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Decision-Making For Prairie Wetland Restorations

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DECISION-MAKING FOR PRAIRIE WETLAND RESTORATIONS

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Abstract. *Assessments of wetland restorations in the prairie region are not done routinely and no accepted assessment framework exists. Wetland assessment protocols in the U.S. have varied over time from those emphasizing social significance to those attempting to quantify functions of wetlands from hydrogeomorphic considerations. A conceptual framework for restoration decision-making is presented that is based on optimizing wetland restoration success at both the landscape and site scales. This framework uses societal concerns, knowledge of factors that limit ecosystem recovery, and data on losses of different types of wetlands locally and regionally to establish restoration goals and guide site selection. These goals in turn generate restoration expectations or targets. Currently, restoration expectations are usually formulated only at the basin scale. Prairie pothole wetlands, however, were historically part of wetland complexes. Consequently, restoration efforts should focus on restoring complexes not isolated wetlands. Wetland restoration decision-making thus requires that landscape-level restoration*

expectations be part of all prairie pothole restorations. Landscape-level expectations should also be used in the assessment of these projects. Reference wetlands or historic data from the wetland and wetland complexes to be restored are used to develop these restoration expectations.

Restoration is often viewed as a way to ensure the perpetuation of natural ecosystems, in spite of their continuing conversion for cultural uses. Consequently, public policy devised to reverse wetland loss within the U.S. has relied on restoration as an essential strategy (NRC 1992). About 36,000 ha of wetlands were restored (1987-1990) through voluntary incentives enabled by the 1985 Food Security Act alone, i.e., the Conservation Reserve Program (CRP) (Dahl and Johnson 1991). Additional wetlands were restored or created nationwide as mitigations mandated under Section 404 of the Clean Water Act. State programs have also supported wetland restoration; for example, 2,558 ha were restored between 1986 and 1995 as part of the Reinvest-in-Minnesota (RIM) program to enhance habitat (MBWSR 1997). If quantity is the standard, clearly these programs have made a significant contribution to maintaining the U.S. wetland base.

The quality of these restorations, however, remains largely unknown. Post-construction evaluations of individual projects commonly consist only of confirming that removal of drainage systems (e.g., ditches and tiles) was successful, i.e., the restored wetland holds water, and dikes and other water control structures have not failed. If specified as a permit condition, wetland mitigation projects, common in urban areas and within major transportation corridors, also include a post-construction assessment of their vegetation to determine whether the project has met permit requirements. Within the prairie pothole region, where mitigation projects are uncommon, absence of routine evaluations is due in large part to the widespread assumption that restored wetlands quickly come to resemble their natural counterparts (e.g., LaGrange and Dinsmore 1989; Madsen 1988). Several studies, however, have challenged this notion (Delphey and Dinsmore 1993; Galatowitsch and van der Valk 1995, 1996a, 1996c). For example, Galatowitsch and van der Valk (1996a) reported that sedge meadow vegetation at the margins of restored wetlands often does not become re-established and suggested that planting of this vegetation may be needed to re-establish it. The extent to which recovery can be maximized with more careful site selection or by improved design is unexplored.

Site selection within the prairie pothole region has generally been a function of landowner interest and has not taken into account what is known about presettlement wetlands (Galatowitsch and van der Valk 1996c). Because of the inherent limitations of project-by-project restoration planning (Preston and Bedford 1988), current restoration decision-making in the prairie pothole region resulted in restoration of isolated wetlands rather than wetland complexes containing diverse wetland types that existed historically. Wetland complexes existed in the prairie glacial landscape as a repeated pattern of few, larger, deeper marshes surrounded by a more extensive network of smaller, shallower marshes, meadows, and swales (e.g., Winter 1988; Swanson and Duebbert 1989). The hydrological connections between basins facilitated plant propagule dispersal, ensured refuge for amphibians during drought periods, and created a diversity of habitat needed between spring and fall migration for birds. Failure of restoration programs to re-establish wetlands in complexes with associated diversity resulted in groundwater hydrology and plant and animal communities that do not resemble those of high-quality natural wetlands. If the purpose of doing restorations includes replacing lost biological diversity and re-establishing hydrology, then it will be necessary to restore wetlands as part of larger complexes.

