Are Isolated Wetlands Isolated?

While federal regulations during the past 10 years have treated isolated wetlands as unconnected to aquatic resources protected by the Clean Water Act, they provide critical ecosystem services to society that extend well beyond their wetland boundaries. The authors offer well-documented examples from the scientific literature on some of the ecosystem services provided by isolated wetlands to society and other ecosystems.

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We have been asked to address the importance and value of isolated wetlands in providing ecosystem services to society outside the immediate boundary of the wetland. In other words, do the services provided by isolated wetlands extend beyond the boundary of the wetland? The impetus for providing this information relates to current federal regulation, or lack thereof, on potentially destructive activities to isolated wetlands (Downing et al. 2003; Haukos & Smith 2003). From a federal perspective, "waters of the United States" are primarily protected from certain potentially destructive activities by §404 of the Clean Water Act (CWA) requiring permits for activities, such as discharging pollutants, dredging, or filling. Navigable waters are automatically afforded this federal protection; however, other waters and wetlands, including isolated wetlands, require a jurisdictional determination. The determination process to declare an isolated wetland jurisdictional has historically been beset with vague and varying policies interpreting statutes, agency rules, and court decisions.

So what do we mean when we use the term "isolated wetland"? This definition has ecological, hydrological, and legal aspects (Leibowitz 2003; Tiner 2003). We initially will discuss what an isolated wetland is and then address it again when we examine the legal argument for a "significant nexus." Isolated wetlands are generally not immediately adjacent or lack an apparent surface water connection to navigable waters; they have well-defined wetland boundaries surrounded by terrestrial systems (Tiner 2003). Isolated wetlands of the United States typically include wetland types, such as prairie potholes, playa lakes, Carolina bays, pocosins, salinas, and vernal pools, among others (Smith et al. 2008). From a hydrogeomorphic perspective, most of these are considered depressional wetlands on the landscape, filling with precipitation or from a groundwater connection, such as a spring or seep (Mitsch et al. 2009).

As most individuals who work on wetland regulation and science know, isolated wetlands were offered protection under §404 from 1986 until 2001, when the *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* U.S. Supreme Court decision rejected the inclusion of isolated wetlands under the migratory bird rule. The migratory bird rule had been used to afford isolated wetlands protection by ruling isolated wetlands were jurisdictional "waters of the United States" under the Commerce Clause nexus of the U.S. Constitution if migratory birds that crossed state and international boundaries used the wetlands (Downing et al. 2003).

Subsequently, in 2006, the Court ruled on *Rapanos v. United States* without a majority opinion (4-1-4). This case has caused confusion among individuals associated with wetland regulation and science, in that clear guidance was not provided for jurisdictional determination (Adler et al. 2007). Essentially, the Court was asked to decide if the CWA applies to wetlands "that do not contain, and are not adjacent to, traditional navigable waters" (ELI 2007). The lack of a majority decision resulted in the "significant nexus" argument by Justice Anthony M. Kennedy. In short, this means that in order to be a "water of the United States" there must be a "significant nexus" between wetlands in question and navigable waters, or a relatively permanent body of water is connected to interstate navigable waters, and/or the wetland has a continuous surface connection with that water body (ELI 2007).

We cannot determine or interpret what an individual or agency might consider "significant" in the regulatory nexus realm, but we can inform readers of the ecosystem services provided to society well outside the boundary of an isolated wetland. This is not meant to be an exhaustive list of those values, but simply a discussion of some of the more obvious ones for which a good set of data exist for support of that importance.

For example, isolated wetlands in the Prairie Pothole Region of the upper Midwest store and slowly release significant amounts of floodwater and runoff (Miller & Nudds 1996). If those wetlands are filled or drained, that water will rapidly enter tributaries to large rivers or directly into large navigable rivers. Losing storage potential contributes to flood events in drainage areas, such as those adjacent to the Mississippi, Missouri, and Red Rivers. These isolated wetlands also store nutrients and other potential contaminants from agricultural runoff along with that water (USGS 2008). Nutrient additions to streams and rivers eventually end up in the Gulf of Mexico leading to hypoxia and the resultant "dead zone" at the mouth of the Mississippi River (Diaz & Rosenberg 2008).

Isolated wetlands also contribute significant amounts of water to underground aquifers. In the High Plains, playa wetlands and sandhill wetlands recharge the Ogallala Aquifer, the largest in North America (Gurdak & Roe 2009). In many areas of the region, historically, the aquifer surface discharges via

springs or seeps, some of which drained into eventual navigable waters (Brune 2002). (This discharge from aquifers occurs in many other regions, and the release of that water into navigable waters may benefit commerce.) In underlying states, from Nebraska to New Mexico, the Ogallala provides drinking water for an increasing number of municipalities and urban areas as historical water sources dry, as well as irrigation water that is critical to a multibillion-dollar agricultural industry. The crops grown using Ogallala aquifer water are exported and essential to feeding a growing global human population. Moreover, because of the recharge aspect of these wetlands, they can also carry contaminants to this underground water source (Gurdak & Roe 2009). In other words, if chemicals, such as pesticides and nutrients, are intentionally or unintentionally applied into an isolated wetland, they can potentially be transported to the aquifer (Zartman et al. 1996).

Isolated wetlands can also be very significant storage sites for carbon that will contribute to amelioration of climate change impacts (Euliss et al. 2006). Those same prairie potholes that store substantial amounts of floodwater also sequester large amounts of carbon. Draining or filling these wetlands reduces that capacity and contributes to carbon dioxide release, which contributes to climate change (Gleason et al. 2009). The positive benefits of carbon storage extend well beyond state and national borders of those wetlands.

In addition, although the migratory bird rule is no longer used to determine whether a wetland is a "water of the United States," migratory birds do move frequently between isolated wetlands and adjacent navigable waters throughout North America (Haukos et al. 2006). This includes endangered species, such as whooping cranes, that frequently use playas in the Rainwater Basin of Nebraska to forage and water. They then use the adjacent Platte River to roost. Moreover, the production of waterfowl on an isolated wetland in northern regions may affect the harvest of waterfowl in navigable lakes, rivers, or coastal waters much farther south, demonstrating that isolated wetlands connect disjunct regions of the Western Hemisphere. This then impacts those individuals who, such as hunting guides and landowners, derive income from this recreational activity.

Clearly, the answer we posed in the title of this piece is "no." Isolated wetlands do not operate in a vacuum, and they provide ecosystem services to the whole of society far beyond the boundaries of the individual wetland. Whether that is considered "significant" will depend on your point of view. ■

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credits, regardless of the actual impacts, to ensure that a project would be able to use the ILF program; the two service areas with moderate numbers of permits issued would have 50 advance credits; and the two service areas with a high number of permits issued would have 150 advance credits.

Because the program has been in existence for four years, credits have already been generated. In some service areas for some resource types, there are excess credits. These will be available for use in addition to the advance credits. Based on the program so far, it is likely that most resource types will have excess credits in most service areas within the next couple of years, which will make the advance credits issue essentially moot.

Changes From Public's Perspective. The application process is not changing. An RFP goes out each year with the target audience being state and local conservation agencies, land trusts, and other conservation organizations. The requirements for submittals change periodically as lessons are learned on how to better focus applications on the types of projects desired, but this has been occurring since the program began. Similarly, the review criteria, and their weights, for projects that are used by the review committee have been modified slightly over time, again to reflect lessons learned each year. Since both the review and approval Committees' proceedings are open to the public, most of whom are the project applicants, this provides transparency that has helped avoid challenges to the grants issued. ■

-Ruth M. Ladd

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