | 0 | 3 | 0 | 6 |
| Eastern Phoebe | 1 | 0 | 0 | 3 | 8 | 5 | 17 |
| American Woodcock | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Downy Woodpecker | 0 | 3 | 0 | 3 | 3 | 1 | 10 |
| Yellow-shafted Flicker | 0 | 2 | 3 | 1 | 0 | 3 | 9 |
| Carolina Chickadee | 6 | 4 | 1 | 2 | 9 | 3 | 25 |
| Tufted Titmouse | 0 | 3 | 4 | 0 | 0 | 0 | 7 |
| Carolina Wren | 15 | 12 | 17 | 15 | 23 | 13 | 95 |
| Marsh Wren* | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| House Wren | 0 | 3 | 1 | 1 | 0 | 0 | 5 |
| Blue-gray Gnatcatcher | 15 | 6 | 8 | 14 | 7 | 3 | 53 |
| Ruby-thr. Hummingbird | 21 | 7 | 18 | 18 | 19 | 38 | 121 |
| Wood Thrush | 4 | 3 | 10 | 3 | 8 | 6 | 34 |
| American Robin | 7 | 12 | 10 | 9 | 13 | 10 | 61 |
| Gray Catbird | 51 | 37 | 24 | 14 | 12 | 30 | 168 |
| Brown Thrasher | 0 | 2 | 1 | 1 | 1 | 0 | 5 |
| Cedar Waxwing | 11 | 19 | 2 | 6 | 6 | 9 | 53 |

Table 2. Continued.

| Species | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|---|---|
| White-eyed Vireo | 6 | 6 | 5 | 6 | 1 | 4 | 28 |
| Blue-headed Vireo | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Warbling Vireo | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Yellow-throated Vireo | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Red-eyed Vireo | 10 | 18 | 11 | 9 | 7 | 3 | 58 |
| Blue-winged Warbler | 2 | 1 | 0 | 2 | 2 | 0 | 7 |
| Golden-winged Warbler | 0 | 1 | 2 | 2 | 1 | 1 | 7 |
| Brewster's Warbler | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Lawrence's Warbler | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Tennessee Warbler* | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Northern Parula | 1 | 0 | 2 | 2 | 2 | 2 | 9 |
| Yellow Warbler | 15 | 11 | 11 | 6 | 12 | 4 | 59 |
| Chestnut-sided Warbler | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| Magnolia Warbler* | 0 | 4 | 3 | 0 | 0 | 0 | 7 |
| Blackpoll Warbler* | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| Yellow-throated Warbler | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| Black-and-White Warbler | 1 | 2 | 1 | 3 | 3 | 1 | 11 |
| American Redstart | 54 | 39 | 40 | 29 | 27 | 24 | 213 |
| Louisiana Waterthrush | 2 | 2 | 6 | 2 | 4 | 3 | 19 |
| Worm-eating Warbler | 4 | 0 | 0 | 7 | 5 | 4 | 20 |
| Ovenbird | 4 | 8 | 4 | 7 | 5 | 7 | 35 |

Table 2. Continued.

| Species | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | Total |
|---|---|---|---|---|---|---|---|
| Mourning Warbler* | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| Canada Warbler* | 0 | 1 | 0 | 0 | 1 | 0 | 2 |
| Common Yellowthroat | 3 | 12 | 3 | 4 | 4 | 5 | 31 |
| Kentucky Warbler | 1 | 1 | 0 | 1 | 1 | 0 | 4 |
| Hooded Warbler | 0 | 2 | 2 | 4 | 1 | 1 | 10 |
| Wilson's Warbler* | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Yellow-breasted Chat | 9 | 8 | 7 | 3 | 1 | 1 | 29 |
| Scarlet Tanager | 1 | 2 | 1 | 2 | 3 | 1 | 10 |
| Northern Cardinal | 21 | 4 | 4 | 7 | 13 | 9 | 58 |
| Rose-breasted Grosbeak | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Indigo Bunting | 11 | 14 | 0 | 4 | 2 | 1 | 32 |
| Eastern Towhee | 1 | 2 | 2 | 3 | 5 | 3 | 16 |
| Chipping Sparrow | 6 | 1 | 0 | 1 | 0 | 0 | 8 |
| Field Sparrow | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| Song Sparrow | 14 | 14 | 17 | 23 | 19 | 19 | 106 |
| Brown-headed Cowbird | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Common Grackle | 2 | 3 | 9 | 2 | 4 | 4 | 24 |
| Red-winged Blackbird | 0 | 0 | 3 | 4 | 0 | 0 | 7 |
| Baltimore Oriole | 3 | 1 | 6 | 4 | 6 | 1 | 21 |
| Orchard Oriole | 4 | 5 | 3 | 8 | 5 | 2 | 27 |
| House Finch | 5 | 0 | 0 | 0 | 0 | 0 | 5 |
| American Goldfinch | 11 | 26 | 24 | 22 | 9 | 6 | 98 |

* = migrant

**Table 3. Recapture data of birds banded in previous years. ***

| Band No. | Species | Original Banding Date |
|---|---|---|
| 1721-15823 | Carolina Wren | Unknown (foreign recovery?) |
| 1513-62901 | Common Grackle | 05-21-2000 |
| 0981-82596 | Northern Cardinal | 10-20-2000 |
| 1721-39113 | Downy Woodpecker | 06-10-2000 |
| 0981-82592 | Northern Cardinal | 10-05-2000 |
| 1551-04985 | Song Sparrow | 10-04-1998 |
| 1721-39109 | Song Sparrow | 05-31-2000 |
| 2140-81766 | White-eyed Vireo | 07-30-1999 |
| 1751-54001 | Northern Cardinal | 05-21-2000 |
| 1551-04915 | Red-eyed Vireo | 06-20-1997 |
| 1721-39108 | Orchard Oriole | 05-31-2000 |
| 1751-54004 | Northern Cardinal | 05-21-2000 |
| 2210-17006 | Common Yellowthroat | 05-21-2000 |
| 1591-10270 | Carolina Wren | 05-21-1998 |
| 2051-15903 | Ovenbird | 08-15-2000 |
| 1162-11751 | Eastern Towhee | 08-25-2000 |
| 2051-75903 | Ovenbird | Unknown (foreign recovery?) |
| 2020-12002 | Red-eyed Vireo | 05-21-2000 |
| 2210-17030 | Yellow Warbler | 06-30-2000 |
| 1721-39134 | Carolina Wren | 06-30-2000 |
| 1751-54014 | Northern Cardinal | 06-30-2000 |
| 2020-12013 | Red-eyed Vireo | 07-10-2000 |
| 1531-91275 | Tufted Titmouse | 09-16-2000 |

* Does not include birds banded this year (2001) and recaptured during this year's MAPS season. Birds banded after July 30th each year represent data collected in fall migration and could be new recruits into the populations (further analyses in progress).

Table 4. Trend analysis for some selected species (preliminary results from regression analyses).

| Species | Slope | P | Trend | sWV Trend (%/yr.)* |
|---|---|---|---|---|
| Eastern Wood-Pewee | -0.43 | 0.13 | No change | 1.9, nonsignificant |
| Eastern Phoebe | 1.34 | 0.06 | No change | -5.8, significant |
| Downy Woodpecker | 0.23 | 0.58 | No change | 2.9, nonsignificant |
| Yellow-shafted Flicker | 0.20 | 0.60 | No change | -6.5, significant |
| Carolina Chickadee | 0.03 | 0.97 | No change | -1.4, nonsignificant |
| Carolina Wren | 0.60 | 0.58 | No change | 1.7, nonsignificant |
| Blue-gray Gnatcatcher | -1.46 | 0.23 | No change | 3.9, significant |
| Ruby-throated Hummingbird | 3.46 | 0.17 | No change | 6.1, significant |
| Wood Thrush | 0.51 | 0.52 | No change | 3.0, significant |
| American Robin | 0.49 | 0.40 | No change | 4.1, significant |
| Gray Catbird | -5.43 | 0.13 | No change | 5.0, significant |
| Cedar Waxwing | -1.29 | 0.42 | No change | 0.4, nonsignificant |
| White-eyed Vireo | -0.69 | 0.16 | No change | -7.0, significant |
| Red-eyed Vireo | -2.00 | 0.08 | No change | 6.5, significant |
| Yellow Warbler | -1.63 | 0.09 | No change | -1.6, nonsignificant |
| American Redstart | -5.63 | 0.005 | Negative | 6.0, significant |
| Louisiana Waterthrush | 0.20 | 0.66 | No change | (limited data) |
| Worm-eating Warbler | 0.63 | 0.41 | No change | -1.9, nonsignificant |
| Ovenbird | 0.26 | 0.59 | No change | -2.3, nonsignificant |
| Common Yellowthroat | -0.37 | 0.70 | No change | -1.3, nonsignificant |
| Yellow-breasted Chat | -1.86 | 0.002 | Negative | -3.5, significant |
| Northern Cardinal | -0.86 | 0.64 | No change | -2.9, significant |
| Indigo Bunting | -2.34 | 0.08 | No change | 2.4, nonsignificant |

* % annual change per year from 1989-2000 via singing male censuses throughout southern West Virginia (Canterbury et al. 2001).

Table 4. Continued.

| Species | Slope | P | Trend | sWV Trend (%/yr.)* |
|---|---|---|---|---|
| Eastern Towhee | 0.57 | 0.07 | No change | 0.9, nonsignificant |
| Song Sparrow | 1.31 | 0.11 | No change | -6.4, significant |
| Common Grackle | 0.17 | 0.82 | No change | (limited data) |
| Baltimore Oriole | 0.09 | 0.89 | No change | -1.2, nonsignificant |
| Orchard Oriole | -0.14 | 0.81 | No change | 1.7, nonsignificant |
| American Goldfinch | -2.23 | 0.33 | No change | -7.4, significant |

* % annual change per year from 1989-2000 via singing male censuses throughout southern West Virginia (Canterbury et al. 2001).

