Wetland Action Plan *for* IOWA

Iowa Geological and Water Survey
Special Report No. 4

Iowa Department of Natural Resources
Richard Leopold, Director
April 2010

COVER

This prairie wetland located in the middle of Union Hills Waterfowl Production Area in Cerro Gordo County is one of the highest quality wetlands the Iowa DNR's wetland monitoring crew has sampled. After being sampled for five years straight, results have shown it is nearly free of excess nutrients, and chemical contaminants. It also supports a rich diversity of aquatic plants and animals. This wetland is now used by the monitoring program as a reference site representing the benchmark in quality.

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Wetland Action Plan for Iowa

Iowa Geological and Water Survey
Special Report No. 4

prepared by

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April 2010

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U.S. Environmental Protection Agency, Region VII

Office of Wetlands, Oceans and Watersheds

Iowa Department of Natural Resources

Richard A. Leopold, Director

Fields of Opportunities

STATE OF IOWA

CHESTER J. CULVER, GOVERNOR
PATTY JUDGE, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
RICHARD A. LEOPOLD, DIRECTOR

April 14, 2010

Dear Iowans,

Wetlands are a unique and diverse resource which provides many benefits for a healthier Iowa landscape. Acre for acre, they are an extremely dynamic resource. Whether it is flood abatement, water quality, or wildlife habitat; wetlands are capable of improving all of these aspects.

Some of the notable highlights include:

1) The "action" items focus on wetlands work that is integrated into a watershed context.

2) This document clearly conveys the ability of wetlands to provide multiple environmental services. Three of these environmental services address environmental issues common to nearly every watershed in Iowa:
   - Improving surface and ground water quality
   - Increasing the amount of vital wildlife habitat
   - Considers the value of riparian and floodplain wetlands in flood prone areas

3) The increased pace of wetlands work proposed in the action items part of this plan will be done as a team effort by multiple agencies and organizations.

4) This plan aligns with several wetland priorities at both the state and national level.

That is why I am pleased to share *The Iowa Wetland Action Plan,* which represents a cooperative effort outlining ways to increase the pace of wetland related work in Iowa from the leading natural resource agencies and organizations that perform wetland conservation, protection, and management.

Sincerely,

Richard A. Leopold
Director

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EXECUTIVE SUMMARY

Strategic Landscape Repair with Wetlands Could Save Taxpayers Billions

Across the country rural and urban communities alike face the same environmental trifecta of water pollution, flood damage, and loss of wildlife habitat due in part to extreme landscape manipulation. In Iowa, however, the underlying cause can also be part of the solution because an estimated 11% of the landscape was originally wetlands that contained hydric soil (i.e., uniquely capable of holding and processing water) and which can be manipulated back into full function. The Iowa Department of Natural Resources (IDNR) has developed a cutting-edge scientific approach to pinpointing the hydric soil of original wetlands and restoring them where they are most needed for improved water quality, flood reduction, and increased wildlife habitat. Although it will require sustained inter-agency coordination and substantial monies to complete and maintain the strategic repairs, the work involved is a bargain compared to buying floodplains every fifteen years. Moreover, landowners' desire for this solution has already been demonstrated by record levels of voluntary easement applications for both wetlands and floodplains assistance programs.

New Technology Provides Objective Method of Identifying Priority Repair Focal Points

By applying a combination of mapping techniques, including GIS satellite imagery, the National Wetlands Inventory, and LiDAR, trained scientists can better determine how Iowa's landscape is designed to function. Switching the focus to how the land naturally behaves gives everyone tasked with maintaining healthy, safe and bountiful resources the opportunity to work with the land rather than against it, a major factor in accomplishing lasting repairs. For example, when attempting to determine the most effective use of a floodplain, it helps to know what soil types are present and how they have historically reacted to precipitation. If it contains hydric soils and experiences routine saturation, then it is likely better suited for managing water resources than supporting structures. Building on that analysis, this Wetland Action Plan further narrows the focal point of priority repairs and resource protection to certain wetland areas capable of supporting all three critical needs: floodwater moderation, water quality, and wildlife habitat.

The Team Approach to Strategic Repairs Maximizes Expertise & Appropriations

The Ad-hoc Wetlands Team proposed in this Wetland Action Plan includes many agencies and organizations with mandates impacting management of land containing wetlands and/or wetland potential. Whether a team member's focus is natural resource protection, public health and safety, or agribusiness, they all overlap in one area: seeking successfully functioning Iowa landscapes. By working together to identify and undertake priority repair and protection projects, the team will be able to combine resources and expertise, thereby moving faster and in a more cost-effective fashion than the current agency-by-agency piecemeal approach. Moreover, successful cooperation has already been demonstrated by the future Ad-Hoc Wetlands Team members, all of whom worked together on the Wetland Planning Committee that advised the creation of this Wetland Action Plan.

Funding Priority Repairs

The good news is that the 'ball' is already rolling. Creation of an interactive mapping tool has been funded by a generous grant from the Environmental Protection Agency Region VII. As the detailed landscape information becomes available, the Ad-Hoc Wetlands Team will proceed to use it to identify high priority critical wetland areas for protection and restoration. The focus must then shift to funding the actual repairs and ongoing maintenance of repaired systems. Because so many of the critical wetlands will be within significantly flood damaged areas as well as those impacting water quality (both in-state and the Gulf of Mexico), there will be several avenues of potential funding including conservation, disaster relief, and pollution prevention initiatives. In fact, some of these opportunities are pending right now and may be lost if postponed until the critical wetlands identification process is finalized. Therefore, this Wetland Action Plan makes the following immediate recommendations:

(1) Fulfill Funding and Staffing needs to process pending Iowa applications for easement in the USDA NRCS's Wetland Reserve and Emergency Watershed Protection (floodplain) Programs. These applications involve landowners seeking sustainable alternatives for their property. Since applications tend to rise in conjunction with major flood events, it is fair to project that many of these applications essentially self-select for land that would otherwise fall within critical wetland target areas. Also, because the vast majority of Iowa lands are privately owned, working to conserve volunteered property should always be a priority. To maximize the conservation and public safety-enhancing opportunity presented by these easement applications, both easement funding and professional personnel are required. The past decade has demonstrated a consistent work-product pattern: 3 state office personnel and 4 field technicians per completion of 40 annual easement applications. Therefore, in order to fulfill the 199 pending Wetlands Reserve Program applications, it will take approximately $62 million in easement funding plus the work of 15 state office personnel and 20 field technicians (or 5 years under current conditions). In order to fulfill the 580 pending Emergency Watershed Protection Program applications, it will take approximately $177 million in easement funding plus the work of 42 state office personnel and 56 field technicians (or 14+ years under current conditions). Combined, these easement applications cover approximately 70,000 acres.

(2) Fund Necessary Wetlands Management for Long-Term Success and Maximum Resource Benefits. Restored wetland basins are 'natural' resources but, like forests and prairies, they require expert care to become fully re-established and thrive. Restoring the basic building blocks for wetland functions--such as allowing water storage--is only the beginning of an effective system of restoration when invasive species are rampant and the surrounding landscape delivers sediment and other pollutants. Basic management measures and enhancements must be conducted in order to achieve desirable water levels, water quality, and maximized wildlife habitat. The cost for this varies depending on the areas involved. Things like size, previous land-use, and current surrounding land uses can all be factors. For a large complex (e.g., Chichauqua Bottoms at 7,300 acres) or other contiguous area that consists of a group of wetlands and their associated uplands together comprising a wetland management complex of similar size, the estimated cost of minimal annual wetlands management is approximately $130,000 for trained staff and equipment. As a starting point, this Wetland Action Plan recommends an annual allocation of $500,000 for state-wide wetlands management and enhancement work to be undertaken by area agencies and organizations that have management responsibility for public lands. Significant investment in wetlands restoration/creation has been and will continue to be made in Iowa. Providing adequate management resources for this investment is the only way to ensure that their long-term value is met.

ACKNOWLEDGEMENTS

The Wetland Action Plan Committee was comprised of professionals representing agencies and organizations engaged in activities affecting Iowa wetlands. The product of their sixteen-month collaboration, this Wetland Action Plan, represents a unified direction for how the Department of Natural Resources and its partners should proceed forward collectively to improve wetland resources in Iowa. Because no single agency or organization can achieve the scale of needed landscape repair, the Plan recommends assembling an Ad-Hoc Wetlands Team to meet at regular intervals to address the following: eliminate gaps in current wetland knowledge; share information gained from ongoing and completed projects on various wetland issues; increase the amount of wetland-related research conducted in Iowa; generate new partnerships and projects aimed at wetland protection, restoration (conservation), monitoring, and research, and effectively address Iowa's role in related national priorities.

Special thanks go to Andy Asell (IDNR GIS Program) for contributing mapping expertise, photographer Ty Smedes for donating photos, and to everyone who participated on the Wetland Action Plan Committee from November 2008 through March 2010. The listing of committee members below indicates involvement and support, but does not indicate endorsement of all items within the Plan by them or their organizations. Those listed have participated in at least one meeting and/or have submitted written comments. Special thanks also go to former State Science Advisor Kathy McKee for her input on adding wetlands to K-12 education curriculum. All other photos in the Plan were provided courtesy of the Iowa DNR.

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Todd Bishop (Iowa Department of Natural Resources)

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Dr. Melinda Coogan (Buena Vista University, Professor/Research Scientist) .

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Bill Ehm (Iowa Department of Natural Resources, Director of Water Resources)

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Mark Gulick (Iowa Department of Natural Resources)

Greg Hanson (Iowa Department of Natural Resources)

Doug Helmers (U.S. Fish & Wildlife Service)

Bryan Hellyer (Iowa Department of Natural Resources)

Bernie Hoyer (Iowa Department of Natural Resources)

Neal Johnson (U.S. Army Corps of Engineers)

Karen Kinkead (Iowa Department of Natural Resources, Wildlife Monitoring)

Jennifer Kurth (Iowa Department of Natural Resources, Total Maximum Daily Load Program)

Chris LaRue (Iowa Department of Natural Resources)

Mark Lindflott (USDA Natural Resources Conservation Service)

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Christine Schwake (Iowa Department of Natural Resources, Permitting)

Ken Tow (Rebuild Iowa Office)

Arnold van der Valk, Professor/Research Scientist (Iowa State University)

Guy Zenner (Iowa Department of Natural Resources)

As this Wetland Action Plan Committee moves from creating a plan into implementing it, new partners and interested parties will be invited to join the ongoing Ad-Hoc Wetlands Committee. For more information on getting involved with the Ad-Hoc Wetlands Committee, please contact Vince Evelsizer at vince.evelsizer@dnr.iowa.gov.

INTRODUCTION

The idea for developing this new Iowa Wetland Action Plan (the 'Plan') began in 2008 when the Iowa Department of Natural Resources (IDNR)'s wetland monitoring program partnered with U.S. EPA Region 7 on a wetland program grant to produce a guidance document on the protection and monitoring of wetlands in Iowa. During the process of working with the Wetland Plan Committee, it quickly became apparent that a comprehensive action plan would be more beneficial to the agency and Iowa's landscape as a whole. After all, wetlands do not exist as independent units on the landscape. Each of them belongs to a watershed. When allowed to function, wetlands enhance each watershed by processing water which improves water quality, slowing and holding precipitation for flood abatement, and providing crucial wildlife habitat. Without these essential wetland functions, the reverse occurs: decreased water quality, increased flooding, and continued population declines of both local and migratory wetland-dependent wildlife. Such is the case today.

The need for a unified plan for Iowa wetlands work lies in the recognition that in Iowa, effective wetland conservation is a shared responsibility of local, county, state, and federal agencies as well as conservation groups, landowners, corporations, and other interest groups. Individually, no one agency or organization has been given either the exclusive mandate or resources to adequately address all of the issues related to wetlands in Iowa. Improving the wetland resource is a team effort. Effective cooperation and communication are the key ingredients in working toward the shared goal of improving this resource.

It has been over a decade since the first state wetland plan was published. The Iowa Wetland and Riparian Areas Conservation Plan, published by the Iowa Department of Agriculture and Land Stewardship in 1999, was the culmination of a two-year public involvement process that was endorsed by seven state agencies and involved more than 100 representatives of private organizations, academia, local governments, utilities, agricultural interest, and landowners. The 1999 plan aimed to provide a "common framework for agencies, organizations and individuals who have diverse interests," to encourage a partnership approach, and to provide education with an emphasis on promoting an understanding of the functions and values of wetlands and riparian areas. The first of the Plan's eight guiding principles stated that wetlands and riparian areas are integral parts of watersheds that function within landscapes. The most important contribution of the Iowa Wetland and Riparian Area Conservation Plan was probably to create a forum for stakeholders that helped them come to an unexpected degree of common ground on controversial topics. Other specific results included: development of a two-year discussion series; two annual one-day conferences; several efforts to prioritize protection of fens; higher profile attention to the concept of watersheds which contributed to a new state watershed grant fund; development of Iowa's wetland-focused Iowa Conservation Reserve Enhancement Program; and a follow-up Iowa Watershed Task Force that issued a report in 2001.

The recent increase in both scientific tools and water-related disasters makes the timing right to build on the 1999 plan's lessons learned and alliances forged. This 2010 Wetland Action Plan recognizes that without the willing cooperation from government agencies, non-government organizations, and private landowners, there is little hope of long-term success for wetland conservation. There was clear consensus from the Wetland Action Plan Committee that promoting a volunteer approach to wetland conservation and protection using education, outreach, technical assistance, and incentives is the most effective way to make a difference. Since more landowners than ever are willing to consider wetland restoration as an option for their land, the outlook for achieving this Plan's voluntary, teamwork-driven, and problem-solving goals appears promising.

The two apparent focus areas for natural wetland restorations are in north-central Iowa's Des Moines Lobe (Prairie Pothole Region) and along all of Iowa's major river floodplain systems (Figure 1). Since restoring wetlands where they once existed is the best route to take economically and ecologically, it is anticipated that much of the restoration and maintenance activities promoted in this Plan will occur there. There are also national priorities that Iowa could address if more wetlands were restored:

- Reduce nutrient loading to the hypoxic zone in the Gulf of Mexico.
- Improve the ecological health of the Upper Mississippi River.
- Improve the ecological health of the Missouri River.
- Assist declining populations of migratory waterfowl, shorebirds, and songbirds by providing more essential and diverse wetland habitats.
- Improve surface and ground water quality.

Although approximately 11% of Iowa's landscape contained original wetlands, restoring them all isn't practical because most areas are privately owned and, even if they were public, restoration funding is limited. But the undeniable need for more wetland-related ecological services exists, so what is the appropriate method of narrowing the field? This Plan recommends specifically targeting those critical original wetlands that have the best potential to positively impact water quality, flood mitigation, and wildlife habitat on a watershed basis. At this time we are planning to use a HUC-8 (hydrologic unit code) scale for this effort (Figure 2).

In order to accomplish prioritization on a landscape as altered as Iowa's, application of advanced mapping techniques will be necessary to locate original wetland basins and then evaluate their restoration potential for water quality, flood mitigation, and wildlife habitat. EPA Region 7 has already provided IDNR with a generous grant for the development of this wetland mapping tool. Once the mapping process is finished, the Ad-Hoc Wetlands Team (a spin-off of the Wetland Action Plan Committee proposed herein) will apply it together with other relevant evidence, such as flood studies and mapping information in the Iowa Wildlife Action Plan, to identify the most critical sites for priority restoration. Because the Wetlands Reserve and Emergency Watershed Protection Programs of USDA's Natural Resources Conservation Service involve voluntary land-

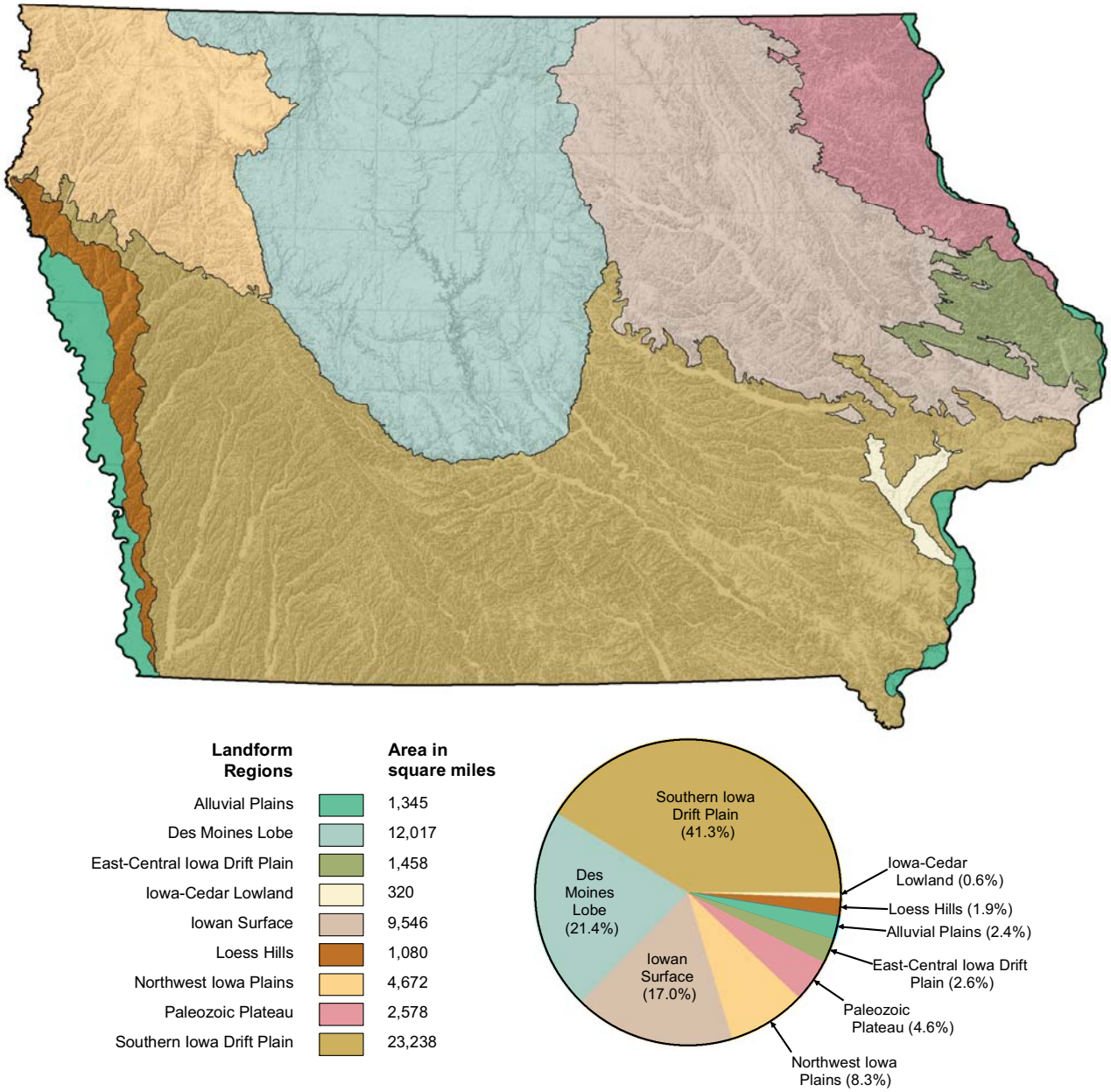


Figure 1. *Landform regions of Iowa and associated area (acres).*
Source: Iowa DNR

owner applicants with land that tends to be flood-prone or otherwise 'unproductive,' this Plan also recommends giving them de facto priority status.

Although the hallmark of this Plan is identifying critical wetlands and pursuing their restoration/protection, there are other crucial interrelated goals including coordination of agency and NGO activities impacting wetlands, continued development of IDNR's wetland monitoring program, creating sustainable restoration and resource management funding, and promoting wetlands education. This is only the beginning of an evolving process to promote a healthier landscape for all Iowans to enjoy.

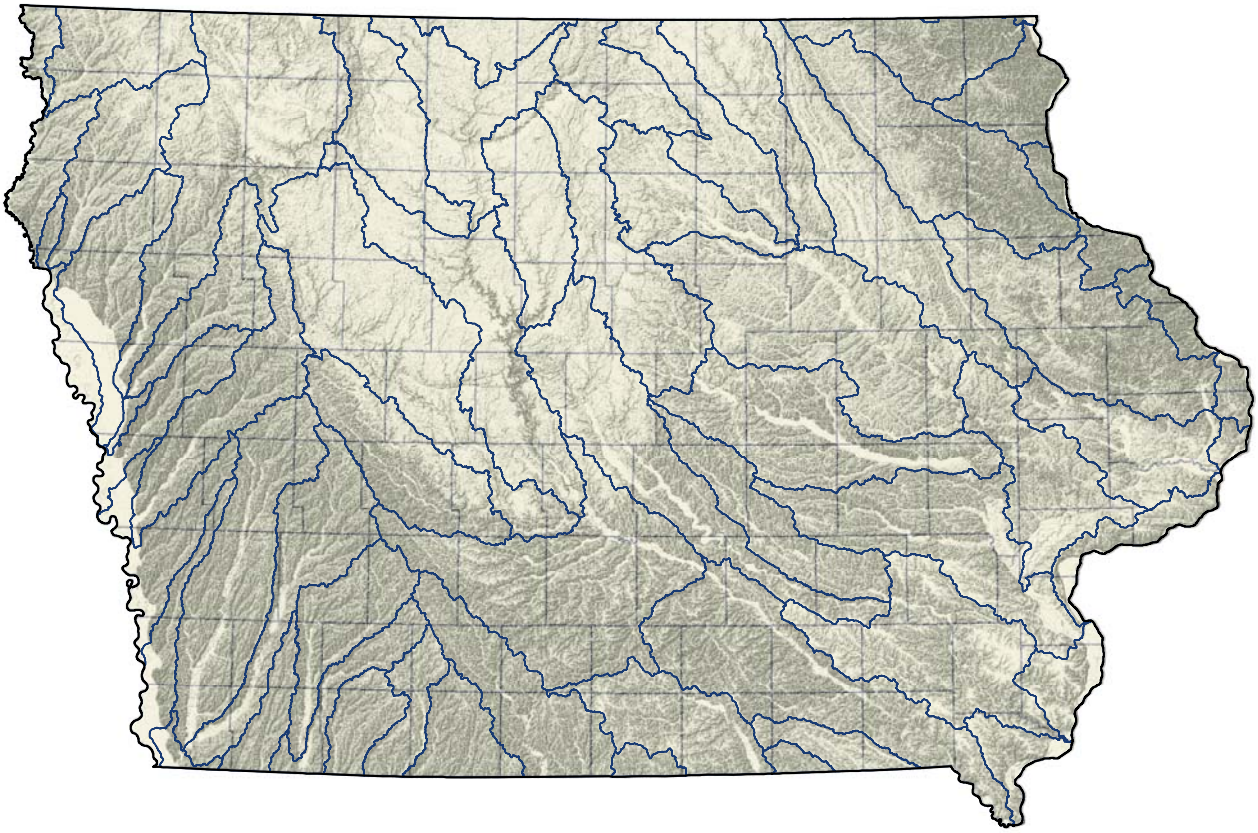


Figure 2. *Map of Iowa with counties and HUC-8 level sub-watersheds.*
Source: Iowa DNR

OVERVIEW OF IOWA WETLANDS

Original wetland basins once covered 4 to 6 million acres of Iowa. That represents approximately 11% of Iowa based upon historical surveys and maps of the landscape prior to European settlement. Wetlands are part of every watershed in Iowa but 90-95% of them were drained and are no longer fully functional (Figures 3 and 4). At the time most wetland-altering development occurred, Iowans were focused on the benefits of agriculture and eventually manufacturing and urban center creation. Congress gave huge incentives to drain and develop the land as fast as possible without any regard to preserving enough wetlands to protect wildlife habitat, water quality, topsoil, natural food supplies, or settlement in areas prone to flooding. Despite serious odds, the first century of Iowa farmers did an amazing job at making the land productive according to standards in force at the time. Today there is a greater scientific understanding of how our landscape functions as a whole. It is now known that this loss of wetlands has come at the expense of poor water quality, flooding, and loss of valuable wildlife habitat, as well as a growing list of additional economic and aesthetic benefits. Iowans are currently facing as great an environmental challenge as our original settlers: finding a way to strategically improve our landscape without fundamentally disrupting existing land use choices.

Fog still hung over this wetland while collecting water and plant samples from it on a warm August morning. This lone wetland located in northern Iowa was fortunately spared from drainage because it was sandwiched between a set of railroad tracks and a crop field.

Ecologically, Iowa is now considered to be one of the most altered states in the nation. Fortunately, conservation efforts to restore wetlands that were once drained have often proved to be successful. When these original wetland basins are allowed to hold water again, many of the seeds stored in the soil respond and the aquatic vegetation grows back. There have also been recent advances in the use of aquatic vegetation seeding mixtures planted in their proper zone around wetlands as part of the restoration process in order to ensure that native communities of plants are established. The hydric soils of pothole wetlands still cover north-central Iowa, while backwater wetlands (a/k/a "riverine" or "oxbow" wetlands) occur along all of Iowa's rivers, having once served as an integral part of river ecosystems for flood water dissipation, fish spawning, and waterfowl breeding and migration (Figure 5). Like buried treasure, Iowa's unique and versatile seed-imbedded hydric soils await our rediscovery. This is a key concept. Yes, most of Iowa's wetlands have been drained, but they can be brought back through restoration efforts that allow these original basins to hold water again. This forms the main crux of current and future wetland work in Iowa. Because greater than 90% of the land in Iowa is privately owned; it is up to natural resource agencies, conservation organizations, and agricultural groups to work with

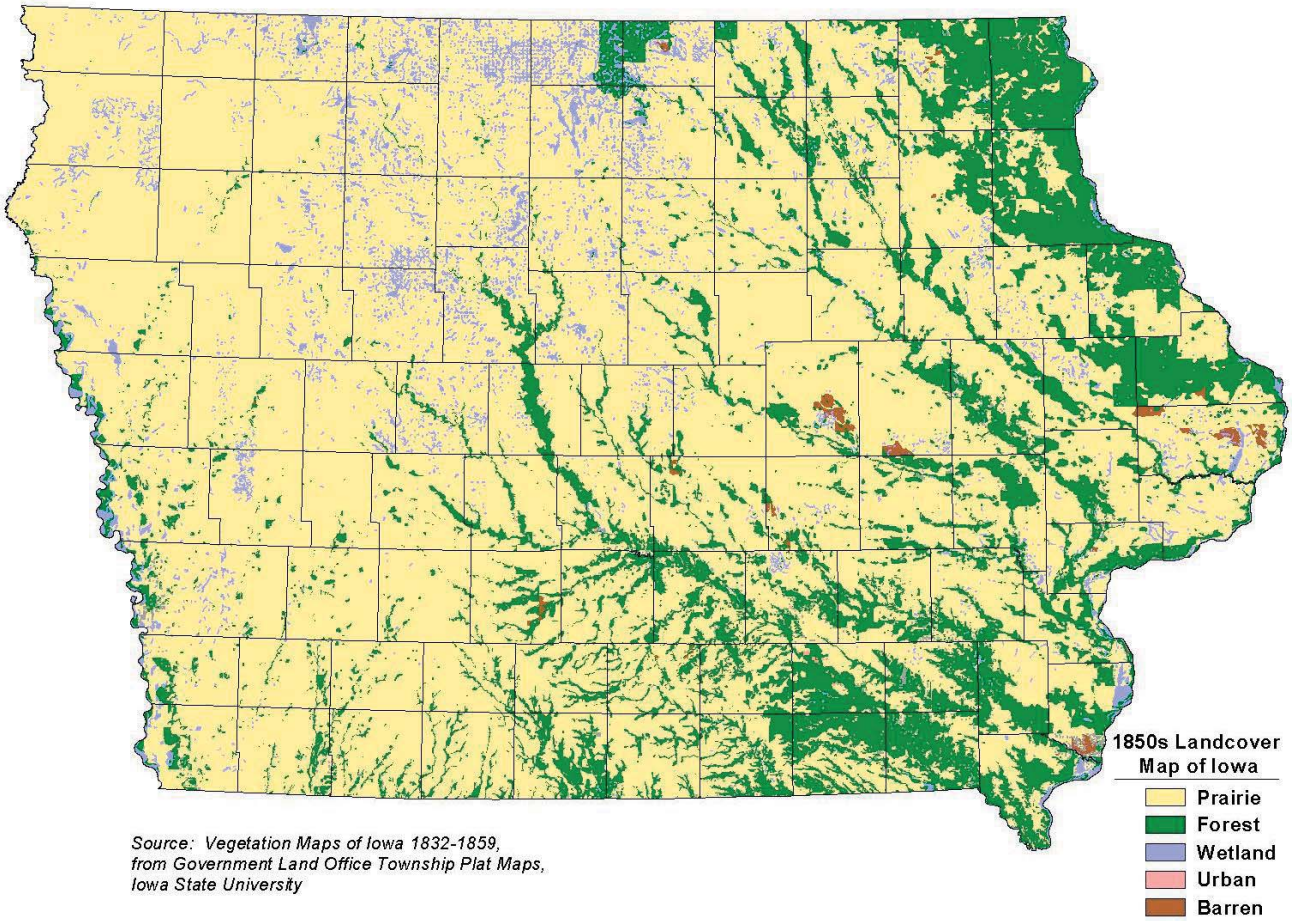


Figure 3. *Land cover map of Iowa from the 1850s.*
Source: Government Land Office original land survey of Iowa.

Iowa's landowners to consider voluntary efforts to restore wetlands on their land (Figure 6). This process works. Many landowners are willing to do this as will be explained further in this plan in the conservation section.

The term 'wetland' is often used interchangeably with other terms such as 'marsh,' 'swamp,' 'slough,' 'pond,' 'pothole,' 'fen,' or 'bog.' Sometimes these terms are used correctly, often they're not. It is important to understand that there are several different types of wetlands. Often these wetland terms can be confusing. For the purposes of this Wetland Action Plan, the term 'wetlands' is used to represent the collective group of all wetland types found in Iowa. However, there are times when a technical, scientific classification scheme is needed. See Appendix A for a detailed explanation of the different types of wetlands and how they can be classified.