Site design in the prairie pothole region has often been based on project-specific goals (e.g., NRC 1992; Yozzo et al. 1996). Wetlands are designed to achieve goals that are typically influenced by societal concerns (e.g., non-point source pollution, inadequate habitat for game species, flooding). Although project-specific goals and designs are critical, these goals can and should be formulated at several different scales. Site and landscape scales are most critical. At landscape scales, the primary goal should be to restore wetland complexes. Ideally, all of the wetlands originally found in a locale should be considered for restoration, resulting in clusters of wetlands, from ephemeral to permanent. At the site scale, uptake of nutrients or establishment of a certain kind of plant or animal communities may be appropriate primary goals.

A better decision-making framework is needed and should be based on optimizing wetland restoration success at both the landscape and site scales. This framework should use societal concerns, knowledge of factors that limit ecosystem recovery, and data on losses of different types of wetlands locally and regionally to establish restoration goals and guide site selection. Because information relating restoration success to site selection and design decisions is minimal in the prairie pothole region and elsewhere (e.g., Clewell and Rieger 1997), this decision-making framework must include a feedback loop that allows what has and has not worked to be incorporated in future restoration efforts. An effective decision-making framework would make it possible to: 1) select locales with greatest potential for successful restoration of wetland complexes; 2) consider effects of wetland complexes on recovery rates when designing projects; and 3) correct problems with existing restoration projects, i.e., determine needs for additional interventions (selective planting of species, hydrological alterations, soil amendments, etc.). While societal concerns are component of each decision step, they are most critical to site selection. Restoring complexes will often require greater coordination (and even consensus) among landowners than does the restoration of small, isolated basins.

A comprehensive decision-making framework including an assessment feedback loop has not developed in the prairie pothole region for several reasons. Most incentive programs (e.g., CRP, RIM, WRP) rely on landowner proposals to select most sites. Solicitations that encourage owners to nominate their lands have efficiently identified willing participants. Since enrollments often exceed resources, other factors, such planning by property units and miminizing the time and money spent on each project, also have limited development of decision-making tools. Previous attempts to develop such assessment frameworks have be done as part of large-scale and long-term restoration projects such as the restoration of the Kissimmee River (see Dahm 1995), which will take decades to complete and have budgets of hundreds of millions of dollars. Individual prairie pothole restoration projects are simply too small to warrant any kind of elaborate assessment of their success or failure. Such an assessment potentially could cost more and require more personnel than completing an individual project. Considered cumulatively, however, the time and money invested in prairie wetland restoration has been significant enough to reconsider ad-hoc decision-making. If an assessment process results in a restoration plan for a complex, even a gradual basin by basin implementation of the plan over time improves the likelihood of successful restoration for each wetland.

Although many tactical decisions need to be made at the site scale, re-establishing prairie pothole complexes requires strategic decisions (allocation of resources) be made at the landscape scale (Landers 1997, in part). In this paper, we propose a comprehensive decision-making framework for wetland restoration in the prairie pothole region. The proposed approach attempts to focus both restoration decision-making and assessment more on the landscape-level rather than on the individual basin. It is our belief that wetland restoration will be most successful and beneficial in the prairie pothole region if it focuses on restoring pothole complexes rather than isolated prairie potholes.

