
Iowa Wetlands: Perceptions and Values

Christopher Azevedo, Joseph A. Herriges,
and Catherine L. Kling

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Center for Agricultural and Rural Development

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Abstract

With major funding from the U.S. Environmental Protection Agency, researchers at Iowa State University developed and administered a survey of Iowans' usage and attitudes concerning wetlands.

This report summarizes some of the primary findings from the survey.

Key words: Wetlands, economic valuations, recreation demand.

IOWA WETLANDS: PERCEPTIONS AND VALUES

Introduction

There is an ongoing debate at the state and federal levels concerning the desirability of allowing floodplains to revert to their natural wetland state. Components of this debate include the following:

- Wetlands serve an important ecological function and have significant recreational benefits.
- By providing habitat for a variety of flora and fauna, wetlands help sustain biological diversity.
- In the Midwest, wetlands play an important role for spring migratory ducks and geese.
- Wetland areas have been found to reduce the frequency and severity of flooding, as well as to help reduce the dissemination of various groundwater and topically transmitted pollutants.
- Wetlands provide a significant source of recreational activities, including hunting, fishing, hiking, and bird watching.

To make intelligent decisions concerning the future of wetland areas in Iowa, it is important for decision makers to understand how Iowans view the benefits and costs associated with the existence of wetlands. To provide information along these lines, researchers at Iowa State University, with funding from the U.S. Environmental Protection Agency, developed and administered a survey entitled “The Iowa Wetlands Survey” to a wide variety of Iowans. This report highlights the findings from that survey.

Survey Design and Implementation

In this section of the report, we provide an overview of the procedures used in designing the Iowa Wetlands Survey, the implementation procedures, and the final survey response rates. We begin, however, by providing the definition of “wetlands” used in survey.

Defining a Wetland

In order to elicit information about the value that households place on wetland restoration and preservation, it is first important to convey a concise definition of a wetland. Considerable time and effort was spent on crafting the definition of wetlands used in this survey, consulting both standard definitions in the literature and physical scientists at Iowa State University.

The U.S. Army Corps of Engineers defines wetlands to be “areas that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support—and that under normal circumstances do support—a prevalence of vegetation typically adapted for life in saturated soil conditions. This definition also includes areas of standing water that are less than six feet deep.”

In the Iowa Wetlands Survey, wetlands are generically described as transitional areas between dry land and open waters. They are defined in terms of the soil and plants found in the vicinity as well as the amount of water present. The exact text of the information provided to survey respondents is provided in Box 1 on page 11.

The Structure of the Survey

The Iowa Wetlands Survey is divided into five sections. The first section solicits information on household wetland visitation patterns during the prior year (1997), as well as information about how that visitation pattern might have changed given changes in the cost of individual wetland trips. Specifically, in the first set of questions, respondents were shown a map of Iowa divided into 15 zones (see Figure 1). Respondents were then asked to indicate the number of trips they had taken to each zone over the past year, as well as the activities they engaged in during these trips. It is important to note that only single-day trips taken to wetland areas are of interest. After establishing their current usage pattern, the survey respondents were then asked how this pattern (i.e., their number of trips to each zone) would have changed if the cost per trip increased.¹

Box 1: What are wetlands?

Wetlands are transition areas between dry land and open waters. While this sounds like a simple enough idea, where one draws the line between a wetland and dry land is not always clear. Wetlands are not always wet, changing over time with the seasons and with changing weather patterns. Most scientists, in fact, define wetlands not only in terms of the amount of standing water, but also in terms of the types of soil and plants found in the region. One commonly used definition of wetlands describes them as “...low areas where



Doreen H. Schindler



water stands or flows continuously or periodically. Usually wetlands contain plant-life characteristic of such areas. Water-saturated soils in these low areas are normally without oxygen and are described as anaerobic. Anaerobic soils and the presence of one or more members of a small group of plants able to tolerate and grow in such soils are universal features of all wetlands.”²

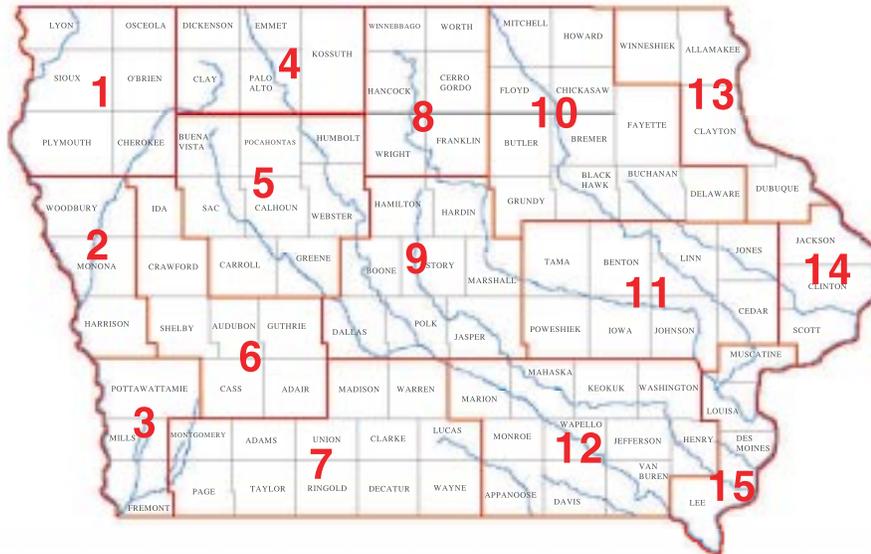
Some of the plants found in wetlands include duckweed, water lilies, cattails, pondweed, reeds, sedges, and bulrushes.

In Iowa, two of the most common types of wetlands are the prairie pothole and riverine wetlands. Prairie pothole wetlands are typically found in the north central region of the state and are characterized by depressions in the land, mostly less than two feet deep, that are filled with water at least part of the year. Riverine wetlands refer to areas of marshy land that are near rivers and streams. Other names for these areas are marshes, sloughs, side channels, floodplains, backwaters, and old oxbows.



