Defining Service Areas for Wetland Mitigation: An Overview

The following discussion articles and responses offer a range of perspectives from private, public, and non-profit stakeholders on how defining service areas can strengthen compensatory mitigation. The authors highlight lessons learned, opportunities for improving the process, and questions for further research.

By Steve Martin and Robert Brumbaugh

The service area of a mitigation bank or in-lieu fee (ILF) program is the geographic area in which it can provide compensatory mitigation to offset the aquatic resource functions lost through actions permitted under §404 of the Clean Water Act. The U.S. Army Corps of Engineers (Corps)-U.S. Environmental Protection Agency (EPA) 2008 Mitigation Rule basically codified the definition provided almost 13 years earlier in the 1995 Federal Interagency Mitigation Banking Guidance. However, the general definition in the Mitigation Rule has led to what some perceive as inconsistent interpretations of the Rule by Corps districts or as a lack of scientific backing behind the establishment of service areas (see Womble & Doyle 2010). Many factors affect decisions in defining service areas. The discussion that follows this overview will provide perspectives on defining service areas across private, public, and nonprofit sectors.

To begin, the size and extent of a service area constrains the area within which a mitigation bank or ILF program can provide compensatory mitigation and can affect whether a mitigation bank can be used to offset the aquatic resource functions lost through permitted impacts. It can affect whether the expense of establishing, implementing, and managing a mitigation bank or ILF program is likely to be offset by potential economic returns from credit sales. Establishment of a service area for third-party mitigation entails balancing the likelihood that a mitigation project is able to replace lost aquatic resource functions with the size of the service area and the potential demand for mitigation credits.

Prior to the Mitigation Rule, considerable effort was spent in considering whether compensatory mitigation was best located on or near the permit impact site or off-site. The question often debated was, given the impact site, where and what would be an appropriate mitigation project? Third-party compensatory mitigation inverts this question to, given the compensation site, where can the impacts that would be compensated at a bank site take place? This last question must be answered to determine an appropriate service area for each bank site.

The Mitigation Rule charged the Corps with approving compensatory mitigation projects that were environmentally preferable, would offset aquatic resource functions lost through permitting, and were strategically selected to address aquatic resource needs in a watershed. The Mitigation Rule (33 C.F.R. Part 332.8(6)(vi)(A)) provides descriptions of service areas, addresses service area scale, includes examples of potential service areas, and identifies considerations to be used in establishing service areas. It describes a service area as the "watershed, ecoregion, physiographic province, and/or geographic area in which a bank or in-lieu fee program is authorized to provide. . . ." It addresses the size and scale of a service area: "[It] must be appropriately sized to ensure that the aquatic resources provided will effectively compensate for adverse environmental impacts across the entire service area" and may consider the "economic viability" of the bank. The Mitigation Rule provides examples of potential service areas, such as U.S. Geological Survey (USGS) eight-digit hydrologic unit codes (HUCs) (referred to as catalog units) or smaller in urban areas and two or more contiguous eight-digit HUCs or a six-digit HUC (accounting unit) in rural areas. These are identified only as examples and not required sizes or scales.

These regulations also suggest other considerations in the development of service areas, including applicable locally developed standards, such as state law and areas where watershed boundaries do not exist or are not applicable. Establishing appropriately-sized service areas is further complicated because the Mitigation Rule does not assign a scale to the terms "watershed," "geographic areas," "ecoregions," or "physiographic province." These features can be very large, very small, or, in some cases, like administrative boundaries, such as county or state lines completely unrelated to aquatic resources and their functions. Although cited in the regulations, "economic viability" is not defined, nor is direction provided for incorporating economic considerations in the development of service areas. The responsibility to address these concerns falls to the Corps and the interagency review team.

In light of these considerations, we pose the question: how should service areas be defined to ensure that functions are adequately offset by mitigation? ■

References

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Lessons Learned on Setting Service Areas

By Paul Amato

Indeed, the Mitigation Rule is not overly prescriptive when it comes to defining bank and in-lieu fee (ILF) program service areas. For this reason, it provides flexibility that is both intentional and appropriate. The preamble and the Rule itself clarify that input from the interagency review team (IRT) will be considered by the U.S. Army Corps of Engineers (the Corps) during bank and ILF program development, including service area determinations. There is no "silver bullet" approach for defining service areas that will best offset impacts in every situation, and it would be unwise to suggest that there is at the current time. Instead, the role of the IRT provides the short, though admittedly not simple, answer to the question posed for this article. I offer up some service area lessons learned (in no particular order) from the U.S. Environmental Protection Agency's (EPA's) western states perspective that we think can improve the process for bank and ILF sponsors, the Corps, and IRT member agencies, and help facilitate compensation for aquatic resources.