Table 5. Sandstone Falls Point Count Data for 2001.

| Route ID | Observer | County | Date | Number of Species |
|---|---|---|---|---|
| Sandstone Falls | D.S. S.B. | Raleigh | 31-May-01 | 17 |
| Sandstone Falls | R.C. S.B. | Raleigh | 20-Jun-01 | 15 |
| Sandstone Falls | R.C. S.B. | Raleigh | 30-Jun-01 | 22 |
| Sandstone Falls | R.C. S.B. | Raleigh | 10-Jul-01 | 15 |
| | | | | Total = 125 |

D.S. - Dollie Stover

R.C. - Ron Canterbury

S.B. - Sarah Belcher

Table 6. Number of birds counted at Sandstone Falls during point counts.

| Species | Number | Site | Date |
|---|---|---|---|
| American Crow | 1 | Sandstone Falls | 31-May-01 |
| American Goldfinch | 3 | Sandstone Falls | 31-May-01 |
| Baltimore Oriole | 1 | Sandstone Falls | 31-May-01 |
| Blue-gray Gnatcatcher | 1 | Sandstone Falls | 31-May-01 |
| Blue Jay | 1 | Sandstone Falls | 31-May-01 |
| Carolina Wren | 1 | Sandstone Falls | 31-May-01 |
| Cedar Waxwing | 5 | Sandstone Falls | 31-May-01 |
| Common Grackle | 1 | Sandstone Falls | 31-May-01 |
| Eastern Towhee | 1 | Sandstone Falls | 31-May-01 |
| Eastern Tufted Titmouse | 1 | Sandstone Falls | 31-May-01 |
| Northern Cardinal | 2 | Sandstone Falls | 31-May-01 |
| Northern Parula | 1 | Sandstone Falls | 31-May-01 |
| Red-eyed Vireo | 1 | Sandstone Falls | 31-May-01 |
| Song Sparrow | 3 | Sandstone Falls | 31-May-01 |
| Warbling Vireo | 1 | Sandstone Falls | 31-May-01 |
| Yellow-throated Vireo | 1 | Sandstone Falls | 31-May-01 |
| Yellow Warbler | 1 | Sandstone Falls | 31-May-01 |
| American Goldfinch | 1 | Sandstone Falls | 20-Jun-01 |
| American Robin | 1 | Sandstone Falls | 20-Jun-01 |
| Blue-gray Gnatcatcher | 1 | Sandstone Falls | 20-Jun-01 |
| Blue Jay | 2 | Sandstone Falls | 20-Jun-01 |
| Carolina Wren | 1 | Sandstone Falls | 20-Jun-01 |
| Common Grackle | 9 | Sandstone Falls | 20-Jun-01 |
| Downy Woodpecker | 1 | Sandstone Falls | 20-Jun-01 |
| Eastern Phoebe | 1 | Sandstone Falls | 20-Jun-01 |
| Green Heron | 1 | Sandstone Falls | 20-Jun-01 |
| Northern Cardinal | 1 | Sandstone Falls | 20-Jun-01 |
| Red-eyed Vireo | 2 | Sandstone Falls | 20-Jun-01 |
| Song Sparrow | 4 | Sandstone Falls | 20-Jun-01 |
| Warbling Vireo | 1 | Sandstone Falls | 20-Jun-01 |
| White-eyed Vireo | 1 | Sandstone Falls | 20-Jun-01 |
| Yellow-shafted Flicker | 2 | Sandstone Falls | 20-Jun-01 |
| American Crow | 3 | Sandstone Falls | 30-Jun-01 |
| American Goldfinch | 3 | Sandstone Falls | 30-Jun-01 |
| American Redstart | 1 | Sandstone Falls | 30-Jun-01 |

Table 6. Continued.

| Species | Number | Site | Date |
|---|---|---|---|
| Blue-gray Gnatcatcher | 2 | Sandstone Falls | 30-Jun-01 |
| Carolina Wren | 1 | Sandstone Falls | 30-Jun-01 |
| Common Grackle | 13 | Sandstone Falls | 30-Jun-01 |
| Downy Woodpecker | 1 | Sandstone Falls | 30-Jun-01 |
| Eastern Wood Pewee | 1 | Sandstone Falls | 30-Jun-01 |
| Eastern Tufted Titmouse | 1 | Sandstone Falls | 30-Jun-01 |
| Gray Catbird | 1 | Sandstone Falls | 30-Jun-01 |
| Green Heron | 1 | Sandstone Falls | 30-Jun-01 |
| Mourning Dove | 1 | Sandstone Falls | 30-Jun-01 |
| Northern Cardinal | 2 | Sandstone Falls | 30-Jun-01 |
| Northern Parula | 1 | Sandstone Falls | 30-Jun-01 |
| Northern Rough-winged Swallow | 4 | Sandstone Falls | 30-Jun-01 |
| Red-bellied Woodpecker | 1 | Sandstone Falls | 30-Jun-01 |
| Red-eyed Vireo | 1 | Sandstone Falls | 30-Jun-01 |
| Song Sparrow | 1 | Sandstone Falls | 30-Jun-01 |
| Warbling Vireo | 2 | Sandstone Falls | 30-Jun-01 |
| Yellow-shafted Flicker | 2 | Sandstone Falls | 30-Jun-01 |
| Yellow-throated Vireo | 1 | Sandstone Falls | 30-Jun-01 |
| Yellow Warbler | 1 | Sandstone Falls | 30-Jun-01 |
| American Crow | 1 | Sandstone Falls | 10-Jul-01 |
| American Robin | 1 | Sandstone Falls | 10-Jul-01 |
| Black and White Warbler | 1 | Sandstone Falls | 10-Jul-01 |
| Blue-gray Gnatcatcher | 1 | Sandstone Falls | 10-Jul-01 |
| Carolina Wren | 2 | Sandstone Falls | 10-Jul-01 |
| Common Grackle | 5 | Sandstone Falls | 10-Jul-01 |
| Eastern Towhee | 2 | Sandstone Falls | 10-Jul-01 |
| Gray Catbird | 3 | Sandstone Falls | 10-Jul-01 |
| Indigo Bunting | 1 | Sandstone Falls | 10-Jul-01 |
| Mourning Dove | 1 | Sandstone Falls | 10-Jul-01 |
| Northern Cardinal | 2 | Sandstone Falls | 10-Jul-01 |
| Northern Parula | 1 | Sandstone Falls | 10-Jul-01 |
| Red-eyed Vireo | 2 | Sandstone Falls | 10-Jul-01 |
| Song Sparrow | 1 | Sandstone Falls | 10-Jul-01 |
| White-eyed Vireo | 1 | Sandstone Falls | 10-Jul-01 |

Table 7. Total number of birds counted at Sandstone Falls during point counts.

| Species | Number |
|---|---|
| American Crow | 5 |
| American Goldfinch | 7 |
| American Redstart | 1 |
| American Robin | 2 |
| Baltimore Oriole | 1 |
| Black and White Warbler | 1 |
| Blue-gray Gnatcatcher | 5 |
| Blue Jay | 3 |
| Carolina Wren | 5 |
| Cedar Waxwing | 5 |
| Common Grackle | 28 |
| Downy Woodpecker | 2 |
| Eastern Phoebe | 1 |
| Eastern Towhee | 3 |
| Eastern Wood Pewee | 1 |
| Eastern Tufted Titmouse | 2 |
| Gray Catbird | 4 |
| Green Heron | 2 |
| Indigo Bunting | 1 |
| Mourning Dove | 2 |
| Northern Cardinal | 7 |
| Northern Parula | 3 |
| Northern Rough-winged Swallow | 4 |
| Red-bellied Woodpecker | 1 |
| Red-eyed Vireo | 6 |
| Song Sparrow | 9 |
| Warbling Vireo | 4 |
| White-eyed Vireo | 2 |
| Yellow-shafted Flicker | 4 |
| Yellow-throated Vireo | 2 |
| Yellow Warbler | 2 |

Table 8. Birds demonstrated during only banding or point counts.

| Banding | Point Counts |
|---|---|
| Brown-headed Cowbird | American Crow |
| Carolina Chickadee | Blue Jay |
| Common Yellowthroat | Eastern Tufted Titmouse |
| Golden-winged Warbler | Green Heron |
| Hooded Warbler | Mourning Dove |
| Louisiana Waterthrush | Northern Parula |
| Northern Cardinal | Northern Rough-winged Swallow |
| Orchard Oriole | Red-bellied Woodpecker |
| Ovenbird | Warbling Vireo |
| Ruby-throated Hummingbird | |
| Scarlet Tanager | |
| Traill's Flycatcher | |
| Worm-eating Warbler | |
| Willow Flycatcher | |
| Wood Thrush | |
| Yellow-breasted Chat | |
| Yellow-throated Warbler | |


# Important Bird Areas in West Virginia

## Nomination Form

The West Virginia IBA Program is conducting an inventory of habitats that may qualify as Important Bird Areas. To qualify, a site needs to meet only *one* of the IBA criteria, although many sites will meet several. Please tell us about areas that you think may meet the criteria. Complete as much of this form as possible, by referring to the accompanying guidelines and criteria. Thank you for participating in the West Virginia Important Bird Area Project. Please type or print the entries and return to Rob Tallman. If further assistance is needed, please contact rtallman@mail.dnr.state.wv.us

### 1. General Information

Site Name _____ Submission Date ___/___/___

Town(s) _____ County _____

Latitude_____ Longitude _____ Approx. size (acres)_____

Approx. elevation (ft.) if a range, give low-high_____

General description of the site (habitat, location, prominent features, ownership, and any other helpful information):

_____
_____
_____
_____
_____
_____
_____
_____
_____

**2. IBA Criteria (Check *all* that apply):** *PLEASE READ CRITERIA FOR SITE SELECTION IN GUIDELINES FIRST*

Why is this site important for West Virginia Birds?

1. High Conservation Priority Species_____

2. Rare, Unique, or Representative Habitat _____

3a. 100+ waterfowl (winter)/ 300+ waterfowl (staging) _____

3b. 10 + breeding pairs wading birds/50+ indiv. Staging, feeding_____

3c. 3,000+ raptors (seasonal)_____

3d. Exceptional concentrations of migratory land birds_____

3e. Single-species Concentrations (>1%)_____

4. Long-term research and/or monitoring_____

## 3. Contact Information

Name _____ Phone ___(____)_____
Address _____ Fax ___(____)_____
City _____ State _____ Zip Code _____Email _____
Audubon Chapter or Other Affiliation _____
County_____ Organization (if applicable)_____
Title (if applicable) _____

## 4. Ornithological Importance

List the species for which this site is important, the season(s) for which the site is important, average or maximum numbers (rough estimates are okay), the years on which this count or estimate are based, and sources of information. *Please refer to the Guidelines.*

| Species | Season | Avg. Numbers/Season | Max. Numbers/Season | Year | Sources |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Specify Sources: _____
_____
_____
_____
_____

## 5. Habitats and Land Use

Please indicate by percent of the total area or with a P for primary (>50%) and S for secondary (<50%).

_____ Conifer Forest (White Pine/Hemlock/Other)

_____ Deciduous Forest (Oak/Hickory/Maple/Other)

_____ Active Farm

_____ Riparian or Floodplain Forest

_____ Shrub

_____ Field

_____ Grassland /Mine State

_____ Ridge Tops/Knobs

_____ Swamp

_____ River/Stream

_____ Pond/Lake

_____ Urban/Suburban

_____ Other (specify): _____

_____ Nature and Wildlife Conservation

_____ Hunting/Fishing

_____ Other Recreation or Tourism

_____ Agriculture/Livestock

_____ Forestry

_____ Water supply

_____ Utility/Right-of-way

_____ Suburban/Residential

_____ Research

_____ Underdeveloped

_____Urban/Commercial

_____ Other (specify)_____

## 6. Land Ownership/Management: Check all that apply

____ State ____ Federal ____ Municipal ____ Private

## 7. Conservation and Other

Primary Conservation Issues: Please note serious (S) Minor (M), and potential (P) threats to the site. Describe primary conservation issues, seriousness, any steps being taken.

_____ Invasive or Non-native plants _____
_____ Introduced Animals _____
_____ Cowbird Parasitism _____
_____ Predators _____
_____ Pollution _____
_____ Habitat Conversion _____
_____ Development _____
_____ Disturbance to Birds or Habitat _____
_____ Hydrologic Changes _____
_____ Other (specify) _____ _____
_____ Other (specify)_____ _____

## 8. Other Resources

Please describe any significant flora non-avian fauna, social, religious, cultural, economic, or historic issues associated with this site:

_____
_____
_____
_____

## 9. Local Groups with an Interest in the Site

Name/Group_____ Address_____
City _____ State_____Zip_____ Phone (_____)_____
Name/Group_____ Address _____
City _____ State_____ ___Zip _____ Phone (_____)_____

## 10. Landowner/Manager Contacts

Please provide the name, address, and phone numbers of the landowner or land manager(s) for the site, and indicate whether they have been contacted and/or given permission for the site to be nominated.