When you answer the questions we pose in this survey, we want you to think of wetlands as including both prairie pothole wetlands and riverine wetlands. This includes the following types of areas: floodplains, streams and creeks, lowlands, ponds and marshes. **We do not** want you to include the large lakes themselves or the main flow of major rivers (e.g., the Mississippi, the Missouri, the Des Moines River, etc.), but we **do** want you to include the uplands in the vicinity of lakes and rivers.

Figure 1: Iowa Wetland Zones



The second section of the survey asked respondents questions concerning their knowledge of and attitudes toward both existing wetlands and possible wetland restoration efforts. In particular, they were asked to indicate the primary benefits and problems associated with wetlands, the specific attributes they consider important in terms of which wetland area to visit, and the general condition of wetlands in Iowa. They were also asked to evaluate specific restoration approaches (e.g., private versus federal restoration efforts), alternative funding sources, and the primary party responsible for restoration efforts in Iowa.

The third section of the survey was used to focus attention on two specific wetland programs in Iowa: The Prairie Pothole Joint Venture (PP) and the Iowa River Corridor Project (IRCP). To this end, two versions of the survey were constructed, identical in every way except the local project described. For the IRCP surveys, the scenario described a plan to purchase 7,000 acres of land in the Iowa River corridor. Respondents were then asked, “Would you be willing to contribute \$C on a one-time basis (payable in annual installments of \$C/5 per year over five years) to an Iowa River Corridor Wetlands Management Trust fund that would cover the cost of acquiring this acreage?” The value for “C” was varied across the surveys (from \$10 to \$250) so that different respondents were faced with a different “cost” of this program. The exact text and information provided in this section of the survey are replicated in Appendix A.

For the PP surveys, the scenario described a program called the Prairie Pothole Joint Venture. The respondent was asked, “Would you be willing to contribute an additional \$D on a one-time basis (payable in annual installments of \$D/5 over five years) to an Iowa Prairie Pothole Management trust fund? This fund would be used to acquire about 2,500 acres of land annually for the next 15 years from willing landowners that would then be restored to prairie potholes.” Again, the value of “D” varied across the surveys (from \$25 to \$500). The exact text and information provided in this section of the survey are provided in Appendix B. Prior to each of these questions, the respondent was reminded to keep in mind any limits their budget might place on their contribution.

Finally, each respondent was asked a series of socioeconomic questions concerning characteristics such as gender, age, income, free time, and money spent on recreation activities.

Developing the Survey Instrument

The survey instrument itself was developed through a series of four focus groups and a pre-test of the survey prior to a final mailing. The focus groups consisted of

1. members of Ducks Unlimited and Pheasants Forever,
2. parents of children from a local elementary school,
3. Iowa State University students, and
4. members of a local church.

Each of these groups provided useful comments that were used to create the pre-test draft of the survey. The most useful information received from the focus groups concerned the definition of wetlands, as well as the definition of a “trip” to a wetland area. Members of the focus groups were paid \$10 for their participation.

Two samples of Iowa residents were drawn for use in both the survey pre-test and final mailing: a sample from the general population of the state and a sample of Iowa hunting/fishing license holders. The intention was to gather information from both users and non-users of wetlands. Table 1 shows the breakdown of the total sample of 6,800 names and addresses.

Table 1: Distribution of Iowa wetlands sampling frame

Total Sample	6,800
General Population Sample	4,300
99 County	3,300
4 County	1,000
Hunters/Anglers Sample	2,500
Counties	1,661
Directs	839

Survey Sampling Inc., a professional sampling firm, drew the general population sample. This sample was drawn from phone records, and was composed of two subsamples. The first was a random sample of 3,300 names and addresses drawn from the 99 county population of all Iowans. The second was a random sample of 1,000 names and addresses drawn from Tama, Benton, Poweshiek, and Iowa counties, the four counties surrounding the Iowa River Corridor. This four-county portion of the sample was drawn to allow us to focus on the region around the IRCP.

To obtain the sample of hunting/fishing license holders, permission was obtained from the Iowa Department of Natural Resources to examine the 1996 hunting/fishing license records. These records were divided into two groups: direct sales, which are licenses sold by retail stores such as Wal-Mart; and county sales, which are licenses sold by the counties themselves. Of all licenses sold by the State of Iowa in 1996, 1/3 of the licenses were sold as directs, with 2/3 sold by counties. Therefore, of the 2,500 licenses sampled, 1/3 were sampled from direct sales and 2/3 were sampled from the counties.

A pre-test of 600 was conducted to test the survey on a sample of Iowa residents.³ The first survey mailing took place in October of 1997. Survey recipients were sent a package that included a cover letter, survey, payment claim form, and return envelope. Respondents were assured that their responses would be completely confidential. Respondents were paid (\$4 via ISU check) for a completed survey.

Two weeks after the initial mailing, a reminder postcard was sent to survey recipients who had not yet returned the survey. Two weeks after the postcard, another survey was sent to recipients who still had not returned the survey. Of the 600 surveyed, 273 responded, which is a 56.3 percent response rate among deliverable surveys.

Evaluation of the pre-test surveys revealed several minor problems in the survey design that needed to be addressed. One of the problems was that a significant number of respondents did not provide a complete answer to question number one, the question that elicited information concerning their past travel behavior. Many respondents apparently were not aware that they were supposed to indicate the number of trips they had taken to each area, instead marking only activities (e.g., hunting, fishing, bird watching, etc.). To address the problem, the column provided to enter the number of trips was highlighted to increase its visibility.⁴ Also, to assure a good response rate, the incentive was increased from \$4 to \$10.

Administering the Final Survey

The final survey was mailed in February of 1998 so that it would not compete with the holiday season (which may have been a factor in the low response rate of the pre-test). The same mailing procedure was followed for the final survey as for the pre-test; i.e., the initial survey was sent, those who had not returned the survey after two weeks were sent a reminder card, and those who still had not returned the survey after four weeks were sent another survey. The distribution of surveys sent is shown in Table 2.

Table 2: Final survey distribution

	Prairie Pothole	Iowa River
General Population	2,400	600
Four County Area	0	1,000
Hunters/Anglers	1,600	400
Total	4,000	2,000

Of the 4,000 PP surveys sent, 443 were returned by the post office as undeliverable and 2,094 were returned by respondents, which is a 58.9 percent response rate among deliverable surveys. Of the 2,000 IRCP surveys sent, 151 were returned as undeliverable and 1,045 surveys were returned by respondents, which is a 56.5 percent response rate among deliverable surveys.