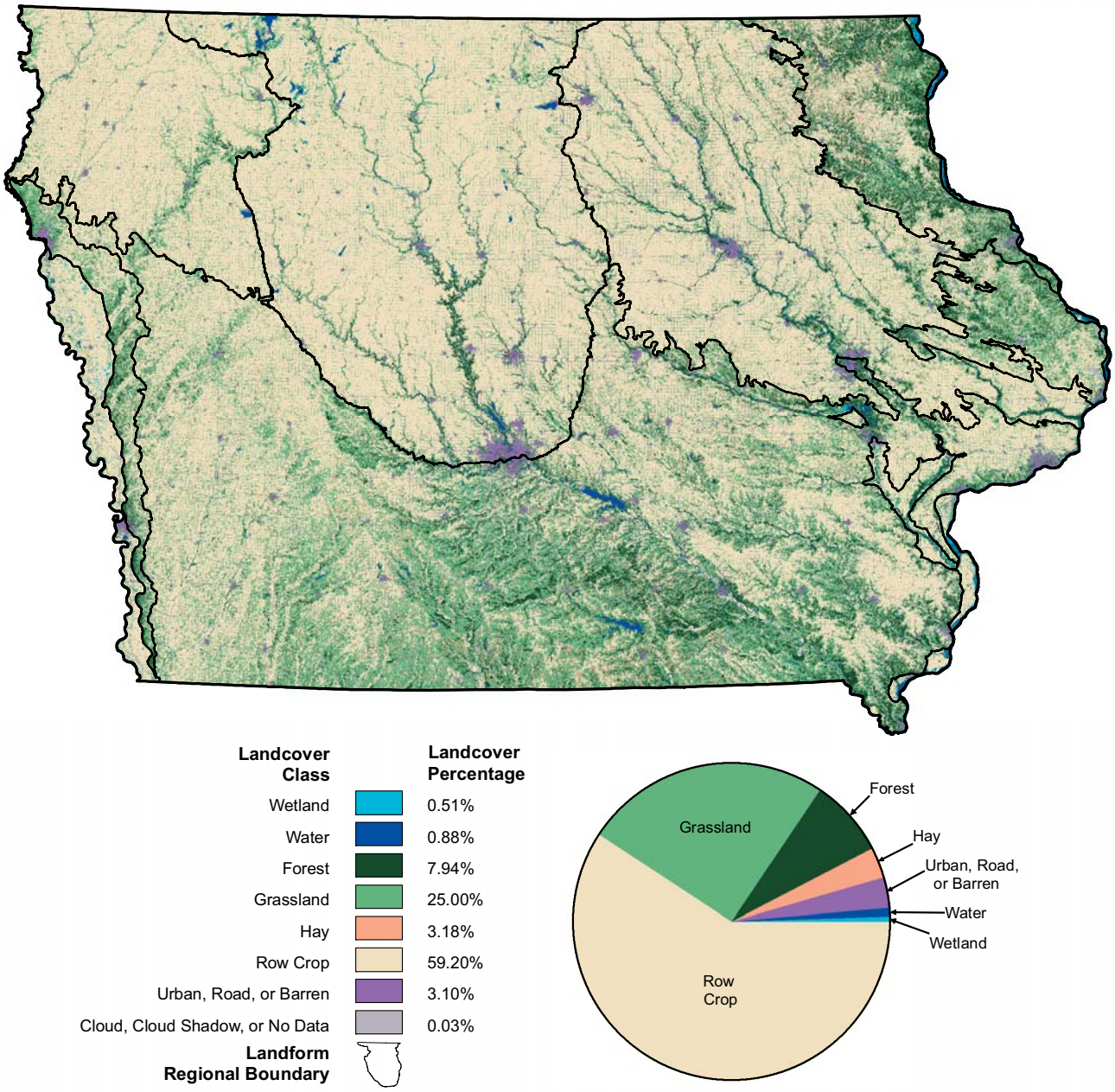


Figure 4. *Land cover/land use classification derived from Landsat satellite imagery collected in 2002. Because of the relatively low resolution of the original satellite data (each pixel representing 15 square meters on the ground), features with small geographic footprints such as grassed terraces or small prairie pothole wetlands are often aggregated into surrounding land cover classes such as row crop. Source: Iowa DNR*

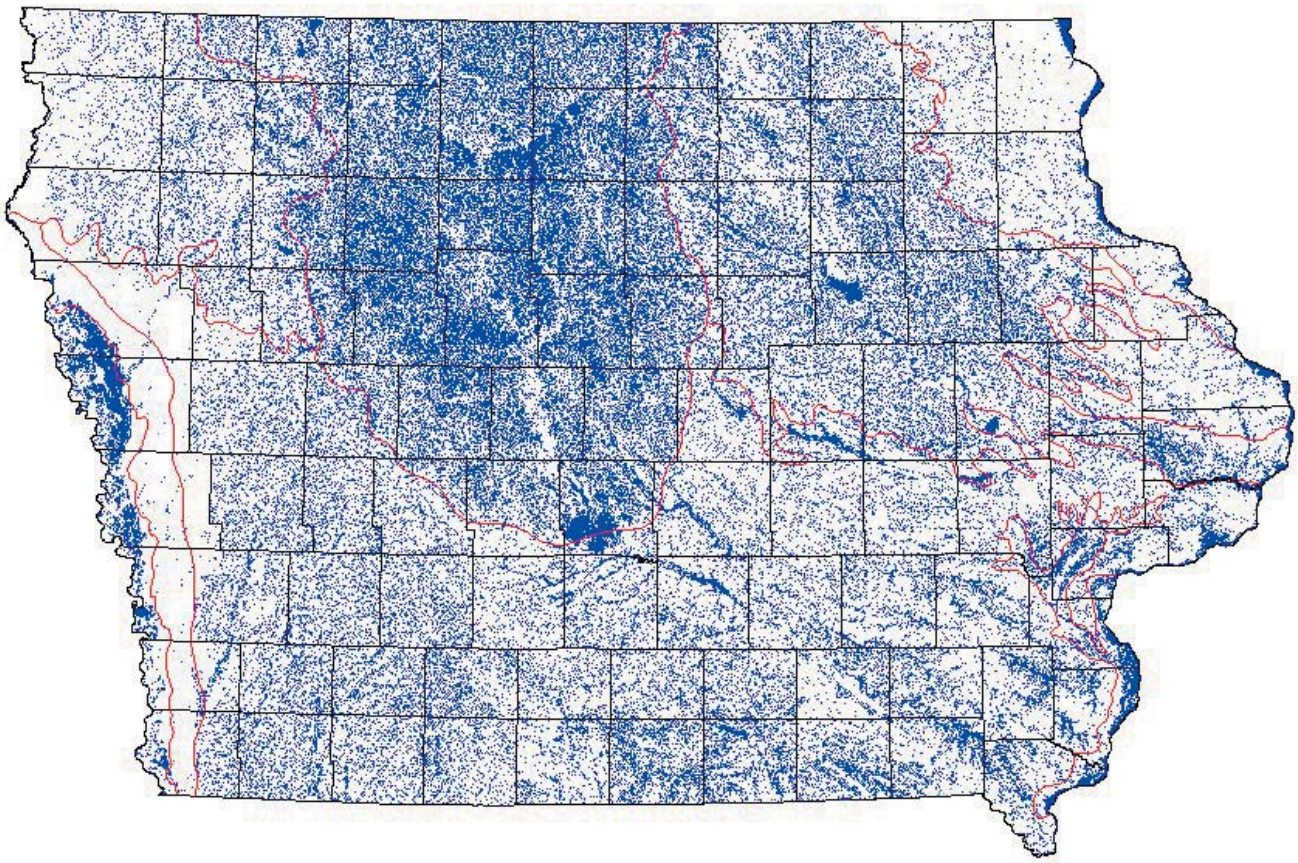


Figure 5. *The distribution and abundance of hydric soils (soils formed from prolonged periods of saturation) in Iowa, as shown in blue.*
Source: Soil Survey Geographic Database and Iowa Soil Properties & Interpretations Database

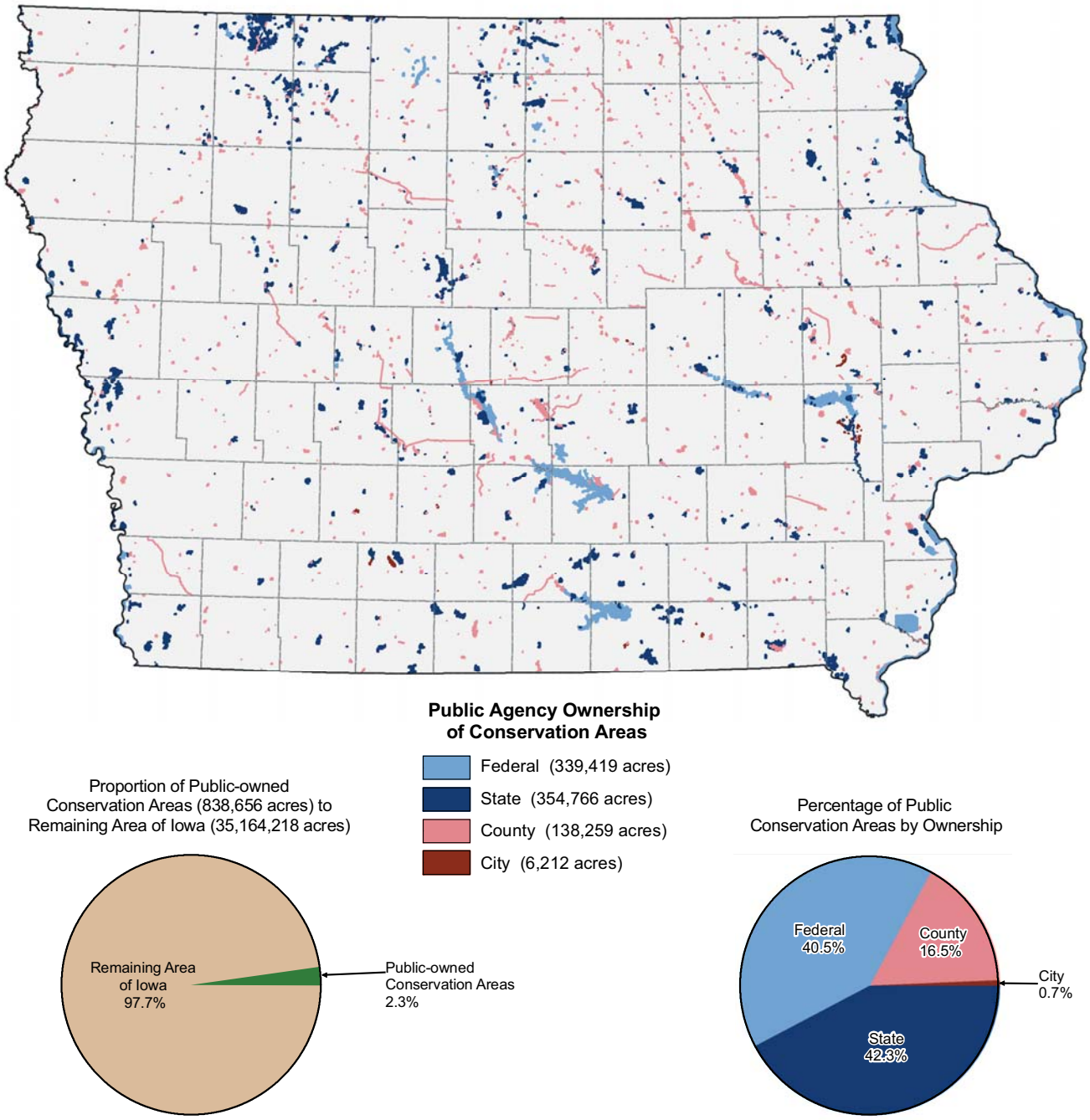
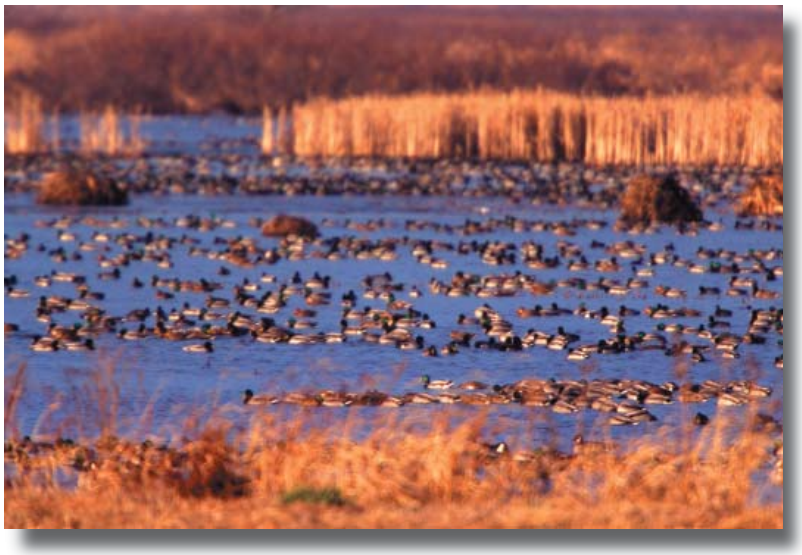


Figure 6. *Map of publicly owned land in Iowa. The proportion of publicly owned land in Iowa is less than 3%.*
Source: Iowa DNR

Benefits of Wetlands



Whether it's wildlife, water quality, recreation, or flood mitigation, wetlands provide many benefits. They are an essential part of every watershed in Iowa. Photo courtesy of Ty Smedes.

As described above, Iowa enjoys a wide diversity of wetlands. One type or another naturally occurs just about everywhere in the state and when allowed to function they accomplish several crucial tasks. The first is water processing. Wetlands, like kidneys in a human body, filter water.

Wetlands also help to moderate the speed and quantity of water flow during precipitation events by absorbing water and storing it. Without this extra storage capacity, and a connection to streams and rivers, more intense flooding would occur. The wetland connection to streams and rivers is also important because without it, the necessary link between terrestrial and aquatic habitats is lost. As such wetlands are an irreplaceable part of a complete watershed system. Because of the overlapping functions associated with wetlands (improved water quality, flood mitigation, and crucial wildlife habitat), the most effective approach to creating a truly functional landscape in Iowa will require incorporating wetlands into broader watershed planning efforts and watershed management goals that reflect the contribution of wetlands to the broader aquatic ecosystem.

These functional benefits of wetlands also translate into hard dollars and cents. Flood mitigation, water treatment, increased wild food sources, recreation, and an ability to respond to climate change are all part of a growing green initiative nationwide known as ecosystem services or "eco-services." Many Iowans may be surprised to find out how much revenue can be generated and/or protected by investing in these natural services. It is worth explaining what benefits are derived from wetlands. They include the following:

<u>Intrinsic Value</u>

At a very basic level, wetlands are valuable just being wetlands. This section of the Plan deliberately identifies several benefits of wetlands as it relates to humans and our society. This is a good thing to do because it helps demonstrate the various reasons they should be considered a valuable part of our landscape to all Iowans. But there are intangible reasons to have them as well. Even though wetlands can be classified and grouped by their hydrology into a certain collective type, it is also important to realize that every wetland has its own unique look and its own unique assem-

blage of plants and animals. Wetlands are part of our natural landscape and thus, a part of Iowa's heritage.

Flood mitigation

The State of Iowa is laced with rivers that ultimately flow to either the Mississippi or Missouri rivers. All of these in-state rivers have alluvial floodplains of their own that were once an important component to the hydrological processes that occurred throughout each river's course. These floodplains were formed over the course of many years during the river meandering process and high water (flood) events. Many of the floodplain landscapes were relatively flat originally but contained a rich mosaic of outwash areas, oxbow (riverine) wetlands, sand bars, grasslands, and/or timbered areas. The role of wetland areas in floodplains was—and could be again—substantial. Their ability to capture, store, and slow the release of excess waters is critical to curbing the effects of flooding, though not a cure-all for the immediate effects of extreme *flash* flood events. In addition, they provide critical areas for several species of fish and wildlife for feeding, spawning, nesting, and winter habitat. Over the course of the last 100 years, however, a lack of information regarding the benefits of maintaining wetlands in floodplain areas led to engineering attempts to "control" rivers via dams, jetties, wing dams, channelization, and levees. Some of these alterations have worked; some have simply provided a false sense of security.

Iowa has experienced two 500-year flood events in the past two decades: the Flood of 1993 and the Flood of 2008, the latter of which is anticipated to be the fifth largest disaster on record in U.S. history according to Public Assistance figures from the Federal Emergency Management Agency. The total cost estimate associated with 2008 flood damage given by the Rebuild Iowa Office is approximately $13 billion. That's a huge price tag but it isn't the end of the story. Due to a combination of ocean surface temperature and climate change, more extreme events are expected to occur during the next ten years (personal communication, Christopher J. Anderson, Assistant Director of Climate Science Initiative at Iowa State University, May 20, 2009).

There is also the ongoing expense of non-disaster level flood damages that occur in Iowa nearly every year. Excluding the catastrophic events of 1993 and 2008, annual flooding has caused Iowans approximately $2 billion since 1955; annual costs incurred during the majority of those years exceeded $8 million.

The severity of the Flood of 2008 has prompted new funding sources for floodplain restoration. One example is the Emergency Watershed Protection Program Floodplain Easement (EWP). This program is administered by the USDA's Natural Resources Conservation Service (NRCS). NRCS has been able to prioritize critical flood prone areas in which to target implementation of this program. This means that for the private landowners who fill out an application to enroll into this program have a good chance for acceptance if their land falls within the priority area boundaries for EWP. As budgetary concerns continue to increase, more programs of this type—those that foster sustainable land use practices—will be needed to ensure the landscape

can withstand future flood events with minimal costs for taxpayers.

Several of the watersheds surrounding Iowa's lakes contain drained wetland basins that are fully capable of being restored if given the chance like this one located near Silver Lake in northern Iowa.

A map of the 2008 Midwest flood provides a clear picture of where the primary problem areas are located (Figure 7). Restoration of wetlands in those natural floodplains associated with the Mississippi and major Iowa rivers, as well as areas made routinely unproductive due to flooding, appears far more promising than continuing the cycle of reconstruction-destruction-taxpayer bailout. According to the leading scientists, watershed specialists, and public administrators who wrote the 25 essays in *A Watershed Year: Anatomy of the Iowa Floods of 2008* (edited by Cornelia F. Mutel, University of Iowa Press 2010), repairing the landscape to better manage precipitation and prevent major flood damages is an obvious choice. *An Ecological Solution to the Flood Damage Problem*, by Donald Hey and others (The Wetlands Initiative 2009), agrees: "We must reconsider how our floodplains are used in the face of increasing, catastrophic flood damage and public investments in flood control. Wetland restoration can effectively and efficiently return basic floodplain functions: holding floodwaters, improving water quality, and supporting biodiversity. Both the 1993 and 2008 floods on the Mississippi River above Grafton, Illinois could have been contained within a small portion of the 100-year floodplain with little flood damage. Low-tech restoration of the river channel and floodplain would result in one to five-million acres of wetlands. For example, the 1993 flood would have occupied 33% of the 100-year floodplain above Grafton, Illinois, while the 2008 flood would have occupied only 7%. The peak discharge would have been reduced by 64% in the case of the 1993 flood and by as much as 78% of the 2008 flood. The wetlands, needed to safely store the 1993 floodwaters, the larger of the two floods, would occupy 4.5 million acres, or 4% of the total watershed area. The annual net social benefits, including flood damage avoidance and recreations, would be $500 million."

Water Quality Treatment

It is no secret that Iowa's water quality is affected by sedimentation, excessive nutrient loads,

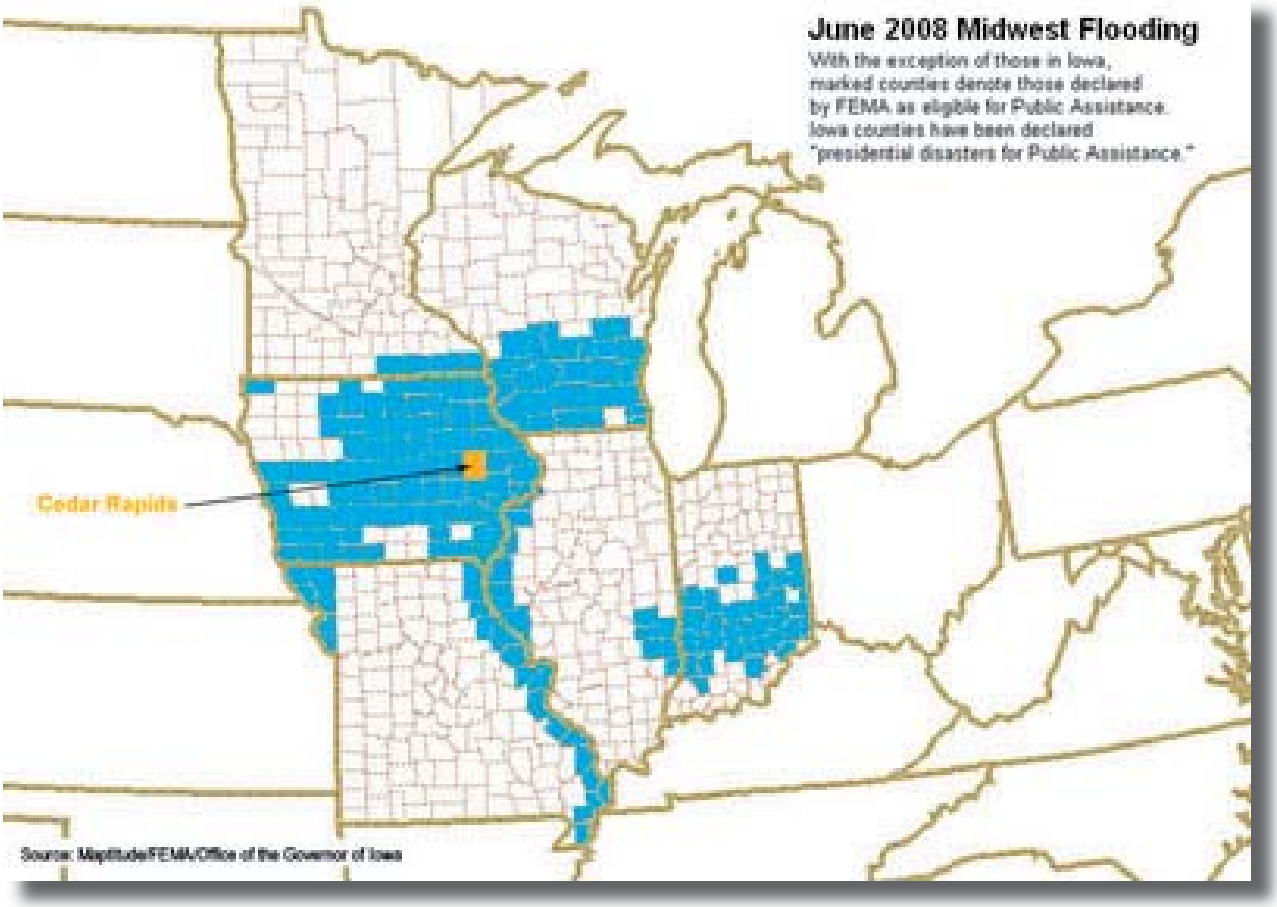


Figure 7. *Flooding extent in the Midwest during June 2008. Seventy-seven of Iowa's 99 counties were included in the presidential disaster declaration.*
Source: Maptitude Federal Emergency Management Agency (FEMA), Office of the Governor of Iowa.

bacteria, and other chemical contaminants. These problems don't just affect Iowans, they affect the people downstream of Iowa's major rivers as well (i.e., excess nutrients flow into the Mississippi River which in turn contributes to the Zone of Hypoxia in the Gulf of Mexico).

Several surveys done in the past ten years have shown that Iowans would like to have better water quality and that it's one of their top environmental concerns. Fortunately, there are now initiatives currently under way to respond to citizens' clean water priorities, some of which include watershed improvement via wetland restoration and/or creation. A few examples of water quality programs currently able to support wetland restorations or creations include the IDNR's Watershed Improvement Coordinators, Lakes Restoration, "319 Program," the Total Maximum Daily Load Program, and Resource Enhancement and Protection (REAP) Program; and the USDA/Farm Service Agency's (FSA) & Iowa Department of Agriculture & Land Stewardship's (IDALS) Conservation Reserve Enhancement Program. (See Appendix E)

The body of science studying wetland function has also grown over the past 20 years and has revealed several ways that wetlands process water to contribute to better overall water quality. Wetlands naturally treat much of the pollution from agricultural run-off, a benefit many communities need. Iowa especially needs this extra assistance as the external unallocated cost associated with water treatment runs in the millions each year. One example of a major treatment facility, the Des Moines Water Works, which has the largest nitrate removal facility in the world, estimates annual operation costs at $500,000 for nitrate removal treatment (excluding capital costs for building treatment facilities); $300,000 for the removal of agricultural pesticides; and $570,000 for sediment-associated costs such as ameliorating stream bank erosion and hydrological alterations of the landscape. (Figures derived from "Costs of Source Water Treatment to Ratepayers or Too Muddy to Drink, Too Wet to Plow," a presentation by Robert G. Riley, Jr. on behalf of Des Moines Water Works at the Symposium *WETLANDS: Reinvesting in Iowa's Natural Capital* on (April 3, 2009). Municipal waterworks serving communities with populations under 10,000 face similar costs. The City of Remsen was recently quoted a nitrate removal system for their community (population: 1,800) that would cost approximately $2,200,000 to install with a $40,000/yr maintenance cost (Correspondence with Rebecca Ohrtman, IDNR SWP Coordinator, October 2009). Considering the number of small towns in Iowa, the potential cost to deal with nitrate removal via installation of expensive conventional systems may not be economically viable for the long term. And none of the costs mentioned thus far include the millions of dollars that go to the multi-agency regulatory systems required to monitor and address water quality issues.

Therefore, it is logical that many watershed improvement coordinators, land managers, and water treatment operators would like to include wetland restorations as part of their efforts to improve the health of their watersheds. In some cases where restorations of the natural basins are not feasible, a wetland can be created. The Farm Service Agency's Conservation Reserve Enhancement Program (CREP), administered in conjunction with IDALS, has been the best tool for installing these wetlands to date. This focus on overall watershed health is significant for wetlands because in the past, almost all of the wetland-related activities and funding came from wildlife habitat conservation entities. This means natural resource agencies and organizations have increased opportunities to forge new partnerships merging wetland wildlife habitat priorities and water quality priorities to increase the pace of wetland restorations to more watersheds across Iowa. It should be mentioned that this is already being done to some extent, but there is a need to aggressively pursue more partnerships and potential funding sources. Action steps to address this will be covered in this plan under the 'Action Steps' section.

<u>Wildlife and Natural Places-Related Recreation</u>

Healthy wetlands fulfill a variety of economy-building recreational opportunities by providing wildlife habitat, supporting native plants systems, and supporting the headwaters of rivers and lakes by mitigating the impact of agricultural and urban pollution as well as flood-level precipitation. (See IDNR's 2005 Iowa Wildlife Action Plan (IWAP), details in Appendix B). Wetland ar-

eas provide year-round critical habitat for many types of wildlife, even during the harshest winter season. The reason wetlands are so valuable for wildlife is because they are capable of supporting several of their needs for feeding/watering, roosting, nesting, and shelter throughout various times of the year. Acre for acre, they are perhaps the most dynamic areas we have ecologically. These shallow water areas, if allowed to function fully as a wetland, often grow a rich diversity of aquatic vegetation, invertebrates, insects, and plankton, all of which are important building blocks to the ecosystem.

Examples of wildlife species that benefit from wetlands include:

- Waterfowl (ducks, geese, swans) - feeding, roosting, nesting, loafing and migration rest.
- Upland wildlife (deer, pheasants, etc) - feeding, watering, roost/bedding.
- Neotropical migrant bird species (songbirds) - feeding, nesting, roosting.
- Shorebirds (sandpipers, plovers, etc) - critical migration stopover areas, feeding, and in some cases nesting.
- Furbearers (mink, muskrat, beaver, etc) - feeding, raising young, etc.
- Amphibians/Reptiles (salamanders, frogs, etc) - egg laying, feeding, habitat.
- Fish - feeding, spawning.

Pheasant hunting in Iowa generates approximately $200 million each year. According to the Deer Study Advisory Committee's 2009 study, "Deer hunting generates $137 million in retail sales in Iowa which has an economic impact of over $214 million and supports over 2,800 jobs. Wildlife watching generates another $312 million in retail sales which has an economic impact of $494 million and supports over 5,300 jobs. Although the study doesn't break out how much of this is directly attributable to deer, 35% of those who watch wildlife around their residence reported watching deer and 60% of those who travel away from their residence (non-residential) to watch wildlife watch deer."

In terms of birds, wetlands are essential habitats for maintaining the populations of approximately 75% of the species in North America. According to the Waterfowl Association of Iowa, 50 million people spend approximately $10 billion each year observing and photographing wetland-dependent birds. Imagine how much more of that money will come to Iowa when we restore more waterfowl habitat.

Above and beyond birds and mammals, the category of wildlife watching is expanding to include species such as dragonflies and pollinators (butterflies and bees). Additionally, fishermen still generate approximately $302 million in revenue each year (*The 2006 Economic Benefits of Hunting, Fishing and Wildlife Watching in Iowa*, Appendix D, prepared by Southwick Associates, Inc., PO Box 6435, Fernandina Beach, FL 32035). Based upon the original range of fish native to Iowa's waters, it is logical to infer that improved water quality would increase fish numbers and diversity and, therefore, fishing revenue would increase. And last but not least, each year outdoor

enthusiasts infuse Iowa's economy with approximately $1,000,000–$1,500,000 in camping fees. Outdoor water recreation via canoe, kayak, and inner tube generates $5 million per year plus an additional $4 million in related spending such as lodging, travel, food and drink (*Iowa Outdoors* Feb. 17, 2009, Iowa Department of Natural Resources, www.iowadnr.gov; Editor: Mick Klemesrud).

Carbon Sequestration to Mitigate Greenhouse Gas Emissions

In 2008 Iowa's total greenhouse gas emissions increased by 1.8 million metric tons of carbon equivalent (MMTCE), exceeding every other state in the nation but Oklahoma. Wetlands once again could become part of the solution. Like forests and prairie, wetlands' natural functioning also extends to the sequestration of excess carbon emissions via plant absorption. A swamp oak savanna, for instance, can capture 5 MMTCE per acre. By restoring more acres of wetlands in Iowa, especially throughout the fragile floodplain areas, it would provide an opportunity to absorb more carbon dioxide from the air while providing landscape relief during heavy precipitation. Many states already use a carbon credit system to give emitters, like power companies, the opportunity to mitigate their emissions by buying credits from those who own emissions reduction systems, like wetlands. It may be something Iowa businesses and natural resource groups could look into further to determine if it was something that would work in this state.

Control of Pest and Invasive Species

Diverse wetlands actually help prevent overpopulation of pest and invasive species (i.e., mosquito populations are kept in check because dragonflies, birds, and bats eat them), while strong native plants leave less room for invasive plants to take root. When the number of pest and invasive species are lowered so goes the costs associated with eradication including herbicide and pesticide applications and their potential water pollution.

Overall Revenue

Not counting fishing and waterfowl-related income, pest species reduction, carbon sequestration, or water processing, the amount of known revenue generated by wetland-related eco-services in Iowa is approximately $424,500,000 per year and rising, while the amount of money strategic wetlands restoration could prevent us from spending runs into the billions.

Current Threats to Wetlands

Despite the enormous benefits of wetlands and the growing desire to have more of them, wetlands on the Iowa landscape face many obstacles. As discussed below, national farm policy dictates that USDA simultaneously provides incentives for both wetland conservation and intensive row cropping; the latter often being the better funded option. But farmers should not be viewed as the only ones whose activities are potentially at odds with wetlands conservation. It should also be noted that many of them step forward to be part of the solution. Urban sprawl leads to

wetland-disrupting development as well. And since the functions of wetlands have long been overlooked or misunderstood, even developers who recognize wetlands may fear leaving them intact will lead to problems such as pest species issues. In fact, the opposite is true. When wetlands contain a healthy balance of native plant and animal species, they actually increase the species we want—birds, frogs, mammals, dragonflies, etc.—while reducing pest species like mosquitoes. If existing wetlands survive development, their ability to thrive may be threatened by encroachment within their watershed, which often leads to increases in invasive species and nutrient overdose. Non-native purple loosestrife and Reed canary grass, for example, have become the bane of many a landowner's existence. Left to their own devices these plants are aggressive enough to choke out the native wetland plants essential to the nutrition and habitat of wetland-dependent animal species. Meanwhile, agricultural run-off containing high concentrations of herbicides and nutrients like nitrogen and phosphorus can have a negative impact on the water quality to the point where native wetland plant and animal species no longer function.

Drainage

Although much of the drainage done through tiling, ditching, and stream channelization took place in the past, it is still an ongoing threat to some of the existing wetland areas that are left, especially smaller wetlands. Spikes in urban development and agricultural commodity prices increase the incentives to alter natural areas that may contain wetlands. Even if this is done to areas surrounding wetlands it can affect their hydrology by disconnecting them from other water bodies, reducing their ability to retain water, altering water tables, etc.

Ponding

In contrast to drainage, another threat to some wetlands is when they are turned into ponds. This activity most commonly occurs on privately owned land with wetland types like fens, wet prairie, and sedge meadows. It can also happen in an area that has hydric soils and was drained for agriculture. Rather than the wetland being restored back to the area, a large dike may be built to capture and store enough water to turn it into a pond used for fishing and swimming. In the case of fens, a landowner may have the existing peat mound completely excavated out and the nearby area around it scooped out as well to form a "nice spring-fed" pond which is often touted as increasing the value of their property.

Siltation

Another threat to some wetlands in Iowa is siltation. Many of Iowa's publicly owned sloughs suffer from this because many are fed by either a small stream or are connected to a larger river. They are literally being filled in year by year from higher than normal loads of sediment or silt carried into them by streams or rivers. This occurs most often during high water or flood events when there is a hard rain that erodes the topsoil from exposed uplands. The result is a decreased life expectancy for the health of those sloughs, as they are filled in at a much quicker rate than what is natural for them to be able to handle.

Herbicides, insecticides, and fertilizers

There's a high prevalence of chemical use in many of the uplands that surround wetlands that are converted to agriculture, city property, golf courses, and other intensive land uses. Unfortunately, rainwater and wind drift also carry varying amounts of these chemicals into wetlands. This often affects the aquatic health of wetlands by altering the vegetation and invertebrate life. Even low amounts of these chemicals can become hazardous to the aquatic life as wetlands dry up periodically which concentrates the chemicals. Over time many wetlands will tend to lose the intolerant species of aquatic plants and animals and tend to support a less diverse community of species that are tolerant, many of which are undesirable in sustaining healthy populations of wildlife.