Landscape Approaches to Restoration Site Selection and Planning

Recently, several different watershed-based analyses have been developed to prioritize wetland restorations in floodplains (Kershner 1997; Nehlsen 1997; Harris and Olson 1997; Olson and Harris 1997; Russell et al. 1997). Interest in landscape approaches to riparian site selection stemmed from evaluations of past restorations showing that ecological performance was typically governed by location (Kentula 1997). These approaches have much to offer restoration decision-making for prairie potholes. For example, Nehlsen (1997) prioritized five major watersheds in the Tillamook Bay Basin (Oregon) for watershed restoration and salmon recovery. High priority watersheds for restoration were considered those with best remaining examples of critical habitat and those with above-average salmon populations. Because not all locations are appropriate for restoration of complexes, it will be necessary to identify where chances of success are greatest. If complexes become the focus of restoration efforts in the prairie pothole region, priorities will likely need to be established to that ensure greater effort in fewer locales is justified. The approach used to prioritize locations can be modeled after these successful riparian restoration efforts.

Once areas for restoration are selected, developing strategic plans that facilitate landscape-scale restorations will be necessary. Restoration strategies were developed for watersheds in Oregon and Utah using a seven-step evaluation conducted by interdisciplinary teams of resource specialists and researchers (Kershner 1997). Each watershed team:

1) developed a coarse description of interactions between physical, biological, and human aspects of the watershed,
2) identified issues,
3) documented current status of variables that are key indicators of system condition,
4) described reference conditions,
5) established measurable objectives to serve as benchmarks for comparing current conditions to those desired following restoration,
6) compared current and desired conditions (benchmarks) to determine restoration prescriptions,
7) provided specific recommendations to managing agencies.

In restorations, comparing feasibility of specific restoration sites within a landscape is critical. Harris and Olson (1997) and Olson and Harris (1997) categorized restoration needs and priorities for stream reaches (California) by comparing landform (from topographic maps) and vegetation structure (from aerial photographs) to local reference conditions. Russell et al. (1997) also ranked restoration feasibility based on image interpretation, but used digital elevation models and land cover themes incorporated into a geographic information system (GIS). Similarly, there is a need in the prairie pothole region to select the most restorable complex units within the larger landscape.

Although concerns about detecting and correcting cumulative impacts due to wetland losses at various landscape scales existed since the late 1970s (Johnston 1994; Preston and Bedford 1988), landscape-level goals and assessments of restorations are still rare. Tracking wetland abundance and condition are increasingly practical as geographic information systems (GIS) become more readily available, easier to use, and less expensive (Johnston 1994). The time and expense to digitize maps and other information sources, however, remain major obstacles (NRC 1995). A GIS can also be used to estimate types and abundances of historic wetlands in a region from soil maps, even if these wetlands have been mostly lost due to drainage (Galatowitsch and van der Valk 1994; Detenbeck et al. in press.). Historic information about types and abundances of wetlands in an area can be used to develop landscape-scale restoration expectations for, and to make landscape-level assessments of, success of wetland restorations. For example, historic wetland patterns in combination with existing land use can suggest where the potential exists to support area sensitive species, such as short-eared owls and sandhill cranes, that require expansive areas of wet meadows. Likewise, the locations of large, semi-permanent wetlands, ideal for nutrient capture and processing can be identified from coverages of historic wetlands.

Gap analysis, using a GIS, has been developed as a comprehensive planning approach for assessing species conservation needs over large geographic regions (Scott et al. 1987, 1993). Vegetation maps, species-habitat associations, and geographic ranges of species are incorporated into models that are used to predict species distributions in order to identify which ones lack adequate protection and where habitat gaps occur. The results of gap analysis for plants and animals of special concern (e.g., waterfowl) should be useful for identifying locations where restoration could provide a critical enhancement of existing habitat and also provide some direction regarding restoration priorities for specific areas.

Landscape planning techniques have not been used for wetland restorations long enough (if at all) to assess their strengths and weaknesses. Such an evaluation will also need to consider ecological effectiveness, attention to social concerns, costs and practicality.