Survey Results

In this section, we provide summary statistics from the Iowa Wetlands Survey, focusing on (1) reported usage patterns, (2) knowledge and attitudes towards existing wetlands and wetland restoration programs, and (3) implied wetland valuations.

Wetland Usage

On average, Iowans report a high usage of the wetland areas in the state. Figure 2 presents the average number of trips reported by Iowans to each of the 15 zones identified in Figure 1. The green bar indicates the average number of trips respondents took within their own zone, and the blue bar indicates the number of trips taken to other zones. Thus, for example, Iowans from zone one take 7 or 8 trips a year to wetlands in their own zone and another 5 or 6 trips to wetlands out of their zone. The average total number of trips taken by Iowans ranges from about 10 in zone 6 to over 15 trips in zone 8. Figure 3 provides a breakdown of the activities typically undertaken during these wetland trips. The most popular activity (undertaken during over half of the reported wetland visits) is wildlife viewing. Biking, hiking, and fishing are the next most popular activities. Hunting makes up a relatively small proportion of the wetland activities.

Figure 2: Average Number of Recreational Wetland Trips During 1997

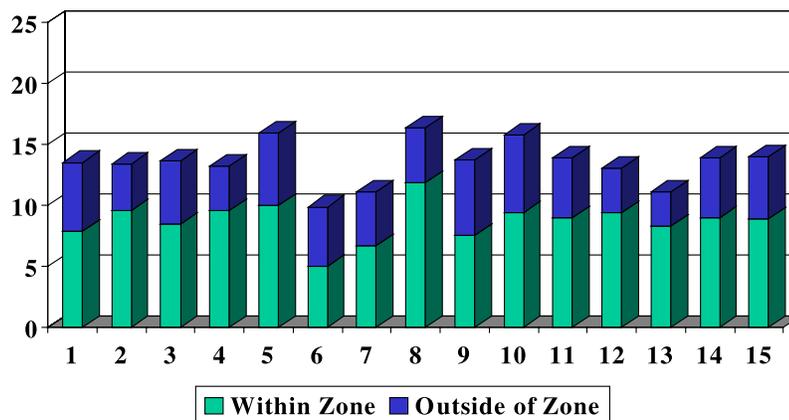
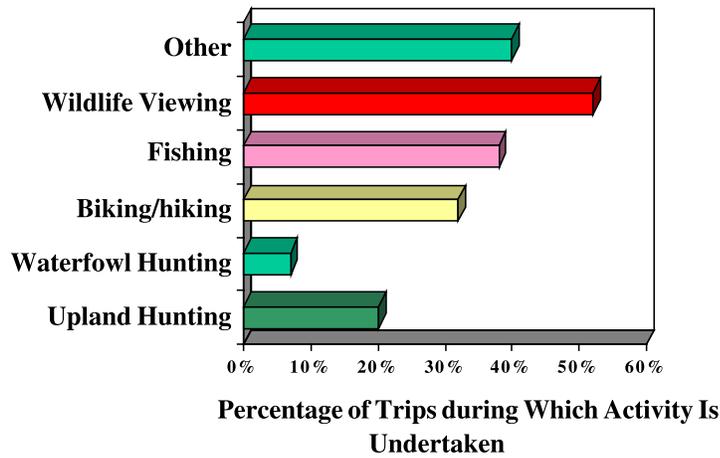


Figure 3: Wetland Activities



Figures 4 and 5 provide the same information for the sub-sample of hunting and fishing license holders. As expected, this set of individuals makes even more use of wetland areas in the state, as can be seen by the height of the bar charts. For example, hunters and anglers living in zone 1 take an average of 10 visits to wetlands within their own zone and a total of about 16 or 17 trips annually. Also, as expected, hunting and fishing make up a larger portion of the wetland activities, though wildlife viewing remains an activity during half of the trips taken. In comparing these numbers across Figures 4 and 5, it is important to remember that the general population survey also contains a large number of hunting and fishing license holders.

Figure 4: Average Recreational Wetland Trips During 1997 - Hunters/Anglers

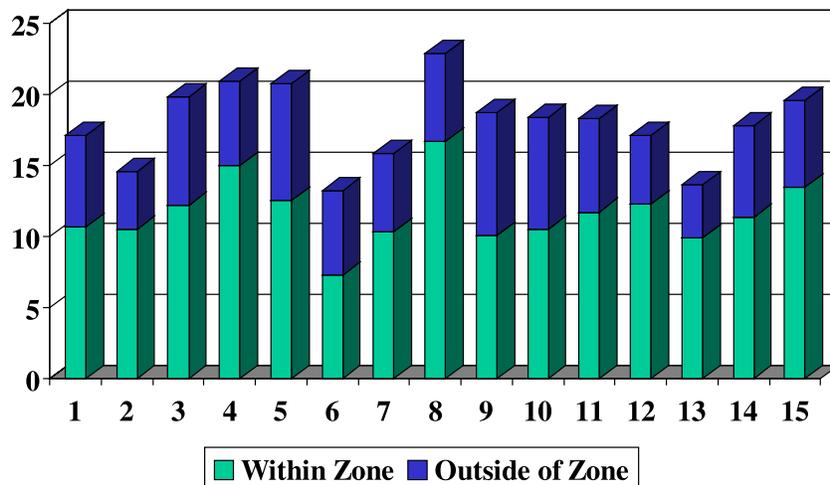
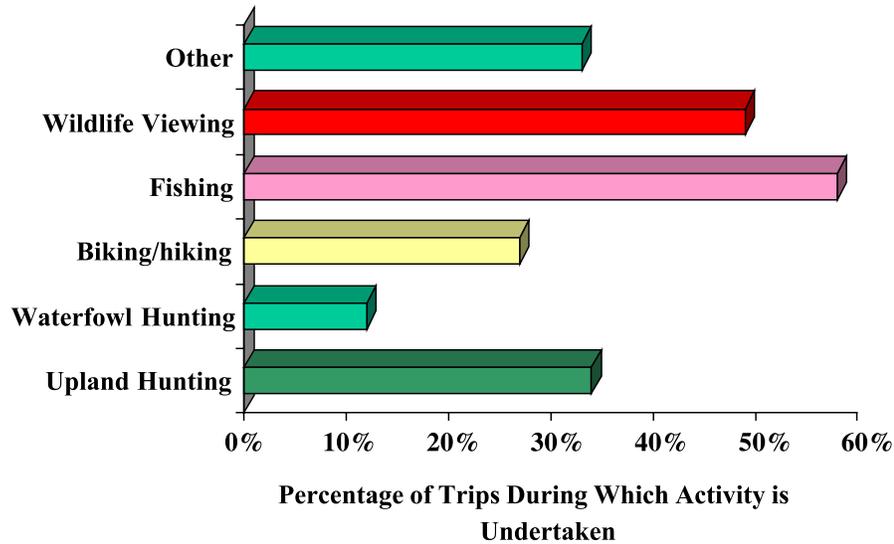