High, stable water levels

Another, somewhat misunderstood threat to wetlands in Iowa is that many suffer from high and stable water levels. Both prairie pothole and riverine type wetlands evolved naturally with water levels that often fluctuated greatly from year to year or even month to month depending upon their hydrology and the weather. It is important to know that water level fluctuations are often a good thing for wetlands. Periodic wet and dry periods cause natural, yet fairly predictable changes in the biogeochemical processes in wetlands which act as a sort of natural ebb and flow for primary production, nutrient cycling, and substrate compaction within these systems. This greatly effects the composition of their aquatic vegetation communities, invertebrate and plankton populations, and in turn on up the entire food chain to the larger animals that use them such as fish and waterfowl. Many of the wetlands that remain in Iowa (both public and privately owned) simply capture and hold too much water. Because there are now fewer wetlands within each watershed, they are forced to receive much more water from the surface run-off, drain tile, and impervious surfaces that surround them. It is often times difficult to properly manage the water levels to fluctuate on a regular basis like they once did because the land around them is so altered, or the water level control structure is too small or outdated, or interest groups don't want it to occur, or because it would cause tension with neighboring landowners.

Undesirable Fish

Similarly, those high and stable water levels tend to support higher populations of rough fish (primarily carp and bullhead) in more wetlands than they once did. These species of fish are adapted to handle low oxygen conditions and often have just enough water to make it through the winter to continue growing and spawning each year. Dense populations of carp can cause disruptions in the food chain of these systems which ultimately leads to more turbid water causing a collapse in the growth of aquatic vegetation. This happens when these species of fish reach a high enough density that their feeding and rooting activities muddy the water enough to block the vital sunlight from penetrating the water column to support aquatic plant growth. In addition, they consume the larger zooplankton, invertebrates, and young plants that are trying to grow. In addition to this, species like the Bullhead often prosper in these conditions. The result of high and stable water levels, coupled with dense populations of undesirable fish species, are several wetland sys-

Thick mats of filamentous algae, bright green water, and a shoreline dominated by reed canary grass often indicates excess nutrients are loading the system. Shallow lakes and wetlands support much more aquatic life and in turn more recreational use if steps are taken to minimize the amount of nutrient run-off into these systems.

tems that are open shallow ponds dominated by rough fish and algae, rather than diverse systems teeming with rich communities of zooplankton, aquatic plants, invertebrates, insects, amphibians, and waterfowl.

The issue of whether fish should occupy a wetland or shallow lake system is often misunderstood. Historically, some wetlands supported fish, while others did not. It all depended on whether they were connected to permanent water bodies such as a stream or a lake in some way. Many of the temporary and semi-permanent prairie pothole type wetlands were not directly connected to permanent water bodies, which meant they frequently dried up as part of the natural wet/dry cycle, and therefore did not support any significant numbers of fish because fish could not over-winter in them. Those wetlands that did support fish were most commonly those connected to the headwaters or occurred along the floodplains of our major rivers. These wetlands were once very critical spawning grounds to several of our native fish populations such as yellow perch and northern

pike, plus several species of minnows and shiners. It was once common in the spring time of the year for many of these native fish species to make huge spawning runs up our major rivers, then up the smaller tributary streams, and into these headwater wetlands to take advantage of the shallow water areas that warmed up quicker and supported a huge smorgasbord of zooplankton and invertebrate life for their young to live off of while growing. The aquatic vegetation provided a great refuge from predators for young of the year fish that hatched from these spawning efforts It was then common for many of the adult fish to move out of these wetlands after spawning back into streams and rivers as the spring gave way to summer and temperatures rose. Unfortunately, our landscape is now so altered that these aquatic systems are disconnected from each other. So, today's landscape does not support the native fish species the same way it used to. Instead species like carp and bullhead fill that niche. Ironically, more than one drainage ditch in the north Iowa landscape is named "Pike Run."

A misunderstood landscape

Most Iowans are now so many generations removed from the original landscape that they have no idea how many wetlands once occupied Iowa, especially in northern Iowa's Des Moines Lobe Landform Region, also known as the Prairie Pothole Region. This hole in the community knowledge should not be surprising given that most of the landscape has been altered beyond recognition (e.g., what may have once been a large marsh in that subtle low area in the 'back 40' is simply viewed as unproductive and troublesome). Widespread support for wetland restoration among the residents of Iowa--especially those effected by flooding--is more likely to come if they understand how their land was designed to function. With the help of digitized soil maps, aerial photos, the National Wetland Inventory, and other mapping programs, IDNR and similarly aligned agencies and NGOs can help provide that missing piece of education about the true identity of our landscape and provide a foundation for sharing this knowledge with all Iowans.

Restoration Potential: Excellent

Although our current rate of wetland loss in Iowa is a staggering 90-95%, the upside is an immense statewide potential for strategic restoration work. As mentioned previously, estimates of the original wetland coverage in Iowa was approximately 4 – 6 million acres. Those wetland basins still exist on Iowa's landscape, however most are currently drained for alternative land use practices, but these areas can be brought back to function as wetlands again. It would not be realistic to restore all of these wetland basins in today's landscape; however there is a large potential to bring back a socially acceptable percentage of wetlands into several of Iowa's watersheds that currently lack them. Restoring wetlands, however, is not as simple as pouring water on any available piece of land. To be successful, restoration efforts must focus on original wetland areas (pothole wetlands, riparian/floodplain wetlands, etc.) containing hydric soil, which have the unique ability to saturate and hold water on the surface (Figure 8). These hydric soils often contain seeds from some of the necessary native aquatic plant species that may have laid dormant

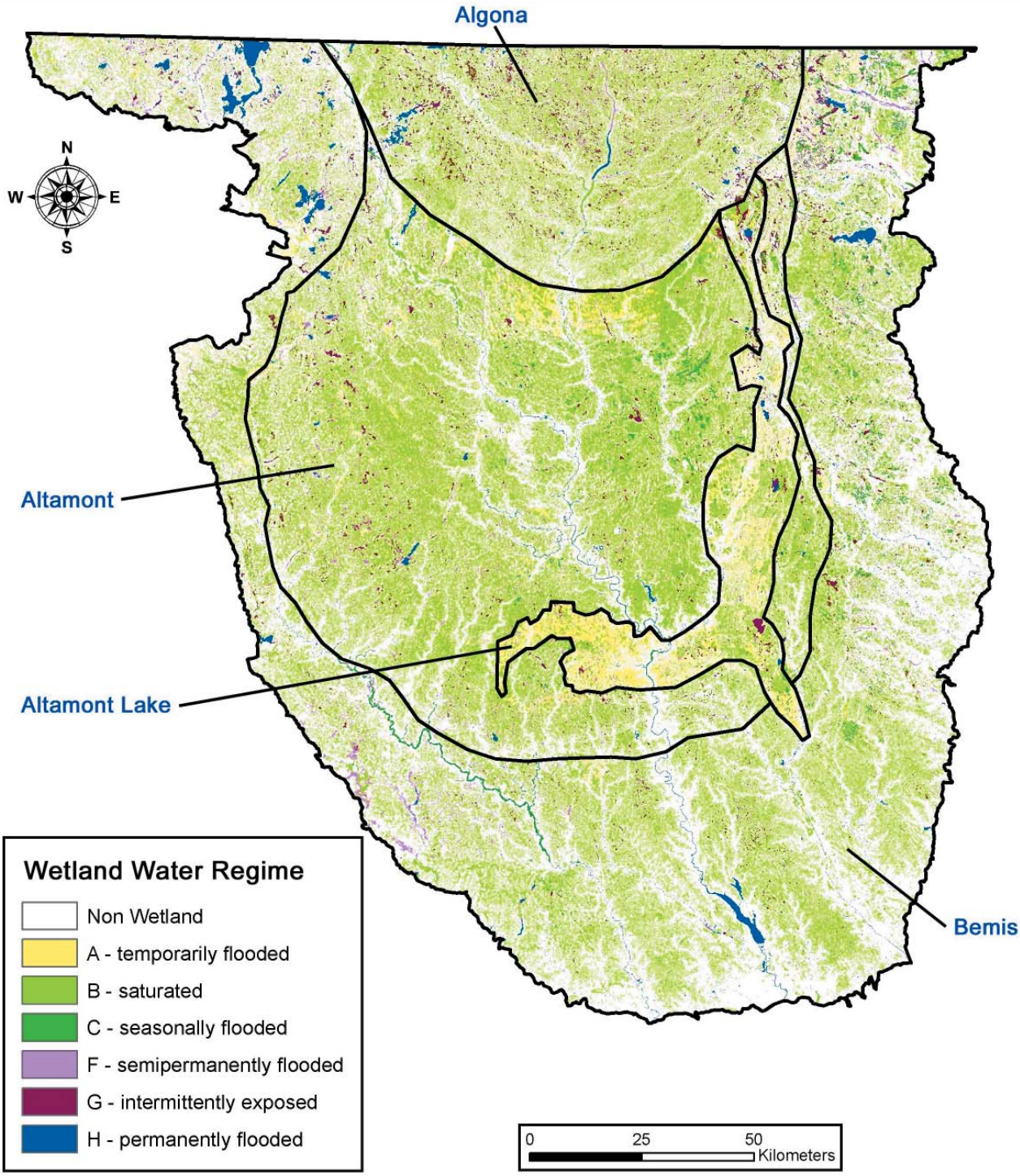


Figure 8. *The historical distribution of wetlands on the Des Moines Lobe. A total of 1.4 million hectares (3.4 million acres) of pre-drainage wetlands were identified on the Des Moines Lobe, representing 44% of the total area. Drier water regime wetlands dominated the pre-settlement landscape. Temporarily flooded, saturated, and seasonally flooded wetland classes comprised 85.6% of the total area of pre-settlement wetlands. Source: Miller, B. A., W.G. Crumpton, and A. van der Valk. 2009. Spatial distribution of historical wetland classes on the Des Moines Lobe of Iowa. Wetlands, 29:1146-1152.*

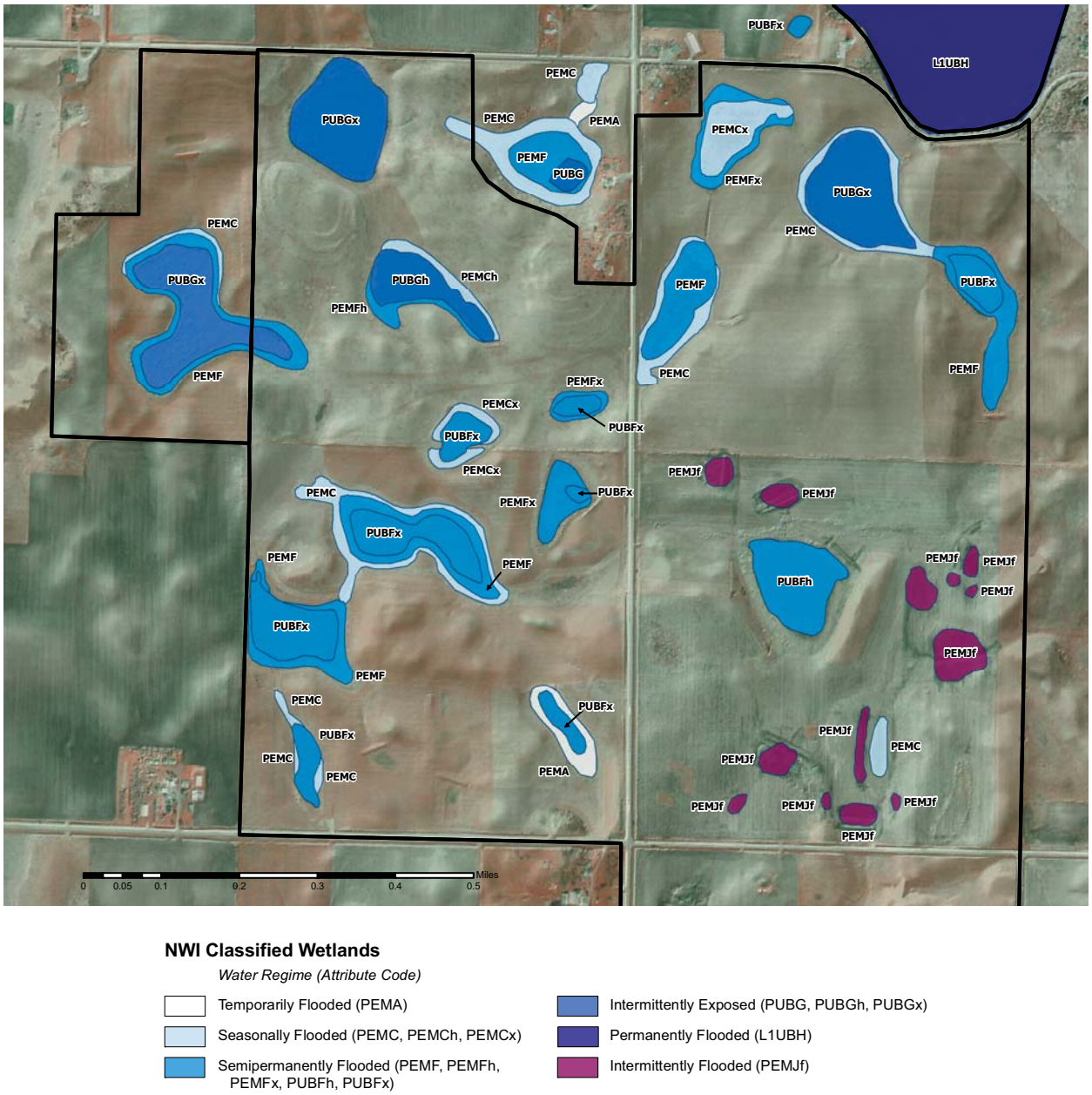
for many years but are capable of sprouting when water is allowed to pond up again. The two biggest factors that limit the pace of wetland restoration work in Iowa are inadequate funding and policies that offer economic incentives to intensively farm every acre possible with row crops. Actions to address these challenges are covered in the 'Action Items' section of this plan.

Fortunately, the exact tools needed to find the wetland areas that are potentially restorable exist now. The technology has advanced well enough now that it provides us with the capability to view the entire landscape using a combination of mapping tools. The mapping tools are very important because it vastly improves the ability of land managers to plan, coordinate, and implement their work with the work of others at a broader scale. Examples of various mapping tools that can be applied to wetland related work include the following:

- **GIS (ArcView/ArcMap):** By now, almost everyone that works with natural resources is familiar with and uses GIS extensively. It's a powerful tool to view the landscape, overlay a multitude of coverages, quantify things, and create maps. These applications are all useful for various wetlands related work, and it's another example of a tool developed in the past 10 years.
- **Digitized Aerial Photos:** There are now aerial photos that are available to view for all counties of Iowa. The digitized aerial photos are updated almost annually along with some sets of aerial photos dating back to the 1930s that have now been digitized. Aerial photos are extremely useful as a base coverage whenever the landscape needs to be viewed at various scales using GIS programs. The value in having them digitized is that it allows a person to apply various GIS tools over any part of the landscape in any county of Iowa. Plus a person can look for changes over time, view specific areas, study changes in vegetation, and also view current land use practices for any area across the state without having to manually look up each picture for an area.
- **Digitized Soil Survey Maps:** Soil surveys are completed by the USDA-Natural Resource Conservation Service periodically for each county in Iowa. In the past 10 years, these soil surveys have also been digitized which makes them extremely accessible to view and use for resource managers. In terms of wetlands related work, one of the biggest values in having soil survey maps digitized is that it allows resource managers the ability to quickly overlay soil types onto aerial photos to view hydric and non-hydric soils in any given area. Often times, it is an extremely useful tool in planning wetland restoration efforts for a given area. Soil survey maps are helpful in understanding previous land use types for upland areas prior to settlement as well. For example, the soil types surrounding a wetland in a transitional area between a low floodplain area and an area of higher elevation may help to reveal whether those areas' soils were originally formed from prairie or woodlands. This could help a resource manager plan accordingly for restoring upland areas back to its original vegetation as well.
- **National Wetlands Inventory (NWI):** The NWI for Iowa is a digital record of wetland location and classification as developed by the U.S. Fish & Wildlife Service. The classification

system was adopted as a national classification standard in 1996 by the Federal Geographic Data Committee. The NWI maps do not show all wetlands since the maps are derived from aerial photo interpretation with varying limitations due to scale, photo quality, inventory techniques, and other factors. Consequently, the maps tend to show only the wetlands that are readily photo interpreted given consideration of photo and map scale. The Iowa NWI is based off of 2002 color infrared photo imagery and uses the Cowardin System of Wetland Classification. This digital, geographically referenced data set was developed by the Iowa Department of Natural Resources to carry out agency responsibilities related to management, protection, and development of Iowa's natural resources. The data provide consultants, planners, and resource managers with information on wetland location and type. The data were collected to meet U.S. Fish & Wildlife Service's mandate to map the wetland and deepwater habitats of the United States. The purpose of this survey was not to map all wetlands and deepwater habitats of the United States, but rather to use aerial photo interpretation techniques to produce thematic maps that show, in most cases, the larger ones and types that can be identified by such techniques. The objective was to provide better geospatial information on wetlands than found on the U.S. Geological Survey topographic maps. It was not the intent of the NWI to produce maps that show exact wetland boundaries comparable to boundaries derived from ground surveys. Boundaries are therefore generalized in most cases. Consequently, the quality of the wetland data is variable mainly due to the source photography, ease or difficulty of interpreting specific wetland types, and survey methods (e.g., level of field effort and state-of-the-art of wetland delineation.

- **LiDAR (Light Detection and Ranging):** A relative new technology being used is LiDAR. This is an exciting new tool that most other states don't have yet. LiDAR is produced with lasers that scan the Earth's surface from aircraft to obtain relatively accurate elevations. At the statewide level the data is accurate to plus or minus 3.3 feet. This data is able to support the development of 2-foot contours which is the most accurate digital elevation information ever produced. IDNR and its partners are acquiring this information for all Iowa counties and will make it available for web use. It will be used for three-dimensional mapping and can be overlaid with aerial photos. LiDAR will allow planners to greatly reduce and supplement field survey requirements for many Iowa businesses and agencies and also provide a great tool for education and outreach (Figure 9).
- **Web Based 'Tools':** The Iowa DNR and other agencies have created web based tools for other water bodies of Iowa that typically link maps, information, and data together to make it all accessible via the web for anyone to use. A similar tool could be developed for wetlands. This will be addressed more in the 'Action Items' section of this plan, but examples of information to develop for a web based tool for wetlands include:
    - Visual map of wetland areas for prioritized protection, conservation, and restoration.
    - Easy access to digitized hydric soil survey maps, the National Wetlands Inventory, and aerial photos.
    - Information and data from wetland quality monitoring, wetland wildlife monitoring, and other sources of information.



NWI Classified Wetlands

Water Regime (Attribute Code)

- Temporarily Flooded (PEMA)
- Seasonally Flooded (PEMC, PEMCh, PEMCx)
- Semipermanently Flooded (PEMF, PEMFh, PEMFx, PUBFh, PUBFx)
- Intermittently Exposed (PUBG, PUBGh, PUBGx)
- Permanently Flooded (L1UBH)
- Intermittently Flooded (PEMJf)

Figure 9. *Map of wetlands located on one tract of land near Welch Lake in Dickinson County, Iowa. LiDAR and NWI coverages are overlaid onto aerial photography and identify drained and undrained wetlands on the landscape.*
Source: Iowa DNR

Because several wetland areas are privately owned, some sources of information would have to be protected for privacy reasons, but the value in developing web based tools is that it houses several sources of information about a particular water body of interest into one place that easily accessible for many people to use.

With the help of the tools listed above, it is easier than ever to find the location of original wetlands within each watershed, determine the different types of wetlands represented (i.e., pothole, fen, etc.), and assess how they're functioning within the context of their modern watershed situation. Because of this, it now makes it possible to assess the wetland situation for each watershed in Iowa and develop priorities for protection, restoration, monitoring, and research on a watershed-by-watershed basis. It could become in essence, a surgical approach to the diagnosis and repair of an altered landscape.

With the need for more wetland functions established and the methods for restoring them to the landscape better than ever, many may wonder why the work hasn't already been accomplished. As it stands today, the legal structure surrounding wetlands provides limited protection of the resource. Contrary to common belief, there is no Federal Wetlands Act or Iowa Wetlands Act. Rather, there is a collection of laws and regulations designed for a variety of other subjects that also have an impact on wetlands. From the top authority down (Federal to State to Local) the breakdown of activities and responsibilities largely fall into three categories: landscape modification, run-off/drainage, and voluntary conservation. See Appendix C on Laws & Regulations for detailed information.

Since the law does little if anything to *compel* wetland preservation and private landowners control approximately 92% of Iowa lands, the pathway to a functional landscape is clear: supporting the proactive measures of landowners must be the primary approach for increasing wetland functions. This won't be news to the many agencies and organizations with decades of experience successfully pursuing that very same strategy on an individual basis. Yet, for all of their hard work, the piecemeal approach has not achieved the kind of large scale wetlands restoration our malfunctioning landscape desperately needs. Considering the vast number of players involved in making decisions about land use in Iowa, this should come as no surprise. However, one of the problems with this situation—lack of teamwork—can also be the solution.

There are 10 federal and state agencies, 99 county conservation boards, 3,000 drainage districts, and countless local planning and zoning entities with authority to impact the disposition of wetlands in Iowa. A multitude of conservation-based non-government organizations (NGOs) work on wetlands projects as well. Although this means plenty of educated and dedicated professionals are available to assist the public, it also poses a high risk of authorities inadvertently acting at cross-purposes with each other as well as public and private funds going to duplicative processes. Meanwhile, budgetary constraints (which are expected to increase) push otherwise like-minded organizations into a competitive posture over funding pet projects. Therefore, in order to maximize the expertise and funding available for restoring wetland functions to the landscape, the many entities involved directly and indirectly in wetlands management must create a unified team vision for targeted action. One of the options identified by the Wetland Action Plan Committee, and recommended herein, is to support full funding of Iowa's leading vehicles for wetland restoration, which are the USDA NRCS' Wetlands Reserve Program and Emergency Watershed Protection Program Floodplain Easement Program (EWP).

WETLAND ACTION PLAN GOALS & OBJECTIVES

Although we can't control the rain, we can decide how to manage the landscape the rain falls upon. Locating and strategically restoring critical wetlands will provide a more balanced, economically sound, and healthier Iowa for people of all ages to work, play, and thrive. Therefore, it is the primary goal of this plan to identify ways to improve and accelerate the pace of coordinated wetland work across Iowa over the next five years by laying out action items for all aspects related to wetland resources. Of particular concern are critical wetlands. To be considered "critical," a wetland must be within a HUC-8 watershed that has poor water quality and/or floodplains and supportive or capable of supporting wildlife identified as species of greatest conservation need according to IDNR's IWAP and/or federal threatened and endangered (T&E) species habitat, as well as native plants that are endangered, threatened, and/or of special concern. Wetlands meeting these criteria that are also part of a site with "complex" potential will likely be the highest ranked of all.

ACTION PLAN OBJECTIVES:

- Identify critical wetland areas for higher priority in terms of protection and restoration.
- Increase wetland conservation work.
- Promote coordination of interagency and NGO functions impacting wetlands.
- Develop wetlands mitigation strategy.
- Create a sustainable wetlands portfolio to maximize all related forms of funding including water quality, flood mitigation, wildlife protection, and recreation.
- Enhance long term wetlands monitoring and assessment strategy.
- Enhance long term management of wetlands.
- Promote wetlands-specific education for engineers, architects, and planning and zoning officials working on projects involving Iowa wetlands.
- Assess conflicting policies and program/regulatory gaps.

Identify Critical Wetland Areas for Higher Priority

Unlike the rivers, streams, and lakes that have obvious banks to mark their boundaries, Iowa's wetlands are often mistaken for ordinary land. Every day people walk on, work with, and drive past wetlands and don't even know it. Sometimes this happens because certain types of wetlands, like fens, tend to be small and blend into the surrounding landscape. More often than not, however, wetlands aren't noticed because wetland drainage has caused them to lose the water storage and native aquatic plants and wildlife that make them recognizable as a natural resource. Since most of Iowa has been artificially drained, mapping techniques and highly trained eyes are necessary to locate original wetland basins again. This is already being done by natural resource

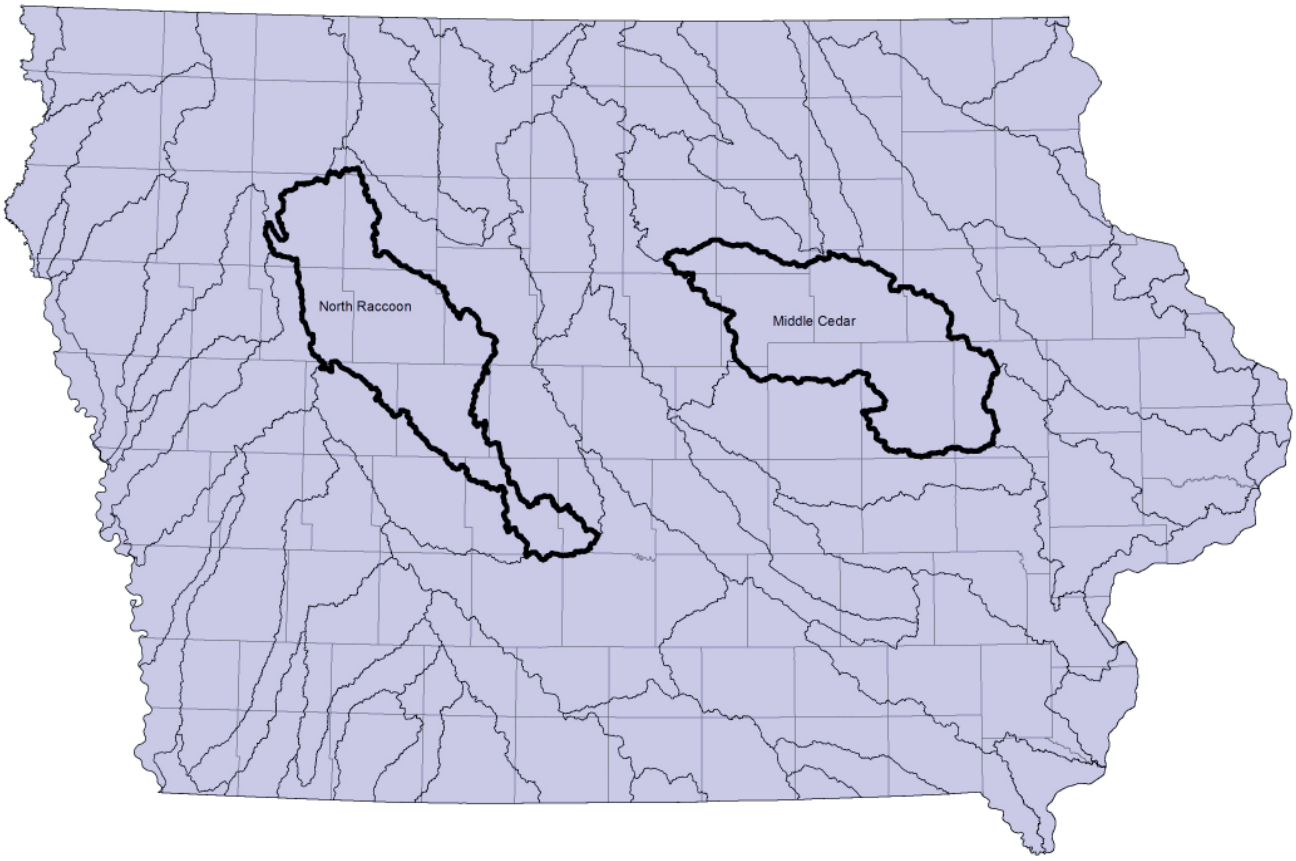


Figure 10. *The North Raccoon and Middle Cedar River HUC-8 Level Watersheds are priority watersheds for the State of Iowa due to water quality and frequent flooding issues. Watersheds such as these will be a primary focus for identifying critical wetlands for potential restoration efforts.*
Source: Iowa DNR

agency and non-government organization staff such as wildlife biologists, private lands biologists, hydrologists, and others. However there are many more people that would benefit from knowing how to do this, how to use it, and would then be able to integrate it into their everyday work goals.

Figure 10 highlights two of the Iowa watersheds in clear need of restorative measures. The potential for extensive wetlands restoration exists. However, given that most of the relevant landscape is currently employed by a mix of agricultural and urban/suburban community interests, this action plan focuses on first preserving and restoring the most critical wetlands areas. To be considered "critical" a wetland must be within a HUC-8 watershed that has poor water quality and/or floodplains, and supportive or capable of supporting wildlife identified as species of greatest conservation need according to IDNR's IWAP and/or federal T&E species habitat, as well as native plants that are endangered, threatened, and/or of special concern. Wetlands meeting these

criteria that are also part of a site with complex potential will likely be the highest ranked of all (i.e., those that currently support or would if restored create a contiguous system of wetlands).

Simply put, the ranking process involves first creating the hydric soils map and then comparing it to the maps of target programs to narrow the focus to potential wetland restorations with the greatest overall impact: these include water quality maps (such as "source water capture zone areas"), flood and floodplain maps (both IDNR & Homeland Security), Species of Greatest Conservation Need (SGCN) and T & E wildlife maps, and native plant maps (including endangered, threatened, and/or plants of special concern). Because so many areas of Iowa suffer from flooding, poor water quality, and diminished wildlife habitat, the question has been raised as to whether the critical wetland criteria are too broad. Once the maps have been combined to create a complete and refined picture, IDNR, in conjunction with the Ad-Hoc Wetlands Team, will consider additional relevant ranking factors in the event that the list of identified critical sites reaches an impractically large number.

This functional watershed approach agrees with federal EPA's Office of Water's primary goals, which are to ensure that drinking water is safe; to restore and maintain oceans, watersheds, and their aquatic ecosystems; to protect human health; to support economic and recreational activities; and to provide healthy habitat for fish, plants, and wildlife. It also comports with the recommendations of the Federal Emergency Management Administration (FEMA), which include taking a proactive role in floodplain management, as well as the Natural Resources Conservation Service (NRCS). It should be noted that whether or not a wetland is identified as critical according to this plan, IDNR remains committed to working with all landowners interested in restoring their land.

Although government agencies and non-government organizations often disagree, when it comes to wetland work in Iowa, there are certain key points they currently agree upon. These points bear repeating because they serve as the foundation for the wetland plan committee's recommendations herein:

- 90-95% of Iowa wetlands have been rendered non-functioning.
- Wetlands provide significant benefits for water quality, wildlife, flood control, and recreation.
- There is a need to restore more wetlands because of their benefits.
- There is a large potential to restore wetlands back to our landscape.
- Growing public support makes the timing good to initiate increased wetland work in Iowa.
- Iowa's landscape is intensively used (i.e., strong competition exists for what's done on nearly every acre) and, therefore, a team effort needs to continue and grow in order to be successful.

Having agreed upon the 'lay of the land,' so to speak, the wetland plan committee next investigated the best possible way to match Iowa's wetland needs with its available resources. In the resources category were new and improved GIS/mapping capabilities for pinpointing hydric soils, pre-existing individual priority wetlands work areas within various agencies and NGOs, private landowner desire for wetlands restoration, and individuated source funding, though often minimal at best. After extensive discussion, the committee determined that developing a state-wide coordinated approach to prioritized wetland work was the obvious lynchpin to maximizing available resources. Therefore, one of the first action items this plan proposes is the development of a web-based interactive priority wetland mapping tool that identifies critical wetland areas within a watershed context (i.e., discreet areas within each watershed capable of providing the most benefit in terms of improved water quality, flood mitigation, and increased wildlife habitat).

The interactive priority mapping tool would not only provide the foundation for coordinated efforts across the state, it would also demonstrate that natural resource agencies and NGOs have a practical plan for maximizing wetlands work with existing funds as well as future funding opportunities. It would also provide a visual source of information to keep everyone updated on the status of wetland related projects so that future planning efforts could be coordinated to augment each other, thus increasing the pace and efficiency of wetland related work across the state. This would especially be useful for new or smaller groups of people who seek to contribute to these efforts but may not be sure how to proceed (e.g., private watershed groups, drinking water operators, source water (groundwater) improvement initiatives, and cities). The importance of this shift in operations cannot be overemphasized. Since most agencies and organizations have priority work areas based on individual objectives and jurisdictions, it can be difficult to keep track of who is doing what and where as potential wetlands-related project opportunities arise.

According to the interactive priority mapping concept, the order of prioritization for wetlands within each watershed would generally occur in the following order:

Protection: Identify all wetlands that still exist as functioning wetlands within each watershed. Take steps to protect any wetlands that are vulnerable to degradation, drainage, or encroachment. Voluntary protection efforts would be pursued for any such wetlands located on private land.
Restoration: Identify all wetland basins within each watershed that are currently drained. Then use polygon color coding to delineate their boundaries and prioritize which basins to restore first according to the critical wetlands criteria set forth herein.
Creation: Identify other areas within each watershed that may have the potential for and/or are in need of wetland creation. Examples may include areas within drainage districts that have the potential to treat surface or drain tile run-off, but may not have necessarily been a wetland previously.