Name _____
Address_____
City _____ State _____Zip _____
Phone _____
Contacted _____ Permission _____

Name_____
Address_____
City _____ State _____Zip_____
Phone_____
Contacted _____ Permission_____

Remarks

_____
_____
_____
_____

**ATTACH SUPPORTING DOCUMENTATION (MAPS, PHOTOS, FIELD NOTES, CHECKLISTS, ETC.) AND RETURN TO:**

*Rob Tallman @ WV DNR*
*Division of Natural Resources*
*Wildlife Resources Section*
*Operation Center*
*P.O. Box 67*
*Elkins, WV 26241-3235*

***Thank You for your Participation!!***

**Appendix B**


# Important Bird Areas of West Virginia

## Criteria for Site Selection

**1. A site that regularly holds a significant population, or exceptional diversity, of one or more species that are of high conservation priority in the state.**

Description: The site sustains a local population, breeding or non-breeding, of an endangered or threatened species, or readily identifiable population in the state. Definition of significant numbers will vary from species to species, as decided by current scientific evidence and agreement of the technical committee. The site sustains significantly large population (e.g., 20% of the entire species population) of one or several species of high conservation priority, which include, for example, species such as the Golden-winged Warbler, Cerulean Warbler, and or Loggerhead Shrike. A site can also be deemed an IBA if it regularly harbors high avian diversity, where a typical morning count could produce 90+ species.

**2. A site that regularly holds a significant suite of species associated with a habitat type that is representative, rare, or threatened in the state.**

Description: The site sustains a group of species whose presence in significant numbers indicates that the area is an outstanding natural habitat. This category is reserved for sites that are distinct habitat types, exceptional in size and/or intactness, rare or threatened in the state or the best representative habitats within a physiographic region.

**3. A site that regularly holds significant concentrations of one or more species.**

Description: The site contains significant numbers of individuals (or pairs) of one or more species, breeding or non-breeding, including migration. This category may also be applied in exceptional circumstances to sites of high diversity. Numerical thresholds are guidelines, not absolute, and should be based on total counts of birds made over a single period of time (e.g. one day) rather than on cumulative totals - except for raptors.

**3a. Concentration of a single species.** The site is known or thought to hold 1% or more of the state population of a species in a given season. This criterion may be used to identify important source population for a species.

**3b. Concentration of waterfowl.** The site regularly supports at least 250 waterfowl wintering (at one time) or supports at least 500 waterfowl staging (at one time).

**3c. Concentration of raptors.** The site is regularly an important migratory stopover site, "bottleneck", of migratory corridor where 3.000 or more raptors (seasonal total) pass through the area .

**3d. Concentration of shorebirds.** The site regularly supports at least 12 species of shorebirds (at one time) or supports at least 100 shorebirds staging (at one time).

**3e. Concentration of wading birds.** The site regularly supports at least 4 species of wading birds (at one time) or supports at least 20 wading birds staging (at one time).

4. **A site important for long-term research and/or monitoring projects that contributes substantially to ornithology, bird conservation, and or education.**

Description: These sites are distinguished by a long record of avian research and/or monitoring that has made a significant contribution to bird conservation. Indicators of such sites will be published articles in peer-reviewed journals and/or agreement of the technical committee on the merits of the site.

West Virginia Important Bird Areas Program

# Nomination Form Guidelines

***READ ALL GUIDELINES AND CRITERIA BEFORE SUBMITTING THE NOMINATION FORM***

An important Bird Areas Nomination Form should be completed as accurately and completely as possible. Please attach any additional information (published or unpublished reports, survey data, field notes, photographs, slides, etc.) about the site. Please label all information with your name and the site name.

Obtain a map of the area where the site is located. Send the original map (note approximate boundaries) with the nomination form and keep a copy for yourself. A USGS Topographic Map (7.5 Series, 1:24,000) is preferable. These maps can be ordered by calling 1-800-USA-MAPS or on line at www.usgs.gov.

**General Information**

- Site Name - Give the name of the site that is most common (give alternate names in brackets).
- Town/County - Give the town and the county where the site is located.
- Latitude/Longitude - Write the approximate latitude and longitude of the center of the site in degrees, minutes, and seconds if possible. Use a map to help determine the center of the site and its coordinates.
- Approximate Size - Write the approximate size of the land in acres or hectares.
- Approximate Elevation - Write the approximate elevation of the site in feet or meters. If the site has a wide range of elevations give the approximate range of elevations, e.g., 500-1000 feet.
- General Description - Give a general physical description of the site. Possible features worthy of notation can include topography, geology, historical, and man-made structures.

## 2. IBA Criteria (*Very Important)*

- Please read the WV IBA Criteria Sheet to determine site eligibility. Check all that apply to the site.

- Also give an explanation of why you believe the site is important in the space provided to the right of the criteria checklist.

## 3. Contact Information

- Please enter the information as indicated. This information may be needed to contact you for additional information or for updates.

## 4. Ornithological Importance

- Species Name - List the appropriate bird species or species group (for example, waterfowl). Please use only one line per species or group. The species listed should correspond to the criteria checked in part two of the nomination form.
- Season - List the season for which the site is important. Write (B) for breeding season, (W) for winter, (SM) for spring migration, or (FM) for fall migration. If a site is important for a species in more then one season, please indicate the season for which the quantitative data is based.
- Average Numbers/Season - Write the best available estimate for the maximum number of individuals (or pairs) using the site during the season for which it is important, over a given period of time. For example, for a raptor species meeting criterion, 4c, you would write "3,000/season". .
- Maximum Numbers/Season - Write the best available estimate for the maximum number of individuals (or pairs) using the site during the season for which it is important, over a given period of time using the format above.
- Year - Write the approximate year (s) for which the numerical estimate is based.
- Sources - Write the code number that best indicates where the data for this species comes from. Choose from (1) Published Reports, (2) Surveys such as Christmas Bird Count or Breeding Bird Survey, or (3) personal observations. If possible, please provide the author, title of article, title of publication, date of publication, and page number (s) in the space provided below the chart.

## 5. Habitat and Land Use

- Major Habitat Types - Mark the appropriate box (s) by using P-primary (>50% of cover vegetation), S-secondary (<50% of cover vegetation), or provide the approximate % cover of the major habitats of the site.
- Major Land Use - Mark the appropriate box (s) by using the P-primary and S-secondary land use types that best describe the IBA site. A primary land use activity is one in which large portions of the sites resources and /or space are utilized.

## 6. Land Ownership/Management

- Indicate the category (s) that best describe the ownership status of the nominated site.

## 7. Conservation and Other

- Primary Conservation Issues - Please clarify the threats as S (serious), M (minor), or P (potential) according to the percentage of the resource that is predicted to be affected negatively if current trends continue; Serious =>50% of the resources, Minor = 10-50%, and Potential =<10%.
- Give details of any conservation measures that have been taken, are in progress, or are proposed that directly affect the potential IBA site. This can include proposals for legislation, protection, or management. Give details of any protection for nature conservation established at or around the site. State whether an officially approved management plan exists and whether it has been or is being implemented and by whom. Also note any other conservation measure taken at the site such as restrictions on development, closure of hunting, or management practices beneficial to the wildlife. An assessment of the effectiveness of measures should be given whenever possible.

## 8. Other Resources

- List any significant plants, non-avian fauna (especially rare and/or endemic) located on the proposed site. Give the species scientific and English name, followed by a brief description of the importance. Also indicate if there is any social, cultural, religious, economic, or historical issues associated with the site.

## 9. Local Groups with an Interest in this Site

- List any local groups that may have an interest in the proposed IBA site. Please give as much contact information as possible.

## 10. Land Owner/Manager Contacts

- Supply the name, phone number, and address of the landowner or manager of the proposed IBA site. Also note whether the person was contacted and if they gave permission for the site to be nominated. All of this information is public record and can be researched at the county courthouse, library, or university.
- Before making any final IBA sites selection, the landowners and managers will be contacted for consent. The parties will then be involved in the conservation projects needed to promote the declining bird populations. We encourage all compilers to contact the landowner or managers when there is near certainty of gaining understanding and cooperation. If the compiler believes that the IBA nomination will not be received well by the landowner or manager, **DO NOT** attempt to contact the party.
- Fill out the landowner/manager information and indicate any potential problems in the comment section at the end of the nomination form.

## 11. Questions

Please Contact Rob Tallman: **email**: rtallman@mail.dnr.state.wv.us **Mail**: Rob Tallman, Division of Natural Resources, Wildlife Resources Section, Operations Center, P.O. Box 67, Elkins WV 26241-3235

# *Important Bird Areas in West Virginia*

## Nomination Form

The West Virginia IBA Program is conducting an inventory of habitats that may qualify as Important Bird Areas. To qualify, a site needs to meet only *one* of the IBA criteria, although many sites will meet several. Please tell us about areas that you think may meet the criteria. Complete as much of this form as possible, by referring to the accompanying guidelines and criteria. Thank you for participating in the West Virginia Important Bird Area Project. Please type or print the entries and return to Rob Tallman. If further assistance is needed, please contact rtallman@mail.dnr.state.wv.us

### 1. General Information

Site Name Sandstone Falls Submission Date __/__/__

Town(s) Hinton County Summers/Raleigh

Latitude 37 46' 22" Longitude 80 54' 22" Approx. size (acres)_____

Approx. elevation (ft.) if a range, give low-high_____

General description of the site (habitat, location, prominent features, ownership, and any other helpful information):

_____
_____
_____
_____
_____
_____
_____
_____

### 2. IBA Criteria (Check *all* that apply): *PLEASE READ CRITERIA FOR SITE SELECTION IN GUIDELINES FIRST*

Why is this site important for West Virginia Birds?

☒ 1. High Conservation Priority Species
Golden-winged Warbler & Cerulean Warbler

☐ 2. Rare, Unique, or Representative Habitat
_____

☒ 3a. 100+ waterfowl (winter)/ 300+ waterfowl (staging)
Green Heron & Ducks

☐ 3b. 10 + breeding pairs wading birds/50+ indiv. Staging, feeding
_____

☐ 3c. 3,000+ raptors
(seasonal)_____

☐ 3d. Exceptional concentrations of migratory land
birds_____

☐ 3e. Single-species Concentrations
(>1%)_____

☒ 4. Long-term research and/or
monitoring MAPS research & Concord College

## 3. Contact Information

Name Ron Canterbury Phone ( ) 304-384-5214
Address P.O. Box 1000 Fax ( )304-384-6225
City Athens State WV Zip Code 24712 Email canterburyr@concord.edu
Audubon Chapter or Other Affiliation Concord College
County Mercer Organization & Title (if applicable) Assistant Professor

## 4. Ornithological Importance

List the species for which this site is important, the season(s) for which the site is important, average or maximum numbers (rough estimates are okay), the years on which this count or estimate are based, and sources of information. *Please refer to the Guidelines.*

| Species | Season | Avg. Numbers/Season | Max. Numbers/Season | Year | Sources |
|---|---|---|---|---|---|
| Golden-winged Warbler | Breeding | | | | |
| American Redstart | Breeding | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# *West Virginia Important Bird Areas*

## Nomination Form

Site Name: Sandstone Falls Submission Date: ___/___/___

Specify Sources:

_____

_____

_____

_____

_____

### 5. Habitats and Land Use

Please indicate by percent of the total area or with a P for primary (>50%) and S for secondary (<50%).