Figure 5: Typical Wetland Activities - Hunters/Anglers

Knowledge and Attitudes

Iowans perceive a wide variety of costs and benefits associated with the presence of wetlands in the state. In the survey, respondents were given nine attributes and asked to indicate which ones they considered to be benefits of wetlands. Figure 6 presents the percentage of the general population, as well as hunters and anglers, who checked the identified attributes (respondents were free to check as many benefits as they desired). The first and second most highly recognized benefits of wetlands are wildlife habitat (about 90 percent!) and recreation (70 to 75 percent). These were the two responses most often checked by both the general population and hunters and anglers. The next most commonly perceived benefits are biodiversity and flood control, with groundwater recharge being the least identified benefit of wetlands by both groups.

Respondents were then asked to identify the attributes they perceived as drawbacks of wetlands. Figure 7 contains the results. By far the most commonly perceived negative aspect of wetlands is mosquitoes. About 1/4 to 1/3 of the respondents felt that difficulty in using the land to farm was a drawback. Relatively few people viewed disease or obstacle to development a drawback.

Figure 6: Perceived Benefits From Wetlands

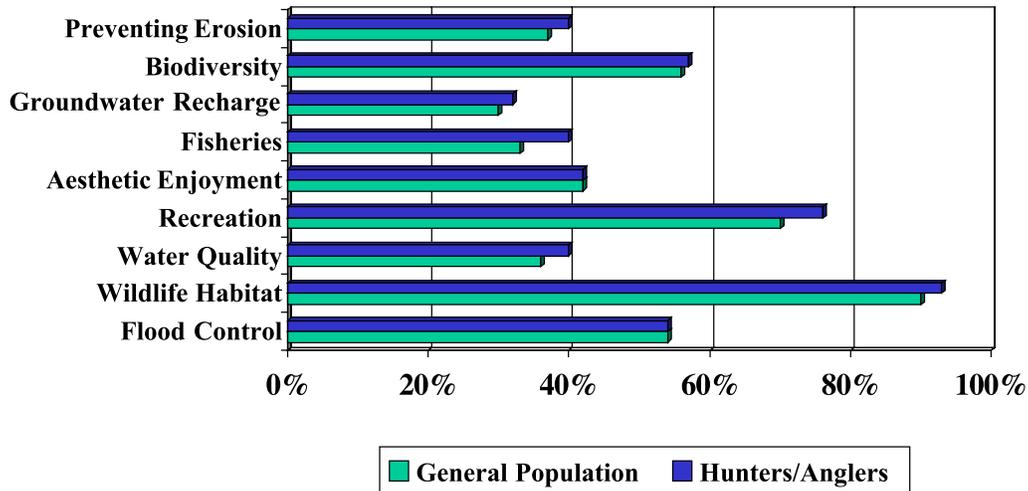
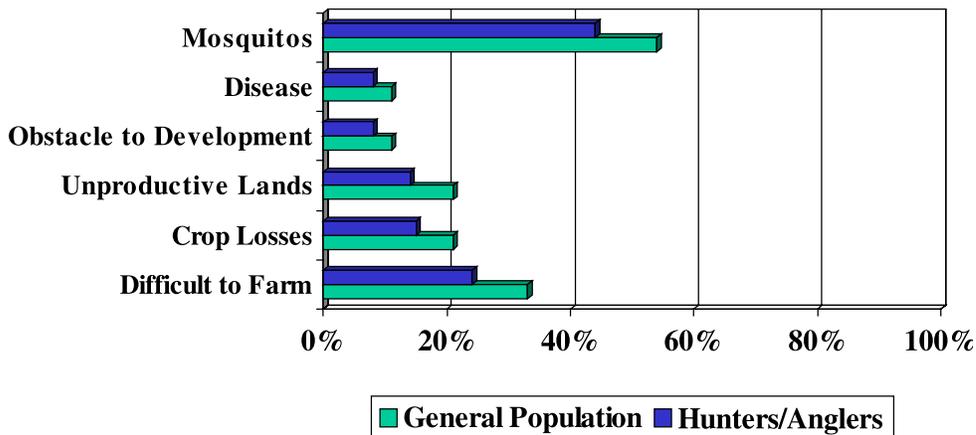
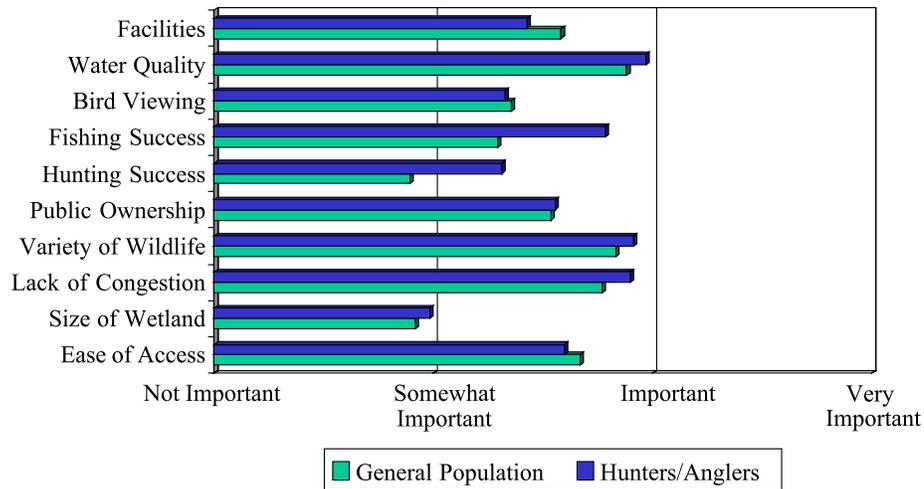


Figure 7: Drawback to Wetlands



To determine what Iowans care about when choosing to visit a wetland area, respondents were asked to rate importance of various wetland attributes in their decisions about where to go. Figure 8 reports the average ratings, again separately for the general population and the hunters/anglers sub-sample. The most important quality attributes reported by Iowans are water quality, variety of wildlife, and lack of congestion—with ease of access, public ownership, and facilities also identified as important. Interestingly, the size of the wetland is not identified as being of particular importance. Not surprisingly, hunting and fishing success are identified to be more important among the hunters/anglers than among the general population.