It is worth noting that mitigation is not included as a prioritization category above. This is because it is generally believed that potential mitigation sites could be identified from the three categories listed above, especially restoration and creation.

Why prioritize wetlands work in the context of watersheds?

As mentioned previously, this Plan proposes to identify critical wetland areas on a watershed by watershed basis in order to prioritize wetland work at a scale that is reasonable across the state. At this time, the wetland plan committee proposes to work with eight-digit hydrologic unit code (HUC-8) size watersheds. This scale may change to larger or smaller HUCs as work begins on developing the interactive priority wetland mapping application to adjust it for a size that seems most appropriate. Iowa has approximately 60 eight-digit HUC-8 watersheds.

There are several reasons for choosing to prioritize critical wetland areas in a watershed context. Those reasons include the following:

- All wetlands are part of a watershed.
- Wetlands are an important component to every watershed, much like kidneys to a human.
- They're functional components that are nearly eliminated in many of Iowa's watersheds.
- Because of the benefits wetlands provide, there is a need to have more restored to improve the health of watersheds across the state.
- It eliminates the inherent troubles/pitfalls of human imposed boundaries.
- Switching to the watershed scale aligns with the nationwide trend for greater success in natural resources management via a systemic approach.
- A watershed-focused systematic approach to prioritization is required for successful restorations aimed at flood reduction and/or mitigation.
- Tackling wetlands prioritization at the watershed scale, rather than a statewide or regional scale is more practical than a piecemeal approach because multiple projects can be implemented at the same time and not be at odds with each other or be forced to choose one priority region over another when funding is limited.
- Rather than arbitrarily picking one or two pet projects from an agency or organization, the watershed approach impartially identifies crucial areas of emphasis and provides the opportunity for coordination on multiple watersheds.

Action:
Develop a web-based Interactive Priority Wetland Work Mapping Tool

Activities:

Use GIS and other mapping applications to conduct this work. The following steps describe the anticipated method for identifying critical wetland areas to prioritize work within each HUC-8 watershed which are as follows:

- Overlay both the digitized soil survey maps (hydric soils activated) and the NWI onto current aerial photo imagery to identify all existing wetlands and drained wetland basins.
- Use mapping applications such as the Natural Areas Inventory (NAI) and other information on T&E species to detect rare or important species or habitats within the watershed .
- Evaluate and identify the most vulnerable existing wetlands for prioritizing protection initiatives.
- Look at the drained wetland basins for that watershed. Evaluate their potential to be restored.
- Assess the restoration impact on that HUC-8's water quality, flood risk, and wildlife habitat needs.
- Assess which wetlands have a better chance for restoration based on what is known about the areas, such as drain tile (amount and size, public or private tile), property boundaries, roads, gas pipe lines, etc.
- Prioritize wetland restoration areas.
- Color code all wetland areas (drained or undrained) based upon prioritization status.

Build this information into the web accessible interactive priority wetland mapping tool.

Timeline:
1 Year Total – (approximately 6 months for mapping work, 6 months to build tool)

Roles and Responsibilities:

- Coordinate development of interactive priority wetland mapping tool – Iowa DNR Wetland Monitoring staff.
- GIS Map work – Iowa DNR Watershed Monitoring and Assessment / GIS staff.
- Oversee process of applying map work to build the web-based interactive mapping tool - Iowa DNR Wetland Monitoring staff.
- Build the Interactive Priority Wetland Mapping Tool - Iowa DNR Watershed Monitoring and Assessment / GIS staff.

The final product will be a web-based Interactive Priority Wetland Work Mapping Tool that provides:

- One shared place (with a shared language) for all groups to use.
- Breakdown of the wetland story for each HUC-8.
- Prioritized HUC-8s to focus partnership wetlands restoration planning.
- Ability to zoom in and out to preferred scale for planning by looking at identified work area targets.
- Potential to track wetlands restoration progress across the state.
- Potential to further quantify and model anticipated benefits and impacts to the landscape.

Increase Wetland Conservation Work

From a statewide perspective, this action item has been, and will continue to be a very important component in terms of making real progress to improve the wetland resource in Iowa. While the other action items proposed in this Plan are important for building a more comprehensive framework of activities related to wetlands work, this particular action item is perhaps the most crucial one to build on because it improves the wetlands that still exist on our landscape and adds wetlands back to the landscape via restoration. As mentioned in previous sections of this plan, the Wetland Action Plan Committee agreed that the primary order for prioritized wetland work should be the following:

Wildlife conservation efforts, led by natural resource agencies and non-government organizations, to restore wetlands and their associated uplands have been extremely crucial for several species of migratory waterfowl, shorebirds, and other wetland dependent wildlife. Photo courtesy of Ty Smedes

- Protect/preserve Iowa's remaining wetlands.
- Restore natural wetlands that have been drained, where and when it is feasible.
- Create wetlands when restoration of drained wetlands isn't an option.

Therefore, the activities for this action item follow the same order of prioritization.

Many of the mechanisms currently in place to do conservation activities are limited by two major factors: inadequate funding for landowner-requested wetland restorations and national policies set in the Farm Bill that offer landowners even more economic incentives that favor large-scale, intensive row cropping practices. Despite these inherent challenges, there are still ways to continue wetland restoration work in Iowa through conservation and public health and safety initiatives. This action item seeks to set wetland conservation goals and lays out some ways to enhance these efforts.

Iowa's current flagship programs for wetlands restoration are the USDA NRCS Wetlands Reserve Program (WRP) and Emergency Watershed Protection Program Floodplain Easement Program (EWP) (Table 1 and 2). It should be noted that the acres restored are a combination of roughly 25-30% wetlands and 70-75% connecting grasslands and uplands, which ultimately leads to a fully functioning landscape. Because of the dominance of these NRCS programs, the voluntary nature of the easements, the backlog of applications, and NRCS' ability to work with a variety of partners, this Plan recommends they be given specific funding priority.

Table 1. *Acres enrolled, number of contracts, and the funding levels to implement the Wetlands Reserve Program (WRP) in Iowa for the years 2000 – 2009, and part of 2010.*
Source: USDA – NRCS Iowa

Year	No. of Contracts	Acres Enrolled	Funding Level
2010 (1st quarter)	31	3,200	$10,730,000
Pending Applications	199	18,165	$61,761,000 (based on current average NRCS 2010 easement values)
2009	31	3,225	$11,456,000
2008	41	2,900	$8,750,000
2007	28	2,845	$7,211,283
2006	27	8,745	$8,398,745
2005	33	4,178	$10,473,822
2004	56	6,113	$14,113,616
2003	46	5,620	$12,829,728
2002	47	5,839	$11,141,148
2001	29	3,872	$7,818,575
2000	33	4,462	$7,695,180

Table 2. *Acres enrolled, number of contracts, and the funding levels to implement the Emergency Watershed Protection Program (EWP) in Iowa for the years 2000, 2001, 2009, and part of 2010.*
Source: USDA – NRCS Iowa

Year	No. of Contracts	Acres Enrolled	Funding Level
2009 & 2010 (1st quarter)	152	17,730	$66,744,281 (½ of contracts enrolled; ½ in process)
Pending Applications	580	52,176	$177,398,400 (based on current average NRCS 2010 easement values)
2001	31	4,599	$6,132,237
2000	17	2,518	$2,998,292

Action:
Continue successful wetland conservation initiatives, and seek new (non-traditional) partners and funding to increase the pace of wetland conservation work statewide.

Activities:

Protection/Preservation:
Use the collective knowledge of agencies and organizations and the interactive priority wetland mapping tool to work on the wetlands that have been identified as the most vulnerable and therefore, in need of protection. In most cases it would be wetlands located on private land that face threats from development, degradation, and/or drainage. Collaborate to find ways to protect these vulnerable wetlands by working with the landowners to offer volunteer easements, agreements, or land acquisition. The wetland plan committee agreed that this work could be done most effectively using the volunteer approach; meaning the landowner would have their choice in the matter and not be told what they have to do through law.

Goal:
All vulnerable wetland areas identified statewide using interactive priority wetland mapping tool. Work with landowners to protect/preserve all vulnerable wetlands

Timeline:
5 Years

Roles and Responsibilities:
Iowa DNR – Wildlife/Private Lands, USDA – Natural Resources Conservation Service, U.S. Fish & Wildlife Service, County Conservation Boards of Iowa, U.S. Army Corps of Engineers, Ducks Unlimited, Pheasants Forever, The Nature Conservancy, Iowa Natural Heritage Foundation

Restoration:

- Promote successful restoration programs, such as USDA NRCS' Wetlands Reserve Program and Emergency Watershed Protection Program Floodplain Easement (EWP).
- Coordinate long term restoration plans and goals; led by conservation sections within state and federal agencies and organizations; also integrate these efforts with the formation of an Ad-Hoc wetlands team.
- Seek additional or new sources of funding and partnerships to support conservation driven restorations to occur in more watersheds throughout Iowa simultaneously; especially focus on integration between the conservation groups, water quality groups, and floodplain/flooding related groups.
- Continue to focus on restoring complexes of wetland areas to ensure that several types of wetlands are present on Iowa's landscape; not just permanent and semi-permanent types.

- Seek to build more partnerships with agricultural groups and entities in Iowa to find common ground and sustainable solutions to poorly drained areas. Focus on working with restorations of natural wetland basins that would both improve water quality/flood impacts/wildlife habitat but also relieve drainage tile stresses and costs. One way this could be done is by working with agricultural partners and landowners in specific areas that are frequently inundated by water that don't provide consistently good crop yields nor function as natural wetland areas.
- In terms of mitigation; seek to be involved with and promote proper mitigation techniques that work with natural sites capable of a full restoration to improve the chances for mitigation success. Help identify potential mitigation sites that are conducive to restoration success in areas where natural basins have been drained.
- Engage monitoring and research projects with conservation groups to assess and document the ecological services derived from wetland restorations and also work to continue to advance the quality of restorations to ensure maximum return on investments.
- Develop and foster partnerships with groups seeking to create wetlands in specific areas where natural restoration is not an option in order to provide technical expertise and oversight for project success.

Goals:

The current pace of wetlands restored to Iowa's landscape annually averages about 1,150 to 1,533 acres (based on average WRP acres). It should be noted that these restorations have often been very successful thanks to a small group of dedicated professionals and are usually done using partnerships among several agencies and organizations in order to make it happen. This plan seeks to increase the pace of wetland restorations done annually in Iowa which will be very challenging, yet worthwhile due to the multiple benefits wetlands provide. There is an increasing sense of urgency to have more wetlands restored as issues continue to arise with decreasing populations of wetland-dependent wildlife species, increasing burdens on water quality, and higher frequencies of flood events. Therefore, this plan proposes to make it a minimum goal to at least double the rate of wetland restorations done annually in Iowa which equates to approximately 2,300 to 3,000 acres.

Timeline:

5 Years. Work to double the pace of wetland restorations done annually within a five-year time frame. This will be done collectively by agencies and organizations working together on this action item.

Roles and Responsibilities:

Conservation agencies and groups will lead the way in this endeavor:
U.S. Fish & Wildlife Service, USDA-Natural Resources Conservation Service, USDA-Farm Service Agency, Iowa DNR – Wildlife, Iowa DNR – Private Lands, County Conservation Boards

of Iowa, Ducks Unlimited, Pheasants Forever, The Nature Conservancy, Iowa Natural Heritage Foundation, and Iowa Department of Agriculture and Land Stewardship.

Possible new or non-traditional partners will include the following:
Local watershed groups throughout Iowa, US EPA, USDA – Resource Conservation & Development, Rebuild Iowa Office, FEMA, U.S. Army Corps of Engineers, Iowa DNR – Watershed Improvement/Floodplains/TMDL/319 Program, Iowa Farm Bureau, Drainage Districts of Iowa, US Geological Survey, Iowa Hydraulics Institute, cities, developers, environmental consultants, and others.

Action:
Develop and implement fen protection/preservation project.

Activities:

- Raise awareness of the value of fen habitats through outreach to landowners.
- Seek funding sources to implement fen protection easements and work with willing landowners to set up on voluntary basis.
- Find and add additional fen site locations on private land to Iowa DNR's Fen Database through GIS-mapping and personal communication with agencies and landowners.
- Assess fen quality using vegetation surveys, hydrological measurements, and a fen rapid assessment method.
- Work with non-government conservation organizations as feasible to implement statewide fen protection easements with willing landowners.
- Formation of a Fen Committee to coordinate efforts at statewide level.

Goal:
Fen protection funding, personnel, and easement work initiated to implement

Timeline:
5 Years

Roles and Responsibilities:
Iowa DNR – Botanists/Private Lands/Wetland Monitoring, Private Botanists, County Conservation Boards of Iowa, The Nature Conservancy, Iowa Natural Heritage Foundation, U.S. EPA, U.S. Army Corps of Engineers

Promote Coordination of Interagency and NGO Functions

Given that thousands of entities affect the disposition of Iowa wetlands, the Wetlands Action Plan Committee recommended making widely available the Interactive Priority Wetland Work Map-

ping Tool created herein, as well as the results of its application, to encourage consistent resource recognition and agency coordination throughout the state. In order to implement the objectives cited herein, the following activities are also recommended:

Activities:

- Creation of a state Ad-Hoc Wetlands Team. Members of the Wetland Action Plan Committee have already been invited to participate, but conservation partners, agency planners, and Interagency Review Team members involved with 404 permitting and mitigation are encouraged to participate as well.

- Ongoing Agency and NGO wetlands restorations may be able to coordinate long-term monitoring systems via the Ad-Hoc Wetlands Team; nearly all program representatives associated with the development of this Plan indicated a lack of funding for management and monitoring of restored sites.

Goal #1:
Formation of an inter-agency/organization Ad-Hoc Wetlands Team

Timeline:
1 Year

Roles and Responsibilities:
IDNR Wetland Monitoring, Wildlife & Permitting; agency partners

- Coordinate integration of other agencies' work into Interactive Priority Wetland Mapping Tool.
- NRCS Easements Program has agreed to consider augmenting easement application criteria with new critical wetlands information to determine easement funding priority.
- The U.S. Army Corps of Engineers Rock Island District has agreed to consider using critical wetlands information to inform decisions regarding the sufficiency of permit applicants' mitigation activities.
- Use of the Interactive Priority Wetland Mapping Tool by multiple agencies and organizations.
- Ask for input and testing from other agencies and organizations during the development of the Wetland Mapping Tool to ensure that it gets built to be a valuable tool that is easy to use.

Goal #2:
Cohesive, efficient coordination of wetland issues within Iowa DNR

Timeline:
1 Year

Roles and Responsibilities:
Iowa DNR Wildlife, Wetland Monitoring, Permitting

Intra-agency coordination within IDNR:

- Work to integrate the various wetland issues and personnel involved with each other more on a consistent basis; wildlife conservation and diversity, management, private lands, regulatory/permitting, water quality, monitoring, and research.
- Work to make wetland restoration, protection, and monitoring a higher priority within the agency - more personnel devoted to wetland specific work.
- The IDNR Wetlands Monitoring is already working with the Wildlife & Fisheries Bureaus and Ducks Unlimited on the "Shallow Lakes Initiative to monitor shallow lakes/ marsh areas.
- The Clean Water Act Section 303(d)/IDNR TMDL Program is already in the process of coordinating with IDNR Wetlands Monitoring to determine whether TMDL protocols could be enhanced to reflect critical wetlands criteria.

Goal #3:
Full integration of other agency/organization priorities and data into the Wetland Mapping Tool and Living Wetland Action Plan

Timeline:
5 Years

Roles and Responsibilities:
Iowa DNR
Inter-agency coordination

- Foster new, non-traditional partnerships with agricultural groups, cities, developers, and planning commissions. Work to overcome inherent opposing views to find areas of common ground or agreement for decisions and solutions related to wetland areas and land use decisions.
- Explore ways to integrate natural wetland restorations in flood-prone areas that were once wetlands to provide an alternative land use practice that is sustainable and fiscally responsible as a long term investment. The desired outcome would be green space for recreation, contributions to improved water quality and flood retention.

Goal #4:
New and innovative wetland restoration projects established

Timeline:
2 Years

Roles and Responsibilities:
Ad-Hoc State Wetland Team

Develop Wetlands Mitigation Strategy

Iowa has lost more wetlands proportionally than nearly any other state, which means its wetland remnants have heightened value as biological units as well as functional measuring tape for future restorations. Add to this the fact that mitigation wetlands rarely function better than the original wetlands replaced, and certain questions naturally arise. Is the allowance of wetland destruction via 'mitigation' less appropriate in Iowa than other states? Should the state have an official policy stricter than the federal policy to avoid disruption to existing wetlands? Are mitigation banks a useful market alternative to small piecemeal mitigations or an opportunity to destroy wetlands where none existed before or both? At this point the governing agencies have no unified strategy to address these issues and one is needed.

Action:
Develop unified statewide mitigation guidance and publish it.

Activities:

- Involve the Ad-Hoc Wetland Team into ongoing work being done on this topic by the Iowa DNR and US Army Corps of Engineers permitting staff.
- Determine the best course of action to take for a properly balanced mitigation program for Iowa.
- Develop the statewide wetland mitigation guidance document.
- Integrate information from wetland monitoring work into US Army Corps of Engineers computer software tracking program RIBITS.

Goal:
Development of a well planned guidance document on wetland mitigation

Timeline:
3 Years

Roles and Responsibilities:
Iowa DNR Permitting, U.S. Army Corps, Ad-Hoc Wetlands Team

Create a Sustainable Wetlands Portfolio

In order to protect and restore critical wetlands in Iowa, IDNR and it's partners must maintain a variety of working currency, such as a combination of cash, land donation, expert resources, partnerships, and landowner participation, dedicated to actual work in the field that improves the landscape and its associated water quality, flood mitigation, and wildlife habitat functions.

As a practical matter, it would be easier to attract outside funding with a restoration-dedicated fund mechanism in place, and given the 2008 Farm Bill's new restrictions on NRCS' ability to support wetlands projects on government-owned land, attracting outside funding is more important than ever. It is, therefore, recommended that the Iowa legislature pass legislation to create such a fund mechanism. However, should that not be a viable option, the Wetland Action Plan Committee also recommended investigating the possibility of creating a state wetlands association or other separate entity dedicated to funding and implementing wetland restoration and long-term monitoring.

Goal:
To increase project-based and long term funding for wetlands preservation, restoration, and monitoring.

Timeline:
1 to 5 Years

Roles and Responsibilities:
Ad-Hoc Wetlands Team

Enhance Monitoring and Assessment of Wetlands Quality

For several years now, many groups of people ranging from outdoor enthusiasts to scientists have raised concerns about the quality of wetlands in Iowa. Once regarded as wastelands and largely ignored from a monitoring standpoint, wetlands are now recognized as important features on the landscape. New research reveals that wetlands actually provide numerous benefits for not only wildlife and fish, but also humans. The more degraded a wetland is, however, the less able it is to effectively perform these functions. Therefore, it is as critical to document the status of wetland quality as it is to document wetland loss.

Today, little to no information exists on the current status or health of Iowa's few remaining wetlands. Previous monitoring activities that have taken place (such as those done for research projects or required for mitigation projects) haven't been consistent in the type of data collected over

time and sampling methods often vary. In addition to this, agency assessments most commonly cited the causes of impairment to be siltation, flow alterations, nutrients, exotic species, and pesticides. These assessments were based upon "best professional judgment." Although these assessments were likely to be quite accurate, the listing of water bodies based on best professional judgment has proven controversial. Without a standardized method for assessing these wetlands, the assignment of causes and sources of impairments is not easily justified without quantified information.

Wetland monitoring and assessment surveys document the ecological health or quality of wetlands. The information gathered from these efforts helps support the management and restoration practices for land managers and decisions for policy makers. The plants held here are Coontail and Chara.

Beginning in 2004, the Iowa Department of Natural Resource's (IDNR) Watershed Monitoring and Assessment Section added wetlands to their surface waters monitoring program. With critical support from the U.S. EPA wetland program development grants, IDNR was able to begin collecting information from wetlands to assess their ecological health. Since then, work has focused on the development of a standardized methodology for monitoring and assessing the condition, either biological or chemical, of the state's remaining wetland resources. Baseline information gathered by the wetland monitoring program so far has provided a valuable foundation of data and information in assessing wetland condition. From 2005 - 2009, IDNR's program was able to sample the physical, chemical, and biological properties of more than 140 wetlands in north-central and northwest Iowa. The following section explains more about wetland monitoring and how the information is being integrated into future wetland related decisions.

Overcoming Inadvertent Regulatory Obstacles

Although it is both a state and federal goal under the Clean Water Act to be able to report on the overall condition of all water bodies within Iowa, wetlands are not recognized as their own type of water body within Iowa Law. Specifically, the Iowa Administrative Code does not distinguish between lakes and wetlands, and this lack of distinction ignores the probable differences in water body form and function. Therefore, it's critical to continue monitoring Iowa's wetlands to ensure that information gets documented using consistent methodology.

Monitoring Objectives

The IDNR's wetland monitoring objectives are designed to be able to report on wetland condition, support regulatory decision-making, and provide information for policy development. In particular, information derived from monitoring will be used to:

- Report on the ambient condition of wetlands in Iowa's Integrated 305(b)/303(d) Clean Water Act Report.
- Identify and document the leading stressors to wetlands in Iowa, and the extent to which these stressors degrade wetlands.
- Establish baseline criteria to effectively evaluate wetland quality; including the establishment of a benchmark of quality using the highest quality (least impacted) reference wetland sites we can find.
- Standardize sampling methodologies to measure wetland quality that are representative of their condition; yet are affordable and efficient as possible.
- Develop tools to effectively convey the results of wetland monitoring to the general public, land managers, decision-makers, and landowners.
- Evaluate the performance of various forms of wetland restoration.
- Evaluate the cumulative impacts of wetland loss and gains through restoration in watersheds relative to ambient ecological conditions.
- Integrate wetland monitoring into helpful forms of information for our agency and partners.

Agency Integration

Another important aspect to develop wetland monitoring is integration. Discussion among our committee at the wetland action plan meetings and other meetings continues to reveal the need for more information on the quality of various wetland areas. Several entities within the Iowa DNR and other agencies that work with wetlands have expressed interest in this type of information on wetland quality to help with decisions they make related to their work. This type of integration will always require ongoing effort but is something worth making as a higher priority. A lot of time, money, and effort goes into collecting information through monitoring to assess the quality of wetlands. The more ways this information can be used to help with wetland related decisions the better. Because the wetland monitoring program is still relatively new, it's natural for there to be a need to work on integrating this new source of information.

Below is a list of some of the top areas the Iowa DNR's Wetland Monitoring staff will be working on to integrate wetland monitoring information within the Iowa DNR and other agencies and organizations.

- Regulatory – Wetland Permitting & Mitigation (Iowa DNR Permit Review, U.S. Army Corps of Engineers, U.S. EPA) Work more closely over the next few years with the part-

ners listed above to provide tools and information that is easy for them to access on a day to day basis. For example, monitoring protocols can be used to assess 404 permit sites and determine if a wetland at issue is high quality and should be avoided, while monitoring data/scores can help determine what level or ratio of mitigation is needed.

- Conservation (IDNR Wildlife & Fisheries, County Conservation Boards, U.S. Fish & Wildlife Service, USDA-Natural Resources Conservation Service, Ducks Unlimited, The Nature Conservancy, Iowa Natural Heritage Foundation, Pheasants Forever) Healthy wetlands support healthy populations of wildlife that use them. Many of the land managers and groups that work to restore wildlife habitat understand the importance in having the best possible wetlands out there on the landscape. They know there's much more to it than just having an open water pond. Often times, active management in the form of water level manipulations and vegetation management practices are needed to maximize wetland function in order to provide good nesting habitat and food sources for all sorts of various wildlife species that utilize them throughout the year. Because of this, these land managers and groups are interested in knowing about what sort of stressors are being documented in the wetlands monitored. They are also interested in knowing if their restorations are resulting in healthy functioning wetlands as well. If monitoring can help provide that information for them, they can work on ways to alleviate those stressors; thus improving the wetland areas they manage. The development of the wetland quality index mentioned earlier is an example of one major way to make it easier to convey monitoring results to land managers. The interactive priority wetland mapping tool will also hopefully benefit conservation groups by providing a tool that identifies areas in need of restoration efforts.
- Water Quality (U.S. EPA, IDNR 319 Program, IDNR TMDL Program, IDNR Floodplains) As the understanding of wetland benefits for water quality increases, the desire to use them for water quality related projects increases. Staff members from the programs listed above have frequently expressed interest in being able to measure the benefits to water quality that a wetland is providing if it was put in as part of the water quality improvement project. The IDNR wetland monitoring program would like to integrate more with these programs to provide answers to their questions. Common questions they have are how to monitor, what to monitor, and interpretation of results. This would help them improve their ability to report on such practices to determine project success. Ultimately, it would be helpful for IDNR to adopt appropriate water quality standards for wetlands.

Monitoring Strategy

The overall strategy is to develop as much of a comprehensive statewide wetland monitoring program that can address all of the inherent variables associated with different types of wetlands, an extremely altered landscape, and cyclic patterns of wet/dry conditions in order to guide management decisions regarding Iowa's wetland resources. This strategy will provide a framework for an ongoing assessment of the status of Iowa's wetland resources and the level of success achieved

by our management programs. This wetland strategy will also be coordinated with and become an integral part of Iowa's comprehensive water quality monitoring program strategy as well. The following section lays out action items we intend to work on over the course of the next five years. There are two main aspects to develop; program depth and agency integration.

Activities:

Development of standardized wetland monitoring protocols

Unlike other water bodies, wetlands vary in size, shape, and type. They may or may not hold water from year to year, and even differ regionally depending upon snowmelt and local precipitation. Because of this and prior misconceptions about the strategic role of wetlands on the landscape, the science of monitoring wetlands is not as advanced as that of other water body monitoring programs. Only twenty of our fifty states have an organized wetland monitoring program. At the federal level, only in the past 10 years or so has there been a concerted effort to develop and advance the science of wetlands in order to have the ability to report on their overall status. Given that, the IDNR wetland monitoring program is working with state and federal partners (led by U.S. EPA) to share knowledge and current methods to advance nationally standardized monitoring methods that are cost effective and representative in determining wetland health. Using the data and information gained so far from five years of monitoring wetlands in Iowa, as well as the information shared at national meetings led by U.S. EPA, we are making valuable progress in adapting scientifically valid methods that will be used in future monitoring to report on wetland condition. We anticipate that over the course of the next three years standardized and accepted methods will be developed for many regions of the U.S. and for Iowa; especially in Iowa's portion of the Prairie Pothole Region.

Development of a wetland quality index for prairie wetlands

With vital funding from a U.S. EPA wetland grant, the IDNR will be partnering with Iowa State University on a 3-year project to develop a wetland quality index for Iowa's prairie wetlands. The idea for doing this comes from the need to easily convey the results from monitoring wetlands to a general audience by drawing upon detailed assessments of wetland health. A wetland quality index can be compared to a person going in for a routine physical at the doctor's office. A set of standardized vital signs with known benchmarks are measured to determine patient (wetland) health. This project will sort out which set of metrics (vital signs, contaminants, fish, aquatic vegetation, etc.) should carry the most weight to assess wetland health or condition in the form of an easily understandable index score.

Development of an Interactive Priority Wetland Mapping Tool

As described above in plan sections II and IV(A), during the SWAP committee discussion process it quickly became clear that the work of our agency and partner organizations would benefit significantly by the development of an interactive wetland mapping tool applied in a watershed context. The key feature of this interactive tool is that it would allow zoning boards, cities, coun-

ties, agencies, watershed groups and others to access a single source to see who is doing what and where, regardless of geo-political boundaries. Numerous agencies, NGOs, and researchers have GIS and other research data available, but access to this is difficult for people that don't work with wetlands daily. Coalescing existing research files into an easy to use windows-based tool will be equally beneficial to scientists and non-technical individuals and groups alike. We believe that by integrating this information into a web-based tool and sharing it with everyone, those making land use decisions will be better able to plan for successful outcomes across the board.

Development of an 'Iowa Wetlands' Website

This will be a central repository of wetland information. A great deal of information about Iowa's wetlands exists, however it is scattered and often difficult for some users to access. Development of this website would provide up-to-date news and events related to wetlands, serve as a directory for partners working with wetlands and their policies, provide wetland monitoring information, provide a library of wetland research information, and would host the interactive priority wetland mapping tool. Such a website would fill a significant void in Iowa and serve as an effective outreach tool. The IDNR's wetland monitoring program will work with several wetland partners to develop this.

Statewide wetland monitoring and continued development of monitoring tools to assess restoration

Another goal with IDNR's wetland monitoring program is to scale up the sampling to cover all regions of Iowa. So far, much of the work has been carried out in northern Iowa where the highest densities of wetlands occur before moving around to other regions. The reason for this has been to build a strong database of monitoring information on wetlands of this region and also develop and test the various techniques for sampling wetlands first before moving around. Over the next 5 years we plan to scale up the sampling to cover all regions of Iowa. Most likely this will occur by sampling various watersheds or regions on a rotational basis in order to cover all parts of the state with the funding and time available to wetland monitoring staff.

Add Long-Term Monitoring Stations Long-term monitoring stations are comprised of automated gauges to measure water levels and water quality. The advantages of installing these mechanisms include increased information for both water quality and climate change.

Implement the Wetland Action Plan

It was a USEPA wetland grant that supported the IDNR wetland monitoring program's development of this wetland action plan. As grateful as we are to have had the opportunity to identify the processes necessary to advance coordinated wetlands work for improving Iowa's water, wildlife, and recreational options, concepts alone won't result in tangible improvements. We must now focus on implementing these processes with vital partners. Therefore, we plan to use this document as a launching point for the formation of a voluntary Ad-Hoc state wetlands team composed of various agencies and organizations that will meet at regular intervals to coordinate all of

the various wetland work that is being done around the state. We will update and adapt this action plan on a regular basis; possibly every 5 years or as often as necessary to keep it useful. Develop a citizen/volunteer based wetland monitoring program Similar to the IDNR's existing IOWATER Program and "Snapshot" Program reach out to the public and work with interested folks that want to sample wetlands. Training and materials could be provided to them to do the sampling on their own and provide us with additional information on wetlands across the state.

Goal:
Development of a comprehensive statewide wetland monitoring program

Timeline:
5 Years

Roles and Responsibilities:
Iowa DNR wetland monitoring and partners

Establish Long-Term Management Plan for Wetlands

Trumpeter swans once again inhabit Iowa's wetlands thanks to efforts led by the Iowa DNR's Wildlife staff. Many of the swan releases over the years have been done with the public and school classes providing a great opportunity to educate folks about the value of wetlands.

Wetlands can be restored to original function with great success. Once the water is allowed to fill the restored wetlands, the aquatic vegetation, invertebrates, birdlife and animals quickly move in and use this new habitat. However, wetlands are similar to prairies and forests in that they need routine maintenance to maximize their potential. In the case of wetlands, routine maintenance means working with their water levels and/or working with the vegetation growing in and around them. This requires special equipment and trained labor. To date, agencies and organizations successful at garnering funds to restore wetlands have been denied the important follow-up funding and personnel needed to accomplish the routine maintenance necessary to ensure restored areas stay productive; i.e., the restoration investment bears fruit.

The Wetland Action Plan Committee agreed that this is an extremely important issue to address here because the number of restored wetlands, as well as wetlands created for mitigation purposes, continues to grow yet their obvious maintenance requirements continue to be ignored.

Therefore, this Plan initially recommends the allocation of sufficient funding--$500,000 annually--to effectively maintain restored wetlands on public land as well as those enrolled in NRCS easements. This figure derives from an estimated $130,000 cost for trained staff and equipment per large wetland complex (e.g., Chichauqua Bottoms 7,300 acres) or other contiguous area that consists of a group of wetlands and their associated uplands together comprising a wetland management complex of similar size. With this funding, area agencies and organizations could work with wetlands restorations/creations on a rotational basis; therefore maximizing the public investment for these important areas. This Plan also recommends that wetlands restored or created for mitigation purposes include a long term maintenance component including a tri-annual schedule of inspection (spring, summer, and fall) and labor costs for maintenance activities including reseeding when necessary. This Plan also recommends that policy going forward for all wetlands, whether public or private, take routine maintenance into account and plan accordingly.

Goal:
Encourage state and federal agency buy-in for long term management of wetlands restorations and mitigation sites, both individual and banks.

Timeline:
Immediate and ongoing

Roles & Responsibilities:
Ad-Hoc Wetlands Team and/or all agencies and departments with jurisdiction over and/or activities involving wetlands restoration and mitigation can immediately begin adding management factors into existing programming or, where existing programming does not permit such allocation, requesting either the necessary authority or appropriations or both from their respective source providers.