_____ Conifer Forest (White Pine/Hemlock/Other)

_____ Deciduous Forest (Oak/Hickory/Maple/Other)

_____ Active Farm

__P__ Riparian or Floodplain Forest

__S__ Shrub

_____ Field

_____ Grassland /Mine State

_____ Ridge Tops/Knobs

_____ Swamp

_____ River/Stream

_____ Pond/Lake

_____ Urban/Suburban

_____ Other (specify): _____

_____ Nature and Wildlife Conservation

__P__ Hunting/Fishing

__P__ Other Recreation or Tourism

_____ Agriculture/Livestock

_____ Forestry

_____ Water supply

_____ Utility/Right-of-way

_____ Suburban/Residential

__S__ Research

_____ Underdeveloped

_____ Urban/Commercial

_____ Other (specify)_____

# *West Virginia Important Bird Areas*

## Nomination Form

Site Name: Sandstone Falls Submission Date: ___/___/___

### 6. Land Ownership/Management: Check all that apply

___ State _X_ Federal ___ Municipal ___ Private

### 7. Conservation and Other

Primary Conservation Issues: Please note serious (S) Minor (M), and potential (P) threats to the site. Describe primary conservation issues, seriousness, any steps being taken.

_S_ Invasive or Non-native plants
_M_ Introduced Animals
_M_ Cowbird Parasitism
___ Predators
___ Pollution
___ Habitat Conversion
___ Development
___ Disturbance to Birds or Habitat
___ Hydrologic Changes
___ Other (specify) _____
___ Other (specify) _____

### 8. Other Resources

Please describe any significant flora non-avian fauna, social, religious, cultural, economic, or historic issues associated with this site:

Contact National Park Service, John Glen

# *West Virginia Important Bird Areas*

## Nomination Form

Name of Site: Sandstone Falls Submission Date ___/___/___

### 9. Local Groups with an Interest in the Site

Name/Group Concord College
City Athens State WV Zip 24712
Name/Group ____
City ____ State ____ Zip ____

Address P.O. Box 1000
Phone ( ) 304-384-3115
Address ____
Phone ( ) ____

### 10. Landowner/Manager Contacts

Please provide the name, address, and phone numbers of the landowner or land manager(s) for the site, and indicate whether they have been contacted and/or given permission for the site to be nominated.

Name National Park Service
Address ____
City ____ State ____ Zip ____
Phone ____
Contacted ____ Permission ____

Name John Perez
Address ____
City ____ State ____ Zip ____
Phone ____
Contacted ____ Permission ____

Remarks ____

ATTACH SUPPORTING DOCUMENTATION (MAPS, PHOTOS, FIELD NOTES, CHECKLISTS, ETC.) AND RETURN TO:

*Rob Tallman @ WV DNR*

***Thank You for your Participation!!***

# ANALYSIS OF AND FACTORS AFFECTING PESTICIDE RESIDUE ON LOCALLY GROWN TOMATOES

Susanna L. Bowling

D. Susan Gianato
Dr. R.F. Sheppard
Dr. K.H. Baker
Dr. L.E. Bayless

Biology 373-374

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## INTRODUCTION

The use of pesticides to control various infestations on crops can potentially leave chemical residues on the produce. Monitoring of residue on foods shipped in interstate commerce is routinely performed by the Food and Drug Administration in compliance with the Environmental Protection Agency. Studies concerning the reductive effect of rinsing on pesticide residues have also been done on shipped food commodities. State monitoring of fresh produce in West Virginia is also performed, samples being taken primarily from Kanawha county and the counties immediately surrounding it (Canaday, 1997). Rinsing studies of fresh produce in general and residue monitoring of fresh produce in southern West Virginia have both been infrequent.

It is necessary to monitor levels of these chemical residues on foods and to explore reductive efforts because these chemicals can be potentially harmful if legal limits are exceeded. Two pesticides commonly used on tomatoes in southern West Virginia are the insecticide carbaryl (Sevin, Copper Dragon) and the fungicide chlorothalonil (Bravo, Daconil). Carbaryl is in a class of chemicals called N-methyl carbamates. These chemicals adversely affect human health by forming a complex with the cholinesterase enzyme. This enzyme would normally catalyze the breakdown of the neurotransmitter acetylcholine. When the enzyme is inhibited by N-methyl carbamates, acetylcholine accumulates. This causes an overstimulation of parts of the nervous system, causing an increase in sweating, secretions of the respiratory and gastrointestinal tracts, heart rate, and stimulation of skeletal muscle. Most patients do recover within 24 hours, because the carbamate-cholinesterase complex readily breaks down (O'Malley, 1997). Chlorothalonil is in the chemical class of organochlorines. It has caused kidney enlargement in rats, and has also been

known to cause benign and carcinogenic kidney tumors (EPA, 1987). It is classed by the EPA as a "probable human carcinogen."

The purpose of this study was to determine the safety of locally grown produce pertaining to the chemical residue from pesticides. The two counties targeted were Mercer and Monroe. Mercer County and Monroe County are both southern counties in West Virginia covering 423 square miles and 473 square miles, respectively. Fifty-eight percent of the Mercer County population and all of the Monroe County population live in small communities and rural areas. The 1987 Census of Agriculture reports 358 farms in Mercer County and 606 in Monroe County, a farm being defined as at least two to five acres of land producing at least 5,000 dollars worth of some commodity per year. The acreage of these farms totals 49,353 acres in Mercer County and 148,842 acres in Monroe County. Many residents also produce private gardens. Crop farmers and gardeners alike face the problem of insect, disease, and rodent control, and often use pesticides to assist in solving these problems. In 1993, there were 116 private pesticide applicators in Mercer County and 72 in Monroe County certified by the West Virginia Department of Agriculture (Gianato, 1993 and 1997).

The two objectives of the study focused on the analysis of tomatoes. One objective was to ascertain if the residue levels on tomatoes locally grown were below the current legal limits set by the Environmental Protection Agency. The second objective was to determine the effectiveness of rinsing fresh tomatoes by the consumer as opposed to the combination of rinsing actions by both the packing house (prior to shipment in interstate commerce) and the consumer (after purchase).

Tomato samples were collected from tailgate farmer's markets of Mercer and Monroe County and analyzed by the West Virginia Department of Agriculture Laboratory in Charleston,

WV and the Pesticide Residue Research Laboratory of Virginia Polytechnic Institute and State University in Blacksburg, VA. It was essential to the study design that the tomatoes had not been shipped in interstate commerce since shipped produce is already the target of well-established monitoring programs and residue studies.

## METHOD OF SAMPLE COLLECTION

Tomato samples were collected from the Mercer County Farmer's Tailgate Market and the garden of a Monroe County Farmer's Market participant. Each sample consisted of nine or ten tomatoes. When the sample was purchased from the farmer, he was asked three questions: which pesticides were used on the tomatoes, how long ago was the last application, and what steps, if any, were taken to prepare the tomatoes for sale (to determine if the tomatoes received any rinsing). The tomatoes were purchased only if the pesticides used could be analyzed by the Charleston and/or Blacksburg laboratories. The three pesticides most commonly used were carbaryl, chlorothalonil, and manzate. Manzate could not be analyzed by either laboratory, so tomatoes raised with this pesticide could not be purchased. Five samples were collected from Mercer County. Two of these samples had been treated with carbaryl, while the three remaining samples had been treated with chlorothalonil. One sample treated with carbaryl was collected from Monroe County. Samples were stored in Ziploc brand plastic bags and kept cool. After the samples were collected, each sample was divided into a control group and an experimental group. Each control group consisted of four to five tomatoes which were not rinsed after collection. Each experimental group consisted of four to five tomatoes that were rinsed after collection under running tap water, medium flow, for one minute while being scrubbed with the hands. The

temperature of the water was not considered. The control group served as a measure of the pesticide residue level on the tomatoes. The experimental group demonstrated the reductive effect of rinsing by the consumer on those residue levels.

## LABORATORY METHODS

Residue levels were measured in parts per million (ppm). This is the measurement the EPA uses in setting tolerance levels for pesticide residue. A tolerance level is a limit set slightly above "the highest level observed in field trials conducted at the maximum legal conditions of pesticide use." These maximum conditions include applying maximum pounds per acre with the greatest allowed frequency and with the minimum time interval between the last application and harvest (Chaisson, 1991). Tolerance levels are legal limits established to insure that pesticides are being applied in compliance with label regulations. While tolerance levels are used in risk assessments, they should not be viewed alone as an expression of what is "safe" to consume (Whitford, 1992). Risk assessment involves comparing the level of human exposure to the toxicity of the pesticide. The tolerance of a pesticide on each crop it is registered to be used on is multiplied by the average daily consumption of that crop. This value, the Theoretical Maximum Residue Contribution (TMRC), is then compared with the reference dose (RfD), a safety level determined by toxicity studies with experimental animals (Whitford, 1992). Thus the tolerance level is only a part of risk assessment, and when viewed alone it should only be considered a gauge to determine if the farmer is applying the pesticide according to label regulations.

Two chlorothalonil samples were analyzed by the Charleston laboratory. Section 303 E1 from the Pesticide Analysis Manual (PAM) Volume 1, used by the FDA, provided the procedure

for the analysis. The tomatoes of each sample were sliced and an 100 gram portion containing the skin (where the residues are concentrated) was blended in acetonitrile. The solution was then filtered so that the acetonitrile alone with the dissolved inorganic materials was obtained. The solvent was then extracted with petroleum ether, washed with water, and dried with sodium sulfate. It was next transferred to a Florisil column for chemical group separation. The chlorothalonil was eluted from the column and concentrated to five to ten milliliters (mLs) by evaporation. Samples of two microliters of this solvent were injected into a gas chromatograph for analysis after the instrument had been standardized with a concentrated chlorothalonil standard solution. Chlorothalonil present was detected by the instrument and a peak within a specific retention time range was recorded. This data was converted into parts per million by the equation:

ppm = (height of sample peak/height of standard peak) X concentration of standard X (final volume of sample/original sample weight) X dilution factor

The remaining chlorothalonil sample was transported to the Blacksburg laboratory for analysis, but preliminary standardizations using the same PAM procedure failed. The gas chromatograph showed no recovery when samples spikes with chlorothalonil were tested. Thus the method could not be used.

The three carbaryl samples were analyzed by the Blacksburg laboratory also. A 25 gram portion of each sample was blended with sodium sulfate and methylene chloride. This was then filtered to render the solvent free of plant material. The methylene chloride was then evaporated to one mL and five mLs of methyl-tert butyl ether were added to dissolve solids. The sample was then transferred to a Florisil column which was on a layer of sodium sulfate. The sample was allowed to drain to the top of the sodium sulfate layer. The carbaryl in the sample was then eluted

with 150 mLs of 1% acetone in methyl-tert butyl ether. Two drops of diethylene glycol were added to the eluted solution, which was then evaporated just to dryness. It was next centrifuged in methanol and evaporated to 0.6 mLs. The sample was taken to one mL with HPLC (High Performance Liquid Chromatography) water and vortexed. It was then transferred to a syringe and filtered into a clean graduated centrifuge tube. The sample was again vortexed and then analyzed with a High Performance Liquid Chromatograph previously standardized. The data was recorded in units of parts per million (Virginia Tech, 1997).

## RESULTS

Tables I and II give a summary of the obtained data. Of the chlorothalonil samples, the highest residue level found on unrinsed tomatoes was 0.09 ppm. Residue levels ranged from 0.60 to 1.80% of the tolerance level of 5 ppm. The amount of residue on the Bravo rinsed sample shows a 98% reduction. For the Daconil rinsed sample, no residue level could be detected. Therefore it cannot be determined exactly what the percent reduction is, since the lowest detection limit capable by the instrument with this method was not aggressively sought. However, an estimate can be made based on the lowest detection limit used in the procedure, which was 0.02 ppm. Since the unrinsed sample had a 0.03 ppm residue level, and the rinsed level was not detected, it is known that the residue level on the rinsed sample is at least less than 0.02 ppm. When using this value as a reference point, the residue level was reduced by at least 33%. The remaining chlorothalonil sample could not be analyzed due to difficulties previously discussed.