Figure 8: Important Wetland Attributes

To get a better understanding of Iowans' perceptions concerning what has actually been happening to the acres of wetlands in the state over the past decade, respondents were asked to indicate whether they believe the total wetland acres in Iowa have been declining, stable, increasing, or to indicate that they did not know. Figure 9 reports a pie chart with their responses. Although 38 percent believe the number of acres to be declining, 16 percent believed them to be stable, and 18 percent thought they were increasing.

Figure 10 reports the results of a question designed to gauge Iowans' general support for protection and restoration efforts of wetlands in the state. The results indicate that Iowans strongly support preservation and restoration efforts, with 78 percent responding that they either strongly or somewhat support such efforts. In order to gauge which specific type of program they favor, survey respondents were asked about their support for five current programs.

- Outright public purchase of wetland areas from willing sellers.
- Private efforts to purchase and restore wetlands, including efforts by such groups as Ducks Unlimited, Pheasants Forever, and The Nature Conservancy.
- Federal restoration of wetlands, with federal leasing of wetlands (CRP) or long-term easements (WRP) to keep the lands out of crop production.
- State and federal regulations prohibiting the further draining and conversion of wetlands to other uses.
- Tying federal farm support funds to compliance with wetland protection.

Figure 9: Perceived Trends in Number of Wetland Acres

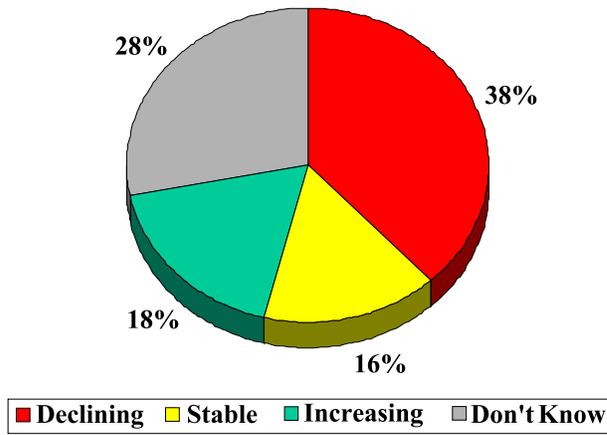
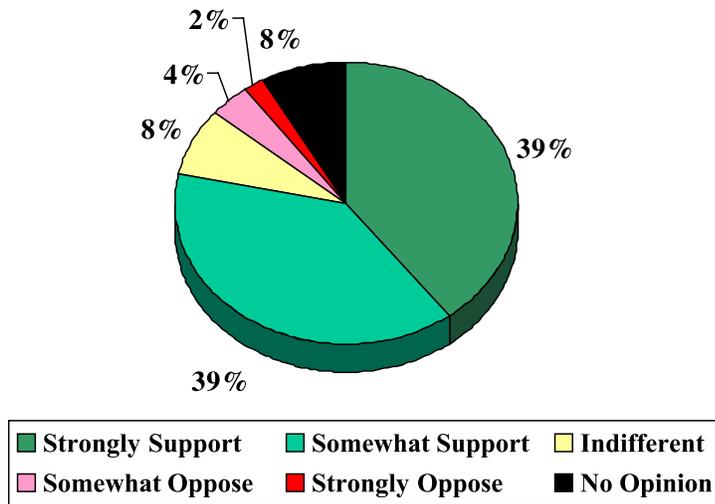
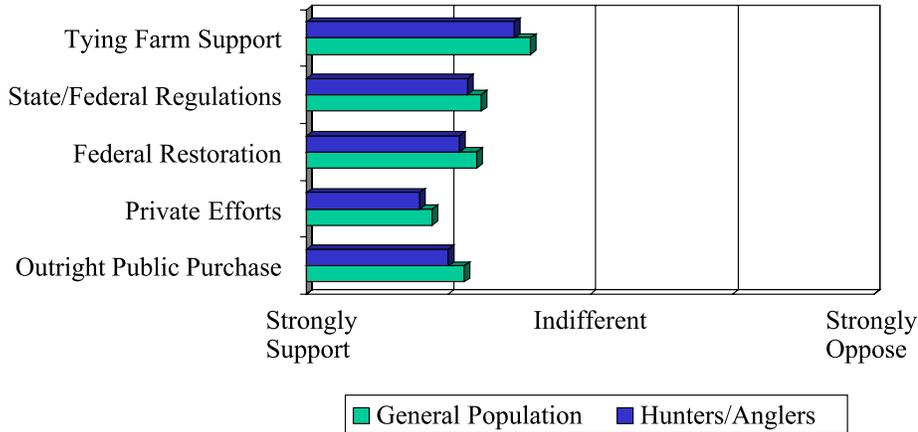


Figure 10: Support for Wetland Restoration and Preservation in Iowa



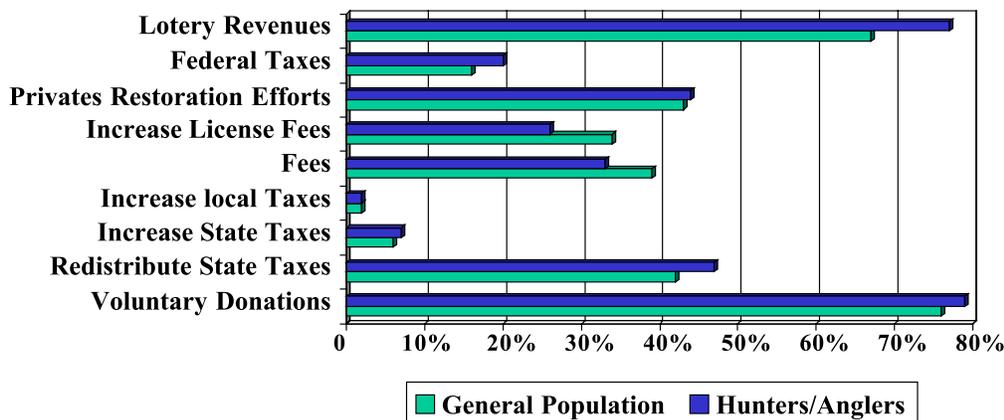
As Figure 11 illustrates, Iowans generally support all of these existing programs.