Wetland Assessment Approaches

An effective framework for prairie wetland restorations needs to rely on assessments that yield information that can be used as feedback to improve individual wetlands as well as complexes. Until recently, wetlands in the U.S. have most often been assessed by demonstrating functions that have been attributed generally to wetlands (Brinson et al. 1994; Adamus 1983; Adamus et al. 1987). Although these assessment protocols were not originally developed to evaluate restored wetlands, they have been adapted for this purpose. The most prevalent assessment framework is the WET (Wetland Evaluation Technique) (Adamus et al. 1987) or Adamus system. Easily observed attributes (e.g., vegetation, surface inlets and outlets) and landscape position are used to estimate whether a wetland has a high, medium, or low probability of performing certain functions. Lists of functions include both ecosystem processes (e.g., denitrification) and social values (e.g., nutrient removal), which sometimes causes confusion. Additional problems arise when valuable social use (e.g., trapping sediment) eventually destroys the restored wetland. This results in the paradox that wetlands having the "opportunity" to receive polluted water and become degraded in the process of removing pollutants will be rated more highly than pristine wetlands. The WET assessment approach has several other shortcomings. First, relationships between wetland structure (observed) and function (inferred) are based on varying levels of certainty. Some relationships are well-documented, others are speculative. Second, a low rating has multiple meanings: (a) the wetland has no opportunity to perform a function; (b) the wetland is degraded and its functional capacity is reduced; or (c) the wetland, because of its type, is not expected to have a certain function. Third, this approach was intended for individual wetlands; landscape-scale considerations cannot be directly addressed, e.g., the significance of adjacent wetlands.

A second generation of assessment techniques is currently being developed in the U.S. Hydrogeologic (Hollands 1987) or hydrogeomorphic

(HGM) (Brinson et al. 1994) assessment methodologies are based on the premise that hydrology is the most important determinant of wetland functions (e.g., Winter and Woo 1990; Winter 1992). Wetlands are grouped by geomorphic setting, sources of water, and within basin water dynamics in order to develop a relevant list of functions for a given type of wetland. The ultimate goal is to develop regional assessment tools in which the functions of a specific type of wetland are clearly and logically linked to wetland hydrogeomorphic properties (Brinson et al. 1994). For example, temporary and seasonal prairie potholes in northeastern Montana, North Dakota and eastern South Dakota are being proposed as an HGM sub-class. Retention of particulates, cycling of elements and compounds associated with agricultural runoff, floodwater storage, breeding isolation for waterfowl, groundwater recharge, and food-web productivity are all functions that have been attributed to this subclass. Such functional assessments for restored wetlands are made relative to those measured in a set of reference wetlands by wetland type (Brinson and Rheinhardt 1996). Reference wetlands are relatively pristine sites selected to encompass the range of variation found in extant examples of each wetland type.

One problem with the use of the HGM framework for restoration assessment is that some post-construction problems are not related to hydrogeomorphic processes. For example, restoration can be limited by highly altered soils, exotic plant invasions, and altered predator-prey dynamics (NRC 1992; Fleskes and Klaas 1991), that may or may not be even indirectly related to hydrology. For example, nesting habitat for the clapper rail (*Rallus longirostris levipes*) was not restored to Sweetwater Marsh (California) because plant productivity was severely limited by low soil organic nitrogen (Langis et al. 1991; Zedler 1993). Budelsky et al. (1997) found that *Carex lacustris* and *Carex stricta* re-establishment could only be predicted in prairie wetland restorations when the invasive perennial, *Phalaris arundinacea* was not present. In the presence of this perennial competitor, vegetative expansion was minimal for *Carex* spp. across all hydrologic conditions.

Using reference wetlands to establish assessment benchmarks is clearly a significant improvement over generic criteria. Benchmarks for prairie wetland restorations need two modifications of HGM: reference complexes rather than individual sites need to be the assessment focus and metrics are needed that are not only a reflection of site hydrology. An effective framework for prairie wetland restorations needs to rely on assessments that yield information that can be used as feedback to improve individual wetlands as well as complexes.