Of the carbaryl samples, the highest residue level found on unrinsed tomatoes was 0.248

ppm. Residue levels ranged from 0.140 to 2.480% of the tolerance level of 10 ppm. The amount of residue on the Copper Dragon rinsed sample shows a 71% reduction. One of the Sevin rinsed samples shows no detected residue level. In this case, no estimate of reduction can be made based on the lowest detection point used in the procedure, since the unrinsed sample's residue level actually fell below this limit itself. Since the lowest detection limit capable by the instrument with this method was not aggressively sought, percent reduction cannot be estimated. In the remaining Sevin sample, the residue level of the rinsed sample was actually slightly higher than the unrinsed sample. This could be due to a number of reasons, the most likely one being slight variations in extraction efficiency in the Florisil column between the solid and liquid phases (Ruggio, 1997). But even in light of this, the residue levels of the corresponding rinsed and unrinsed group are so close to one another that, if the analysis could be repeated a number of times, the residue levels would most likely be equal. This suggests that no reduction by rinsing took place in that sample (Ruggio, 1997).

## DISCUSSION

The results suggest that, according to EPA tolerance level standards, pesticide residue levels on locally grown tomatoes in southern West Virginia fall well below legal limits. This shows that the local farmers from whom the samples were collected are applying pesticides according to label regulations. Since the sample size was small, no conclusions can be definitively drawn that could be applied to the entire farmer population or local tomato crop. Also, no statistical analysis could be performed on the data, since each analytical test was performed only once on each sample. Testing the statistical significance of the data would require several

analytical tests to be performed for each sample, which would be time-consuming and very costly.

In the FDA's incidence/level monitoring of tomatoes in 1992-1993, 84% of domestic samples had pesticide residue, and 1.9% of these samples had violative levels (Roy, 1995). Thus a large majority had residue and a minute percentage of those residue levels violated tolerance levels. The results of this study are roughly comparable, where all samples had residue and no levels were violative.

Rinsing by the consumer was shown to be very effective in reducing residues (except in one sample with the carbaryl brand Sevin). In combining the data from the rinsed samples in which a definite, quantitative reduction was observed, there was an average percent reduction of 85%. This is comparable to a study cited by Whitford (1992) that shows an average residue reduction by washing of 83% for tomatoes during marketing and processing.

To view the data in the correct perspective, it should again be emphasized that a tolerance level cannot serve as a complete expression of risk. It is only part of the risk assessment process, as previously discussed. However, the value of a tolerance level should not be underestimated either. It can still be considered as a good indicator of safety. It would appear that the FDA holds this opinion, since findings from many of its monitoring programs are reported as percentages of the corresponding tolerance levels.

Though there is ample data showing that pesticide residue levels are too low to be considered harmful, public concern is growing instead of diminishing. The seventh biggest fear of Americans is pesticides on food (DeBecker, 1997). Nationwide, organic food sales have increased 20% in each of the past six years (Biondo, 1997). Why the contradiction? One reason may be distrust in the way tolerance levels are set. Congress passed the Food Quality Protection Act in 1996, part of which calls for the EPA to change risk assessment procedures. The EPA's

goal to fulfill this requirement is to complete 90% of the tolerance level reassessment for all pesticide tolerances by 2005 (Heier, 1997).

Americans may also be concerned that any pesticide residue, no matter how small, can cause long-term effects, including toxic poisoning and cancer. In assessing long-term toxicity, a major consideration is the time a chemical stays in the body. The pesticides of this study do not accumulate in the body. Carbaryl is metabolized by the liver, and the degradation products are excreted by the liver and kidneys (Rea, 1994). Chlorothalonil is rapidly excreted, mostly unchanged, from the body. If the dose is small, total excretion occurs within 24 hours (EPA, 1987). When considering the possibility of cancer development, concern arises from the current theory that the least amount of a cancer-causing agent can present the possibility of mutation. If this is the case, then there is always a chance that a pesticide which is a suspected carcinogen may lead to cancer, even when residue levels fall within legal limits. While the probability of such an occurrence is small and based on assumptions, it does leave room for concern. Here it can only be said that one must draw one's own conclusions for now, until further evidence is presented on the subject.

## CONCLUSION

The results of this study suggest that residue levels on locally grown tomatoes in southern West Virginia are minimal, and rinsing effectively reduces these levels in most cases.

| Brand | Time of Last Application | Time of Analysis | Rinsed by Seller? | Unrinsed by Consumer (ppm) | % of EPA tolerance level | Rinsed by Consumer (ppm) | % Reduction |
|---|---|---|---|---|---|---|---|
| Daconil | 8-9-97 | 8-21-97 | YES | 0.03 | 0.60 | ND | >33% |
| Bravo | 8-2-97 | 8-21-97 | YES | 0.09 | 1.80 | 0.002 | 98% |
| Daconil | 8-2-97 | NA | YES | NA | NA | NA | NA |

**Table I:** Measured pesticide residue levels of chlorothalonil in rinsed and unrinsed tomato samples from Mercer County. EPA tolerance level for chlorothalonil: 5ppm

| Brand | Time of Last Application | Time of Analysis | Rinsed by Seller? | Unrinsed by Consumer (ppm) | % of EPA tolerance level | Rinsed by Consumer (ppm) | % Reduction |
|---|---|---|---|---|---|---|---|
| Copper Dragon | 8-2-97 | 10-24-97 | NO | 0.248 | 2.48% | .073 | 71% |
| Sevin | 7-9-97 | 10-24-97 | YES | 0.014 | 0.14% | ND | cannot determine |
| Sevin | 8-8-97 | 10-24-97 | YES | 0.060 | 0.60% | .082 | None |

**Table II:** Measured pesticide residue levels of carbaryl on rinsed and unrinsed tomato samples. Copper Dragon sample from Monroe County, remaining samples from Mercer County. EPA tolerance level for carbaryl: 10 ppm

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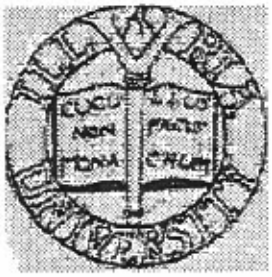
# Shakespeare Goes to College:

# A Contemporary Interpretation of Twelfth Night



Cindy Marie Boyce

Concord College

McNair Scholars Project

Mentor Dr. James E. Lile

7 May 2001

# Shakespeare Goes to College:
# A Contemporary Interpretation of *Twelfth Night*

Cindy Boyce

Mentor: Dr. James E. Lile

When trying to develop a production concept for a show, directors have many factors to consider. Two considerations are directing style and play setting. When looking at Shakespeare, directors may have further questions to answer before they can develop their concept. Because audiences are sometimes intimidated by Shakespeare's language, directors face the obstacle of deciding whether or not to move the production.

In forming my production concept for Shakespeare's *Twelfth Night* I researched four directing styles: Naturalism, Symbolism, Constructivism, and Epic theatre. I also wrestled with whether or not to move the production or change any of the language.

Because the audience for my production of *Twelfth Night* was college students, I decided to move the production to the present day college campus of Illyria University. I made the characters in the play staff and students on the campus, and I only changed language when the new characterizations I gave the characters deemed it necessary.

The show was cast from Concord College students. It was rehearsed in the Concord theatre and was performed Thursday through Saturday, December 7th through 10th in the H.C. Paul Theatre of the Alexander Fine Arts Center, Concord College.

I determined that the show was successful in reaching the college audience it was performed for. The directing style and concept were consistent throughout the show. The production concept that I had envisioned was almost totally realized on the stage, and the problems I faced in totally realizing my concept were out of my control. Therefore, I deemed it a successful production.

## THE PROBLEM

At the risk of stating the obvious, different directors use different styles of stage direction to convey a concept to an audience. With that in mind, the goal of a production is to reach the audience in some meaningful way. The way in which a director chooses to interpret and present a play on stage will effect how the audience perceives it. Therefore, how a director makes a play relevant to the audience is essential for theatrical directors to understand.

In the case of Shakespearean drama, making the play seem relevant to the audience is perhaps even more crucial. It is my observation that theatre goers and some theatre practitioners seem to be "afraid" of Shakespeare. The themes, the language, and the settings seem to be difficult for some modern audiences to comprehend.

Ironically, the messages found in Shakespeare's plays are universal: love, hate, loyalty, jealousy, and other common emotions. And, although many people find the language intimidating, it is the way in which the language is employed that helps to form the interpretation of his plays (1). The language can often be better understood when treated as if it were Modern English (1). In regards to the settings of Shakespeare's plays, if the director senses a need to move the production due to a unique production concept or in order to try to better identify with an audience, a move can be done quite effectively.

The themes in Shakespeare's plays are current to audiences. The question is, what techniques do directors use to bring Shakespeare effectively to modern audiences. Two answers to this question lie in directing style and play setting.

## LITERATURE REVIEW

When I began my literature review, I set out to answer the question, "What techniques do directors use to bring Shakespeare effectively to modern audiences?". In trying to answer this question, I decided to look at two things: directing styles and play setting. The four directing styles I chose to research were: Naturalism, Symbolism, Constructivism, and Epic Theatre. I chose these four directing styles to research because I was curious about each one. I wanted to learn more about these particular styles, and I decided to look at play setting because I was thinking of moving my production of Twelfth Night, but I wasn't sure if it was something I wanted to do until I looked at it in more depth.

One directing style commonly used is Naturalism. Naturalism attempts to portray reality on the stage as closely as is possible (2). Realism also attempts to portray reality on stage, however, Naturalism is an extreme form of realism. Georg II, the Duke of Saxe-Meiningen was a Naturalist who researched the period of every play in depth and made the sets, costumes, speech, and action reflect that period in great detail (2). He could be classified as an extremist Naturalist.

Constantine S. Stanislavsky was a Naturalist concerned with the realistic portrayal of life through "truthful" acting (2). Having actors portray characters realistically can be extremely effective. The only problem I can foresee with "truthful" acting is that the actor may lose control of his emotions on stage. I believe the actor should stay in control of himself and of the character at all times. Theatre is an event in time to be manipulated by the director in order to present a very specific impression to an audience (3). If an actor loses control on the stage, the illusion can be destroyed.

I also dislike the acute attention to detail given to scenery in the Naturalist Theatre. In one of Meiningen's productions, actors had to climb over real tree trunks on stage during a battle scene (2). I believe the focus should be put on the message of the play and not the spectacle.

As for the Symbolist Theatre, I like that its practitioners rebelled against what they found wrong with their society, but I personally find their abstract style disconcerting. The Symbolists rebelled against Naturalism and bourgeois society. They used senses, symbols, and words to evoke a reality separate from the one they lived in (2). Stephane Mallarme, a leading Symbolist poet, said it is impossible to create stable art in an unstable society (2). Maurice Polydore-Marie-Bernard Maeterlinck went so far as to say that "every masterpiece is a symbol and the symbol will not tolerate the active presence of man" (2). Consequently, they often focused on writing puppet plays, and many of the Symbolist works are unstageable because they are so abstract (2).

The Constructivists tried to introduce the circus and an acrobatic element into the theatre (4). Their sets were very abstract and served as playgrounds for the actors. Vsevolod Emilevich Meyerhold used these jungle-gym-type sets often. Meyerhold also combined his drama with real world events through dialogue and scenery (2). I think the functional set is a useful tool for conveying a concept if the concept is abstract just as incorporating society into drama is effective for generating audience interest and societal awareness.