Figure 11: Support for Alternative Restoration Programs



Iowans are less unified concerning funding issues (see Figure 12). Many Iowans support voluntary donations and lottery revenues (nearly 80 and 70 percent, respectively), but almost none support local or state tax increases. Less than 50 percent Iowans support private restoration efforts, increased license fees, user fees, and/or the redistribution of state taxes.

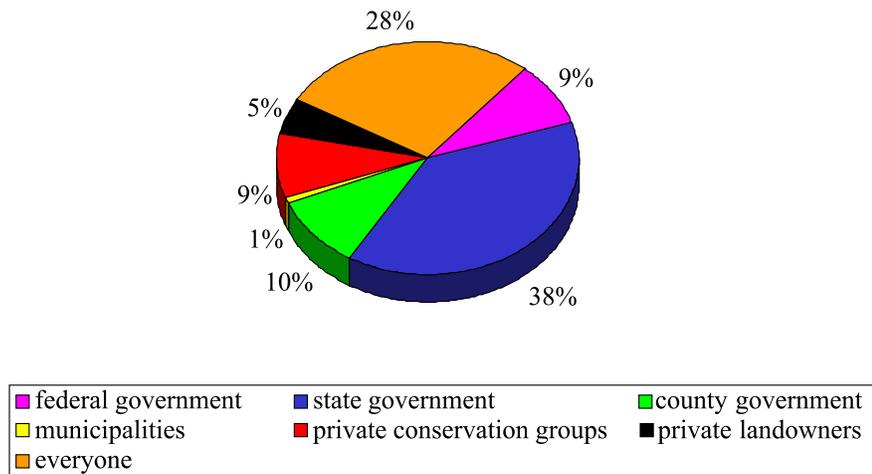
Figure 12: How Should Wetland Conservation Efforts be Funded?



Finally, respondents were asked who should be responsible for wetland protection in the state. Figure 13 contains a summary of the results. Over 1/3 (38 percent) felt that the state should have primary responsibility for this function, and 28 percent felt that *everyone* should

have such a responsibility. A relatively small number—10 and 9 percent, respectively, felt that the county and federal government should have primary responsibility. About the same number (9 percent) felt that private conservation groups should shoulder the responsibility. Few felt that private landowners or municipalities should be primarily responsible for the protection of wetlands.

Figure 13: Who Should Have Primary Responsibility for Protecting Iowa Wetlands?



Valuation

One important goal of the Iowa Wetlands Survey was to estimate the value that Iowans place on the preservation and/or restoration of wetlands in the state. In the foreseeable future, conservation budgets will be tight and there will be more projects than money to fund them. Thus, society must decide where to focus the available resources (both private and public sources of funding). To help with these decisions, economists have devised methods to measure the value people place on environmental goods as measured by their willingness to pay for the goods. Two of these techniques are employed in this study. The first method is based on observing the public use of a natural resource (visits to wetlands) and inferring their willingness to pay for the resource from their behavior. The second method is based on directly asking whether they are willing to pay various sums of money to support a particular project.

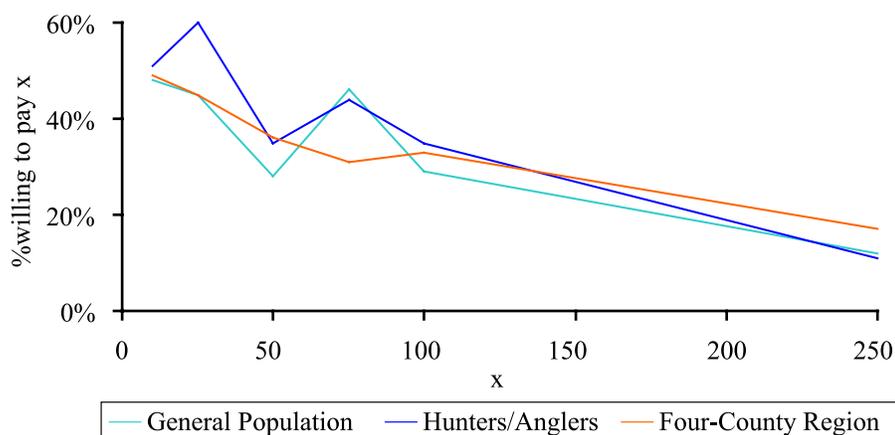
The first value estimated in the study is the willingness to pay for the existing level of wetland visits. This can be thought of as providing a baseline of the value Iowans place on preserv-

ing the existing level of the resource in terms of how much enjoyment they get from wetlands through direct use (hunting, fishing, hiking, etc.). Note that these values **do not** include the values wetlands generate in terms of reduced flood damage, water cleansing services, groundwater recharge, etc.