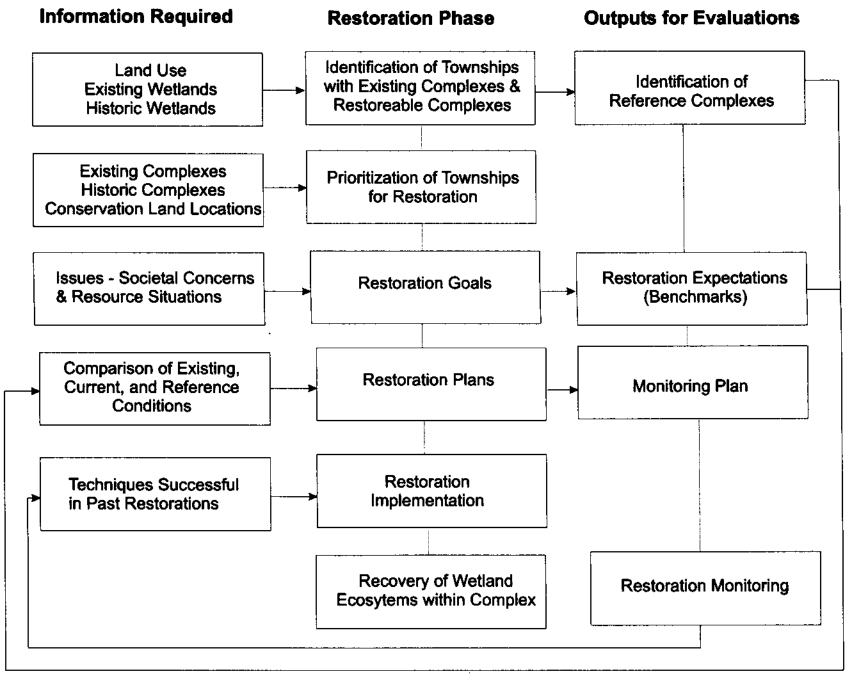

Figure 1. Framework for wetland restoration decision making.

Decision Framework for the Prairie Pothole Region

In Figure 1, we propose a comprehensive restoration decision-making framework. The primary goal is assumed to be the restoration of prairie wetland complexes since this strategy can potentially result in the greatest overall functional gains to hydrology, plant and animal habitat, flood attenuation, and improvement of water quality within a region. At the landscape scale, prairie pothole complexes that can feasibly be restored need to be identified and their priority for restoration established. For complex areas selected, specific goals should be developed based on issues identified for each complex (including societal concerns and special natural resource opportunities) and a comparison of current, reference, and historic conditions there. Plans to implement these goals need to reflect evaluations of past similar efforts. After implementation, all complexes need to be monitored to improve what is known about effective restoration strategies. Below we discuss our recommendations for planning and site selection, goal setting, and assessments of restorations at the landscape level of this framework. Information on planning and implementing prairie pothole restorations at the site scale is covered in Galatowitsch and van der Valk (1994).

Planning Units

Since complexes do not exist as tracts of land that can be delineated, establishing planning units is somewhat arbitrary. Townships (36 square miles) can be useful planning units for two reasons. First, land units between nine and 36 square miles (township), exhibit a consistent pattern in wetland abundance and types (Galatowitsch and van der Valk 1996b). Second, many natural resource and agriculture databases catalog information using townships and sections.

Landscape units based on distinctive environmental boundaries, such as watersheds or ecoregions, may at first seem more relevant for restoration planning, but in reality, present implementation challenges in the prairie pothole region. Watersheds are logical planning units in landscapes where drainage patterns are well-developed and where primary goals of restoration are to support aquatic organisms (e.g., riparian wetlands) or improve downstream water quality (van der Valk and Jolly 1992). In the prairie pothole region (as well as other areas of recent glaciation, deep sand, karst topography), watersheds are less applicable because drainageways are not fully integrated and groundwater processes do not conform to surface topography (Hughes and Omernik 1981). As importantly, semi-terrestrial rather than aquatic biota are the prime focus of restoration efforts in the prairie pothole region; their movements do not conform to watersheds. Drainage divides within the prairie pothole region occur in the areas with the highest relief and consequently create boundaries through areas with the greatest wetland diversity (Fig. 2).