- Utilize appropriate watershed plans, but expect that there probably is not one.
- Assume a smaller service area is more appropriate and rigorously justify going bigger.
- Consider the physiographic uniqueness of specific aquatic resource types.
- Be cognizant of habitat conservation plans (HCPs) and other conservation plans in the area.
- Determine the service area early in the process.

Utilize appropriate watershed plans, but expect that there probably is not one. The Rule requires the use of a watershed approach "to the extent practicable" and the use of "appropriate" watershed plans where available, but to what extent are IRTs and the Corps doing this, and if so, doing it consistently? The Rule outlines a watershed approach to compensatory mitigation (40 C.F.R. pt. 332.3(c)), even going so far as to identify information needs in the absence of a watershed plan. This is fortunate because few watershed plans cover wetlands comprehensively. A real need still exists to develop the kinds of "landscape profiles" described by Dr. Barbara L. Bedford,[1] which can be used to create a blueprint of aquatic resource restoration needs. Lacking this information, the burden of proof is placed on the sponsor to support how the proposed bank or ILF project will benefit the aquatic resources across the proposed service area and ultimately the responsibility of the Corps and the IRT to make sure the agreed-upon service area is adequately discussed within, and supported by, a defined watershed approach. The Corps and IRTs are best suited to establish a process by which this is done consistently and in a way that results in appropriate service areas within their regions.

Assume a smaller service area is more appropriate and rigorously justify going bigger. In California, the default approach has generally been consistent with the example in the Rule. We typically use the eight-digit hydrologic unit code (HUC) as a starting point. The guidance from the Sacramento District is to start with the even smaller 10-digit HUC, where the bank or ILF project is located, and to require a written justification that is increasingly more detailed as the proposed service area grows to include adjacent 10- or eight-digit HUC watersheds or ecoregions.[2] This approach has merit, but to adequately inform the Corps and IRT process, it is imperative that the justifications be rigorous and ecologically based, and not simply a paper exercise. Emphasis must be placed on how the bank or ILF project will provide a suite of real benefits to specific aquatic resource types and functions throughout the larger service area.

Consider the physiographic uniqueness of specific aquatic resource types. In some instances it may be appropriate to set aside watershed boundaries and instead consider the physiographic regions of a particular aquatic resource. Vernal pools serve as a good example in California where a watershed may not be a logical service area boundary. In the absence of nearby vernal pool banks and ILF projects, regulators would be missing the mark to force compensation for Central Valley vernal pools within the same eight- or six-digit HUC. Instead, an ecoregional approach could help establish service areas based on the unique physiographic requirements of vernal pools that are typically found in the gently sloped grasslands of the Central Valley and lower foothills. Establishing bank and ILF program service areas by ecoregion may also help encourage vernal pool bank and ILF program establishment, ensuring that in-kind mitigation credits will be available when impacts to vernal pools are unavoidable.

Be cognizant of HCPs and other conservation plans in the area. HCPs and natural community conservation planning can provide an important resource for banks and ILF programs. They typically have the latest scientific and technical information on covered species and habitat needs, and where there is overlap, there should be coordination. To avoid conflicts, banks and ILFs should be part of the conservation planning process. This process can also help to inform appropriate service area boundaries by identifying spatial linkages between bank and ILF project benefits and documented habitat and conservation areas.

Determine the service area early in the process. In addition to the number and type of available credits, the service area is perhaps the most important factor that controls the viability of the bank proposal. Reaching agreement between the IRT and bank or ILF sponsor on an appropriate service area at the outset is critical to avoid a potentially significant and prolonged diversion from other important aspects of the bank or ILF program development. Early agreement over the extent of the service area prevents a scenario where parties proceed with disparate assumptions over size and location only to discover late in the process, after considerable time and resources have been spent developing the instrument, that they are far from resolution. Ideally, the sponsor has carefully considered the points listed above and service area agreement is reached by way of the optional draft prospectus stage. This has the additional benefits of providing economic certainty to the sponsor and regulatory certainty to the agencies. Using a checklist of specific elements, similar to that found in the Washington State's Wetland Mitigation Banking Act,[3] as a way of determining service area could help promote more defensible and consistent service area determinations.