Promote Wetlands-Specific Education

In April of 2009, Iowa held its first wetlands symposium—Reinvesting in Iowa's Natural Capital. Both engineers and architects received continuing education credits for attending two-days of wetlands restoration-specific content. At this time the wetlands symposium committee plans to expand the program into a multi-state event beginning in 2011. Other wetlands-specific education is also available from the Iowa Department of Agriculture & Land Stewardship and the Iowa Association of Municipal Utilities. As a practical matter, one of the simplest ways to ensure that land use professionals obtain wetlands-specific education is to link wetlands certification with contract eligibility for government projects affecting wetlands. Reasonable fees associated with providing a recurring wetlands certification course may be applied to offset the costs incurred by the education provider. And as mentioned above, there are at least three organizations already capable of individually undertaking or sharing the task.

In order to have the opportunity to include wetlands-specific education in K-12 student curriculum, a connection with the Iowa Core Curriculum must first be established. Kathy McKee, K-12 Education Coordinator for Blank Park Zoo and former State Science Advisor for the Department of Education (2000-2009), has graciously undertaken a review and found several Essential Concepts and Skill Sets within the core curriculum at each grade span within which wetlands information would be relevant and potentially instructive.

Earth and Space Science

- Grades K-2: Understands and applies knowledge of earth materials (includes water and atmospheric gases).
- Grades 3-5: Understands and applies knowledge of the properties and uses of earth materials; Understands and applies knowledge of processes and changes on or in the earth's land, oceans, and atmosphere.
- Grades 6-8: Understands and applies knowledge of the structure and processes of the earth system; Understands and applies knowledge of the water cycle.
- Grades 9-12: Understands and applies knowledge of energy in the earth system; Understands and applies knowledge of geochemical cycles.

Life science

- Grades K-2: Understands and applies knowledge of the basic needs of plants and animals; Understands and applies knowledge of ways to take care of the environment.
- Grades 3-5: Understands and applies knowledge of how individual organisms are influenced by internal and external factors; Understands and applies knowledge of the relationships among living and non living factors in terrestrial and aquatic ecosystems; Understands and applies knowledge of environmental stewardship.
- Grades 6-8: Understands and applies knowledge of populations and ecosystems; Understands and applies knowledge of the cycling of matter and energy in ecosystems; Understands and applies knowledge of the social and personal implications of environmental issues.
- Grades 9-12: Understands and applies knowledge of the interdependence of organisms; Understands and applies knowledge of the interdependence of matter, energy, and organization of living systems.

It is our understanding that the Iowa Department of Education has a wide range of options in terms of the tools it may employ to convey wetlands information into some or all of the core curriculum identified above.

Another potential promoter of wetlands-specific education in K-12 is the Iowa Conservation Education Coalition (ICEC), whose mission is to provide educational pathways to enable Iowans to make responsible environmental decisions. ICEC's main event, Winter Solstice Educator's Workshop, is held every January. The workshop begins on a Friday night with food, fun, and a remark-

able keynote speaker. Saturday is spent in concurrent sessions interspersed with other keynote addresses. Their Workshop Committee coordinates workshops for ICEC, primarily Winter Solstice in January but can include special workshops as well.

Goal:
To integrate information regarding the role of Iowa wetlands as a multi-functional natural resource into the curriculum of all relevant levels of education from elementary through post-secondary.

Timeline:
1 to 5 Years

Roles and Responsibilities:
IDNR Wetland Monitoring and Ad-hoc Wetlands Team

Additionally, the IDNR Wetland Monitoring Division has received a grant from USEPA Region VII to develop a wetlands website for both educational and technical assistance to professionals and the public at large. It is anticipated that this website development will occur during 2010 through 2011.

Goal:
To integrate information regarding Iowa wetlands into an interactive website.

Timeline:
1 to 2 Years; monitoring and updating functions ongoing.

Roles and Responsibilities:
IDNR Wetland Monitoring Program

Assess Conflicting Policies and Program/Regulatory Gaps

The primary issues raised by the planning process involved the inherent conflicts associated with the regulations and/or goals of various state and local authorities. For instance, a local zoning board's primary goal may be to develop land to the maximum extent practicable in order to increase the local tax base while IDNR and Iowa Homeland Security's goal is to make sure the same landscape is safe and maintains natural function. Without coordination, it is unlikely everyone's goals will be met.

Aside from seeking policy-unifying amendments to the law itself, the Wetland Action Plan Committee felt the best way to address this issue would be to make the Interactive Priority Wetland Mapping Tool available to everyone in the state who has the authority to affect wetlands disposition and invite representatives of both local zoning boards and Drainage Districts to join the up-

coming Ad-Hoc Wetlands Team to foster enhanced coordination opportunities. Another option for proactive cities and counties would be to develop local stream and wetland protection ordinances. The Association of State Wetland Managers has examples of model ordinances at www.aswm.org/propub/jon_kusler/model_ordinance_051407.pdf.

Goal:
Dissemination of the Interactive Priority Wetland Mapping Tool to every public and private entity in the state of Iowa with either an interest in preserving/restoring wetlands or the jurisdictional authority to impact them.

Timeline:
1 Year

Roles and Responsibilities:
IDNR Wetland Monitoring and Ad-hoc Wetlands Team

CONCLUSION

The wetland story in Iowa is no doubt one of an uphill battle. There are many factors in place that create significant obstacles to having more of them functioning on the landscape; misunderstanding and lack of information being at the top of that list. However, there are also indications that things are changing for the better. More landowners than ever are considering the option of restoring their property back to native grasslands and wetlands in the name of improved wildlife habitat, water quality, recreation, and even flood retention. Farm Bill programs that provide landowners with both economic and technical support continue to lead the way as the number one mechanism for restoring wetlands in Iowa. Ironically, there are often more applications from willing landowners to sign up for these voluntary wetland and floodplain restoration easements than what annual funds can cover. Meanwhile, agencies and NGOs are taking steps to combine resources for more cost-effective and successful actions to improve the wetland resource in Iowa. They are all looking for ways to improve wetland management, restoration quality, and wetland mitigation while monitoring and research continues to improve our collective understanding of wetland quality. These efforts are all a work in progress though, and it won't happen overnight. Therefore, the need for collaboration is stronger than ever.

The Bottom Line

The intent of this Wetland Action Plan for Iowa is to re-invigorate the agencies and NGOs that work with wetlands in the form of an updated guidance document that identifies what is known and not known about wetlands and also attempts to identify some actions to pursue that will hopefully increase the pace of wetlands work. It is our hope that this Wetland Action Plan will

be a living document that is useful, but can be adapted every 5 years or so as economic, social, and scientific conditions change. With continued input from the Ad-Hoc wetlands team, this Plan will focus on the following items over the next 5 years:

- The integration of wetland protection, restoration, and creation within a watershed context.
- The use of available tools in mapping technology to characterize the wetlands within watersheds.
- The development of criteria to prioritize where, when, and how wetlands work can be done on a watershed by watershed basis.
- The increase of wetland-specific funding and pace of wetland restoration work in Iowa by integrating water quality, regulatory, flood retention, wildlife conservation initiatives related to wetlands, especially with projects dealing with wetland restoration and compensatory mitigation.
- The development and fostering of more projects with non-traditional partners for wetland projects.
- The development of multi-media products for wetlands education and outreach to the public.
- The continued advancement of the breadth and depth of wetland monitoring and research in Iowa.

With renewed commitment by agencies, organizations, and the citizens of Iowa, a new and successful chapter will hopefully be written in the story of Iowa's relationship with its wetlands. It may take a great deal of education and field work to recast wetlands in their true light, but it's a worthwhile cause that will ultimately improve Iowa's natural and economic landscape for a sustainable future.

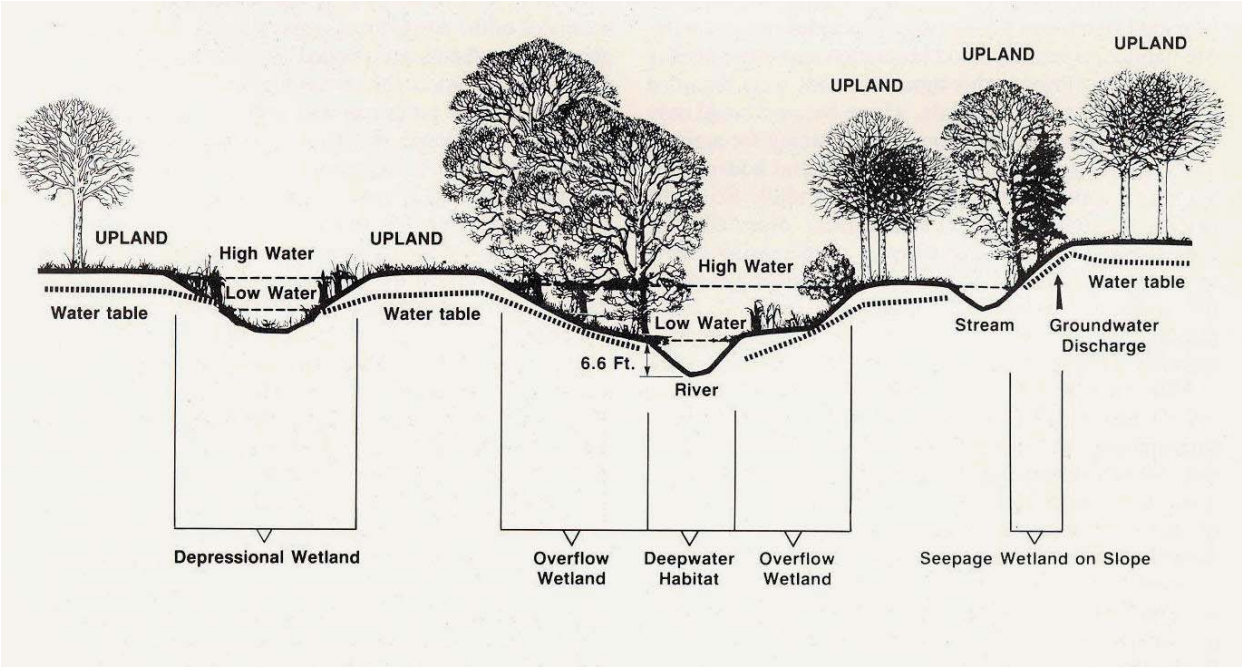


Figure 11. *From Cowardin et al. (1979) illustrating the relationship of wetlands, deepwater habitats and uplands, as well as the water table, on the landscape.*

APPENDIX A:
Wetland Types and Classification

In general terms, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. The single feature that most wetlands share is soil or substrate that is at least periodically saturated with or covered by water. The water creates severe physiological problems for all plants and animals except those that are adapted for life in water or in saturated soil. Drained hydric soils that are incapable of supporting hydrophytes are not considered wetlands. However, they do provide a valuable record of historic wetlands and indicate areas that may be suitable for restoration. This does not mean that wetlands and farmlands are necessarily exclusive. Many wetlands can be farmed during dry periods. If these wetlands were not actively farmed, they would likely develop natural communities of hydrophytes.

The Cowardin system for wetland classification was officially adopted by the U.S. Fish and Wildlife Service (FWS) in 1979 to define and classify wetlands and deepwater habitats across the U.S. (Cowardin, et al. 1979). It was subsequently used to define and classify wetlands for the National Wetlands Inventory (Tiner, 1984). Cowardin et al. (1979) noted that there was "no single correct, indisputable, ecologically sound definition for wetlands, primarily because of the diversity of wetlands and because the demarcation between dry and wet environments lies along a continuum." Nevertheless, FWS needed to define wetlands to accurately identify and delineate the Nation's wetland resources. FWS defined wetlands as follows:

> "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Figure 11)."

The U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency define wetlands as follows:

> "Those areas that are inundated or saturated by surface or ground 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. Wetlands generally include swamps, marshes, bogs, and similar areas."

COE uses three characteristics of wetlands when making wetland determinations: vegetation, soil, and hydrology. Unless an area has been altered or is a rare natural situation, wetland indicators of all three characteristics must be present during some portion of the growing season for an area to be a wetland.

In defining wetlands from an ecological standpoint, the FWS emphasized 3 key attributes of wetlands: 1) hydrology – the degree of flooding or soil saturation, 2) wetland vegetation (hydrophytes) and 3) hydric soils. Most wetlands have hydrophytes growing on hydric soils but all wetlands must have enough water at some time during the growing season to stress plants and animals not adapted to life in water or saturated soils. It is important to note that the FWS did not include permanently flooded deepwater areas as wetlands. Instead, these water bodies (generally deeper than 3 meters or 6.6 feet) were defined as deepwater habitats because water is the principle medium in which dominant organisms live. In summary, the FWS's definition of a wetland is based on the degree of flooding or soil saturation and the presence of wetlands plants and/or hydric soils.

The structure of the Cowardin classification is hierarchical, progressing from systems and subsystems to classes, subclasses and dominance type. Figure 12 illustrates the classification structure to the class level. Modifiers for water regime, water chemistry, and soils are applied to classes, subclasses and dominance types. Special modifiers are used to describe wetlands and deepwater habitats that have been created or highly modified by man or beavers.

In Iowa, most wetlands fall under the Palustrine System. The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergent vegetation or emergent mosses or lichens (Figure 13). It also includes wetlands lacking such vegetation but with of the following 3 characteristics: 1) area less than 8 ha (20 acres), 2) active wave-formed or bedrock shoreline features lacking, and 3) water depth in the deepest part of the basin less than 2 meters at low water. This system includes vegetated wetlands traditionally referred to as marshes, swamps, bogs, fens, and prairie wetlands, including the small, shallow, intermittent water bodies often called potholes or ponds. Palustrine wetlands may be situated shoreward of lakes or river channels, on floodplains, in isolated catchments, or on slopes. The emergent vegetation adjacent to rivers and lakes is often referred to as "the shore zone" or the "zone of emergent vegetation" (Reid and Wood 1976) and is generally a different type of habitat from the river itself. There are often many similarities between wetlands lying adjacent to lake or rivers and isolated wetlands of the same class.

The second most common classification for wetlands in Iowa is under the Lacustrine System (Figure 14). The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: 1) situated in a topographic depression or a dammed river channel; 2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% surface coverage and 3) the total area exceeds 8 ha (20 acres). Similar wetland or deepwater habitats totaling less than 8 ha are also included in the Lacustrine System if an active wave-formed

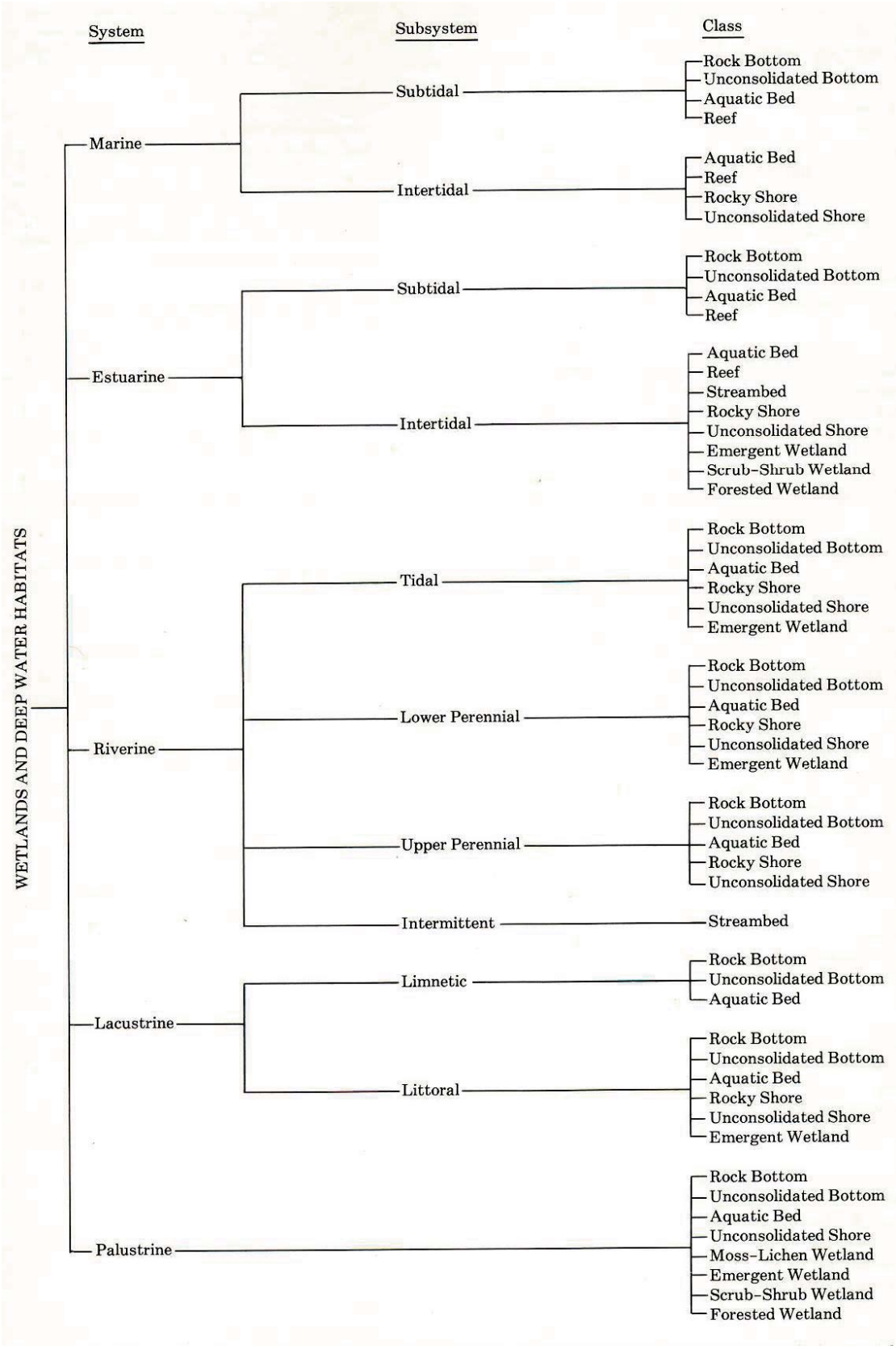


Figure 12. *The Cowardin wetland classification system to the class level (Cowardin et al. 1979).*

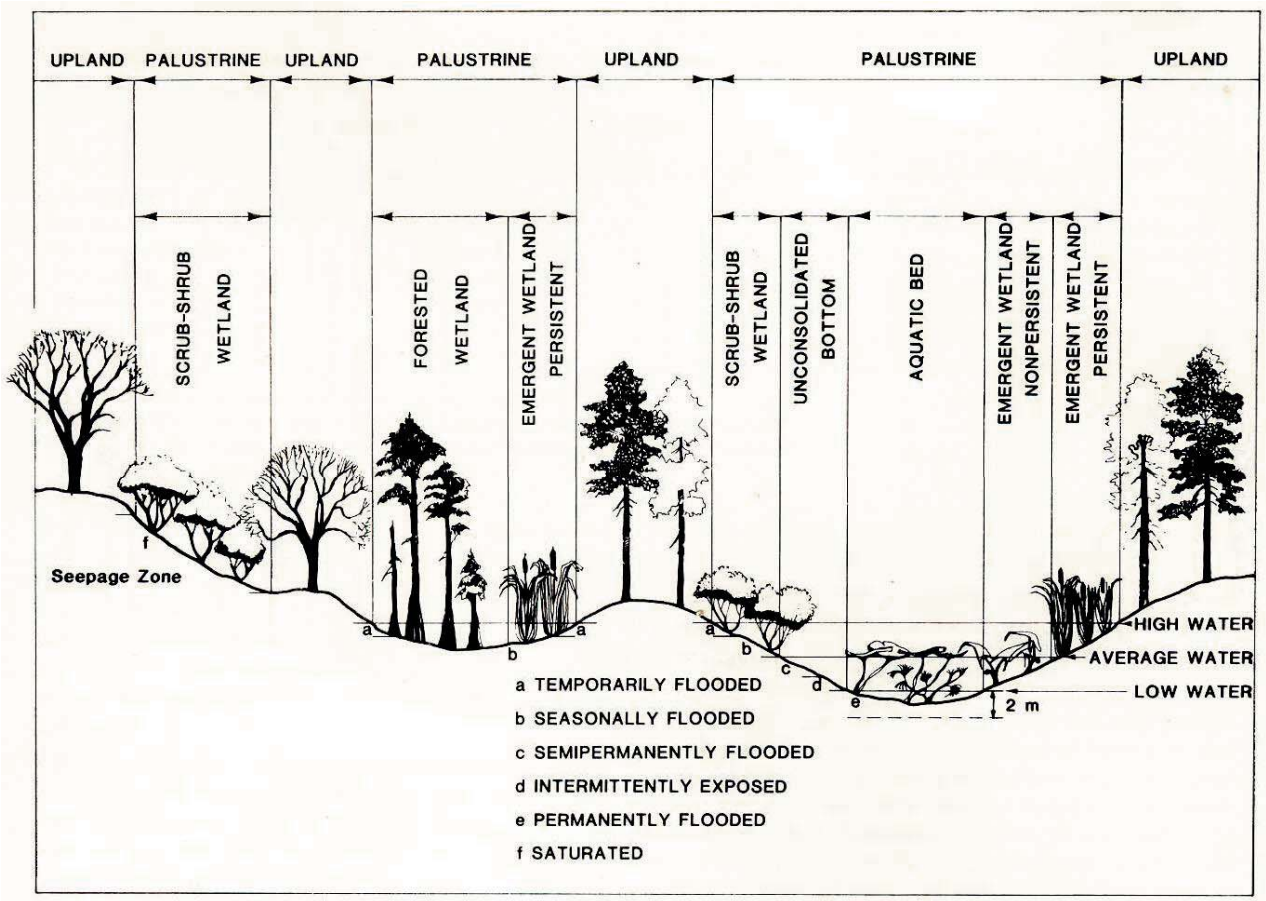


Figure 13. *Examples of wetland habitats in the Palustrine System (Cowardin et al. 1979).*

or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2 m (6.6 feet) at low water. Typically, these are permanently flooded lakes or reservoirs with extensive areas of deep water and considerable wave action. Islands of palustrine wetlands may lie within the boundaries of a lacustrine wetland.

Most linear wetland features in Iowa would fall under the Riverine System (Figure 15). The Riverine System includes all wetlands and deepwater habitats contained within a channel, with the two exceptions: 1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and 2) habitats with waters containing ocean derived salts in excess of 0.5‰. A channel is "an open conduit either naturally or artificially created which periodically contains moving water, or which forms a connecting link between two bodies of standing water" (Langbein and Iseri 1960:5). Water is usually, but not always, moving within the Riverine System. Palustrine Forested Wetlands, Emergent Wetlands, Scrub-Shrub Wetlands, and Moss-Lichen Wetlands occur adjacent to the Riverine System, often on a floodplain. Some biologists suggest that all the wetlands occurring on the river floodplain should be part of the Riverine System because their presence is often the result of river flooding. However, Cowardin and others (1979)

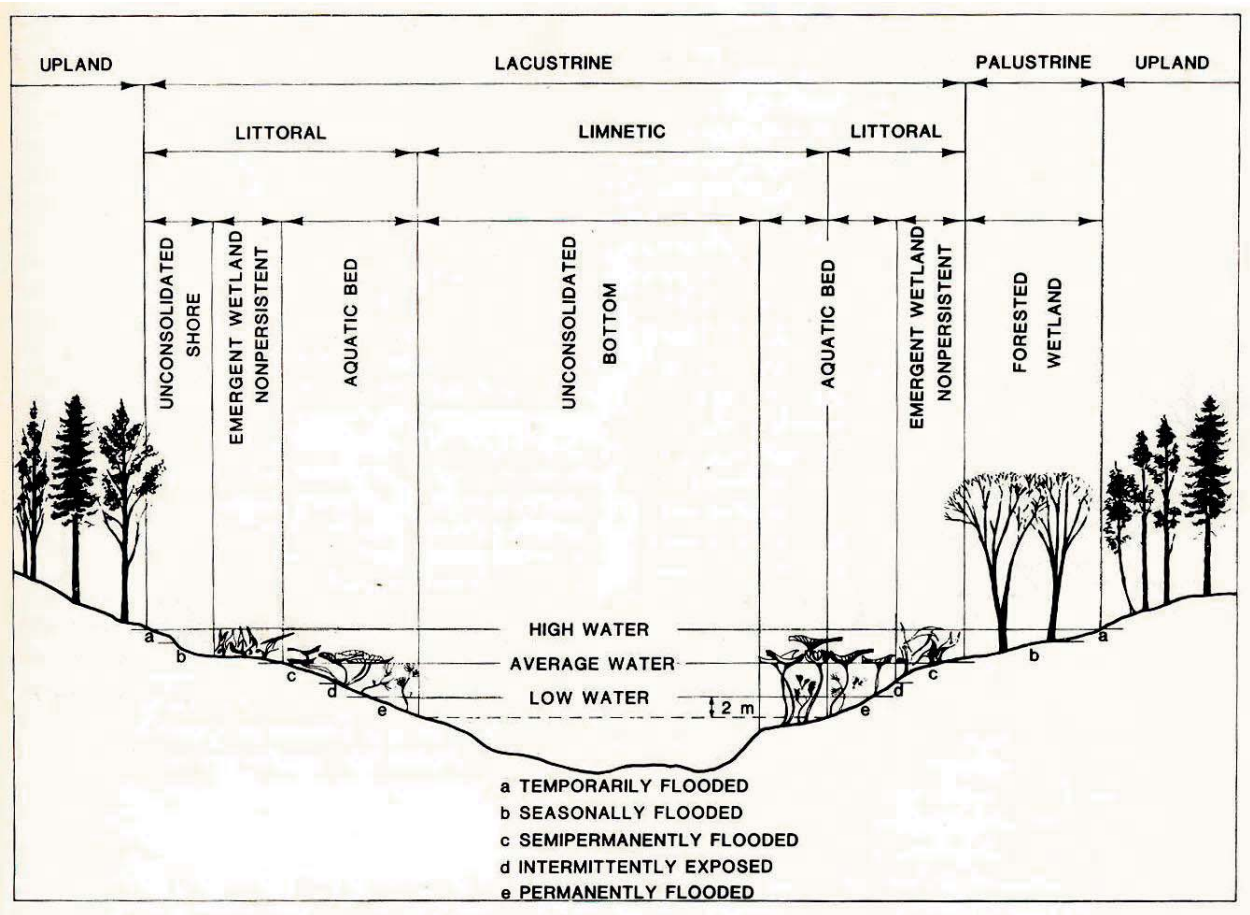


Figure 14. *Examples of wetland habitats in the Lacustrine System (Cowardin et al. 1979).*

agreed with Reid and Wood (1976) that the floodplain is a flat expanse of land bordering an old river and that it often takes the form of a very level plain occupied by the present day stream channel. It may never, or only occasionally, be flooded. It is the subsurface water, i.e., the ground water that controls to a great extent the flow of streams, the water level in lakes, and the extent of swamps and marshes.

The other two wetland classification systems developed by Cowardin et al. (1979), Marine and Estuarine, have no application in Iowa.

The second most common wetland classification system used in the United States was developed by Martin and others (1953) and republished in U.S. Fish and Wildlife Circular 39 (Shaw and Fredine 1956). Because this wetland classification system has been in circulation for more than 50 years, it has been used to describe wetlands in thousands of published research papers and continues to be used to describe wetlands for many long-term waterfowl and wetland studies. It is a somewhat simpler system for wetland classification than Cowardin and others (1979) system and is based on criteria such as water depth and permanence, water chemistry, life form of veg-

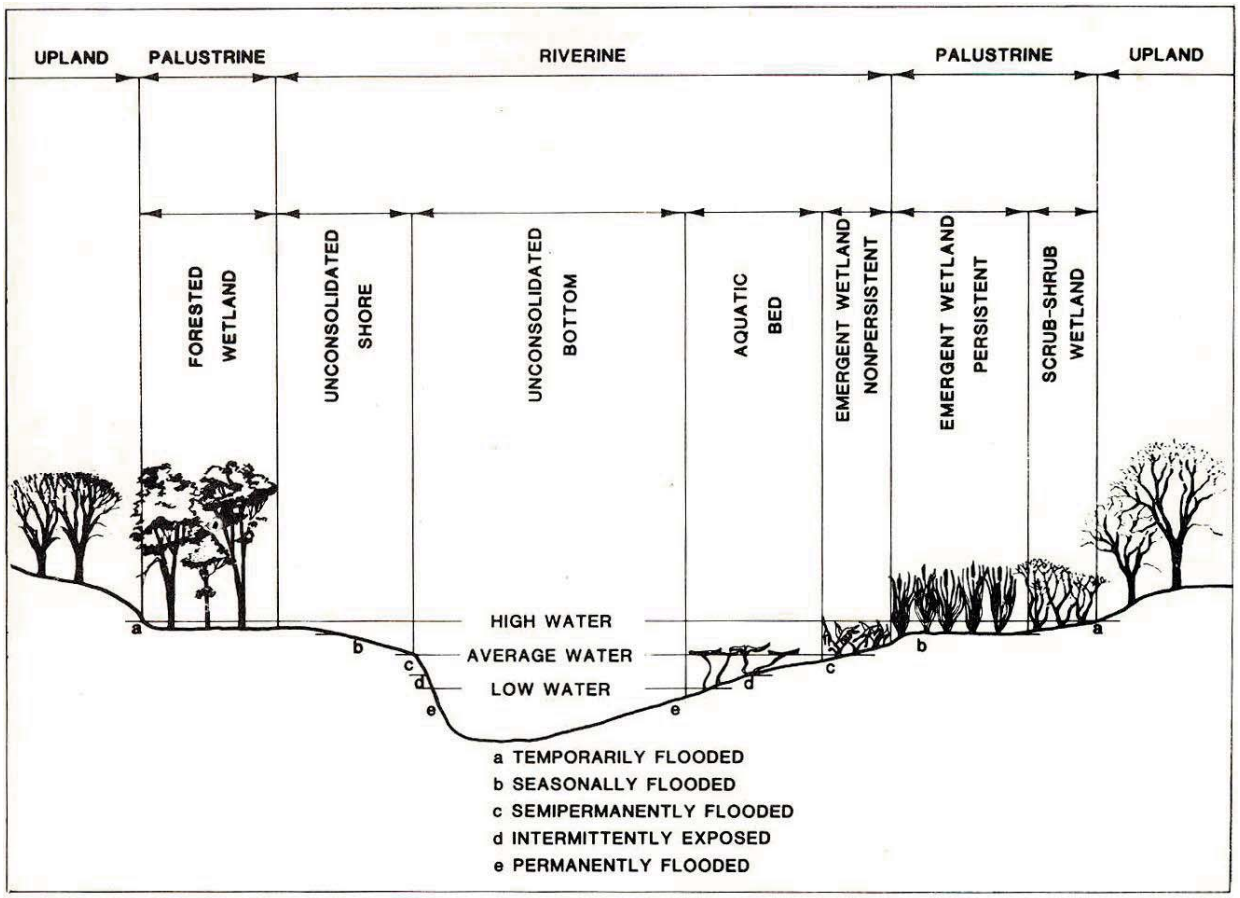


Figure 15. *Examples of wetland habitats in the Riverine System (Cowardin et al. 1979).*

etation, and dominant plant species. This system recognizes 20 different types of wetlands, but Types 9 through 20 describe saline wetlands and salt marshes that are not found in Iowa. Table 1 illustrates how wetlands would be classified under the Circular 39 system and the Cowardin et al. system.

The third most common wetland classification system used in the upper Midwest was developed by Stewart and Kantrud (1971) to specifically serve the needs of researchers and wetland managers in the glaciated prairies region. Their system recognizes seven classes of wetlands that are distinguished by the vegetational zone occupying the central or deepest part and covering 5% or more of the basin. The classes reflect the wetland's water regime, e.g., temporary ponds (Class II) are those where the wet-meadow zone occupies the deepest part of the wetland. The classification system includes six possible subclasses based on differences in plant species composition that are correlated with the average salinity of the surface water. The classification system also includes a cover type component that represents differences in the spatial relationship of emergent cover to open water or exposed bottom soil. The zones of the Stewart and Kantrud (1971)

classification system are roughly equivalent to the water regime modifiers and water chemistry modifiers in the Cowardin et al. (1979) system (Table 2).

Recommendations for defining WETLANDS in Iowa for the purposes of prioritizing wetlands as it relates to their protection and restoration.