Ecoregions have been proposed as landscape units for restoration assessment and planning and resource management of all types (e.g., Omernik and Bailey 1997; Bedford 1996; Abbruzzese et al. 1988; Brooks and Hughes 1988). Ecoregions are physiographic units based on surficial geology, landform and land cover (Omernik 1987). Consequently, regional differences in wetland hydrology, biogeochemistry, and biodiversity should occur among ecoregions (Bedford 1996). Three ecoregions constitute the prairie pothole

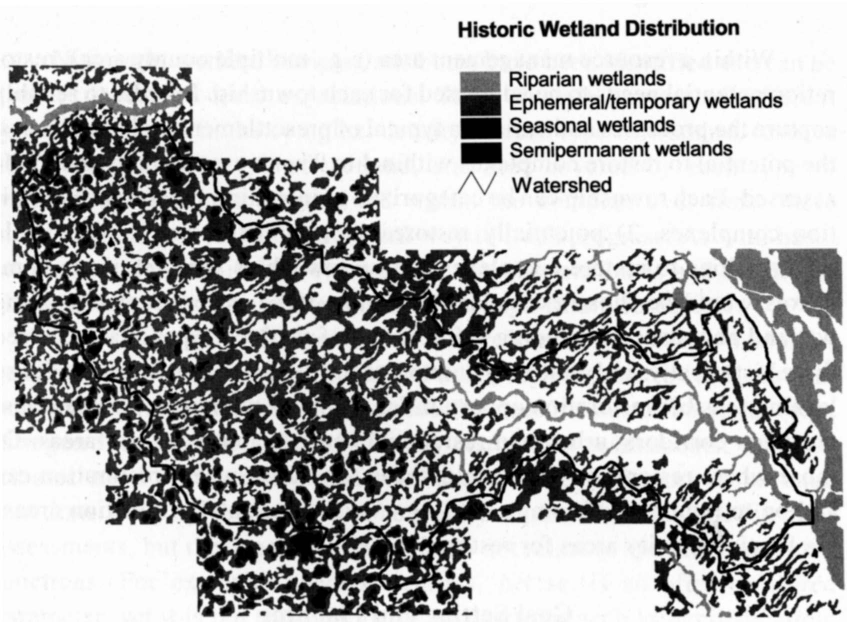

Figure 2. The historic distribution of wetlands is shown for the Walnut Creek watershed and the immediate vicinity (Story County, Iowa). Presettlement wetland class was determined from soil map units following Galatowitsch and van der Valk (1994).

region: Northwestern Glaciated Plains, Northern Glaciated Plains, and Western Cornbelt Plains (CEC 1997). Precipitation excess, soil fertility and the extent of cropland increases from the Northwestern Glaciated Plains to the Western Cornbelt Plains. Although restoration decisions ideally should also be made at this level, it is highly unlikely that this can be done in the near future. The amount of data that needs to be collected and integrated to make decisions at this scale is prohibitive; but it is a worthy goal. Keeping track of where wetlands are restored may be feasible at the regional scale. For most restoration programs, except those focused on water quality improvement, the township scale is the recommended planning unit.

Selecting Complexes to Restore

Within a resource management area (e.g., multiple county area), restoration potential needs to be addressed for each township. In order to reliably capture the processes and variation typical of presettlement prairie potholes, the potential to restore complexes within 4 to 9 square-mile tracts should be assessed. Each township can be categorized as including 1) reference-condition complexes, 2) potentially restoreable complexes, or 3) no feasible opportunities to restore complexes. Those townships with reference complexes would be those exemplary (e.g., top 10%) in terms of remaining wetland abundance, including a full range of wetland types that occurred there historically, and relatively unimpacted by land use and drainage. Those lacking feasible restoration opportunities are those with high volume transportation corridors, urban and residential centers, and industrial areas. Of those where restoration is possible, those townships where restoration can add on to remnants of complexes (e.g., small waterfowl production areas) are logcial priority areas for restorations.