Determining appropriate service area boundaries can be contentious when economic and ecological interests are at odds. This process can be further complicated when a lack of sufficient information forces parties to take a leap of faith. The Mitigation Rule recognizes that these complicating factors require development of sufficient information (i.e., watershed plans) and robust discussion among IRTs to address the challenges that arise with each unique bank and ILF program. Simply put, the Corps and the IRTs should not have to "go by feel" when making decisions about service area boundaries, and sponsors should have better guidance on what kind and how much information to provide. Early discussions and realistic expectations can help; however, development of national and regional service area guidance could improve our ability to establish these boundaries consistently while taking into account economic viability and, more importantly, the replacement of lost aquatic resource functions. ■

Endnotes

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3. Wash. Admin. Code §173-700-302, Considerations for Determining Service Area Size (2009), *available at* http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/pdf/Guidance/RuleText_EasyRead.pdf.

Standards That Matter

By Martin Doyle

When implemented over an entire state or U.S. Army Corps of Engineers district, compensatory mitigation programs produce a tension that has unintentionally created distinct trade offs between (1) ecological quality, (2) spatial quality, and (3) temporal quality (BenDor et al. 2008). The current policy practice has been to place great preference on spatial quality via limited geographic service areas, yet the trade offs and comparable concern for ecological quality or temporal quality have been lacking.

Ecological quality refers to the ecosystem functions sought by restoration projects, which generally include improvements in physical, chemical, or biological integrity, such as retention of floods and nutrients, stabilizing water temperature, or increases in biodiversity. Most important, high ecological quality in a compensatory mitigation sense would be associated with a restoration site in which functional improvements have been rigorously documented via empirical measurements, rather than relying on surrogate or indicator variables. Such documentation is stunningly rare.

My colleague and I suspect that, if rigorously implemented, such empirical studies of compensatory mitigation would show systemic failure of the vast majority of sites to provide demonstrable improvements in chemical, physical, or biological integrity (Doyle & Shields 2012). I suspect that one of the most common causes of failure is the combination of limited size of the restoration site and the degradation of the watershed relative to the size of the restoration. To date, based on limited information, the null hypothesis of compensatory mitigation programs has been that traditional stream and wetland restoration provides wide benefits. This is flawed, and indeed, backwards. Based on existing information and past performance writ large, the null hypothesis should instead be that compensatory mitigation projects provide limited ecological quality, and rigorous studies are needed to prove this hypothesis wrong.

Second is the issue of location. Site location is important in the performance of compensatory mitigation programs at entire landscape scales. Thus, individual compensatory mitigation sites must also be thought of as having "spatial quality." Restoration sites that are located in close proximity to impact sites could be considered to be of higher spatial quality than those that are far away (or are in another watershed), since they are likely to exhibit similar functions and provide similar services as nearby wetlands. This is the rationale behind strict implementation and interpretation of geographic service areas, a rather blunt policy instrument used to ensure some minimal level of spatial quality of compensation sites within a program (reviewed by Womble & Doyle 2011).

Finally, and less well understood, is the issue of the timing of restoration relative to the timing of the impacts, or "temporal quality." In order to prevent no net loss of ecosystem functions, the overarching goal of most compensatory mitigation programs, restoration sites must be completed and functioning *before* impacts occur. This was one of the original rationales and core arguments for compensatory mitigation as a management practice. However, given the time required for a restoration site to recover ecological functions, temporal quality can be problematic. At a minimum, achieving higher temporal quality would require that sites are completed and monitored prior to being used for impact compensation; in reality, they should be functioning well before impacts to ensure sustainability of the site. The worst-case scenario, in terms of temporal quality, occurs when impacts occur prior to initiating compensating restoration projects, a painfully common reality of the past. It is important to note that even if a restoration site is an excellent ecologically functioning site near the impact site, if it is completed several years after the impacts, then there is a long time window during which there is a temporary "debit" of functioning ecosystems (BenDor 2009).

The trade offs between these metrics of quality derive from the realities of market forces. More rigorously constrained geographic service areas reduce the area within which restoration can compensate for impacts. Small geographic service areas result in "thin" markets, where insufficient demand potential for mitigation credits (due to uncertainty about the number of potential buyers) fails to provide the incentive for mitigation bankers to speculatively purchase and restore an ecosystem: small service areas decrease the likelihood of entrepreneurial, speculative ecosystem restoration.