Epic theatre sought to separate the audience from the action on stage and make the audience observe the theatrical event instead of becoming engrossed in it (5). Epic theatre also focused on man's motivations and how he is alterable instead of focusing on

his unalterable instincts. Bertolt Brecht, who helped to give Epic theatre it's name and form, was concerned with society and politics and spent a lot of energy trying to coach truth from his actors (2). Having the audience critique the production rather than accept it at face value was an important step in the formation of modern theatre.

Besides style, another aspect of directing that can be examined to determine how a director can bring the audience to Shakespeare is play setting. The setting given for a play by Shakespeare can be changed if the director has a good reason for it. If the director believes that his/her audience would not identify with a play set in ancient Greece, he/she might set the play in America in the 1920's in an effort to reach more people.

However, a Shakespearean play should not be moved simply because it can be. A play should not be put into another time frame unless the themes dealt with in the play, as well as the audience the play is being done for, dictate the move (6). There should be some environmental factor which leads the director to form a contemporary interpretation of the play. If it will clarify a concept, though, moving Shakespeare can be done both creatively and effectively.

Some contemporary examples of Shakespeare being moved effectively include Kenneth Brauagh's *Much Ado About Nothing* and Baz Luhrmann's *William Shakespeare's Romeo and Juliet* starring Claire Danes and Leonardo Dicaprio. Both of these movie versions of Shakespeare's plays have received critical acclaim for their contemporary interpretations of Shakespeare's classic plays, proving that moving the shows can be effective if done properly and for the correct reasons.

## HYPOTHESIS

I was looking at what directing techniques a director can use, specifically the dramatic elements of directing style and play setting, to make Shakespeare's Twelfth Night relevant to a college audience at Concord College in Athens, WV.

In my production of Twelfth Night, I tried to merge some of the Naturalist's acting methods with Brecht's search for simple truth. I wanted my characters to be slightly believable to the audience. However, I also wanted the production to be fun and lighthearted, so I used a Melodramatic approach to my directing style. By Melodrama, I mean the acting style that tends to have actors give direct asides to the audience and play the play in a non-realistic, exaggerated manner. I think this style draws the audience in and makes them confidants to the characters, and I wanted that intimacy of audience to production

I debated over making my entire production concept of Twelfth Night a Melodrama. However, Malvolio didn't completely satisfy me as an evil villain. So, I opted for a mix of Naturalism and Melodrama. I was trying to have characters that could be identified with by my audience while being fun, possibly believable, yet over the top.

Obviously, I wanted the audience to be highly involved with the show. Therefore, I did not incorporate Epic theatre into my concept. I did try to incorporate Meyerhold's use of societal events, however, by making my characters be administration and students on a college campus with an environment similar to the one found at Concord.

I debated on whether to use masks in my production. Because I was looking for a very expressive and very playful atmosphere, I considered masks. They add a new dimension to characterization, forcing the characters to play everything bigger. However,

I decided that believability would be destroyed if I used masks. I also thought that the show would look more contemporary if masks weren't used, and therefore, opted not to use them.

## DATA COLLECTION / ANALYSIS

My research project was a sort of internal qualitative study. After I completed my literature review, which consisted of researching different types of directing styles, I studied the script of Twelfth Night in order to get a firm understanding of the play. I read the play through from beginning to end three times in order to get the plot firmly in my mind. The number three was not picked ahead of time. It is simply the number of times it took me reading the script all the way through in order to feel that I had a firm grasp of the show.

After the initial three readings, I put the script down for two weeks in order to let the play float in the back of my mind. I simply let myself try not to focus on the script. I wanted to come back to it after I had rested in order to see if I would get anything new from the script following a rest period.

After leaving the script alone for two weeks, I picked it up again and reread it just to familiarize myself with the script. Sure enough, there were new things that I saw in the script that I hadn't seen before such as relationships and characterizations.

Next, I began to dissect the play. I read the play through once to find every character in the script and what scenes he/she appeared in. Then, I read the script through to see how many of the smaller parts could be doubled. I found that I needed 16 actors: thirteen being actors with only one part and three being actors that doubled or tripled roles.

My next objective was to decide how I wanted to interpret the script. I decided that I definitely wanted to move the show. Because I was producing Twelfth Night for a college audience, I feared that the very word Shakespeare would turn many of the

students off before they even entered the theatre. There was also the possibility that some students would avoid coming because of the idea that Shakespeare is to be feared. At Concord, we often have a problem getting students involved with productions. They come to get their cultural credit, not to see the show. Almost always, the student audiences on Thursday, and sometimes Friday, will be inattentive, rude, and uninvolved with the show. I wanted to reach them, so I decided to contemporize my production concept.

I read the script through for considerations of the show being set at a circus which I decided I didn't like. Then, I thought about moving it to a college campus. I thought that the best way in which to reach a college audience was to set the show on a college campus with characters that they could look around at their school and draw parallels to. I read the script through in pieces and parts five times before I finally decided on my modern characterizations. My final decisions are in figure 1.

All of the characterizations fit in with my move. The script also fit well with this move except for the shipwreck where Viola and Sebastian were separated. My mentor, Dr. Lile, and I finally came up with the idea to have the twins be on a Carnival cruise that went down. This fixed the hole in my concept, and thus, I could proceed with my production of Twelfth Night as a college playground wherein the actors and the audience could participate.

Before I begin describing my concept in detail, it is necessary to briefly describe the layout of the H.C. Paul Theatre at Concord College, the space in which the play was set. First of all, the Paul Theatre is a black box theatre. It has the ability to have the audience on three sides, however, for Twelfth Night I had the side bleacher seating areas

pushed back and out of the way and had the audience only in the front as in a proscenium arrangement. It has a traditional proscenium arch, however, it also has a false proscenium in front of the traditional proscenium through which actors can enter and exit. There is also a door in the false proscenium on stage left and stage right. I used the doors stage left and right as entrances and exits, but the platforms I had on stage prevented the use of the onstage ends of the false proscenium as entrances and exits.

That having been said, in keeping with my college concept, I gave the characters positions in and around a college campus. Duke Orsino became President Orsino, the President of Illyria University. He was always accompanied by his laptop toting, faithful secretary, Curio and his stoic bodyguard, Valentine. Valentine never smiled or showed any abundance of emotion. He was dressed in suit and sunglasses and had one spot on which to perch when he was on Orsino's platform.

Curio was at the beck and call of Orsino. Orsino was self involved and would snap his fingers where by Curio would come running throughout the play. Curio also played the flute for Orsino's pleasure. I had Curio accompany Feste on the ending number. They were alone on the stage together. Feste sang and entered the audience, and at the conclusion of the song, snapped his fingers for Curio to follow. I gave Curio her dues by having her turn just before she was gone and snap to bring down the lights.

Feste was a member of the Twelfth Knights fraternity, along with Sir Andrew and Sir Toby. Because they were the Knights, they always talked in terms of Sir and Knight and drawing their swords instead of putting up their fists.

I wanted Feste to be the comic relief for the play. I my mind, he was the boy who always did the outrageous to get attention in school.

I wanted Sir Andrew to be a backward, almost dorky guy, destined to fail. I wanted him to be the type of guy who trips over his own feet and misses all the put-downs that people send his way. He was a drunken friend of Sir Toby, the mischievous frat boy who I saw as a fifth year freshman, majoring in alcoholic consumption.

In my production, Fabian was a sorority wanna-be who hung out with Andrew and Toby. She was almost a Twelfth Knights groupie.

I made Olivia into the head librarian at the university, the daughter of a professor who had recently died. I wanted her to be proud, self absorbed, and sexually frustrated. When she saw Cesario, she went after what she wanted with full force and expected to get him, because she had never been told no, to anything she wanted. She was spoiled.

Malvolio was Olivia's assistant librarian. I wanted him in a black, stylish suit, because he was full of himself and would never be caught out without every hair in place. This image made him look even more absurd when he came out in yellow stockings and cross gartered. The actor playing Malvolio was the brain child of a biker look for Malvolio when he returned to woo Olivia. I wanted Malvolio to be so obnoxious in the beginning of the play that the audience would find his position of being tricked funny and well deserved. If the audience sympathized with him, the prank wouldn't be funny, and the audience would just find Sir Toby and his friends cruel and perhaps turn on them.

I wanted Maria to be a mod work study student who only worked when she had to. I thought she would prefer to read a magazine on the job than file books. I also wanted her to be a smart aleck and sure of her looks and importance.

I made Antonio into an army officer on the cruise with Sebastian and Viola. I wanted him to be a little rough around the edges.

I wanted Sebastian to be a lover not a fighter. However, I wanted him to be obviously virile if the occasion arose. I wanted him to be an all around nice guy, fairly well off, who was just confused by his situation.

I wanted Viola to be a nice girl as well. Again, she was well off with money, as the party dress she was wearing when she came ashore attested. However, I wanted there to be some calculation in her plan to disguise herself. In my production, I wanted her to take up the disguise in order to get closer to Orsino in hopes of winning him.

Finally, the two officers I made into Illyria University campus police officers. The captain that brought Viola ashore, I made into the captain of the Carnival cruise ship that went down.

Because the feel I wanted for the production was one of playfulness and intimacy, I moved all the action of the play within and down of the false proscenium in order to tighten up the space and move the play closer to the audience. I also had the characters to directly address the audience, making the audience feel involved in the action.

I wanted my set to have levels and an abstract feel, so I decided on two platforms. I had a platform on the stage right side to serve as Orsino's office as well as other various localities. As Orsino's office, I decided that a desk and chair for Orsino and one stool for Curio was all that was needed. I didn't want anything unnecessary on the set to distract from the action or the characters.

In the second half of the show, the desk and Orsino's chair disappeared from the stage right platform. The stool stayed. Act III, Scene II the platform served as the Twelfth Knights fraternity house. Act III, Scene III, the platform became Illyria Fashions where Antonio and Sebastian were buying new clothes after their suits had been ruined in

the sea. Act IV, Scenes I and III, the platform served as Olivia's home.

I wanted Olivia's platform to be opposite Orsino's on the stage left, and I wanted it to be higher. Olivia is what Orsino aspires to. She thinks herself to be of great beauty and importance, and in the development of the plot she is of great importance. I wanted Olivia higher than Orsino for symbolic effect.

Olivia's platform stage left represented the Library. It was the only fully dressed set throughout the entire show. The Library was used throughout the show, so I needed something constantly representing it. I didn't want the platform to look busy though. With Dr. Lile's help, we came up with a design that included a circulation desk center platform, a filled bookshelf upstage left on the platform, and a trap door in the floor down stage left for Feste and Malvolio to play with.

Neither of the platforms were faced. Orsino's was low enough to the ground so that with the legs painted black, they seemed to disappear. I didn't want Olivia's platform faced, because I wanted Malvolio to be open to the audience when he was locked in the basement in Act IV, Scene II. I wanted the audience to see Malvolio and Feste at the same time reacting to each other. However, the platform needed some decoration to cover the bracing. So, I used two wreaths to cover the bracing on the front of the platform, tinsel to trim the edge of the platform, and I hung Christmas bulbs from the front of the platform to fill in the open space. The decorations also served to set the time of the play, Christmas season in the year 2000; a play on Sir Toby's line "O the twelfth day of December". The title of the play also refers to the end of the Christmas season, so I decided to keep that dynamic and have it set at the holiday season.

The floor of the theatre was painted into six different areas. The center was a grey

cobblestone which faded off to the left, right, and upstage. Stage left and right in front of the two platforms was green, representing grass, the area on campus known as the square. The areas to the far stage left and right in front of the false proscenium were painted brown to represent a general, all purpose space. The area upstage of the playing area where the seal was hung was also painted brown. The color scheme was really Dr. Lile's work. My only request was that I have an area of grass to represent the square in the center of the acting area and an area both far left and far right to serve as street scenes and other general localities.