Goal Setting and Planning

While township areas are too large to restore most wetlands that existed there historically, their size affords some flexibility when developing strategies for recreating or expanding complexes. At this scale, techniques such as the team approach to watershed evaluation used by Kerschner (1997) for riparian restorations in Oregon and Utah provide a useful model for decision-making. Societal concerns and natural resource opportunities especially need to be identified and incorporated into the decision-making process. For example, issues that need to be addressed for a township in southern Minnesota may include high nitrates in rural wells, low waterfowl production, and declining amphibian populations. Identifying interactions between human and biophysical aspects of the township planning area is important for determining most promising locations for wetland restorations. For example, wetlands for nutrient removal need to be sited where they will intercept tile or ditch drainage and need to be large enough to handle loads of nutrients entering them (van der Valk and Jolly 1992). In contrast, amphibian populations will be best supported by large contiguous blocks of wetland and grassland, with minimal road development (Lehtinen et al. in review.). Corresponding restoration expectations or benchmarks should be measureable and meaningful attributes of a complex.

Establishing Baseline Conditions and Assessing Success

Numerous wetland complex attributes have been identified and can be used as landscape-level expectations. These include number of different types of wetlands in the complex, density of each type of wetland, relative abundance of each type of wetland, and area covered by each type of wetland. As wetlands are restored within the complex over time, these attributes represent a straightforward way to track progress. As with basin attributes, relationship between wetland complex attributes and functional characteristics remain to be established through future research.

Useful long-term data set collected at reference wetlands is useful for gauging pre-restoration conditions and assessing progress towards restoration expectations. It is rarely feasible to measure most functions (e.g., nitrogen fixation rates) directly during restoration assessments; thus, attributes need to be easily measured and reliable indicators of wetland functions. Only attributes that can be readily measured are included in most assessments, but these parameters often do not relate to specific ecosystem functions. For example, species richness, per se, is an often-measured parameter, yet it is not related directly to functions such as denitrification, waterfowl recruitment, sediment trapping, or flood attenuation.

Restoration expectations are often depicted as response curves (rather than single numbers) that show predicted values of wetland attributes over time (Fig. 3). These curves differ by wetland class and size and for different attributes. For each curve, a range needs to be specified because there is often a significant amount of variation in wetland attributes among similar wetlands. Also, values of many attributes fluctuate reflecting weather conditions and periodic disturbances such as grazing or fire.

Attributes should be used because they have been validated by ecosystem research not solely because they are convenient for a rapid assessment protocol. Identification of useful and reliable indicators of wetland function need to be developed for the prairie pothole region. For example, soil organic matter can be easily measured and is widely presumed to be an indicator of a wide range of wetland functions, including denitrification, phosphorus retention, success of re-establishing many plant species, invertebrate production, etc. It is often low in newly restored wetlands because of years of cultivation of the basin prior to restoration (Galatowitsch and van der Valk 1996c). Unfortunately, relationships between organic content of soils and wetland functions have not been quantified or assessed.