Larger geographic service areas thicken the market, but increase the potential distance between impacts and mitigation projects. Yet, entrepreneurs face more secure long-term prospects for selling their credits generated by speculative restoration activities, thus incentivizing environmental entrepreneurship. Moreover, it is possible that large geographic service areas provide an incentive for investment in large restoration sites: thick markets increase the potential to sell large quantities of credits over time, which incentivizes higher risk, larger restoration sites. Critically, if large restoration sites have greater potential to provide greater ecosystem services than small sites (a realistic assumption), then large geographic service areas may be a policy change needed to provide incentives for investment in large, more demonstrably effective restoration sites.

Current regulations have sought to avoid the proximity problem by creating programs that allow compensation to occur after impacts: in-lieu fee (ILF) programs. These programs collect fees at the time of impacts, and then consolidate those fees to develop restoration sites subject to spatial constraints. Thus, these programs ensure spatial proximity of compensation to impact sites, yet can essentially standardize post-impact compensation.

Quite simply, ILF programs assume that at the landscape and programmatic scale, spatial quality should supersede temporal quality; sacrificing the benefits of advance timing of compensation is presumably made up by the advantages of geographic proximity. For some ecological functions (e.g., nutrient loads), such preference for spatial proximity may be warranted. Yet, recent research has shown that improved water quality from restoration cannot be presumed (see review by Doyle & Shields 2012).

Before proceeding with inordinate sums being spent on restoration under the compulsion of compensatory mitigation, the science, policy, and regulatory community should be compelled to first address:

(1) Have the current practices of aquatic ecosystem restoration generated *demonstrable* improvements in the physical, chemical, and biological integrity of the nation's waters at the site-specific and programmatic scales?
(2) What is the relationship between size of restoration and ecological functions gained?
(3) Are there demonstrable benefits that justify small or large geographic service areas?
(4) Is there an optimal scale for geographic service areas? ■

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A Building-Block Approach to Service Areas

By Hal Holland and Greg DeYoung

The unique contribution of mitigation banks arises from the power of choice—the ability to select the best sites and the best design for wetland restoration in advance of impacts. To function at this high level, there has to be a balance in economic and ecological perspectives. Current service area models either minimize the economic variable or pit the two values against each other in agency-banker negotiations. However, with a better understanding of the needs or motivations of bankers and the regulatory agencies, a model can be developed to select sites that prioritize regionally significant conservation. This article proposes a new service area model to provide incentives favoring regionally significant projects over average or low-performing projects.

Risk Factors—Financial

Mitigation credits are not created equal; however, from a purchaser's perspective, as long as the credit fulfills the regulatory mandate, price trumps all other factors. There is no motivation for a project applicant to purchase credits from a bank with higher priced credits, even if the bank provides an environmentally superior mitigation solution. As such, there are two alternatives: either the bank approval process begins to prioritize or incentivize highest quality projects, or, if market forces are left unchecked, competition will reinforce the model of successful banks being those that develop the lowest cost credits.

Targeting locations where restoration can have dramatic functional improvements is ideal, but financial cost and/or risk factors can deter tackling such critical sites. For example, a banker could chose to create riparian habitat behind a levee, or improve the regional and ecological values by reconnecting the site to the river and reestablishing floodplain wetland processes. If both processes create riparian credits, and there is a preference for higher functioning restoration, a mechanism would be needed to encourage a banker to undertake the floodplain restoration effort.

Often, bankers focus on large sites as a surrogate for ecological value, with the result being a large number of credits to sell. If the size of the service area is not predefined, the banker will feel obligated to negotiate for the largest service area possible to capture a sufficient market to sell the credits within a reasonable amount of time. However, if the size of the service area is predefined, a banker can evaluate the potential sales rate within that area, and scale the size of the bank accordingly.

In summary, bankers undertake a large financial risk when establishing a mitigation bank, with the typical assumption being a timely and reasonable economic return on the investment. If the banker feels solely responsible for managing risk, they will limit exposure (dollars spent) and employ every tool (competitive pricing and extended service area) to maximize sales rates.