Based only on the reported trips data, the average recreational value per season of wetlands ranges from \$95 to \$123 per person.⁵ In addition, respondents were asked how their trip behavior would change with higher trip costs. Incorporating that information results in a revised range of estimates of between \$137 and \$202.⁶

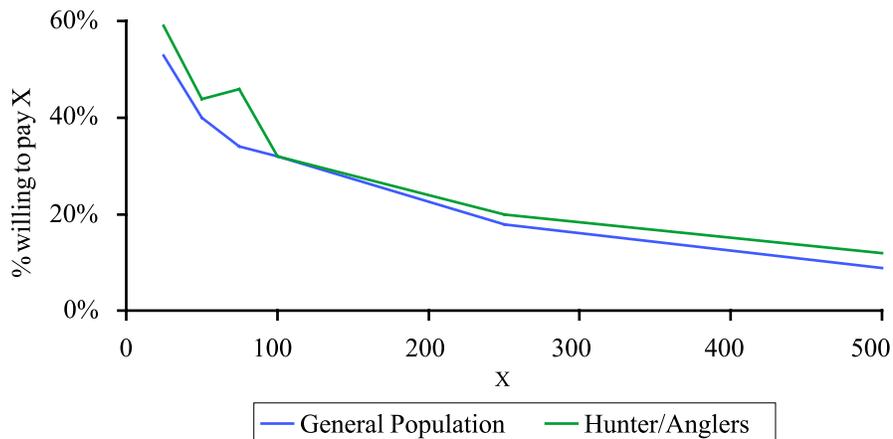
In addition to estimating values associated with current wetland levels in the state, we estimated the value of adding wetlands through two specific projects. Willingness to pay was calculated based on the data collected in the Prairie Pothole scenario (Figure 14). The figure charts the relationship between the percentage of respondents indicating that they would be willing to pay the stated amount along the horizontal axis. That is, roughly 35 percent would be willing to pay \$100 towards this project (\$20 annually for five years), but only about 20 percent would be willing to pay \$200. Based on this data it is estimated that 50 percent of Iowans would be willing to pay approximately \$25 in support of the PP project (see Appendix B for details of the project).

Figure 14: Willingness to Pay for PP Project



Analysis of the data from the IRCP scenario (see Appendix A) provided the information summarized in Figure 15. Again, this figure shows the relationship between the percentage of respondents indicating their willingness to pay the amount indicated on the horizontal axis. As expected, fewer people are willing to contribute the higher levels of payments. Based on these data, 50 percent of Iowans are estimated willing to pay less than \$10 for the IRCP.

Figure 15: Willingness to Pay for Iowa River Corridor Project



Finally, to help readers assess these survey results, it may be helpful to know that the average income level reported in the general population survey was about \$43,500 per year, the average household size was about 2.5 people, and 72 percent of the respondents were male. The average income reported in the license holders survey was about \$45,500 annually, the average household size was about 3.0 people, and 81 percent of the respondents were male.

Conclusions

This report has summarized some of the main findings from the Iowa Wetlands Survey implemented in 1998. It is hoped that the information from this survey can be put to use to help efficiently manage the state of Iowa's natural resources. For additional information concerning the data, survey results, or statistical methods, contact one of the principal investigators of the study, Joseph Herriges or Catherine Kling, in the Department of Economics at Iowa State University.

Endnotes

1. The increased cost per trip was varied across the survey sample from \$5 to \$50.
2. Bishop, R. A., and A. van der Valk. 1982. 1982. *Wetlands*. In Cooper, T., *Iowa's Natural Heritage*. Iowa Natural Heritage Foundation and Iowa Academy of Science, Des Moines, pp. 208-29.
3. The sample used for the pretest was drawn from the general population and hunter/fisher subsamples in the same proportions as the final survey. See Table 2 for these proportions.
4. This change was apparently effective as few of the final survey respondents failed to complete the trips section of the survey.
5. The range of values reflects different model specifications and location in the state.
6. The second range is not necessarily superior since there are questions concerning the reliability of hypothetical questions in this context. See Hanemann (1994) and Diamond and Hausman (1994) for alternative views on this issue.

Appendix A

Survey Text Describing the Iowa River Corridor Project

Survey Text Describing the Iowa River Corridor Project

It is estimated that prior to the 1750s, Iowa had around 2.3 million acres of wetlands. Today, Iowa has about 35,000 acres, with over 98 percent of the original wetlands having been converted to other uses. The majority of these wetland conversions have been to put the land in agricultural production. In the last several decades, scientists, policy makers, and landowners have begun to realize wetlands provide numerous environmental benefits that were lost by these conversions and that there may be reason to restore some of the lost areas to their wetland state.



As a consequence of the 1993 floods, many landowners in the region referred to as the Iowa River Corridor became interested in alternatives to traditional farming practices. The Iowa River Corridor is an area of saturated soils that experiences frequent flooding and which encompasses roughly a 50 mile stretch along the Iowa River between Tama and the Amana Colonies (see the map on the following page). In response to landowners concerns in the region, the Natural Resource Conservation Service initiated the Iowa River Corridor Project. Under this program, interested landowners could enroll their land in the Emergency Wetlands Reserve Program, providing them with a one time payment equal roughly to the value of their farm crops (\$837 to \$905/acre) in exchange for a permanent easement on the land.

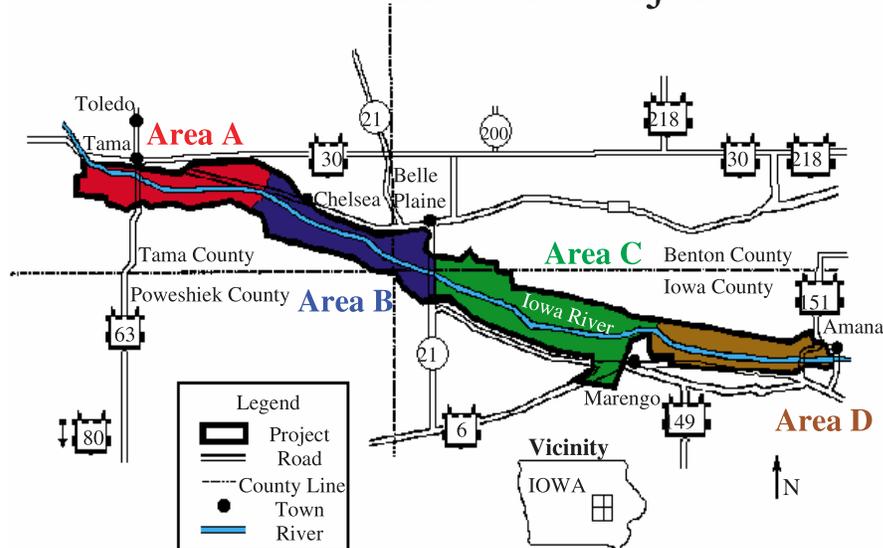
The easement implies that the land is retired from agricultural production and is restored by the Natural Resource Conservation Service to wetlands. Out of the 50,000 acres in this region, about 11,600 acres have been entered into permanent easements. Under these arrangements, landowners retain their property rights to the land so that, although the land is restored to its previous wetland and upland habitat, there is not necessarily open public access to the area.