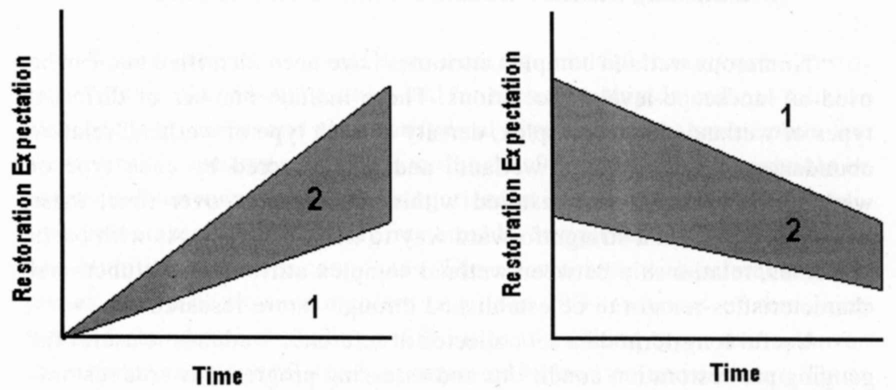

Figure 3. Hypothetical restoration expectation response curves for two wetland attributes that were derived from reference wetlands. The shaded area contains the range values for an attribute found at a given time in the development of the reference wetlands. Measured values of these two attributes from two restored wetlands indicate that restored wetland 1's attributes are significantly different from those of the reference wetlands while restored wetland 2's attributes have values comparable to that found in reference wetlands.

Reference Wetland Complexes

Reference wetlands should be studied as components of complexes (*sensu* White and Walker 1997). To better understand how wetlands in a complex interact in a variety of contexts, we need to identify reliable indicators of the status of complexes; i.e., how well the complex functions as habitat and as a hydrologic unit. Thus, it is necessary to establish reference wetland complexes, not just reference wetlands for establishing restoration expectations. It is impossible to generate realistic landscape-level restoration expectations and to make landscape-level assessments unless reference wetland complexes are available. Many different reference wetland sets are needed to capture the variation in hydrologic regime, water chemistry, and size typical of wetlands in the prairie region (Brown and Dinsmore 1986; Whited et al. in review.). Periodic (i.e., annual to every few years) monitoring of reference wetlands is needed because changes in wetland characteristics due to climatically-driven cycles or regional environmental degradation can affect the characteristics of extant wetlands.

Conclusions

Wetland restoration decision-making in the prairie pothole region can be improved in a number ways. First, a more comprehensive framework for decision making is needed that takes into account societal concerns and historic and reference information about the regions' wetlands. Both restoration goals and restoration expectations need to be formulated on at least two different scales, basins and wetland complexes. Although many wetland restoration goals and expectations can be formulated at and assessments can be done at the basin-scale, basin-level decision making will not result in the restoration of landscapes that resemble those that were found in the region prior to widespread drainage. All prairie potholes were historically part of complexes in which wetlands were linked to each other hydrologically and where plants and animals relied on the variable resources available. Thus, the wetland complex needs to become the unit that is being restored, not individual basins. An isolated restored wetland is not functionally equivalent to the same wetland when part of a restored wetland complex. Shifting to restoring wetland complexes requires that strategies be revised for soliciting cooperating landowners. Managers need to be pro-active more often when selecting restoration sites than is the norm for smaller sites. Currently, restoring very large wetland basins usually requires managers gain approval from many adjacent landowners. While the process may be slow, the opportunity to restore a very large wetland is significant. The opportunity to restore a wetland complex likewise justifies the considerable logistical challenges associated with gaining support from multiple owners.

In addition, assessments of wetland restorations should be done using restoration expectations or benchmarks. These are ecologically and societally important predicted attributes of a fully restored wetland or wetland complex. Measured attributes of restored wetlands or wetland complexes collected as part of the monitoring of these wetlands or wetland complexes are compared to restoration expectations to determine the status of the restored wetland or complex. While these data will be of primary value to improving managers' decision-making, the public will also have agreater appreciation for, and confidence in, restoration efforts if successes (and failures) are documented. The lack of information on past wetland restorations likely hinders development of compelling arguments to continue and expand programs. Federal, state, provincial, and local legislators are likely to be more supportive if restoration programs have demonstrated their actual (not presumed) benefits. Likewise, landowners may be more likely to understand why a manager is interested in one part of their property, but not another. Complete assessments will also provide new opportunities for demonstrating how restored wetlands can provide multiple functions and values, critical to widespread public support.

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