The only set pieces I had besides the two platforms were a banner, a huge incarnation of Illyria University's seal, created by Dr. Lile, and two benches down stage left and right in the square. I placed the fraternity banner of the Twelfth Knights on the stage right false proscenium in hopes that the banner, along with the fraternity letters on their costumes, would clarify the relationship of Sir Toby, Sir Andrew, and Feste. The college seal hung in the background above the stage. It served as a backdrop for the action and an identification of the location. The two benches gave the actors opportunities to sit down, climb upon them, and even a place to hide.

In order to keep the show interesting and high energy, I wanted a lot of entrances and exits. I made use of the entrance to the theatre stage left and the door to the lighting booth stage right for Viola's and Sebastian's first entrances when they enter from the sea. The entrances in the false proscenium stage left and right were used for Antonio and the officers and Sir Toby and his fraternity buddies respectively. Center was an all purpose entrance and exit. The platform stage left stayed the Library throughout the show while the platform stage right was Orsino's office, The Twelfth Knight's fraternity house, Illyria

fashions, and Olivia's home.

I had Valentine, because of his stoic appearance, enter after Act III, Scene II and take down the Twelfth Knights banner to reveal a sign for Illyria Fashions, because I didn't think the store idea would read well without some identification. I had Valentine reenter after Act III, Scene III and take down the Illyria Fashions sign which, to me, added a reinforcement that the show was not done in an entirely realistic fashion but was slightly over done and meant to be playful.

Lighting helped clarify the action and lend to the playful feel. The stage was divided into five lighted areas: one center, one platform stage left, one platform stage right, and one each far stage left and right in front of the false proscenium. They came up as dictated by where the action was happening on stage. The college seal stayed lit throughout the production.

## METHODS

Auditions for my production of Twelfth Night were held Wednesday, October 25, 2000 at seven p.m. in the H.C. Paul Theatre of the Alexander Fine Arts Center, Concord College and Thursday, October 26, 2000 at three p.m. in M105 of the Alexander Fine Arts Center, Concord College.

Seventeen Concord College students were cast from a pool of thirty-one auditionees. Sixteen actors accepted their roles. The original cast list and the final cast list appear in Figures 2 and 3 respectively.

The rehearsal schedule can be viewed in Figure 4.

Copies of the flyers that were posted on campus advertising the show can be viewed in Figure 5.

The show was performed Thursday through Saturday, December 7th through 10th at eight p.m. in the H.C. Paul Theatre of the Alexander Fine Arts Center, Concord College. Figure 6 is a copy of the program.

Photos of the production are in Figures 7 through 10.

I wanted to create an atmosphere of laughter and fun. Whether I succeeded is left to the audience. I did, however evaluate the production along with Dr. Lile. We looked at the following guidelines. To be considered effective, the production had to meet the following:

1. Whatever directing style was used, it was used consistently throughout the play. I did not jump from style to style. Here it is important to note that the mixing of two or more traditional directing styles is allowed. However, if I chose to mix styles to come up with my own style, that unique style must be

consistent throughout the production. It will not be considered successful for example to use naturalism in the first act and symbolism in the third act. If they are to be combined, they should be combined into one style.

2. The effectiveness of moving the production. It was done so for a purpose, and the move lent some insight into the production concept. It was not moved "because it could be".
3. Was my production concept fully realized on stage? Was what the audience saw what I had envisioned the show should look like in my head?

## LIMITATIONS

Because my study is qualitative and my analysis is based on opinion, my study will be biased. The viewpoints stated in my research will reflect my own. In the analysis of the success of my production of Twelfth Night, the research will also reflect the views of my mentor, Dr. James Lile. My production concept will, by nature, be unique to my own personal tastes. Another director would produce a different production and have different measures of a successful production. I will have Dr. Lile help with the critique of my own production in order to get a second opinion and try to avoid bias.

I will also not be generalizing my opinions of a successful production to insinuate that all directors consider the same productions successful for the same reasons. Other directors will have other measures of success. Other directors may also disagree with my analysis of my own measures. My analysis is only my personal analysis, and my concept will reflect my conclusions alone and not the conclusions of anyone else.

## INTERPRETATIONS/CONCLUSIONS

Looking at the first criteria for a successful production, I determined that both my directing style and concept were consistent throughout the production. I mixed Naturalism and Melodrama throughout the show. My set was based on the Constructivist ideas of playfulness, colors, and levels. I used the element of Melodrama to add a dimension of playfulness to the actor's performances.

As for moving the production, I feel it was a justified move. My audience gave good feedback on the show, giving a standing ovation on Friday and Saturday nights. My target audience was the college students and therefore, moving the show to a college campus gave the audience something to identify with.

Was my production concept fully realized on stage? Here I ran into the problem that a select few of my actors never reached the level that I wanted them to in their characterizations. However, I feel that the reason this occurred is because I had trouble getting these particular actors to memorize their lines and blocking. They continually came to rehearsal unprepared. As a director, I can not work with actors if they are not off book and ready to work.

Therefore, because my directing style and concept were consistent, my production was moved for a reason which lent some insight into the production concept, and my production concept was almost totally realized on stage, I considered my production of Twelfth Night to be a success.

# Figure 1

FINAL CHARACTERIZATIONS

Shakespeare .....Vs..... My Contemporary Interpretation:

Orsino.....Illyria University President

Sebastian.....Rich Vacationer

Antonio.....Army Officer

Valentine.....Orsino's Body Guard

Curio.....Orsino's Secretary *change from male to female

Sir Toby Belch.....Member of the Twelfth Knights Fraternity (5th yr. freshman)

Sir Andrew Augecheek.....Sir Toby's old Fraternity buddy

Malvolio.....Head Librarian under Olivia

Fabian.....Frat Groupie *change from male to female

Feste.....Member of the Twelfth Knights Fraternity

Olivia.....Head Campus Librarian (daughter of an Illyria U Professor)

Viola.....Rich Vacationer

Maria.....Library Workstudy Student

Captain.....Carnival Cruise Captain

First and Second Officers.....Illyria University Campus Police

Servant.....Illyria University Student

Priest.....Priest

(I added a role in
Act III scene III).....Illyria Fashions Sales Clerk

*denotes a gender change from Shakespeare's cast to mine

# Figure 2

Original Cast List for Twelfth Night

Orsino.....Robert Moore III

Sebastian.....Aaron Brakefield

Antonio.....Steven Fenton

Valentine.....Luke Peters

Curio.....Jeanne Mahaffey

Sir Toby Belch.....Greg Brown

Sir Andrew Augecheek.....Piotr Switalski

Malvolio.....Kahlil Joseph

Fabian.....LeeAnn Weaver

Feste.....Matt Campbell

Olivia.....Karen Atha

Viola.....Sarah Lewis

Maria.....Beth Sampson

Captain.....Adam Shatarsky

First Officer.....Stephen Hensley

2nd Officer/Servant/
Sales Clerk.....Chandra Mullins

Priest.....Prina Khemka

# Figure 3

Final Cast List for Twelfth Night

Orsino.....Robert Moore III

Sebastian.....Aaron Brakefield

Antonio.....Steven Fenton

Valentine.....Luke Peters

Curio.....Jeanne Mahaffey

Sir Toby Belch.....Greg Brown

Sir Andrew Augecheek.....Piotr Switalski

Malvolio.....Kahlil Joseph

Fabian.....LeeAnn Weaver

Feste.....Matt Campbell

Olivia.....Karen Atha

Viola.....Sarah Lewis

Maria.....Beth Sampson

Captain/Priest.....Adam Shatarsky

First Officer.....Stephen Hensley

2nd Officer/Servant/
Sales Clerk.....Chandra Mullins

# Figure 4

Rehearsal Schedule for Twelfth Night

## November 2000

| Sunday | Monday | Tuesday | Wednesday | Thursday |
|---|---|---|---|---|
| | | | 1<br>Read-Through | 2<br>Act I Scenes I, II<br>Robby, Jeanne, Luke, Sarah, Adam |
| 5<br>Act I Scenes III-V<br>Greg, Beth, Pete, Luke, Sarah, Robby, Jeanne | 6<br>Act I Scene V<br>Beth, Matt, Karen, Greg, Kahlil, Sarah | 7<br>Run Act One<br>Off Book Act I | 8<br>Act II Scene I<br>Act III Scene III<br>Aaron, Steven F<br>@ pm | 9<br>Act II Scene II<br>Sarah, Kahlil<br>@ pm |
| 12<br>Act I Scenes II-V<br>Greg, Pete, Matt, Beth, Kahlil, Robby, Jeanne, Luke, Sarah, Leanne | 13<br>Run Act II<br>Off Book Act II | 14<br>Act III Scenes I-II<br>Sarah, Matt, Greg, Pete, Karen, Beth, Leanne, | 15<br>Act II Scene IV<br>Karen, Beth, Kahlil, Chandra, Greg, Leanne, Pete, Sarah, [illegible] | 16<br>Run Act III<br>Off Book Act III |
| 19 | 20 | 21 | 22 | 23 |
| 26<br>Act IV Scenes I-III<br>Matt, Aaron, Pete, Greg, Karen, Beth, Kahlil | 27<br>Act V<br>Everyone EXCEPT Beth and Chandra | 28<br>Run Acts IV & V<br>Off Book Acts IV & V | 29<br>No Prompting<br>Run Through<br>Everyone | 30<br>Run Through |

*There were no rehearsals on Friday or Saturday in November.
*The 20th through the 24th was Thanksgiving Break/ No School or Rehearsal.

## December 2000

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3<br>Tech Sunday<br>2 pm<br>Bring Food | 4<br>Dress Rehearsal<br>6:30 call<br>8:00 curtain | 5<br>Dress Rehearsal<br>Add Make-up<br>6:30 call<br>8:00 curtain | 6<br>Final Dress<br>6:30 call<br>8:00 curtain | 7<br>Opening Night Performance<br>6:30 call<br>8:00 curtain | 8<br>Performance<br>6:30 call<br>8:00 curtain | 9<br>Performance<br>6:30 call<br>8:00 curtain |

