DRAFTED 11/1999, revised 12/2000

Society of Wetland Scientists

Position Paper on Performance Standards for Wetland Restoration and Creation

POSITION STATEMENT: The Society of Wetland Scientists recommends that 1) wetland restoration and creation project-planning documents should include clearly articulated performance standards that are based on the best available science and that reflect the structural and functional objectives of projects and 2) research linking performance standards to wetland function should be encouraged.

SCALE OF ISSUE: International

PERFORMANCE STANDARDS DEFINED: The Society of Wetland Scientists defines performance standards as measurable attributes of restored or created wetlands that, when measured over an appropriate period, can be used to judge whether project objectives have been met. Performance standards have also been called "success criteria," "success standards," "release criteria," and other names.

BACKGROUND: Wetland restoration and creation are used increasingly as a means of compensating for planned or past wetland losses around the globe (e.g., Streever 1999a). However, for almost 20 years, wetland professionals involved with restoration or creation have lamented the general absence of clear and unambiguous objectives for wetland projects (Race and Christie 1982, Race 1985, Erwin 1990, Streever 1997). More recently, wetland professionals have recognized a need for clearly articulated performance standards.

Despite this recognized need, planning documents for many wetland projects do not include performance standards (see Table 6-3 in Kentula et al. 1993 and Streever 1999b). When performance standards are included, they may not address wetland function adequately, leading to a gap between what has been called "compliance success" and "functional success" (Quammen 1986). Furthermore, there is no clear guidance regarding the appropriate duration of performance-standard monitoring. Because little research has targeted the development and application of performance standards specifically, wetland restoration and creation project stakeholders attempting to establish performance standards have had to rely on a combination of best professional judgment and precedents set by other projects.

No comprehensive summary of performance standards used in wetland restoration and creation has been produced. However, a recent review of over 300 wetland permits from various regions in the United States determined that there are no universally applied performance standards for restoration and creation required under Section 404 of the U.S. Clean Water Act (Streever 1999b). The review identified seven distinct approaches to performance standards:

1) requirements for survival of planted stock;
2) requirements for plant density or percent cover;
3) requirements that are staged over time so that different performance standards must be met as the project matures;

4) requirements that specifically reference the 1987 Corps of Engineers Wetlands Delineation Manual;
5) requirements calling for specific scores on various wetland assessment scales;
6) reliance on natural reference wetlands or other sites as a benchmark; and
7) requirements specifically limiting occurrence of exotic or nuisance plant species.

In some cases, requirements called “performance standards” or “success criteria” were, in fact, guidelines for construction methods or planting techniques rather than measurable attributes that can be used to judge whether project objectives have been met.

SCIENTIFIC CONSIDERATIONS: There is a growing literature showing that restoration and creation projects do not consistently replace lost wetland structure and function (for example, Erwin 1992, Zedler 1998, Minello 2000, Streever 2000). In addition, there is an increasing body of evidence showing that some wetland attributes of natural and restored or created wetlands may be similar, while others may be different, and that different wetland attributes develop at different rates (Galatowitsch and van der Valk 1996, Simenstad and Thom 1996, Streever et al. 1996, Galatowitsch et al. 1999, Zedler and Callaway 1999, Streever 2000). The realization that restoration and creation projects are not replacing lost wetland structure and function consistently, coupled with the understanding that no one attribute captures the full character of a restoration or creation project, underscore both the importance and the challenge of developing appropriate performance standards.

RECOMMENDATIONS FOR PERFORMANCE STANDARDS: Despite the need for further research, currently available research results and experience with restoration and creation projects offer useful insights on performance standards, summarized as follows:

1) stakeholders should carefully consider project objectives and the link between these objectives and performance standards;
2) as a general rule, performance standards should be monitored for a minimum of 5 years or until the standards have been met for at least 3 consecutive years;
3) if wetland assessment techniques have been developed for the wetland type that is to be restored or created, they may provide at least a useful starting point for discussion of performance standards;
4) because hydrology is a key factor driving wetland function, performance standards based on hydrology may be useful in many circumstances;
5) if project objectives include restoration or creation of a site to a condition similar to that of nearby natural wetlands, performance standards should be based on conditions found in the natural wetlands; and
6) survival of planted stock or percent cover by vegetation, although often used as performance standards, do not reflect wetland function and should not be relied on as a sole measure of performance in most cases.