In addition, some landowners indicated a preference to sell their land outright. The US Fish and Wildlife Service responded to this interest by purchasing over 8,000 acres outright in this region and converting this land to wetlands. These lands have been made part of the National Wildlife Refuge System and are open to the public.

Although it is too early to measure all of the environmental services provided by these newly reclaimed wetlands, there are several types of likely benefits:

- **Wildlife.** Wetlands provide critical areas for breeding, raising young, and gathering food for many mammals, waterfowl, birds, reptiles and amphibians. Many game species such as pheasants, ducks, and deer have greatly increased in the area. Also, sand hill cranes and bald eagles have been seen in the area in the past four years and trumpeter swans have been reintroduced into the Amana wetlands.

Iowa River Corridor Project



- **Water quality.** Wetlands help to improve the water quality of local lakes and rivers by absorbing excess nutrients and chemicals that run off from both farms and towns. Although it is too early to have scientific data on the water quality effects, experts in the area believe that the benefits will be valuable since the Iowa River currently contributes some of the largest concentrations of sediment and nutrients to the Mississippi River in the upper Midwest and Atrazine and nitrate levels in Iowa City regularly exceed EPA standards.
- **Flood attenuation and storage.** Wetlands store large quantities of water temporarily thus helping to reduce the severity of floods when they occur. Because of the Iowa River Corridor Project, several private levees will not be rebuilt. This should reduce the height of flood peaks and thereby reduce flood damages to lands downstream.
- **Recreation.** One of the most obvious benefits provided by wetlands is the recreational opportunities they provide to hunters, anglers, hikers, bird watchers, and other wildlife and outdoor enthusiasts. The increased availability of wetland acres should provide increased access to recreational activities in the region.
- **Taxpayer savings/flood damage reduction.** Due to the project, crops and roads in the area will no longer suffer flood damage. The Natural Resource Conservation Service estimates that taxpayers paid upwards of \$761/acre over the last ten years in disaster payments and crop subsidies which will no longer be necessary.

Appendix B

Survey Text Describing the Prairie Pothole Joint Venture

Survey Text Describing the Prairie Pothole Joint Venture



Ducks Unlimited

Prairie potholes are not always wet, changing in shape and size during the course of a year.

As we mentioned earlier, prairie potholes are one of the major types of wetlands found here in Iowa. This kind of wetland consists of natural depressions in the landscape that are filled with water for at least part of the year and may range in size from a fraction of an acre to over 500 acres. In fact, as the picture above indicates, this type of wetland need not always be wet, but will often change in shape and size from year to year due to local flood or drought conditions.

The prairie potholes of Iowa are part of a larger collection of these wetlands in the United States and Canada known as the Prairie Pothole Region. The larger region, and the portion of Iowa that is contained in it, is highlighted on the map on the left. Although once quite numerous, the prairie pothole region has lost over half of its original wetland acreage and Iowa specifically has lost over 98 percent of its pothole acreage.

Prairie pothole wetlands provide a wide variety of benefits to both the local and regional environment:



Prairie Pothole Region of North America

- **Wildlife.** One of the benefits of prairie potholes is the habitat they provide for a variety of waterfowl and other species. About 175 species of birds breed in the prairie pothole region. Of this total, about 20 species of waterfowl breed in this region and 70 percent of the continent's waterfowl population is produced there. Up to half of the bird species in the region depends upon wetlands at some time in their lives.



Scott Nelson/Ducks Unlimited

- **Water Quality.** Prairie potholes help to improve the water quality of local lakes and rivers by absorbing excess nutrients and chemicals that runoff from both farms and communities in the region.

- **Flood Control.** All types of wetlands, including prairie potholes, help by temporarily storing large quantities of water. This in turn reduces the severity of floods when they occur. In addition, by providing an area for storing excess rainfall, prairie potholes reduce water runoff from land, which in turn helps to control soil erosion.
- **Recreation.** Finally, one of the most obvious benefits provided by wetlands is the recreational opportunities they provide to hunters, anglers, hikers, bird watchers, and other wildlife and outdoor enthusiasts.

Some of these benefits are local (e.g., recreational opportunities, wildlife habitat, flood control, improved water quality) and some provide benefits to the entire region and elsewhere (e.g., preservation of endangered species, nesting grounds for migratory waterfowl, reduced soil erosion that would affect lakes and rivers elsewhere, flood reductions that occur elsewhere).

The dramatic declines in Iowa's prairie pothole wetlands have stopped and some wetlands have recently been restored. In 1986, the North American Waterfowl Management Plan was developed. As part of this plan, the Prairie Pothole Joint Venture was developed. In Iowa, about 27,000 acres have been placed under public protection.

The Prairie Pothole Joint Venture program has restored wetlands both by purchasing land outright from willing sellers and by developing a variety of easements where landowners retain the ownership of these lands, but agree to restore the land to its original prairie pothole wetland state. When the land is purchased and put under state or local control, the land is public and can be used by recreationists. When easements are used, the land remains private and can only be accessed with the landowner's permission.



U.S. Fish and Wildlife Service

In response to these programs, as well as recent increases in annual rainfall, populations of many species of birds and plants have shown notable increases. Waterfowl populations, which had hit their low during the mid-1980's, are now recovering. Populations of mallard and blue-winged teal ducks have shown promising increases.

Although biologists do not know exactly how populations of birds and other species will respond as more wetlands are reclaimed, it is likely that these gains will be maintained or even improved upon. Likewise, it is expected that significant additional gains in flood control and water quality will occur if more wetland acres are reclaimed.

As part of the Prairie Pothole Joint Venture, there is a goal for Iowa to acquire a total of 40,000 acres of land at a rate of about 2,000-3,000 acres per year for the next 15 years. These lands would be purchased from willing sellers, restored and held as public wetland reserves. Previous land has been acquired at a cost of about \$940/acre.

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