For the purpose of prioritizing wetlands for protection and restoration in Iowa, wetlands will be defined as those that are classified as Palustrine wetlands, as defined by Cowardin et al. (1979), with water regimes A-Z (temporarily flooded/saturated to permanently flooded/intermittently exposed) and including those with special modifiers *b* (beaver), *d* (partially drained/ditched), *f* (farmed), *h* (dikes/impounded), and *x* (excavated) (see Figure 6). Because the vast majority of wetlands in Iowa have been drained and converted to cropland, it is particularly important to include palustrine wetlands with the modifiers *d* and *f* as these wetlands have substantial restoration potential. Additionally, wetlands included in the Lacustrine System that are less than 8 ha (20 acres) in size but deeper than 2 meters (6.6 feet) should be included with palustrine wetlands for prioritization purposes as these smaller lacustrine wetlands are often developed to enhance water quality for streams, rivers, and lakes, often have emergent vegetation in their littoral zones, and substantially benefit wildlife due the high shoreline to surface acre ratio. Lacustrine wetlands larger than 8 ha (20 acres) and between 2 and 3 meters deep (6.6 – 9.9 feet) will be defined as shallow lakes.

The wetlands defined above are included in the following classes defined by Circular 39 ((Shaw and Fredine 1956) (also see Table 1):

Type 1 – Seasonally flooded basins, including wet meadows, incompletely drained pastures or crop fields that would support hydrophytes if not tilled, flooded bottomland hardwoods, and fresh water swamps
Type 2 – Inland fresh meadows, including fens and sedge meadows.
Type 3 – Inland shallow fresh marshes, usually semipermanently flooded.
Type 4 – Inland deep fresh marshes, usually semipermanently or permanently flooded.
Type 5 – Inland open fresh water, including open water wetlands with submergent aquatics, usually semipermanently or permanently flooded.
Type 6 – Shrub swamps.
Type 7 – Wooded swamps.
Type 8 – Bogs.

The single feature that these wetland definitions share is soil or substrate that is at least periodically saturated with or covered by water. Drained hydric soils that are incapable of supporting hydrophytes are not considered wetlands. However, these areas provide a valuable record of historic wetlands and are indicators of areas that may be suitable for wetland restoration (Tables 3 and 4).

Table 3. *Comparison of wetland types described by the U. S. Fish and Wildlife Service. Source: Cowardin et al. 1979*

Circular 39 type, and references for examples of typical vegetation	Classification of wetlands and deepwater habitats: Classes	Water regimes	Water chemistry
Type 1—Seasonally flooded basins or flats Wet meadow (Dix and Smeins 1967; Stewart and Kantrud 1972) Bottomland hardwoods (Braun 1950) Shallow-freshwater swamps (Penfound 1952)	Emergent Wetland Forested Wetland	Temporarily Flooded Intermittently Flooded	Fresh Mixosaline
Type 2—Inland fresh meadows Fen (Heinselman 1963) Fen, northern sedge meadow (Curtis 1959)	Emergent Wetland	Saturated	Fresh Mixosaline
Type 3—Inland shallow fresh marshes Shallow marsh (Stewart and Kantrud 1972; Golet and Larson 1974)	Emergent Wetland	Semipermanently Flooded Seasonally Flooded	Fresh Mixosaline
Type 4—Inland deep fresh marshes Deep marsh (Stewart and Kantrud 1972; Golet and Larson 1974)	Emergent Wetland Aquatic Bed	Permanently Flooded Intermittently Exposed Semipermanently Flooded	Fresh Mixosaline
Type 5—Inland open fresh water Open water (Golet and Larson 1974) Submerged aquatic (Curtis 1959)	Aquatic Bed Unconsolidated Bottom	Permanently Flooded Intermittently Exposed	Fresh Mixosaline
Type 6—Shrub swamps Shrub swamp (Golet and Larson 1974) Shrub-carr, alder thicket (Curtis 1959)	Scrub-Shrub Wetland	All nontidal regimes except Permanently Flooded	Fresh
Type 7—Wooded swamps Wooded swamp (Golet and Larson 1974) Swamps (Penfound 1952; Heinselman 1963)	Forested Wetland	All nontidal regimes except Permanently Flooded	Fresh
Type 8—Bogs Bog (Dansereau and Segadas-vianna 1952; Heinselman 1963) Pocosin (Penfound 1952; Kologiski 1977)	Scrub-Shrub Wetland Forested Wetland Moss-Lichen Wetland	Saturated	Fresh (acid only)

Table 4. *A comparison of wetland zones as described by the U.S Fish and Wildlife Service. Source: Cowardin et al. (1979)*

Wetland Zone (Stewart and Kantrud 1971)	**Water Regime Modifier** (Cowardin et al. 1979)
Wetland-low prairie	A non-wetland in the Cowardin et al. (1979) system
Wet meadow	Temporarily flooded
Shallow marsh	Seasonally flooded
Deep marsh	Semipermanently flooded or intermittently exposed
Intermittent-alkali	Intermittently flooded with saline water
Permanent-open water	Permanently flooded
Fen	Saturated

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Reid, G. K., and R. D. Wood. 1976. Ecology of inland waters and estuaries. D. Van Nostrand and Co., New York. 485 p.

Shaw, S. P., and C. G. Fredine. 1956. Wetlands of the United States. U.S. Fish Wildl. Serv., Circ. 39. 67 p.

Tiner, R. W. Jr. 1984. Wetlands of the United States: Current Status and Recent Trends. 59 p.

Wetland Classifications Links

Wetlands of the United States

http://www.npwrc.usgs.gov/resource/wetlands/uswetlan/index.htm

Classification of Wetlands and Deepwater Habitats of the United States http://www.charttiff.com/pub/WetlandMaps/Cowardin.pdf

Classification of Natural Ponds and Lakes in the Glaciated Prairie Region http://www.npwrc.usgs.gov/resource/wetlands/pondlake/index.htm

Wetlands of the United States (Circular 39)

http://www.npwrc.usgs.gov/resource/wetlands/uswetlan/index.htm

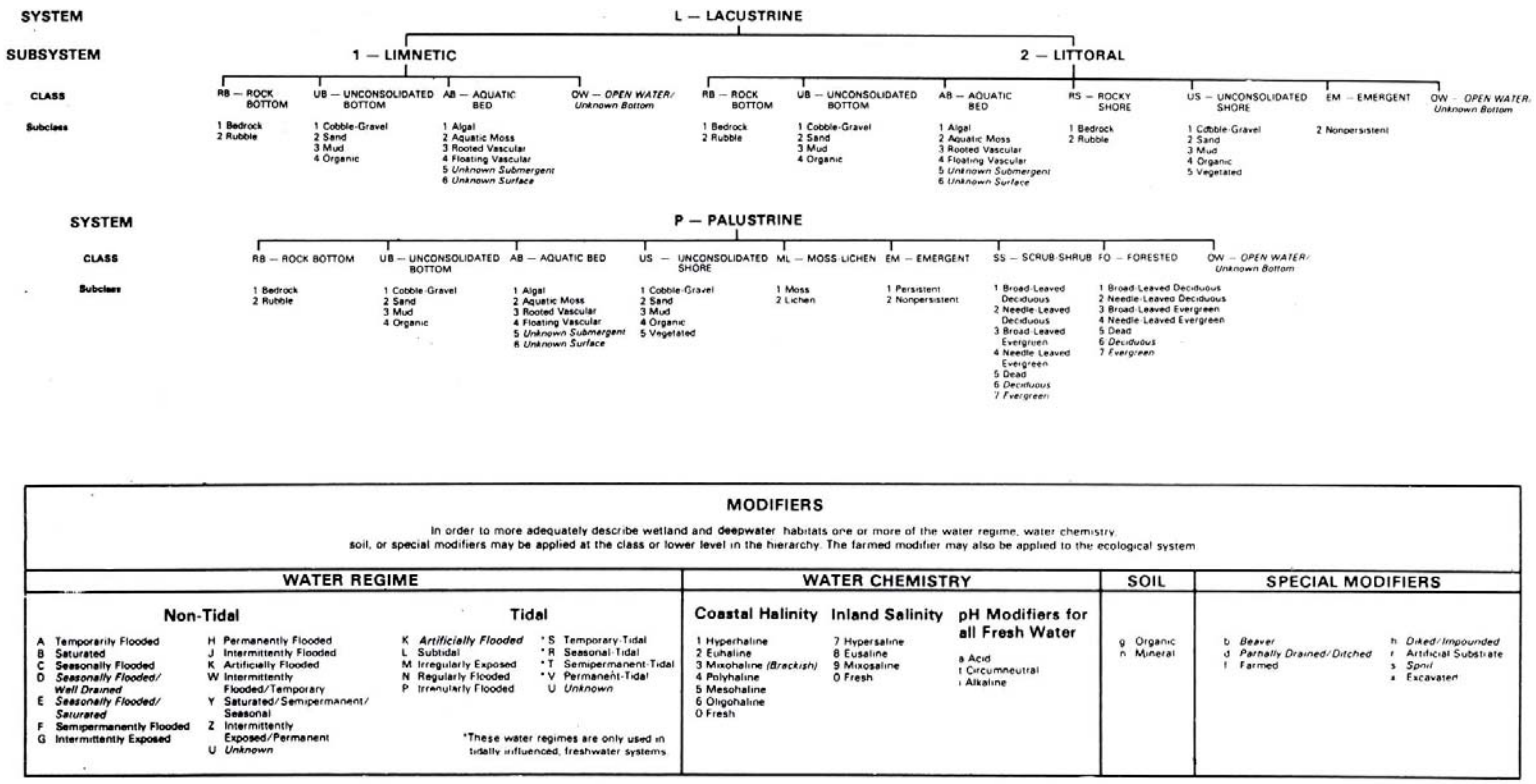

Figure 16. *Wetlands and deepwater habitats classifications and modifiers using the Cowardin et al. (1979) system.*

Temporary (Vernal) Ponds, Fens, Bogs, and Sedge Meadows: The Forgotten Wetlands

When most people picture a wetland in their mind, they think of a classic marsh like setting – one with some open water, interspersed with cattail, rushes, and sedges; perhaps a few muskrat houses dotting the edges of it with a few bunches of ducks, geese, and red-winged blackbirds inhabiting it. However, there is another group of wetlands that are often overlooked – temporary/seasonal wetlands, fens, bogs, and sedge meadows. Unfortunately, all too often this group of wetlands is off the radar in terms of attention by natural resource agencies, nature enthusiasts, and the general public.

Yet, there are quite a few of these types of wetlands scattered across the state of Iowa. Most of these occur on privately owned land. They have not gotten the same attention as larger wetland types because they don't look like much to the common observer. This is usually because they are typically small areas, they lack open water, and don't get used by our larger wildlife species as much. Temporary or seasonal wetlands are a little different than these other wetland types because they may have some open water and often do have more use by wildlife. However, many of these little areas may be less than half an acre, but some may be up to 3 - 5 acres in size. But

Fen wetlands such as this one located on a sidehill above the Winnebago River are often quite small (only a few acres in size) but are capable of supporting several unique species of plants. More than 90% of fens in Iowa are located on private land. Outreach with landowners is vital to protect fens, and often leads to increased appreciation by the landowner when they learn more about them.

to a trained botanist or biologist, they can be little gold mines of ecological diversity and are very productive for wildlife – it's just in a little bit different way than the bigger wetlands. Temporary wetlands may only hold water for a few months each year. So they are shallow and fishless, plus they often warm up quicker in the spring than deeper wetlands. These characteristics make them ideal for supporting a healthy population of invertebrates such as amphipods and are also sought out by salamanders and frogs for egg laying. Also, several species of shorebirds and waterfowl really key in on them to feed on the protein rich invertebrates that are easily available. Fens, bogs, and sedge meadows are valuable ecologically because they often support a unique assemblage of plants that won't be found growing anywhere else. For example, fens often provide a year round source of water that comes out of the ground in one or a few areas where the geological setting is just right. Some species of plants prosper in these wet spots because this constant source of

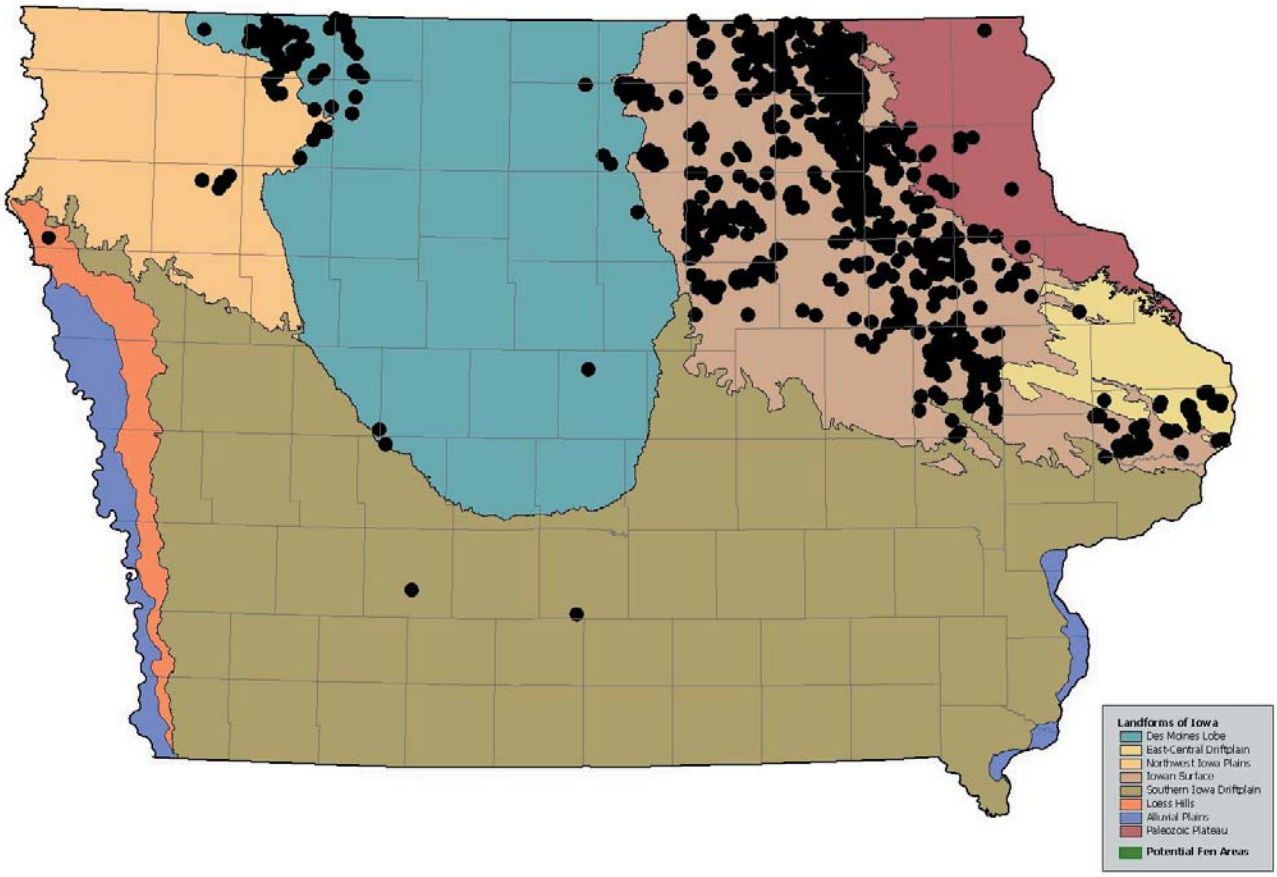

Figure 17. *Map of Iowa showing the location of all documented fens (2006). Communication with landowners and land managers indicates that many more fens exist in Iowa than previously thought and still have yet to be documented. Documenting the locations of fens is critical in assessing their quality and protecting them on a voluntary basis.*
Source: Iowa DNR

groundwater creates a relatively stable micro-environment where the chemistry, temperatures, and soils are just right for them to grow. Plants species like Turtlehead, Bottle Gentian, Grass of Parnassus, and up to a hundred more species can be found in these unique areas.

It should also be noted that natural resource agencies, botanists, entomologists, and others are of course aware of the value of these areas. Unfortunately, budget constraints often force agencies to prioritize their wetland related work for larger wetland areas of semi-permanent and permanent wetland types. So there has been some work done to study them and also protect them, however there is much more work that could be done with them especially in working with those that are privately owned. Often times, landowners simply may not be aware of the value of these little wet areas on their property, and in many cases would be willing to treat the area better if a trained ecologist worked with them. This will be addressed further in the action item steps of this plan.

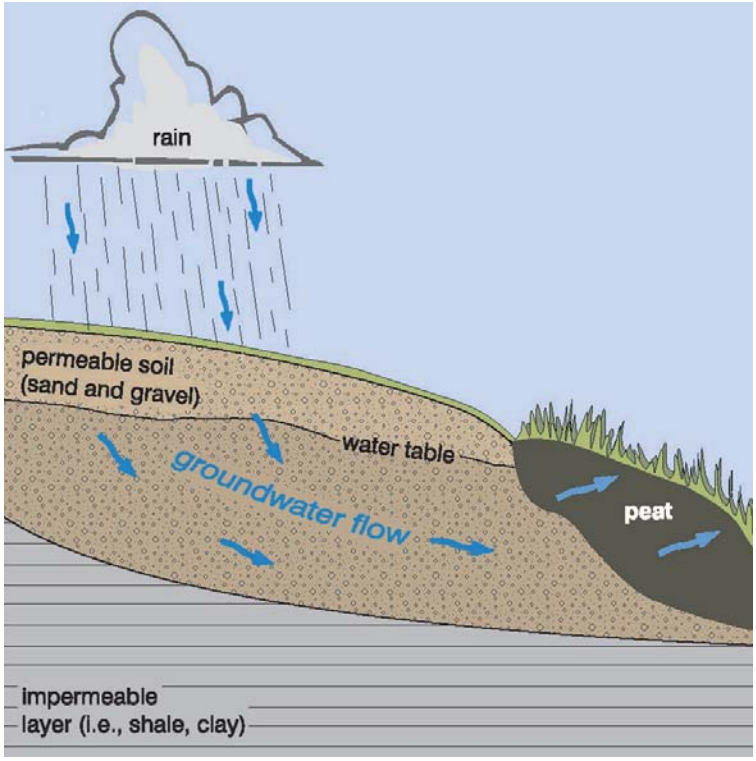

Figure 18. *The geological cross-section of a typical fen in Iowa.*
Source: Iowa DNR

The following is a brief explanation of each wetland type:

Temporary/Seasonal (Vernal Pools) Wetlands: Shallow, intermittently flooded wet meadow, typically they are filled with water in the spring and dry up during the summer and fall,

Fens: A peat-accumulating wetland that receives some drainage from surrounding mineral soil and usually supports marshlike vegetation. A typical fen will have a mound of saturated, squishy peat built up around it. Their pH is usually around 7.0 – neutral, they may range from 6.5 – 7.5. Most in Iowa are considered calcareous or rich fens because of their chemistry.

Bogs: A peat-accumulating wetland that has no significant inflows or outflows and supports acidophilic mosses, particularly Sphagnum. Their pH is usually around 5.5 – slightly acidic. There are only a few such spots like this in Iowa; they are typically more common in northern states and Canada.

Sedge Meadows: Very shallow wetlands characterized by several species of sedges. In Iowa, remnant sedge meadows are most commonly found in pastures that haven't been drained for row crops.

What is a fen? Fens are among the rarest type of wetland found in Iowa. These ecosystems, though often small, support large numbers of rare plants and animals. A fen is unusual because they are formed under unique geological settings where they are fed by groundwater that slowly seeps out of the soil. Most other wetland types are formed from ponded surface water (i.e. rain-fed). Typically in fens, a layer of sand and gravel is "sandwiched" between less permeable stratigraphic layers. Rain water permeates the sandy upper layer and accumulates above the impermeable layer. Typically, fens form on or at the base of hillsides. As the water flows underground it dissolves limestone and becomes alkaline. In extremely alkaline fens a crusty, yellowish-white calcium carbonate deposit called marl or tufa forms at the surface on the soil.

To the casual observer, the most obvious characteristic of fens is that walking in one is like walking on a waterbed. This unusual condition has led to fens being referred to as "quaking" or "trembling" fens. Fens often produce mounds of peat because the groundwater inhibits decomposition of plant material. Some experts also believe the pressure of the groundwater tends to push the peat outwards slightly. This rich organic peat becomes saturated with water and creates this spongy condition. In especially moist fens a good jump will cause the ground to ripple for many feet.

Why are fens important? Fens are among the most diverse natural ecosystem in Iowa. Fens span the full gradient of soil moisture. Everything from saturated soils with small pools of standing water, to moist soils progressing into dry prairie or woodlands may exist within the boundaries of a fen. This gradation of moisture can allow one small fen to hold as many as 200 species of plants. Over twenty threatened or endangered species of plants occur in Iowa fens, with many more species of special concern. Fens also provide excellent mixed cover for upland and wading birds and other wildlife. Since the beginning of European settlement, Iowa fens have been misunderstood and therefore in danger of being destroyed. Many of Iowa's fens have been drained for row crops, heavily grazed or simply excavated into ponds. Only a handful of undisturbed, high-quality fens are known to remain in Iowa. However, several good-quality fens still exist, even despite occasional disturbance.

Where are fens located? Fens are found throughout much of the world's upper latitudes. In England and Ireland, fens used to be prominent features of the landscape, though most have now been destroyed. In North America, fens extend throughout most of the glaciated regions from Canada south to New England and west to the Rockies. Fens in Iowa occur at the southern part of this range, with only a few known to exist as far down as Missouri.

Until the early 1990s most fens in Iowa were thought to occur in northwest Iowa near the Okoboji area. At that time State Preserves Board botanists John Pearson and Mark Loeschke attempted to locate the state's fens using aerial photography and soil maps. This investigation showed that a large number of fens also existed in Northeast Iowa and several have since been found scattered

throughout other parts of the state. Therefore, recent work by the Iowa DNR has begun to map these localities throughout Iowa to provide an organized and updated database.

While compiling this information, several new areas suspected of being fens were found. Most of the highest quality fens such as Silver Lake and Excelsior fens in Dickinson County have already been preserved as public lands or through conservation easement such as the Wetlands Reserve Program. However, it's possible that more high quality fens exist, but are known only to a few people. In 2006, the Iowa DNR's Watershed Monitoring and Assessment section worked with Tom Rosburg of Drake University to develop a rapid method to assess the quality of fens. Thirty of the original sites visited by Pearson and Loeschke in the 1990s were revisited to test the rapid method and assess the changes that have taken place. In the future, the Watershed Monitoring and Assessment section hopes to expand the use of this rapid assessment method and visit as many of these suspected fens as possible. These types of standardized assessment techniques will allow workers to visit and evaluate the quality of numerous sites in a short period of time the same way each year.

APPENDIX B:
History of Wetland Conservation In Iowa

It's important to note in this plan that for the past 30 – 40 years, much of the work done by agencies and organizations to protect, restore, or enhance wetland areas happened from within the wildlife conservation side. It was conservation dollars for wildlife habitat that implemented this work. Concerned hunters also supported much of the original work done on wetlands by the conservation agencies and organizations that represented them.

This shouldn't be forgotten because a lot of Iowa's remaining wetland areas on both private and public land are the direct result of conservation led initiatives to protect or restore them. For Iowa, much of the methodology in restoring wetlands was developed through trial and error by wildlife biologists and non-government organizations that often had to work with whatever drain tile was put in beneath each wetland basin decades earlier. Over the years, some wetland basins had two to three layers of drain tile put in beneath a basin so it wasn't always easy. Techniques to fully restore a drained wetland basin vary with each area, but over time the collective knowledge gained through undertaking restorations has helped make sure today's restorations are more successful than ever.

It is also important to understand that many of the conservation initiatives, especially those that are waterfowl/waterbird related, deal with migratory species. Many of these bird species spend the winter in the southern United States, Mexico, or even further south and then migrate north in the spring to nest in the northern United States, Canada, and the Arctic. Therefore Iowa's wetlands, which are part of a multi-state Prairie Pothole Regional network, play a critical role to more than just the wildlife within this state's boundaries; they also serve as critical stopover areas for many species of migratory waterfowl/waterbirds – from shorebirds to ducks. Because of this, many of the major conservation initiatives available to Iowa deal with plans, objectives, and goals for increased wetland habitats across North America. On the plus side, these initiatives are consistently funded and promote interstate collaboration of wildlife managers throughout the entire flyway of the affected bird species. The drawback is that Iowa must compete for wetland restoration funds with the other Prairie Pothole Region states including Minnesota, Montana, and the Dakotas, which all have more original wetland habitats left intact than Iowa – a fact that weighs strongly in favor of their funding success. It is all the more impressive that Iowa, one of the most altered states in the nation, has done very well competing for these dollars.

Below are some of the important wetland wildlife habitat conservation tools that effect Iowa's wetland conservation work today. Without these important conservation initiatives, we would likely have less acres of wetlands left, and surely wouldn't have had as many restored over the past few decades. Many wetland acres have been restored in Iowa thanks to a lot of dedicated

effort with limited funding. By far, the two most crucial limiting factors for more wetlands conservation work in Iowa are limited funds and federal agricultural policies.

North American Waterfowl Management Plan

Perhaps one of the most important pieces to the foundation of current wetland and waterfowl conservation was the formation of the North American Waterfowl Management Plan (NAWMP) in 1985. By the mid-1980s, waterfowl populations had declined to all time lows. Much of the cause for this was habitat loss from conversion of wetlands and grasslands. At that time wetland mapping efforts and historical data indicated that since the first European settlers arrived, the United States had lost 53% of its original 221 million acres of wetlands. Moreover, the fertile grasslands around the original wetlands that once provided quality nesting habitat for thousands of waterbirds was disappearing even faster. The story in Canada was equally grim. Once considered the duck factory of North America in terms of breeding significance, the vast wetland areas of prairie Canada had given way to agriculture.

As a result of concerns expressed by multi-national conservation agencies and organizations, the U.S. and Canadian governments developed a strategy to restore waterfowl populations through habitat protection, restoration, and enhancement: The North American Waterfowl Plan. The Plan was signed by the U.S. and Canada in 1986, and Mexico signed in 1994. This plan was considered innovative because implementation of the actual wetland/grassland habitat restoration occurred in regions that covered multiple jurisdictions, often crossing international boundaries. Partnerships now known as 'joint ventures' became the keystone tool for working with regional areas of concern.

Today, the NAWMP Committee is an international body of leadership and oversight for the implementation activities that still take place in accordance with the Plan. To date, the joint ventures have invested $4.5 billion to protect, restore, or enhance 15.7 million acres of waterfowl habitat. These projects have not only advanced waterfowl conservation efforts, but have also made significant contributions to all wetland-associated wildlife species.

The Prairie Pothole Joint Venture

One of the first successful (and perhaps most important) partnerships formed from NAWMP was the Prairie Pothole Joint Venture (PPJV). This joint venture formed in 1987 and Iowa is part of it. The PPJV was one of six original joint ventures formed from NAWMP. It includes portions of the states within the U.S. portion of the Prairie Pothole Region: Montana, North Dakota, South Dakota, Minnesota, and Iowan (Figure 19). The remaining portion of the Prairie Pothole Region is in Canada. This unique region contains millions of depressional wetlands that constitute one of the richest wetland complexes in the world. These wetlands, along with their associated grasslands are very productive and support an incredible diversity of wildlife, especially bird life.

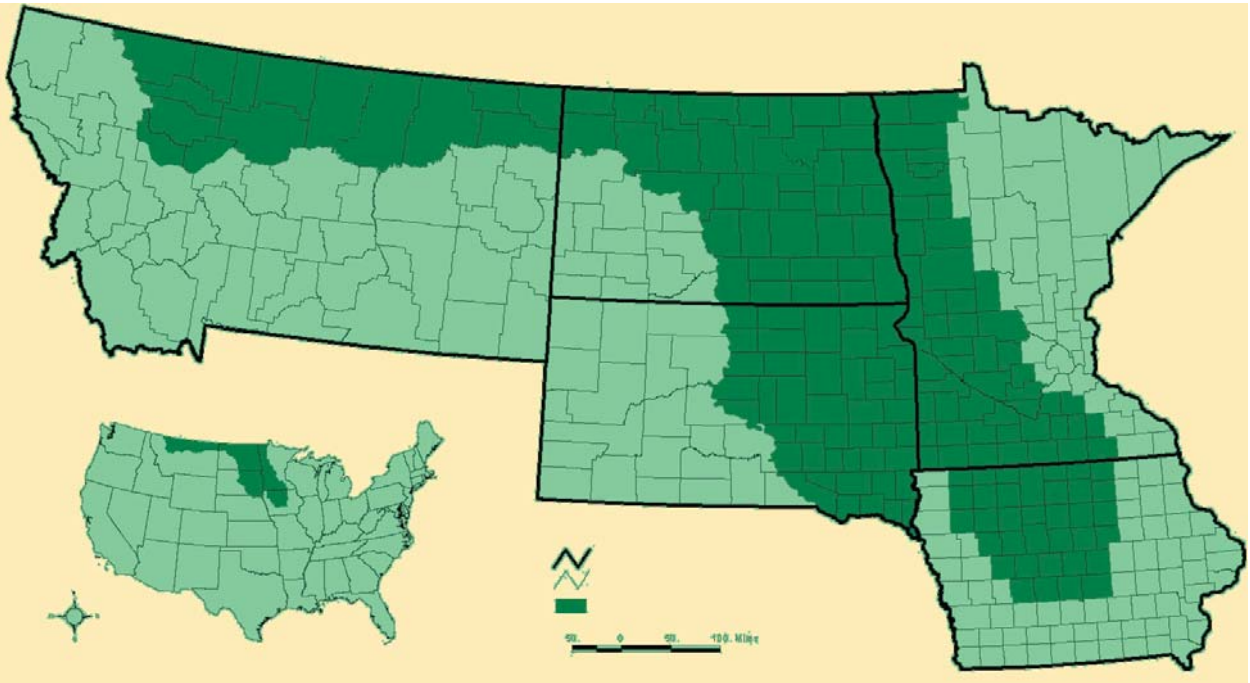

Figure 19. *The U.S. portion of the Prairie Pothole Region (shaded).*
Source: http://www.ppjv.org/counties_map2.htm

The mission of the PPJV is to implement conservation programs that sustain populations of waterfowl, shorebirds, other waterbirds, and grassland birds at objective levels through targeted wetland and grassland protection, restoration, and enhancement programs. The wetland objective of PPJV is to protect in perpetuity 1.4 million acres of high priority wetlands at risk (small, shallow wetlands less than an acre in size, which are totally or partially embedded in cropland and currently unprotected. The grassland objective of PPJV is to protect in perpetuity 10.4 million acres of priority grassland.

The North American Wetlands Conservation Act

Another important conservation tool for Iowa is the federal North American Wetlands Conservation Act (NAWCA) created in 1989. The Act was passed by congress, in part, to further support implementation activities under the North American Waterfowl Management Plan. NAWCA was designed to provide matching grants to organizations and individuals who have developed partnerships to carry out wetland conservation projects in the United States, Canada, and Mexico. The main objective was to increase much needed wetland habitat for several species of wetland-associated migratory birds and other wildlife. The U.S. Fish and Wildlife Service's Division of Bird Habitat Conservation is responsible for facilitating NAWCA. However, Congress reserves the right to authorize funding levels for NAWCA on an annual basis. In 2006, Congress reautho-

rized NAWCA and expanded its scope to include the conservation of all habitats and birds associated with wetland ecosystems which extended authorization of up to $75 million per year to 2012.

NAWCA has been a very successful wetland conservation tool so far and continues to look promising. From 1990 through September 2009, approximately 4,000 partners worked with 1,943 projects and received more than $1 billion in grants. Another $2.06 billion in matching funds were contributed to these projects, which affected 25.2 million acres of habitat and $1.16 billion in nonmatching funds have affected 217,350 acres of wetland habitat.

Iowa DNR's Wildlife Action Plan

In 2005 the Iowa Department of Natural Resources (IDNR)'s Wildlife Diversity Section and Wildlife Bureau, along with several important conservation organization partners, developed the Iowa Wildlife Action Plan (IWAP). The plan is designed to address the needs of all wildlife, but its main purpose was to identify Iowa's wildlife Species of Greatest Conservation Need (SGCN) and their habitats, and implement the prioritized conservation work needed to sustain or improve them. Wetlands were identified in the plan as a critical habitat to increase and/or improve, especially to benefit many of the non-game species such as insects, migrant songbirds, reptiles and amphibians. For example, GAP analysis maps of Iowa done for this plan revealed how important the low floodplain areas of southeast Iowa are for wildlife diversity. Riverine type wetlands, plus other types of wetlands are part of this floodplain area as well. In fact, this part of the state supports the most diverse assemblage of wildlife species in Iowa.

Aside from providing a very informative and comprehensive overview of the status of Iowa's wildlife species, completion of the IWAP made Iowa competitive to receive federal funds in the form of State Wildlife Grants. These grants support projects for the IDNR Wildlife Diversity Section to work with conservation partners to implement their wildlife action plan.