**Figure 5**

Flyer Advertising Twelfth Night

# Twelfth Night
# or
# What You Will

**Directed by Theatre Student Cindy Boyce**


## Thursday, Friday, & Saturday

## December 7, 8, & 9

## at 8:00 p.m.

## H.C. Paul Theatre

A contemporary interpretation of one of Shakespeare's great comedies

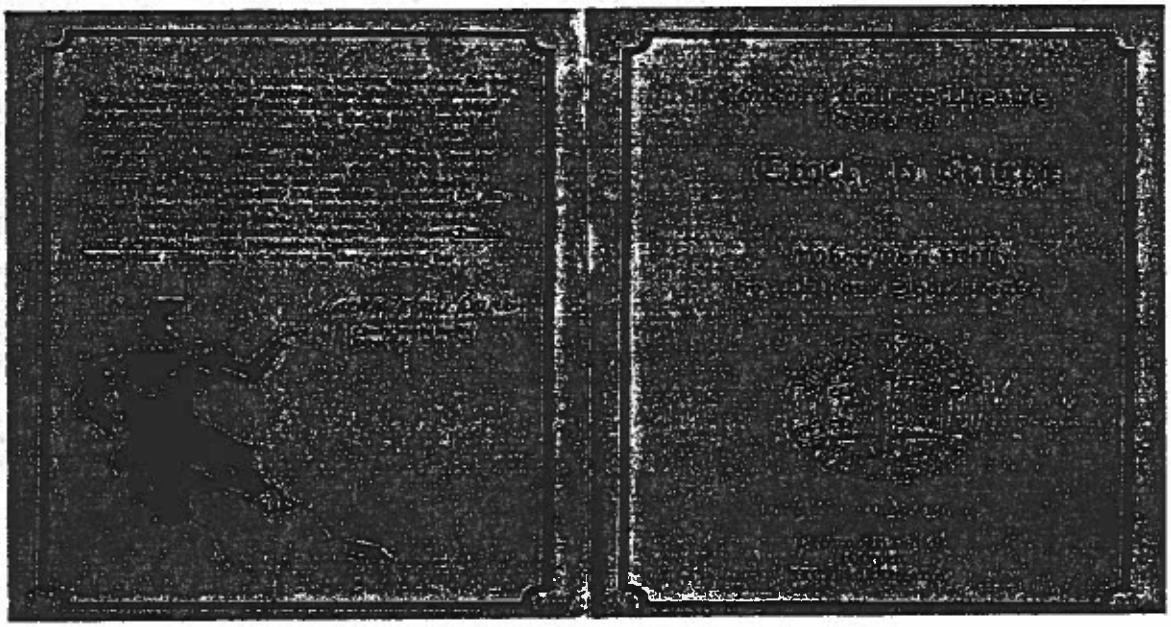
Set on the present day campus of Elysia University,

and filled with laughs, mistaken identities, and misguided love

**Cultural Credit Available**

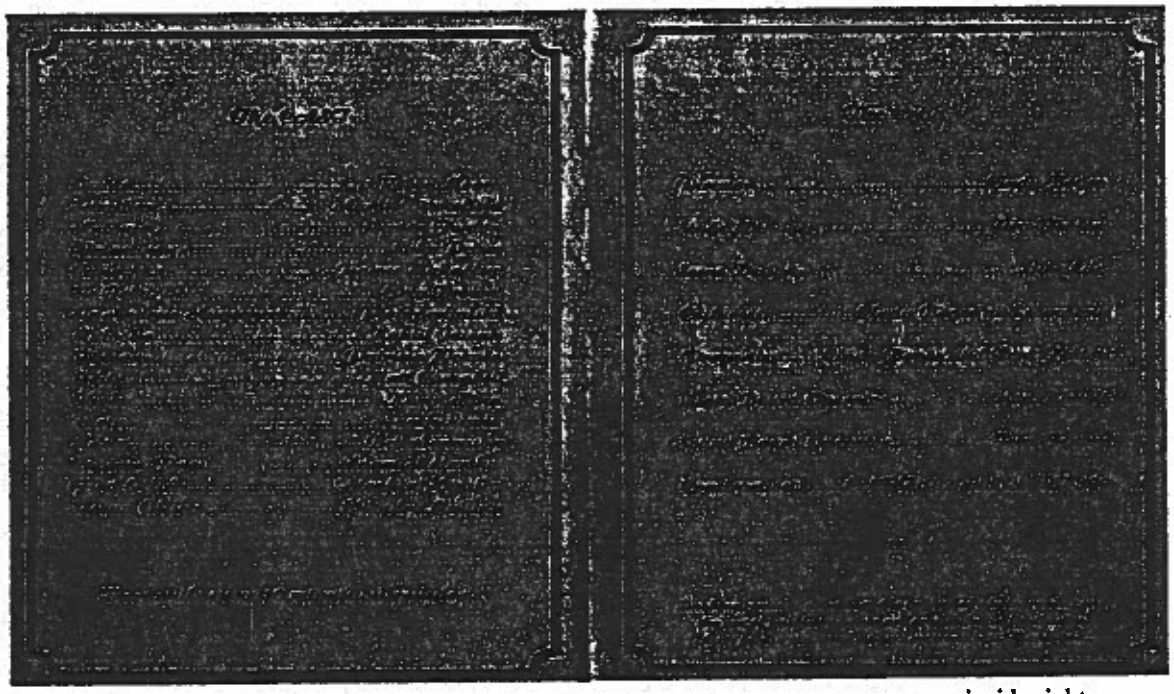
# Figure 6

Twelfth Night Program



back cover

front cover



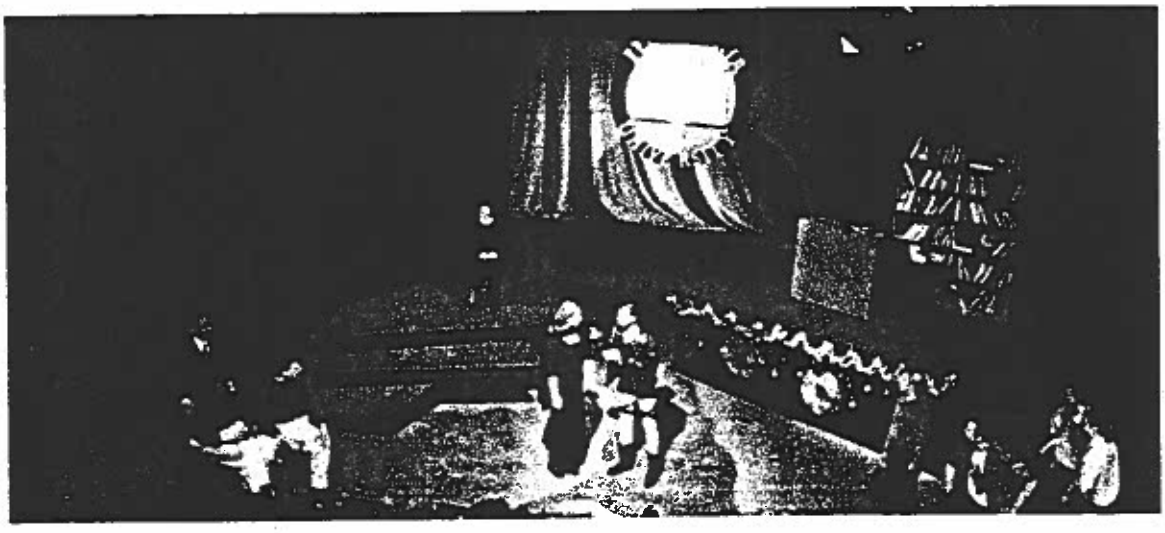
inside left

inside right

## Figure 7

Act V scene I of Twelfth Night showing the scene design.

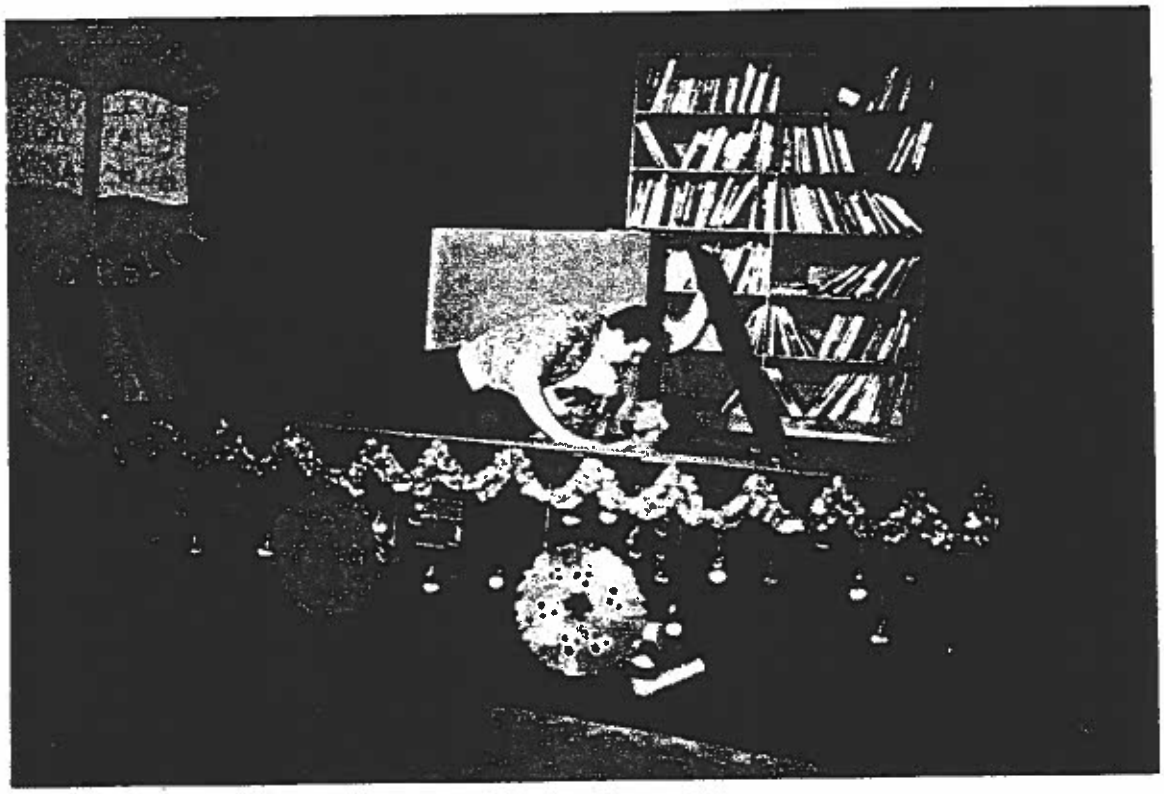
*Left to right—Orsino, Viola, Sebastian, Curio, Olivia, Malvolio, Fabian, Feste, First and Second Officers.



## Figure 8

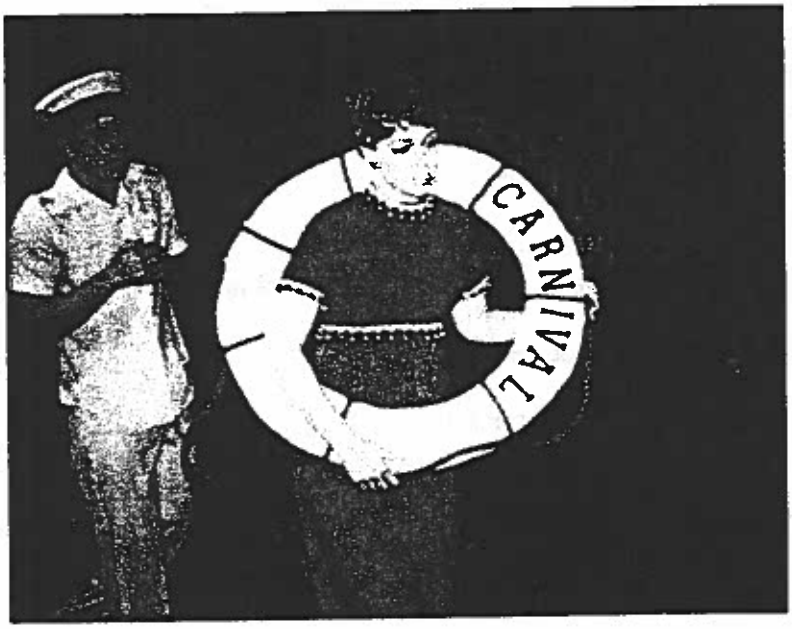
Act IV scene II of Twelfth Night showing the trap door on the stage left platform.

*Feste, Matt Campbell, is atop the platform while Malvolio, Kahlil Joseph, is below it.



## Figure 9

Act I scene II showing the Carnival costumes of the Ship Captain and Viola.




## Figure 10

Act II scene II showing Sir Andrew, left, & Sir Toby, right, in Twelfth Knights costume.

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# Stress: Origins and Management Techniques Used Among College Students

By:
Gilbert O. Catron

**A Research Project for the McNair Scholars Program**

Concord College

Summer - 2001

**Mentor: Michael Olpin, PhD**
Chair, Department of Health and Human Performance
Weber State University
Ogden, Utah

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