REFERENCES

Bedford, B. L. 1996. The need to define hydrologic equivalence at the landscape scale for freshwater wetland mitigation. Ecological Applications 6:57-68.

Erwin, K. L. 1990. Freshwater marsh creation and restoration in the southeast. p. 233-266. ***In*** J. A. Kusler and M. E. Kentula (eds.) Wetland Creation and Restoration, the Status of the Science. Island Press, Washington, DC, USA.

Erwin, K. L. 1992. Status Report on the Assessment of Wetland Creation for Mitigation in the SJRWMD. Unpublished report for the Saint Johns River Water Management District, Palatka, FL, USA.

Galatowitsch, S., R. Budelsky, and L. Yetka. 1999. Revegetation strategies for northern temperate glacial marshes and meadows. p. 225-242. ***In*** W. J. Streever (ed.) An International Perspective on Wetland Rehabilitation. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Galatowitsch, S. M. and A. G. van der Valk. 1996. The vegetation of restored and natural prairie wetlands. Ecological Applications 6:102-112.

Kentula, M. E., R. P. Brooks, S. E. Gwin, C. C. Holland, A. D. Sherman, and J. C. Sifneos. 1993. An Approach to Improving Decision Making in Wetland Restoration and Creation. C. K. Smoley, Boca Raton, FL, USA.

Levin, L. A., D. Talley, and G. Thayer. 1996. Succession of macrobenthos in a created salt marsh. Marine Ecology Progress Series 141:67-82.

Minello, T. J. 2000. Temporal development of salt marsh value for nekton and epifauna: Utilization of dredged material marshes in Galveston Bay, Texas, USA. Wetlands Ecology and Management 8:327-341.

Minello, T. J. and R. J. Zimmerman. 1992. Utilization of natural and transplanted Texas salt marshes by fish and decapod crustaceans. Marine Ecology Progress Series 90:273-285.

Quammen, M. L. 1986. Summary of conference and information needs for mitigation in wetlands. p. 151-158. ***In*** R. Strickland (ed.) Wetland Functions, Rehabilitation, and Creation in the Pacific Northwest: the State of Our Understanding. Washington State Department of Ecology, Olympia, WA, USA.

Race, M. S. 1985. Critique of present wetlands mitigation policies in the United States based on an analysis of past restoration projects in San Francisco Bay. Environmental Management 9:71-82.

Race, M. S. and D. R. Christie. 1982. Coastal zone development: Mitigation, marsh creation, and decision-making. Environmental Management 6:317-328.

Simenstad, C. A. and R. M. Thom. 1996. Functional equivalency trajectories of the restored Gog-Le-Hi-Te estuarine wetland. Ecological Applications 6:38-56.

Streever, W. J. 1997. Trends in Australian wetland rehabilitation. Wetlands Ecology and Management 5:5-18.

Streever, W. J. (ed.). 1999a. An International Perspective on Wetland Rehabilitation. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Streever, W. J. 1999b. Examples of performance standards for wetland creation and restoration in Section 404 permits and an approach to developing performance standards. U.S. Army Engineer Research and Development Center, Vicksburg, MS,

USA. WRP Technical Notes Collection (TN WRP WG-RS-3.3). (www.wes.army.mil/el/wrp).

Streever, W. J. 2000. ***Spartina alterniflora*** marshes on dredged material: a critical review of the ongoing debate over success. Wetlands Ecology and Management 8:295-316.

Streever, W. J., K. M. Portier, and T. L. Crisman. 1996. A comparison of dipterans from ten created and ten natural wetlands. Wetlands 16:416-428.

Zedler, J. B. 1998. Replacing endangered species habitat: the acid test of wetland ecology. p. 364-379. ***In*** P. L. Fiedler and P. M. Kareiva (eds.) Conservation Biology for the Coming Age. Chapman and Hall, New York, NY, USA.

Zedler, J. B. and J. C. Callaway. 1999. Tracking wetland restoration: do mitigation sites follow desired trajectories? Restoration Ecology 7:69-73.