Iowa's County Conservation Boards

Iowa has 99 county conservation boards (CCBs). Each of the CCBs provides local outdoor recreation opportunities, natural and historical interpretation, and the conservation of local natural resources. In many cases throughout Iowa, they contribute significant time and money to restoring wetland areas including wetlands like Chichaqua Bottoms in Polk County and several pothole wetland areas in north Iowa. They are often a strong partner in wetland conservation efforts because of their local knowledge with the landscape and the landowners that own it. Like the state and federal natural resources agencies, the county conservation boards often own and manage some land for the public, plus they often provide direct assistance to landowners for privately owned land in their counties.

USDA Natural Resources Conservation Service - Wetlands Reserve Program and Emergency Watershed Protection Program Floodplain Easement

The United States Department of Agriculture (USDA) has a unique role in shaping the landscape of Iowa as it simultaneously encourages land development for agricultural purposes while also providing the most incentives for resource conservation on agricultural land. The authority and incentives involved derive primarily from what is generally known as the "Farm Bill," the contents and funding of which change from year to year depending on congressional appropriations. Two departments within USDA implement the many conservation-related programs: the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA). NRCS has more acres enrolled (and applied to be enrolled) in conservation programs than any other agency or organization. Their primary wetland-related programs are the Wetlands Reserve Program (WRP) and the Emergency Watershed Protection Program Floodplain Easement (EWP). The FSA runs a close second in acres enrolled with its Conservation Reserve Program (created by the Food Security Act of 1985), which contains special provisions for the farmable wetlands program, floodplain wetlands and non-floodplain wetlands restoration, the conservation reserve enhancement program (CREP), the upland bird habitat initiative, and the prairie duck habitat initiative.

Perhaps, the two programs that have made the most impact though in terms of wetlands are WRP and EWP because they are offered as permanent easements. When private land is enrolled into these programs their land is put back to grassland and wetlands based on the soils and feasibility of restoration. It's interesting to note that both programs are voluntary – landowners have the choice to sign up for it; yet there is a significant back-log of applicants that want to enroll. Each year, USDA-NRCS uses their appropriated funds to get as many applications accepted into these two programs as their funds allow. Yet, each year there are some applications that go unfunded because the money runs out. Although this is unfortunate, it is a reality of federal resources shared among many states. Fortunately, Iowa has consistently ranked as one of the top 5 states in the Nation for the number of WRP/EWP easements enrolled into these programs. The backlog of willing applicants demonstrates that many Iowa landowners are willing to consider restoring their land back to grassland and wetlands. Once these areas are restored, they not only provide good wildlife habitat, but also help improve water quality through filtration to our ground water, flood retention, and nutrient recycling.

U.S. Fish & Wildlife Service

The United States Fish and Wildlife Service (FWS) also has a variety of programs that contribute to wetland conservation and restoration including the National Wildlife Refuge System (authorized by the Migratory Bird Hunting & Conservation Stamp Act, and PL 85-585), Endangered Species Act grants, and the Partners for Fish and Wildlife Program, authorized by the Partners for Fish and Wildlife Act (16 U.S.C. 3771), that offers technical assistance and funds to private landowners and their partners to restore fish and wildlife habitats.

Non-Government Organizations

Non-governmental Organizations (NGOs) also do a tremendous amount of work related to Iowa's wetlands. A comprehensive list can be found in Appendix E. Organizations such as Ducks Unlimited, Pheasants Forever, The Nature Conservancy, Iowa Natural Heritage Foundation, Waterfowl Association of Iowa, The Izaak Walton League of America, and others all play a major role in wetlands conservation. In fact, these groups have helped protect, restore, and enhance several wetland areas over the years that may have been lost had it not been for their ability to act quickly and efficiently. Despite each organization having its own unique goals and objectives, they all agree on the importance of viable wetland resources and recognize the importance of partnering with each other as well as federal, state, and county natural resource agencies to leverage valuable dollars for wetlands protection and restoration. This type of work, plus advances in wetland science, both continue to improve the collective understanding of wetland functions and values that lead to good wetland restoration and management. Many of the action items identified in this wetland plan for Iowa seek to add to the ongoing efforts of these conservation entities.

APPENDIX C:
Laws and Regulations Affecting Wetlands

There is no Federal Wetlands Act or Iowa Wetlands Act. Rather, there is a collection of laws and regulations designed for a variety of other subjects that also have an impact on wetlands. From the top authority down (Federal to State to Local) the breakdown of activities and responsibilities largely fall into three categories: landscape modification, run-off/drainage, and voluntary conservation.

Landscape Modification

Subject to certain agriculture-related exceptions, if a person wants to modify their land in a way that involves the placement of dredged or fill material into a wetland, they are required by the Federal Clean Water Act (CWA) to first obtain a 404 permit through a joint process with IDNR and the U.S. Army Corps of Engineers (COE). Depending on the acreage and location of the wetland impacts, the permit process may involve review by EPA, FWS, and NRCS in addition to the COE and IDNR reviews. Projects requiring Individual Section 404 permits require the permit applicant to complete "Sequential Mitigation" if a discharge of dredged or fill material into wetlands or other waters of the United States is involved. The first step in sequential mitigation is "avoidance." The COE requires and IDNR prefers that landowners avoid adverse impacts to wetlands when there is a practicable less damaging alternative available. Therefore, a permit applicant should expect to thoroughly justify any proposed plans involving the discharge of dredged or fill material into wetlands. If the alternatives analysis determines that a project will have unavoidable impacts to wetlands, he (she) must move on to the second step in sequential mitigation. That second step is "minimization." Minimization involves taking appropriate and practicable steps to minimize impacts to wetlands through project modifications. The final (third) step in sequential mitigation is "compensation." Once unavoidable impacts to wetlands are minimized, the permit applicant must develop a "mitigation plan" to compensate for wetland losses. Compensation may involve the restoration, establishment, enhancement, and/or preservation of wetland functions (such as water quality, flood storage, and wildlife habitat). The mitigation plan is typically made a condition of the 404 permit. For a detailed description of the COE mitigation determination process, see Appendix F.

There are three ways to compensate for unavoidable wetland loss: (1) permittee-responsible mitigation; i.e., restoration undertaken by the permittee; (2) payment of in-lieu fees to a non-profit or government-sponsored wetland management program (not yet available in Iowa); and (3) purchasing credits in a mitigation bank. The basic premise of mitigation banking involves a private or public entity purchase (or maximizing existing ownership) of land suitable for large scale wetland restoration and/or creation. The bank concept derives from selling credits—i.e., points for a

given amount of ecological restoration work at the site—to those who cannot or are not interested in undertaking mitigation, monitoring, and long term protection of a site on their own. When the necessary mitigation credits are purchased, the section 404 permit applicant seeking mitigation actually transfers his/her liability directly to the mitigation bank, which then has responsibility for the ultimate success of the wetland mitigation activities taking place.

Four wetland mitigation banks currently operate in Iowa. The first is a commercial bank in Harrison County known as the G. William Coulthard Wetland Mitigation Bank. The second is a wetland mitigation bank in Franklin County created through Iowa Farm Bureau and operated by Iowa Wetland Mitigation Bank, Inc. That bank area itself is known as Coulter Marsh. The third is the Salt Creek Wetland Mitigation Bank operated by a commercial banker in Tama County. The fourth is another commercial bank in Harrison County known as the Coulthard Trust Wetland Mitigation Bank (Figure 19).

Three additional mitigation banks are currently seeking IRT authorization and several others have been proposed. Of the three mitigation banks currently seeking authorization, two will serve the Raccoon River and Des Moines River watersheds. The third will serve the Mississippi River and Wapsipinicon River watersheds.

Compensatory Mitigation

The following paragraphs are a summarized policy for dealing with wetlands as it relates to compensatory mitigation provided by COE's Rock Island District.

The COE may issue an individual section 404 permit but, only upon a determination that the proposed discharge complies with applicable provisions of 40 CFR part 230, including those which require the permit applicant to take all appropriate and practicable steps to avoid and minimize adverse impacts to waters of the U.S. Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the US EPA's Section 404(b)(1) Guidelines. During the 404(b)(1) Guidelines compliance analysis, the COE may determine that a DA permit for the proposed activity cannot be issued because of the lack of appropriate and practicable compensatory mitigation options. When permitted impacts are located within the service area of an approved mitigation bank and the bank has the appropriate number and resource type of credits available, the permittee's compensatory mitigation requirements may be best met by securing those credits from the bank.

Compensatory mitigation may also be performed by the permittee using the methods of restoration, creation, enhancement, and in certain circumstances preservation. Of these permittee-re-

sponsible methods of mitigation, restoration is generally most preferable due to the likelihood of its success being greater and the impacts to potentially ecologically important uplands being less compared to establishment, and the potential gains in terms of aquatic resource functions being greater compared to enhancement and preservation.

For more information on the COE requirements for compensatory mitigation, and the location of approved mitigation banks in Iowa, please refer to the COE regulations at 33 CFR PART 332, COMPENSATORY MITIGATION FOR LOSSES OF AQUATIC RESOURCES, or the COE Rock Island District website: http://www2.mvr.usace.army.mil/Regulatory/.

Aside from Clean Water Act obligations, wetland mitigation may also be required pursuant to the Food Security Act's Swampbuster program, which discourages farmers from converting wetlands for agricultural use. Landowners who want to modify a wetland to make farming more possible must either perform compensatory mitigation (i.e., restoring, enhancing or creating new wetlands) or become ineligible for certain types of federal agricultural support.

A unique set of rules also exists for modifications to land already developed for agricultural purposes. If a person wants to alter a wetland on agricultural land, the first issue is whether it's a farmed wetland, converted wetland or prior converted wetland, the latter of which is essentially exempt from conservation-related restrictions. Two agencies within the U.S. Department of Agriculture (USDA) – Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) – regulate the treatment of these wetlands pursuant to the Farm Bill, which for twenty-some years has discouraged wetlands destruction by removing federal farm program incentives for conversion of wetlands to agricultural use. Unlike the Clean Water Act, Farm Bill-related policies apply to any type of wetland alteration, not merely dredging and filling.

IDNR Floodplain Management Program will also be involved if the landscape modification requested involves building in a floodplain. For more information on the floodplain program, see the "run-off/drainage" section below. Local Zoning Boards and Planning Commissions also affect wetlands by their decisions to either approve or disapprove of the development of land containing critical wetlands and/or related natural systems. And last but not least, although a landowner does not always need a permit to restore a wetland, amateur restoration activities without oversight can inadvertently cause more damage than they seek to cure as well as run afoul of drainage regulations (see Run-off/Drainage Section below). When in doubt, it is best to contact COE for advice on jurisdictional requirements, and landscape professionals with wetlands training for advice on restoring and/or protecting wetlands.

Run-off/Drainage

Run-off from rain and snowmelt presents a serious water management challenge. Too much run-off at once causes flooding. Several agencies engage in efforts to prevent excessive run-off-

related problems: IDNR, Iowa Homeland Security, the Federal Emergency Management Administration, and local soil and water conservation districts.

The IDNR Floodplain Division regulates construction on all floodplains and floodways in the state and promotes the orderly development and wise use of the flood plains in general. Any person who desires to construct or maintain a structure, dam, obstruction, deposit or excavation, or allow the same in any flood plain or floodway has a responsibility to contact the department to determine whether approval is required from the department or a local government authorized to act for the department. However, the primary considerations are currently limited to (a) whether the construction is adequately flood-proofed and (b) whether the construction would fill or otherwise block water flow in the floodplain. Consideration of the environmental impacts of building in a floodplain appear to be limited to situations involving channels.

Iowa Homeland Security's connection to run-off comes from its mission to "lead, coordinate and support homeland security and emergency management functions in order to establish sustainable communities and ensure economic opportunities for Iowa and its citizens." Its Iowa Hazard Mitigation Plan, published in 2004, recommends wetlands restorations as a protective strategy in accordance with Objective 4.1.2: the acquisition and improvement of property…to prevent or reduce risks to property from flash flooding. FEMA has also incorporated wetland issues into Iowa's flood mitigation program including (a) incorporating 44 CFR Part 9, floodplain and wetland review (Executive Orders 11988 and 11990), into the state review process for the Hazard Mitigation Grant Program and Flood Mitigation Assistance Projects; and (b) collecting and analyzing environmental information regarding proposed projects such as the proximity of the project to waterways, water bodies, floodplain, floodways, potential wetland areas, and threatened and endangered species.

Drainage Districts also have a significant impact on the management of run-off. Drainage Districts are created in Iowa Code Chapter 468. The trustees of each district have the authority to order repairs to drainage tiles and ditches as well as to levy assessments to pay for the costs of repairs. Because "[t]he drainage of surface waters from agricultural lands and all other lands or the protection of such lands from overflow shall be presumed to be a public benefit and conducive to the public health, convenience and welfare," there is an inherent potential conflict between the duties of drainage districts and the goal of protecting and/or restoring wetlands. For example, repairs and improvements to drainage systems may result in the reduction of source water for wetlands to the extent that they actually lose their status as wetlands.

Local Zoning Boards and Planning Commissions again play a role in terms of their ability to approve or disapprove the development of land containing critical wetlands and/or related natural systems that would otherwise lessen the impact of excessive run-off.

Whether in excessive quantities or not, run-off must also be managed from a water quality standpoint. Simply put, run-off that comes into contact with pollutants brings that pollution with it, ultimately contaminating streams, rivers and lakes. Several agencies contribute to the management of run-off for water quality purposes: US EPA, IDNR, USDA/NRCS, Watershed Improvement Review Board, soil and water conservation districts, and the Iowa Department of Agriculture & Land Stewardship.

U.S. EPA has a minimal role in this area having delegated Clean Water Act National Pollutant Discharge Elimination System (NPDES) regulatory authority, including the stormwater program, to the state. Parties planning to engage in industrial activities covered by the stormwater regulation must first obtain a stormwater permit from IDNR and then comply with it as their activities progress. Covered activities include (a) construction that disturbs one or more acres or which is part of a larger project that disturbs one or more acres in total; (b) certain industrial or commercial activities; and (c) city storm sewer systems in larger communities or those near larger communities; agricultural activities have been specifically excluded. With some exceptions associated with animal feeding operations, IDNR's Watershed Improvement Section relies on voluntary cooperation from agriculture to reduce the impact of run-off-related water contaminants in watershed projects that it supports.

The Iowa Department of Agriculture and Land Stewardship (IDALS) helps mitigate the impact of nutrients from tile drainage through its Conservation Reserve Enhancement Program (CREP).

The activities of non-government organizations (NGOs) may have an influence on run-off water quality as well. NGOs operating in Iowa are too numerous to list here, but their wetlands-related activities often include land acquisition and wetland restorations. They represent a very important segment for conservation efforts and water quality projects across Iowa and are therefore a critical partner to IDNR and other agencies.

Voluntary Conservation

Since about 92% of the land in Iowa is privately owned, the most successful wetland programs tend to be those using incentives to encourage voluntary conservation activities. There are multiple reasons for this success, some of which include the following:

- Landowners aren't told what they have to do. It's their choice.
- The wetland programs provide reasonable economic incentive that is usually competitive with the financial gains derived from current row crop commodity prices.
- Many landowners in Iowa want wetland and grasslands restored back to their property for various reasons of their own and these programs provide the vehicle to do so.
- Usually there is good technical guidance during the wetland program enrollment process.

Landowners are typically linked up with wetland restoration programs in one of two ways: the landowner seeks out a wetland program on their own by contacting a natural resources agency or organization, or a person that works for the natural resources agency or organization contacts the landowner, especially if they own land that is in an important area and the land has good potential for wetlands to be restored. Either way, the landowner is given the information about the various programs that are best suited for their particular tract of land and most closely align with their goals and expectations for what they'd like it to be enrolled into. Then it's up to the landowner to decide if they'd like to apply for the program to seek acceptance for enrollment. In most cases, the landowner will have technical assistance about the program offered from a professional that's knowledgeable about the programs available to get the information they need to help decide. The key information about each program they are most often interested in knowing to help with the decision include the following:

- Economic incentive or how the program pays the landowner, costs of restoration, etc.
- Length of program enrollment.
- How the restoration will be done.
- Who will do the restoration.
- What the final product will be and how it will likely turn out.

Fortunately, there are many organizations and programs involved in this area of work. Therefore, we list those programs in a full list in Appendix E. As explained in Appendix B 'History of Wetlands Conservation', there is a strong interest to work with private landowners in this endeavor because it supports many of the goals for wetland conservation initiatives. Often times the only thing limiting the pace of this type of work is adequate funding for more trained private lands personnel, state level wetland restoration programs, and the engineering costs.

APPENDIX D:
Current Wetlands Work: Pros, Cons, and Unknowns

This subsection contains a brief summary of the current status of wetland work in Iowa; its pros, cons, and unknowns. Frankly assessing the strengths and weaknesses in this manner helps guide the direction of where work could be done in the near future to improve the wetland resource in Iowa as a whole. The logical strategy that forms the action items addressed in this plan is to build upon the strengths and to also begin taking more aggressive actions to work on the weaknesses.

Pros: Science, Organizational Expertise & Interested Landowners

Wetland science has already been able to identify much useful information about these natural formations, including the functional benefits they provide such as improved water quality, flood storage, and wildlife habitat. The same line of study also shows that not only can drained wetlands be brought back through restoration work, restoring areas where natural wetland basins exist is a better, more sustainable practice economically and ecologically than trying to create them where it's convenient; i.e., restoration is better than creation. Since Iowa has approximately 4 to 6 million acres of original wetlands, this means a strong opportunity exists to significantly improve the landscape's overall quality with restored wetland functions. The multiple GIS mapping tools available now (and currently under development) are already helping to identify and quantify the exact areas with the greatest potential for successful wetlands restoration and the greatest need for the landscape-benefitting functions wetlands provide (i.e., flood storage, water pollution reduction, and wildlife habitat). Additionally, wetlands monitoring science has expanded to include testing for the overall ecological health of wetlands and their various wildlife species, which directly correlates to the ability to maintain successful cost-effective restorations.

Iowa also has multiple agencies with natural resources expertise and relevant jurisdictional authority, as well as many private conservation organizations with direct knowledge and expertise in successful wetland restorations. Perhaps most importantly, given that offering voluntary restoration support for private lands has been proven more effective than regulatory mandates, more landowners in Iowa are willing to have wetlands restored on their property than current funding levels can support. In fact, social acceptance and recognition of the usefulness of wetlands restorations is higher than ever.

Cons: Limited Funding, Lack of Inter-Agency Collaboration

Lack of funding available to restore wetlands through wildlife habitat conservation is the number one limiting factor holding back restoration work even though many landowners want to have it done. To date, there is no real funding available at the state level to support wetland restorations

even though catastrophic flooding and impaired water quality issues continue to threaten Iowans in terms of both personal and financial safety. The Federal Farm Bill, a somewhat double-edged sword environmentally, continues to provide the majority of funding for wetlands work on private lands, though it too is underfunded; i.e., there are more landowner applicants seeking wetlands and floodplain easements than available funding can satisfy.

Another symptom of limited funding is that state natural resource agencies may not be able to make wetlands work a priority in terms of identifying, documenting and protecting existing unique wetland types such as fens and sedge meadows; protecting/restoring temporary wetlands and other smaller wetland types; undertaking large scale restorations; maintaining adequate wetlands-specific staff and wetlands monitoring equipment; and keeping the public informed and engaged through education and outreach using multiple forms of media such as websites, videos, television and radio spots, education curriculum development, and hands-on training.

Also missing from the mix is collaboration among the various agencies and organizations that deal with one or more issues related to wetlands; i.e., regulatory, monitoring, conservation, education, outreach, etc. A prime example of helpful out-of-the-box collaboration would be to develop and foster more partnerships with non-traditional partners such the Drainage Districts of Iowa and with agricultural interest groups in order to find sustainable solutions for land use in watersheds and drainage districts that are currently intensively farmed, but in need of some percentage of grasslands and wetlands restored back to improve flood storage, water quality, and wildlife habitat for area residents.

Unknowns – Data requiring collection

There is a need for a better understanding of what amount (percentage or acres) of wetland acres need to be present in Iowa's watersheds to have a measurable impact for improved water quality, flood storage, and wildlife habitat. There is some science available on this topic, but there is much more to learn and understand.

More research is needed to better understand the thresholds of non-point source pollution to aquatic life in Iowa's wetlands and the subsequent impact to wildlife use.

More economic research is needed for Iowa wetlands. For example, one major topic is related to the ultimate monetary value of wetlands, which would include quantifying ecological services, unbiased work to understand nutrient processing, and cost/benefit economics comparing restoring natural wetland basins versus creating a wetland.

Wetland mitigation activities in Iowa need assessment in terms of their functional and economic effectiveness to date. Regulatory assessment is needed to determine whether setting water quality standards for wetlands would have a positive impact on the resource.

APPENDIX E:
Agency and NGO Chart

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
USDA's Natural Resources Conservation Service	Wetland Restoration Program	WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. NRCS provides technical and financial support to help landowners with their wetland restoration efforts.[i]	Owners/operators of agricultural land	For permanent easement, the USDA will pay for 100% of the restoration costs plus the lowest of the following amounts: agricultural value of the land, an established payment cap, or an amount offered by the landowner. USDA will pay 75% of such costs for 30-year easement.
	Emergency Wetlands Reserve Program	EWRP was established in response to the 1993 flooding in the Upper Mississippi and Lower Missouri River basins, and is targeted specifically at prior-converted wetlands damaged by flooding in that region.	Owners/operators of agricultural land	No longer taking applications. See EWP.
	Emergency Watershed Protection Program (Floodplain Easements)	EWP purchases floodplain easements for purposes of restoring balance to watersheds.	Owners/operators of agricultural land	Currently funded at the highest level of any NRCS Iowa wetland-related program and yet there are twice as many applications for easements as available funding.
	The Environmental Quality Incentives Program	EQIP is a voluntary conservation program that promotes the compatibility of agricultural production and environmental quality. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land.	Farmers and ranchers	EQIP may cost-share up to 75 percent of the costs of certain conservation practices. Incentive payments may be provided for up to three years to encourage producers to carry out management practices they may not otherwise use without the incentive. However, limited resource producers and beginning farmers and ranchers may be eligible for cost-shares up to 90%.
	The Wildlife Habitat Incentives Program	WHIP provides incentives for landowners to develop or improve fish and wildlife habitat on privately owned land through the application of a conservation plan. Covered practices include seeding, tree plantings, fencing, and prairie restoration.	Owners/operators of agricultural land	NRCS provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
USDA's Natural Resource Conservation Service (cont.)	Conservation Security Program	CSP is a voluntary conservation program that supports ongoing stewardship of private agricultural lands by providing payments for maintaining and enhancing natural resources including wetlands. CSP rewards those farmers and ranchers who are meeting the highest standards of conservation and environmental management on their operations. Working lands include cropland, grassland, prairie land, improved pasture, and range land, as well as forested land that is an incidental part of an agriculture operation.	Owners/operators of agricultural land. CSP sign-up is offered each year in selected watersheds across the Nation. Selected watersheds are listed at: http://www.nrcs.usda.gov/programs/csp/	CSP provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands.
	Resource Conservation and Development Program	The purpose of the RC&D program is to accelerate the conservation, development and utilization of natural resources, improve the general level of economic activity, and to enhance the environment and standard of living in designated RC&D areas.		RC&D areas are locally sponsored areas designated by the Secretary of Agriculture for RC&D technical and financial assistance program funds.
	"No Interest" loan program	This program provides "no interest" loans to eligible landowners for the construction of permanent soil conservation practices, which are part of a conservation plan. SWCDs set priorities for practices to fund. Examples include terraces, waterways, and structures.	Owners/operators of agricultural land	Landowners must be able to secure the loan, be capable of repaying the loan, and be a cooperator with the SWCD.
	Conservation Technical Assistance	CTA assists land users to plan and install resource management systems that will improve and protect natural resources on their land including practices to reduce soil erosion; improve soil, water, and air quality; improve and restore wetlands; and reduce upstream flooding.	All land users may receive technical assistance from the NRCS. Land users are encouraged to work through their local SWCD to become district cooperators.	Contracts vary by programs and practices.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
USDA's Farm Security Agency	The Conservation Reserve Program includes: * Farmable Wetlands[ii] * Floodplain wetlands restoration[iii] and non-floodplain wetlands restoration[iv] initiatives * Conservation Reserve Enhancement Program[v] *Upland Bird Habitat initiative[vi] *The Prairie Duck Habitat initiative[vii] *State Acres For wildlife Enhancement[viii]	CRP is a voluntary program that offers long-term rental payments and cost-share assistance to establish long-term, resource-conserving cover on environmentally sensitive cropland or, in some cases, marginal pastureland. Goals: prevention of soil erosion and improvement of water quality. CRP Goals for 2009 are to (1) increase acres managed under continuous signup (including CREP/FWP/initiatives); (2) increase CRP acres of riparian and grass buffers; and (3) increase CRP restored wetland acres.[ix] The 2009 Goal for number of wetlands contracts in Iowa = 1,990.[x]	Owners/operators of agricultural land	Commodity Credit Corporation (CCC) makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. (http://www.fsa.usda.gov/dafp/cepd/crp.htm).
	Emergency Conservation Program	ECP provides emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland damaged by natural disasters and for carrying out emergency water conservation measures. Funding for ECP is appropriated by Congress.	Farmers and ranchers with farm-land damaged by natural disasters.	In August 2008, $91 million was made available to address Midwest floods and other disasters.
	Debt Cancellation Conservation Contract (a/k/a "Debt for Nature")	This program provides the opportunity to cancel a portion of indebtedness in exchange for a conservation contract.	Eligible landowner owe FSA and have marginal croplands or other environmentally sensitive lands for conservation, recreation, and wildlife purposes.	
	Emergency Watershed Protection Program	Emergency watershed protection consists of measures to reduce hazards to life and property from floods, drought, and the products of excessive runoff or erosion on any watershed impaired by a natural occurrence.	Agriculture-based rural residents and communities	Loans, grants, and related assistance may be available to ongoing programs for rural residents and communities.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
U.S. Fish & Wildlife Service Contact: USF&SW Region 3 http://www.fws.gov/midwest. Chief, Ecological Services Operations: T. J. Miller, 612-713-5334. George Maze (Union Slough NWR) manages the Iowa Wetland Management District. (515) 928-2523.	National Wildlife Refuge System	The refuge system is the world's largest collection of lands specifically managed for fish and wildlife. Overall, it provides habitat for more than 5,000 species of birds, mammals, fish, amphibians, reptiles, and insects. The goals for the National Wildlife Refuge System include conserving those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts..	Public or private entity	To create or enhance a Wetland Management District, lands are acquired under the authority of the Migratory Bird Hunting and Conservation Stamp Act, and since 1958, under Public Law 85-585 as "Waterfowl Production Areas." Private land habitat restoration projects, and protection and management of wetlands, flood plains, and other important habitats on conservation easements may be combined to improve workload and habitat diversity of a WM District.
	Endangered Species Act-Related Funding	Programs include: (1) grants to implement conservation projects for listed and at-risk species; (2) Habitat Conservation Planning Assistance Grants to integrate habitat conservation into local land use planning through the development of conservation plans; (3) Habitat Conservation Plan Land Acquisition Grants to further species conservation through land acquisition and easements; and Recovery Land Acquisition Grants to acquire lands essential for recovery of listed species.	Public & private entities	Grants
	Private Lands[xi]	Overview of the Program: USF&WS works with volunteers to restore and enhance fish and wildlife habitat on private lands.	Private landowners	Monetary and technical support for wetland, native prairie and stream restoration, migratory bird habitat, endangered species habitat & invasive species control.
	Refuges, Wildlife and Sport Fish Restoration Programs			$4,990,102 has been apportioned to Iowa for FY 09 wildlife restoration.[xii] $5,747,479 has been apportioned to Iowa for FY 09 sport fish restoration.[xiii]

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
U.S. Army Corps of Engineers	Environmental restoration in conjunction with dredging projects (Water Resources Development Act of 1992, Section 204).	Corps has authority to restore, protect and create aquatic wetland habitats in conjunction with dredging or an authorized project.	Private landowner; government entity; NGO	Sponsor must cover 25% of costs; Corps funds cover the rest.
	Aquatic Ecosystem Restoration (Water Resources Development Act of 1992, Section 206)	Projects may include manipulation of hydrology in and along bodies of water, including wetlands and riparian areas. A project is adopted for construction only after a detailed investigation determines that the project will improve the quality of the environment, is in the best interest of the public, and clearly shows the engineering feasibility and economic justification of the improvement.	Private landowner; government entity; NGO	Sponsor must cover 35% of costs; Corps funds cover the rest.
	Construction of water-related environmental infrastructure including flood control			Under the American Recovery & Reinvestment Act of 2009, USCOE was appropriated $2 billion in construction funds for water-related environmental infrastructure assistance.
	CWA Section 404 Permit Program for Discharges into Waters of the U.S. (including wetlands)	Anyone planning to work in "navigable waters" or discharge (dump, place, deposit) dredged or fill material in waters of the United States, including wetlands, must first obtain a permit from the Corps of Engineers. Permits or other forms of authorization may also be required by other Federal, state and local statutes. In Iowa, applicants work with the Rock Island District Office.[xiv] Although the Corps has authority to regulate via permit discharges to wetlands, it does NOT function as an aggressive enforcement authority or wetlands protection advocate.	Any person, firm, or government agency planning to work in "navigable waters" or discharge (dump, place, deposit) dredged or fill material in waters of the United States,	Enhanced protection for wetlands may be factored into the permit process when the Corps is able to utilize the critical wetlands identification tool created by the State Wetlands Action Plan.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
U.S. Environmental Protection Agency	Clean Water Act section 319 Program	This program provides funding for watershed-based water quality projects that demonstrate and implement conservation practices to protect priority water bodies from agricultural and other non-point pollution sources.	Individual landowners and legal entities such as non-profit organizations and communities participating in USEPA Section 319 water quality projects are eligible.	Funds can be used for a variety of traditional and innovative conservation practices that provide water quality benefits. Funding for conservation practices is typically administered through contracts with local SWCDs.
	WPD Grants			
Federal Emergency Management Agency **Iowa Homeland Security and Emergency Management Division**	Pre-Disaster Mitigation Program	This program helps states and communities implement long-term hazard mitigation measures. The program's objectives are to prevent or reduce the loss of life and property from natural hazards, to implement state or local hazard mitigation plans.	State and local community representatives.	Because restoring strategic wetlands above and within floodplain areas has the potential to reduce flood-related disasters, this program may be supportive of wetlands restoration in general.
	Flood Mitigation Assistance Program	The FMA program helps states and communities identify and implement measures to reduce or eliminate the long-term risk of flood damage to homes and other structures insurable under the National Flood Insurance Program.	State and local community representatives.	Because restoring strategic wetlands above and within floodplain areas has the potential to reduce flooding impacts, this program may be supportive of wetlands restoration in general.
Internal Revenue Service	Various Deductions for Conservation Activity	Deductions for Conservation Easements (IRS; P.L. 96-541) Tax Deductions for donors of wetlands and to some nonprofit organizations (IRS; P.L. 99-514)	Landowners	Tax deductions
Iowa Department of Natural Resources	Prairie Pothole Joint Venture	Pursuant to the North American Waterfowl Management Plan, IDNR, in cooperation with USF&WS, county conservation boards, and various private partners, has restored wetlands and associated surrounding uplands within identified prairie/wetland complex sites in northern Iowa. Program also includes seed harvesting.	Landowners, county conservation boards, conservation-based NGOs	Education, training, and direct restoration and conservation on both public and private land. The North American Wetlands Conservation Act of 1989 (NAWCA) is one of the most critical sources of funding available to the PPJV. Another source of potential funding is the Neotropical Migratory Bird Conservation Act.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
Iowa Department of Natural Resources (cont.)	Forest Land Enhancement Program:	FLEP assists landowners to develop and implement a forest management plan, which may include forest stand improvement, tree planting, site preparations for natural regeneration, agro forage, watershed protection, wildlife habitat improvement, invasive species control, savanna restoration, and forest stewardship planning.	Eligibility is limited to landowners with two or more acres who agree to maintain practices for estimated life span. A management plan is required.	Supports uplands that ultimately feed into wetlands and other water bodies. Program offers cost coverage up to 75 percent.
	Water Resources Section	The Water Resources Section has responsibilities for water quality and water quantity programs. Primary water quality responsibilities include setting state water quality standards, water quality monitoring and assessment, water quality modeling, providing state water quality certification for federal permits and licenses, and developing and implementing the state's non-point source pollution control program.	N/A	IDNR has the authority to set nutrient standards for the state of Iowa, which could have a significant impact on the water quality of wetlands.
	"Total Maximum Daily Load" and Water Quality Assessment Section; Water Body Assessments to determine "Impaired Waters" CWA sections 303(d) & 305(b)	An assessment survey can be described as intense water monitoring with the sole purpose of determining the source of impairment, so that the appropriate measures can be taken to rid the water of its pollutant. Impaired waters on Iowa's 303(d) list are candidates for the TMDL process.	N/A	IDNR has the authority to make these assessments regarding Iowa waters including wetlands. Completing this work would identify "impaired" wetlands and provide the regulatory mechanism to pursue appropriate measures for pollutant reduction.
Iowa Department of Agriculture and Land Stewardship	Iowa Conservation Reserve Enhancement Program	CREP is a major state/federal initiative to develop wetlands which are strategically located and designed to remove nitrate from tile-drainage water from cropland areas.	Owners/operators of agricultural land. Because CREP wetlands are best suited to certain discreet areas, IDALS has in the past reached out to suitable landowners to ascertain interest.	The program operates with a combination of federal and state funds.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
Iowa Department of Agriculture and Land Stewardship (cont.)	Iowa Watershed Protection Program	The Watershed Protection statute includes two elements: 1. Watershed Protection Program - to provide technical and financial assistance for the development of local watershed initiatives. 2. Watershed Task Force - to study the condition of watershed protection in Iowa.	N/A	Since restoring wetlands can often assist malfunctioning watersheds with flooding and water quality issues, all local watershed initiatives have the potential to be a source of support.
Iowa Natural Heritage Foundation	Variety of programs including permanent land protection, promotion of improved land management, and landowner outreach.	INHF builds partnerships and educates Iowans to protect, preserve and enhance Iowa's natural resources for future generations. This organization has extensive experience with successful wetlands restoration.	Landowners	INHF arranges (1) donations and sales of natural lands which become county or state public lands, and (2) conservation easements, which protect land that remains privately owned. INHF also develops land management plans with landowners who have implemented permanent protection; and provides education.
The Nature Conservancy (Iowa Branch) The Homestead Building, 303 Locust Street, Suite 402, Des Moines, IA 50309; (515) 244-5044; iowa@tnc.org.	Conservation by Design	TNC develops a strategic, science-based planning process, called Conservation by Design, which helps identify the highest-priority places that, if conserved, promise to ensure biodiversity over the long term. In Iowa, current wetland-related priority projects include (1) fens in Little Sioux Valley; (2) Boone River Watershed, upper and lower; (3) Driftless Area; (4) Lower Cedar River Valley; (5) Grand River Grasslands; and (6) Prairie headwater streams as historic habitat for Topeka shiners.		Provides support through funding, restoration, and/or land acquisition/donation.
Ducks Unlimited (Iowa) Eric Lindstrom, DU Iowa Regional Biologist (515) 232-9104; elindstrom@ducks.org	Conservation and Restoration of Duck Habitat	DU has helped conserve over 61,000 acres of wetland and upland habitat across the state at a cost of over $10 million. Wetlands of Iowa's Prairie Pothole Region represent DU's primary conservation focus area in the state.	Landowners, state and federal agencies, private corporations and foundations, and individuals.	Land acquisition and restoration; partnerships; and direct assistance to landowners seeking to protect and enhance the wildlife benefits of their property. Lobbying.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
Pheasants Forever (Iowa) David Van Waus (641) 377-2390 or dvanwaus@pheasantsforever.org	"Reload Iowa" Campaign	The "Reload Iowa" Campaign adopts an aggressive strategy for establishing and improving 1 million acres of wildlife habitat, increasing the number of upland hunters and increasing hunting-related revenue to local communities. PF plans to hire 50 Habitat Promoters, one for every two counties, in order to educate and assist all Iowa landowners in maximizing the conservation benefits available to them.	Anyone can donate; educational assistance is designed for private landowners.	Educational and grassroots assistance that will support wetlands restoration as crucial part of restoring pheasant habitat.
Raccoon River Watershed Association www.northraccoon.org	Various Watershed Protection Activities	The association is currently involved with an exciting new project know as "Outlet Creek Wetland Remediation Project," headed by Dr. Melinda Coogan, Asst. Professor of Biology at Buena Vista University. The impact of this project will be the bio-remediation of waters containing some of the highest concentrations of nitrates and Escherichia coli within the Mississippi River drainage basin tributaries (Jones, 2006) and the establishment of a community and state-supported project.[xv]	Anyone so long as the proposed activity benefits the Raccoon River Watershed.	Mixed funding and grassroots support. The unique contribution of the Outlet Creek project to Iowa is the potential development of a state model showing how both private and public entities can come together to address problems of the magnitude found in Outlet Creek through the implementation of wetland remediation projects. Once implemented, the potential for future wetland research projects and training could provide employment opportunities in the field of wetland bioremediation. An example of past success using a constructed wetland for tertiary wastewater treatment can be found at http://www.pwrc.usgs.gov/resshow/perry/tertiary/tertiary.htm.
Trees Forever	Various tree-planting related projects including trail recovery or planting projects, waterway recovery or plantings, assessing and caring for storm-damaged trees.	Trees Forever has created nationally award winning programs that pool resources from donors and sponsors to fund and assist with grassroots projects such as "Recover, Replant & Restore Program" for Iowa communities directly impacted by the 2008 storms and floods.	Landowners	Grants and practical assistance including damage assessment, project planning, plant material selection, planting design, volunteer organizing, and tree care or cleanup projects.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
Iowa Association of Municipal Utilities www.iamu.org	Storm Water Program	IAMU provides workshops, training sessions, and an annual meeting to address issues identified as priorities by storm water managers. Additional resources are being placed on IAMU's website and newsletter.	Municipalities in Iowa that are required to comply with EPA's Phase II NPDS regulations.	Educational Support: Strategic restoration of wetlands to manage storm water is part of IAMU's program.
Practical Farmers of Iowa www.practicalfarmers.org	Research, Education and Advocacy; ex. "Buy Fresh/Buy Local" Campaign	PFI is a non-profit, educational organization that began in 1985 and now has over 700 members in Iowa and neighboring states. Their mission is to research, develop and promote profitable, ecologically sound and community-enhancing approaches to agriculture. They carry out diverse programs to assist farmers with both production and marketing needs, to raise public awareness of where food comes from and how it is grown, and to educate youth about agriculture and the environment.	Anyone	Education and Advocacy. Important for wetland restoration because PFI promotes low-impact agriculture, which means less sediment and pollutants into wetlands and other waters.
Iowa Wildlife Federation PO Box 3332, Des Moines, IA 50316 Phone (319) 624-3107	Conservation Education & Advocacy	IWF is the leading conservation voice for sportsmen in Iowa. IWF is committed to protecting wildlife habitat, promoting common sense solutions to natural resource issues, enhancing hunting, fishing and other recreational opportunities, and educating and inspiring future generations the importance of our natural resources.	Members	Educational and grassroots support
1,000 Friends of Iowa	Sustainable Development and Low-Impact Development	Program includes promoting the establishment of wetlands, vegetative buffer strips around waterways, and other practices to improve water quality and promote healthy watersheds.	Anyone	Community outreach is the most likely form of support.
Wallace House Foundation	Watershed Outreach	WHF provides resources and training to local partner organizations to staff and facilitate watershed engagement, education, and planning.	Anyone	Education and Advocacy

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
National Fish and Wildlife Foundation www.nfwf.org	Partnership Programs	Examples include: (1) the Upper Mississippi River Watershed Fund,[xvi] which is a partnership between the USDA Forest Service and the NFWF. This partnership provides grants that benefit the stewardship of the forests and the restoration of watersheds in the Upper Mississippi River drainage; (2) Acres for America,[xvii] a partnership between Wal-Mart and the NFWF. The "AFA" program provides funding for projects that conserve important habitat for fish, wildlife, and plants through acquisition of interest in real property; and (3) the Native Plant Conservation Initiative.[xviii]	See website for grant-specific criteria.	Strategic partnerships and competitive funding including "Keystone Initiative Grants" and other special grant programs that focus on Iowa wetland-related issues such as control of invasive species and enhancing delivery of ecosystem services in agricultural systems.
The Conservation Alliance www.conservationalliance.com	The Conservation Alliance Legacy Fund:	TCA is a group of outdoor businesses that supports efforts to protect specific wild places for their habitat and recreation values. TCA makes grants to registered 501(c)(3) organizations whose work meets the following criteria: (1) The project should seek to protect a specific wild land or waterway for its habitat and recreational values; (2) The campaign should engage grassroots citizen action in support of the conservation effort. No general education or scientific research projects; (3) All projects should be quantifiable with specific goals, objectives, and action plans, and should include a clear measure for evaluating success; and (4) The project should have a good chance of closure or significant measurable results over a fairly short term (one to three years).	Registers 501(c)(3) organizations whose work meets the listed criteria (see left) and is nominated by one of TCA's member companies.	Grant requests should not exceed $35,000. To see a list of TCA members to contact, go to http://www.conservationalliance.com/membership. TCA conducts two funding cycles annually. Deadlines for those cycles are: (1) Summer Cycle: Nominations due May 1 / Proposals due June 10 / Grants announced early October; and (2) Winter Cycle: Nominations due November 1 / Proposals due December 10 / Grants announced early April.

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
The Conservation Fund www.conservationfund.org/midwest/iowa	Land & Water Conservation Activities	TCF acquires in strategic partnerships conservation land, develops market-based conservation strategies, finances natural resource-based small business in rural areas, operates a leading mitigation bank in the South, and pursues other investment-based activity. A $2.9 million Mississippi River Revolving Fund was established in 1994 to aid in the protection of wetlands, wildlife habitat, working landscapes, greenways and other natural areas in the ten states of the Mississippi River Corridor - from Minnesota to Louisiana.	Nonprofit organizations, including land trusts, and government agencies	Grants, loans, and strategic partnerships. The Conservation Fund and its partners have protected nearly 5,500 acres valued at over $1.3 million dollars in Iowa. A top priority for the Fund is working with partners to conserve wildlife habitat, water quality and recreation areas along the Mississippi River and its tributaries. Mississippi River Revolving Fund: Since 1994, the Fund and its partners have protected more than 14,400 acres of important wildlife habitat and recreation lands along the great river valued at over $19.6 million.
Waterkeepers Alliance www.waterkeeper.org	Grassroots	Waterkeepers supports passage of the Clean Water Restoration Act to ensure that all of the nation's wetlands and streams receive legal protection, and that federal and state authorities exercise environmental enforcement.	Anyone	It is primarily a grassroots organization that would promote, but not necessarily submit funds, to restore critical wetlands in Iowa.
Partners in Flight (Iowa's Partners in Flight contact is Tom Will, US Fish & Wildlife Service at tom_will@fws.gov.)	Conservation Education, Advocacy, and Implementation	PIF's primary goals are to (1) ensure an active scientifically-based conservation design process that identifies and develops solutions to threats and risks to landbird populations; (2) create a coordinated network of conservation partners implementing the objectives of the landbird conservation plans at multiple scales; and (3) secure sufficient commitment and resources to support vigorous implementation of landbird conservation objectives. The Prairie Pothole Joint Venture area is of particular interest.	Anyone	Conservation Education, Advocacy, and Implementation

Agency or NGO	Program	Program Overview	Who can apply	Funding/Other Support
The Association of Fish & Wildlife Agencies www.fishwildlife.org	Conservation Coordinating entity	This Association's primary goals are to promote the sustainable use of natural resources, encourage the professional management of fish and wildlife, develop coalitions among conservation organizations to promote fish and wildlife interests, and foster public understanding of the need for conservation, encourage cooperation and coordination of fish and wildlife management at all levels of government.	See website for grant-specific criteria.	Multi-state grant program available. Education and advocacy, too.
The National Audubon Society www.audubon.org/states/index.php?state=IA.	Education and Advocacy	Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity. They maintain a national network of community-based nature centers and chapters, scientific and educational programs, and advocate on behalf of areas sustaining important bird populations.	Anyone	Education and Advocacy. Important for wetland restoration support because wetlands support so many indigenous and migratory birds.
Dragonfly Society of the Americas	Research, Education, and Advocacy	One of DSA's primary purposes is to support wetlands and habitat preservation as the most effective manner for odonate conservation.	N/A	Education and Advocacy. Important for wetland restoration support because wetlands support dragonflies.
The Xerces Society 4828 SE Hawthorne Blvd., Portland, OR 97215; (503) 232-6639 Fax: (503) 233-6794 info@xerces.org.	Conservation, Education and Advocacy	The Xerces Society is an international, nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. Butterflies, dragonflies, beetles, worms, starfish, mussels, and crabs are but a few of the millions of invertebrates that are essential to the reproduction of most flowering plants, including many fruits, vegetables, and nuts; as well as food for birds, fish, and other animals.	N/A	Direct conservation, education and advocacy, which ultimately promotes wetland restoration because of the strong connection between invertebrates and wetland habitats.

[i] The WRP is authorized by 16 U.S.C. 3837, et seq. The WRP regulations are at 7 CFR Part 1467. The purpose of WRP is to assist landowners in developing and implementing conservations plans for restoration of wetlands previously altered for agricultural use. The emphasis of WRP is to protect, restore, and enhance the functions and values of wetland ecosystems to attain first and foremost, habitat for migratory birds and wetland dependent wildlife, including threatened and endangered species, protection and improvement of water quality, attenuation of water flows due to flooding, recharge of ground water, protection and enhancement of open space and aesthetic quality, protection of native flora and fauna contributing to the Nation's natural heritage, and contribution to educational and scientific scholarship. It applies to land that has been owned for one year and that could be restored to wetland conditions. Landowners may restore wetlands with permanent easements, 30-year easements or 10-year contracts. Permanent easements pay 100% of the agricultural value of the land and 100% cost-share for restoration; 30-year easements pay 75% of the agricultural value and 75% cost-share for restoration; 10-year contracts pay 75% cost-share of restoration only. Permanent or 30-year easements are recorded with property deeds. Ten-year contracts are not recorded with deeds.

[ii] See Conservation of Farmable Wetlands (16 USC Sec. 3831; 7 CFR 1410). The Farmable Wetlands Program (FWP) was initially authorized by the 2001 agriculture appropriations act as a six-State voluntary continuous program to restore up to 500,000 acres of farmable wetlands and associated buffers by improving the land's hydrology and vegetation through CRP. Since then, FWP was expanded to all States with enrollment of up to one million acres, with no more than 200,000 acres enrolled in any one State. USDA Conservation and Environmental Program Division (CEPD) FY 2008 Annual Report at 6.

[iii] Since 2004, the Floodplain Wetlands Restoration initiative has given farmers the opportunity to enroll up to 500,000 acres wetlands and playa lakes that are located in the 100-year floodplain.

[iv] Since 2004, the Non-floodplain Wetland Restoration initiative has given farmers the opportunity to enroll up to 250,000 acres wetlands and playa lakes located outside of the 100-year floodplain.

[v] The Conservation Reserve Enhancement Program (CREP) is voluntary and helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat and safeguard ground and surface water. The program is a partnership among producers; tribal, State, and federal governments; and, in some cases, private groups. USDA Conservation and Environmental Program Division (CEPD) FY 2008 Annual Report at 6. CREP provides incentives to landowners in specified counties of North-Central Iowa to establish wetlands for water quality improvement in the tile-drained regions of Iowa. Enrollment is on a continuous basis. Eligible land must be in one of thirty-seven counties in North-Central Iowa, and must meet the basic eligibility requirements for USDA's Conservation Reserve Program. Eligible lands must be in landscape positions to intercept significant tile flow while not obstructing normal drainage. Landowners will enter a 15-year contract with USDA as under the Continuous CRP. State funds will be used for additional one-time, up-front incentive payments to encourage participating landowners to enter into a required additional 15-year agreement or permanent easement. USDA and State funds will provide for 100% cost-share.

[vi] The Upland Bird Habitat initiative helps producers plant ground covers, shrubs and grasses, to provide appropriate habitat conditions for common upland birds such as sage grouse and northern bobwhite quail. Studies show that these conservation practices have increased the population amongst upland bird species. Up to 250,000 acres can be enrolled.

[vii] The Prairie Duck Habitat initiative was unveiled to increase duck populations by an estimated 60,000 birds annually and to restore 100,000 wetland acres. The program targets improving prairie pothole habitat conditions namely in Minnesota, South Dakota and North Dakota. There are also 127 acres enrolled amongst Kansas, Missouri, and Iowa.

[viii] Launched in 2008, the State Acres For wildlife Enhancement (SAFE) program provides States and regions with the opportunity to locally develop plans that conserve 500,000 acres for high priority wildlife areas. SAFE, like other continuous CRP practices, targets smaller parcels of the most environmentally sensitive land to achieve maximum environmental benefit. See www.fsa.usda.gov.

[ix] Notice CRP-631.

[x] Wetland and buffer goals include re-enrollment of expiring contracts and new enrollments. Wetlands include practice CP9, CP23, CP23A, CP27, CP28, CP30, CP31, CP37, and CP38. The Farmable Wetlands Program (FWP) was amended by the 2008 Farm Bill. Once the statutory changes authorized by the 2008 Farm Bill are implemented, the new practices will be incorporated into the wetland goal. Id at 2.

[xi] For more information contact the USF&WS Iowa Private Lands Coordinator (P.O. Box 399, Prairie City, IA 50228, phone: 515.994.3400).

[xii] U.S. Fish and Wildlife Service Final Apportionment of Pittman-Robertson Wildlife Restoration Funds (CFDA # 15.611) for Fiscal Year 2009.

[xiii] U.S. Fish and Wildlife Service Final Apportionment of Dingell – Johnson Sport Fish Restoration (CFDA # 15.605) Funds for Fiscal Year 2009.

[xiv] Rock Island District, Clock Tower Building, P.O. Box 2004, Rock Island, IL 61204-2004; (309) 794-5379.

[xv] The end point vision of the Outlet Creek Project has two phases: (1) Phase I involves a cooperative effort between the Storm Lake Wastewater Treatment Plant (WWTP), Tyson Foods, Inc. WWTP, and Buena Vista University (BVU) to establish a point-source constructed treatment wetland as tertiary treatment for effluent water entering Outlet Creek. Non-monetary supporting entities for this project are RRWA, IDNR, and City of Storm Lake Administrators. Current efforts are focusing on funding opportunities for a feasibility study that would provide further information for project implementation. If implemented, this project would successfully bio-remediate current Outlet Creek point-source pollution issues as well as restore habitat for wetland organisms; and (2) Phase II involves a cooperative effort between BVU and a private landowner at the confluence of Outlet Creek and Raccoon River for the establishment of a restored wetland for remediation of non-point source pollution. Non-monetary supporting entities are RRWA, IDNR, and City of Storm Lake Administrators. This information comes courtesy of Dr. Melinda Coogan, correspondence dated March 11, 2009. Her email address at Buena Vista University is Coogan@bvu.edu.

[xvi] Contact Todd Hogrefe, Assistant Director, Central Partnership Office at Todd.Hogrefe@nfwf.org. Preproposal Date: 04/15/2009; Full Proposal Date: 06/15/2009; Notification Date: 10/01/2009.

[xvii] Contact Peter Stangel, Director, Science and Evaluation, National Fish and Wildlife Foundation at Peter.Stangel@nfwf.org. Preproposal Date: 04/01/2009; Full Proposal Date: 06/01/2009; Notification Date: 11/30/2009.

[xviii] Contact Ellen Gabel, Program Director, National Wildlife Refuge Programs at Ellen.Gabel@nfwf.org.

APPENDIX F:
U.S. Army Corps of Engineers
Wetland Mitigation Determination Process

The U.S. Army Corps of Engineers (COE) has no officially listed mitigation-to-impact ratios or policy but rather determines appropriate mitigation requirements for each project based on the public interest review, wetland functions, and watershed factors. The following ratios (mitigation : impact) are currently typical in Section 404 permits involving unavoidable wetland losses within the COE's Rock Island District when mitigation takes place within the same basic service area as the impacted wetland:

- Emergent Wetlands (identified as farmed wetlands or wetlands dominated by invasive species such as reed canary grass or purple loosestrife): 1:1 to 1.5:1. Note: Actively-farmed wetlands are the only wetlands that might be mitigated at the minimum of 1:1. Emergent Wetlands dominated by native species, sedge meadows, etc.: 1.5:1 to 2.5:1.

- Typical Forested Wetlands (defined as having > 50% aerial cover of trees): 2:1 to 3:1. (Note: Forested Wetland mitigation may require annual monitoring and reporting for a minimum of 10 years.)

- Difficult to replace wetlands (mature diverse forests, bogs, fens, hillside seeps): No standard ratio. These wetland types are our most unique and diverse and should be preserved. Very rigorous avoidance and minimization are required before compensatory mitigation can be considered. In some cases, permit denial may be appropriate.

The example ratios above include an important assumption: that the mitigation work will occur within the same basic service area as the wetland impacts and involve the restoration or creation of the same type of wetland that is to be lost by the permitted project (a/k/a "on-site, in-kind mitigation"). If the proposed mitigation is to take place outside the basic service area of the impacted wetland, then the mitigation process becomes far more complicated and, usually, far more expensive.

Generally, the most environmentally advantageous definition of an impacted wetland's "service area" of an impacted wetland is simply HUC-8 watershed in which the wetland exists. However, since wetland mitigation within the same HUC-8 watershed is not always practical, the COE may allow mitigation within adjoining watersheds. Wetland mitigation requirements are significantly increased when mitigation is proposed beyond adjoining HUC-8 watersheds or across HUC-6 watershed or any ecological drain units (EDUs) boundaries.

APPENDIX G:
Historical Flood Damage in Iowa

Flood Damage in the United States 1926-2003:
A Reanalysis of National Weather Service Estimates

States Data Set

Total Flood Damage (millions of current US$)

Years*	Iowa
1955	0.035
1956	0.051
1957	1.543
1958	7.508
1959	0.128
1960	7.612
1961	9.389
1962	6.778
1963	0.070
1964	0.240
1965	32.462
1966	0.904
1967	4.416
1968	1.650
1969	6.233
1970	0.977
1971	0.684
1972	13.262
1973	12.724
1974	56.367
1975	7.300
1976	0.160
1977	0.000
1978	0.000
1979	2.000
1980	--
1981	--
1982	--
1983	0.000

1984	600.550
1985	0.050
1986	45.307
1987	16.755
1988	0.000
1989	7.286
1990	351.401
1991	195.703
1992	50.800
1993	5740.000
1994	9.124
1995	3.498
1996	165.265
1997	3.680
1998	168.101
1999	111.221
2000	14.877
2001	33.250
2002	10.990
2003	10.882

* Years from 1955 to 1979 are calendar years, 1983 to present are water years (Oct. – Sept.)
-- denotes missing data
0.000 denotes no estimate was submitted by NWSFO or estimate was less than the current minimum set by NWS ($50,000 in 2002)

Flood Damage in the United States 1926-2003: A Reanalysis of National Weather Service Estimates is a report of the University Corporation for Atmospheric Research, supported by the National Science Foundation, the National Weather Service, and the National Oceanic and Atmospheric Administration, Office of Global Programs, pursuant to an NOAA Award No. NA96GP0451 cooperative agreement. In partnership between the Environmental and Societal Impacts Group of the National Center for Atmospheric Research and the Center for Science and Technology Policy Research, Cooperative Institute for Research in Environmental Sciences, University of Colorado. http://www.flooddamagedata.org/cgi/states.cgi

For more information about this study and ongoing related work, contact:

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Federal Emergency Management Administration Flood Data
http://www.fema.gov/news/disasters_state.fema?id=19

- DISASTER #1518: Iowa Severe Storms, Tornadoes, and Flooding Declared May 25, 2004; Combined Disaster Aid For Iowa Reaches $13 Million

- DISASTER #1705: Iowa Severe Storms, Flooding, and Tornadoes Declared May 25, 2007; $11.3 Million in Disaster Assistance to Iowa for May Storms

- DISASTER #1727: Iowa Severe Storms and Flooding Declared September 14, 2007;

National Flood Insurance Program Claims Paid in Iowa:

NFIP loss statistics show Iowa receiving a total of $223,722,537.84 since 1978. (http://www.fema.gov/business/nfip/statistics/pcstat.shtm)

October 1, 2006 – September 30, 2007 = $3,286,972.51
(http://www.fema.gov/library/viewRecord.do?id=3174)

October 1, 2005 - September 30, 2006 = $2,000
(http://www.fema.gov/pdf/nfip/claimpaymt2006.pdf)

September 30, 2004 – September 30, 2005 = $22,000
(http://www.fema.gov/business/nfip/statistics/totclmpay2005.shtm)

September 30, 2003 – September 30, 2004 = $2,246,000 (http://www.fema.gov/business/nfip/statistics/totclmpay2004.shtm)

Non-Catastrophic Events:

Although non-catastrophic events don't get as much press, serious flooding occurs in Iowa with alarming frequency. Consider the following list of significant flood events: August 30, 1985; October 9, 1985; July 1, 1986; May 26, 1987; June 28, 1990; August 13, 1990; June-August 1993; June 13, 1998; June 28, 1999; April 15, 2001 (just short of the 1993 record of 22.6 feet); June 4, 2002; May 22, 2004; September 15, 2004; May 6, 2007; August 16, 2007; March 17, 2008; May 24, 2008; June 2008; December 26, 2008 (snowmelt). The Dartmouth Flood Observatory, Floods 1985 to Present. See also Eash, D.A., Koppensteiner, B.A., Floods of September 15-16, 1992, in the Thompson, Weldon, and Chariton River Basins, South Central Iowa: USGS OFR 97-122 (1997); Ballew, J.L., and Eash, D.A. (2001), Floods of July 19-25, 1999, in the Wapsipinicon and Cedar River Basins, northeast Iowa: USGS OFR 01-13; Patterson, G., Kolpin, D.W., Kalkhoff, S.J., Lee, K., Schnoebelen, D., Barnes, K.K., and Coupe, R., 2001, It's not just how high; it's how clean: Sampling the spring 2001 flood in the Upper Mississippi River Basin: EPA Watershed Events, EPA 840-B01-001 (Summer 2001); Eash, D.A., 2004, Flood of June 4-5, 2002, in the Maquoketa River Basin, east-central Iowa: USGS OFR 2004-1250 ("Severe flooding occurred on June 4-5, 2002, in the Maquoketa River Basin in Delaware, Dubuque, Jackson, and Jones Counties, following thunderstorm activity over east-central Iowa. The rain gage at Cascade, Iowa, recorded a 14-hour rainfall of 6.0 inches at noon on June 4. Radar indications estimated as much as 8 to 10 inches of rain fell in the upper-middle part of the Maquoketa River Basin. Peak discharges on the Maquoketa River at Monticello of 47,500 cubic feet per second (recurrence interval estimated to be greater than 500 years as computed using flood-estimation equations developed by the U.S. Geological Survey), and at the Maquoketa River near Maquoketa streamflow-gaging station of 47,900 cubic feet per second (recurrence interval about 50 years), were determined for the flood. The peak discharge of the 2002 flood is nearly equal that of the 1944 flood (48,000 cubic feet per second), the largest flood on record in the Maquoketa River Basin. The 2002 flood is the largest known flood in the North Fork Maquoketa River Basin. A peak discharge of 22,600 cubic feet per second (recurrence interval about 110 years) was determined for the flood at the North Fork Maquoketa River near Fulton gaging station. Information about the basin and flood history, the 2002 thunderstorms and associated flooding, and a profile of high-water marks are presented for selected reaches along the Maquoketa and North Fork Maquoketa Rivers."); Eash, David, Flood of May 23, 2004, in the Turkey and Maquoketa River Basins, northeast Iowa U.S. Geological Survey Open-File Report 2006-1067 ("Severe flooding occurred on May 23, 2004, in the Turkey River Basin in Clayton County and in the Maquoketa River Basin in Delaware County following intense thunderstorms over northeast Iowa. Rain gages at Postville and Waucoma, Iowa, recorded 72-hour rainfall of 6.32 and 6.55 inches, respectively, on May 23. Unofficial rainfall totals of 8 to 10 inches were reported in the Turkey River Basin. The peak discharge on May 23 at the Turkey River at Garber streamflow-gaging station was 66,700 cubic feet per second (recurrence interval greater than 500 years) and is the largest flood on record in the Turkey River Basin. The timing of flood crests on the Turkey and Volga Rivers, and local tributaries, coincided to produce a record flood on the lower part of the Turkey River. Three large floods have occurred

at the Turkey River at Garber gaging station in a 13-year period. Peak discharges of the floods of June 1991 and May 1999 were 49,900 cubic feet per second (recurrence interval about 150 years) and 53,900 cubic feet per second (recurrence interval about 220 years), respectively. The peak discharge on May 23 at the Maquoketa River at Manchester gaging station was 26,000 cubic feet per second (recurrence interval about 100 years) and is the largest known flood in the upper part of the Maquoketa River Basin."); 2004 Global Register of Major Flood Events: www.dartmouth.edu (The September 2004 flood affecting both Minnesota and Eastern Iowa cost approximately $12,000,000 in damages.); Fischer, E.E., and Eash, D.A., 2008, Flood of May 6, 2007, Willow Creek, West-Central Iowa: U.S. Geological Survey Open File Report 2008–1229.

Flood Damage in the United States, 1926–2000, Roger A. Pielke, Jr., Mary W. Downton, and J. Zoe Barnard Miller (Environmental and Societal Impacts Group National Center for Atmospheric Research, June 2002), at 55-58. See also, *The Extreme Weather Sourcebook: Economic & Other Societal Impacts Related to Hurricanes, Floods, Tornadoes, Lightning, & Other Weather Phenomena* (http://www.sip.ucar.edu/sourcebook/floods.jsp). *The Extreme Weather Sourcebook* is a collection of data on severe weather events acquired from Roger Pielke, Jr. and his colleagues at the Center for Science and Technology Policy Research at the Cooperative Institute for Research in Environmental Sciences. (Based on flood data from 1955–2006, the Sourcebook ranks Iowa 6th nationwide with total damages of $10,980,550,000 and total wealth adjusted damages of $16,426,840,000 adjusted for inflation to $2006 U.S.); www.iowadnr.gov/education/plndwr.html ("Studies in the Midwest have shown flood levels in watersheds with 30 percent wetland coverage were reduced by 80 percent compared to watersheds without wetlands. Prevention of flood damage can result in considerable savings. Nationally, clean up and repairs from flooding costs about $1 billion annually. The record Iowa flood of 1993 most likely would have had less impact on downstream residents had sizable numbers of wetlands been present upstream."). See also Appendix A.

Flood Damage Reduction in the Upper Mississippi River Basin: An Ecological Alternative, Donald L. Hey, Ph.D., Deanna L. Montgomery, and Laura S. Urban of The Wetlands Initiative; Tony Prato, Ph.D. University of Missouri-Columbia; Andrew Forbes, Mark Martell, Judy Pollack, Yoyi Steele, and Ric Zarwell of Audubon (August 6, 2004) ("Currently, in Iowa, 32 percent of the sampled flood zone (577,000 acres across 25 counties) is underlain by hydric soil or NWI wetland indicating that at least this much of the flood zone once existed as wetlands. If these wetland areas as well as the existing levees were managed to store water an estimated 2.0 million acre-feet of water could be contained in the sample flood zone. If this flood storage calculation is extrapolated to the entire UMRB 100-year flood zone in Iowa, an estimated 10 million acre-feet of water could be stored…. Estimated total annual net benefit of cropland conversion of all counties in the study in Iowa is $64,510,667 or $88.34 per acre. It appears, therefore, that society would be better off if cropland acreage in the 100-year flood zone in the study area was converted to wetlands than if it remained in cropland."); Ecosystem Services Derived from Wetland Conservation Practices in the United States Prairie Pothole Region with an Emphasis on the U.S. Department

of Agriculture Conservation Reserve and Wetlands Reserve Programs, Chapter D Floodwater Storage at 31-37 (USGS November 2008); NRCS CEAP Conservation Effects Assessment Project Prairie Pothole Regional Studies November 2008 ("Wetlands on program lands have significant potential to intercept and store precipitation that otherwise might contribute to downstream flooding; conservatively estimated, wetland catchments on program lands could capture and store an average of 1.1 acre-feet of water per acre of wetland.")

"Proposal for twin levees stalled because Cedar Rapids and the federal government disagree over how much economic punch a levee-protected Cedar Rapids would bring over the next 50 years. 'We aren't guaranteeing protection,' said Ron Fournier, spokesman for the U.S. Army Corps of Engineers in Rock Island, Ill. The June 2008 flood caused $6 billion in damage in a 10-square-mile area of the city. In all, 7,782 properties were flooded to some degree, including 4,800 homes. The city wants $500 million from the federal government for levees along both sides of the Cedar River as it slices through town. The government follows a formula for such projects to make sure tax money is spent wisely. But state and local leaders say the formula has undervalued the economic, historical and cultural worth of a wide swath of a city that's the heart of one of Iowa's few growth areas. To meet the Corps of Engineers' formula, the project would have to produce at least $500 million in benefits over the 50-year life span of the levees, Fournier said." (Des Moines Register, March 7, 2010)

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