Risk Factors—Environmental

When regulators are evaluating projects, they want to be sure that the compensation will fully address the impact. At the time a bank is being developed, the spectrum of what types of impacts may be compensated at the bank are unknown. Therefore, there is a preference that restored wetlands at a bank provide the highest level of functional lift, to cover all future eventualities. Some of the factors to be considered include: proximity to adjacent preserved lands; large sites; ability to compensate for localized wetland functions; and ability to restore natural processes in a broader ecological context.

In certain parts of the country, wetlands compensation is primarily conducted on a wetland classification basis rather than a functional assessment. If only a single wetlands value, such as habitat type, is considered, a service area equivalent to an ecoregion within a six-digit hydrological unit code (HUC) watershed may allow for equivalent offsets. However, if overall functional capacities (e.g., flood control or water quality) of the wetlands are being evaluated, the regional context of the mitigation is much more important. Without an assessment mechanism, defaulting to small watersheds (e.g., HUC 10 watershed covering 227 square miles versus a HUC 6 watershed covering 10,596 square miles) is a basic mechanism for ensuring the compensation has a regional value.

One particular challenge is that there often is not a clear or common definition of what regional values are most important for bank establishment. Without clear guidance, bankers are not sure how a site will be received by the interagency review team (IRT), and the IRT has the burden of making subjective evaluations and then negotiating credit applicability and service area based on what may be appropriate compensation for unknown future impacts.

Current Service Area Approaches

One current approach for defining service areas is to have the bank sponsor justify the size and shape based on function within the watershed and economic viability. Factors such as ecoregion benefit, functional capacities, and economic considerations can be weighed and balanced, and sites with higher benefits can secure larger service areas. However, this process is fluid and subjective, with varied outcomes; similar banks have secured different service areas, and banks with unequal levels of ecological contribution have equivalently sized service areas. The result of this approach is that bankers have little certainty or precedent on which to rely when proposing banks. Worse, negotiations can create a false dichotomy where economics and ecology become pitted against each other in the decisionmaking process.

Alternatively, many parts of the country have a standard approach of assigning service areas based on set watershed boundaries for any bank within the watershed. This process provides a clear planning process for bank development, and leaves the economic evaluation up to the banker as to whether it is financially viable to develop a bank. However, the limited flexibility creates a mold that promotes only certain types or sizes of banks, and incentivizes a banking model that provides the least amount of offset to capitalize on the set service area boundary.

A Better Solution

The existing systems for service area determination both have benefits and detriments from ecological and economic standpoints. Pre-established service areas are helpful for economic planning purposes and minimize subjectivity, but tend to be indifferent to the type of restoration. This limits the power of banking to focus on large sites with complex restoration goals. A more flexible approach allows for regionally important restoration projects to secure larger service areas, but this process is currently very subjective in the outcome and riskier for banker on the ultimate market for the credits.

A better process would seem to blend the best of these two systems to provide certainty and a clear process for defining the ultimate size of the service area. A quantitative assessment tool should be utilized to document the effects of site setting, restoration objectives, and wetland functions for each site, creating a common method to evaluate both credit allocation and regional site contribution. Regulators and bankers should establish a regional prioritization of restoration outcomes (e.g., habitat connectivity, water quality, flood attenuation, etc.), and assign a consistent and nonsubjective process for assembling the service area's layout according to how a site's features achieve these outcomes. This process would amount to a series of building blocks to expand upon a base service area. For example, a project with little regional significance (e.g., wetlands behind a levee) might receive a 10-digit HUC watershed, but ecologically superior floodplain restoration would add on many eight-digit HUCs as it achieves multiple regional wetlands values.

If the ecological contribution of the bank is directly correlated to the size of its service area, it might just become the new economic viability consideration for the type, location, and size of mitigation banks. ■

Corps District Considerations in the Definition of Service Areas

By Steve Martin and Robert Brumbaugh

The Mitigation Rule does not severely constrain service area determination. This is consistent with its support of a watershed approach that depends upon local needs and functions of importance. U.S. Army Corps of Engineers (Corps) districts have used a number of approaches to define or refine the extent of mitigation bank and ILF program service areas to provide locally important functions. These approaches include the use of watersheds or hydrologic units, ecoregions, other physical features (physiographic provinces, U.S. Department of Agriculture (USDA) major land resource areas, etc.), administrative boundaries, or some combination of features. A mitigation bank may have separate service areas for different resource types (e.g., vernal pools, seasonal wetlands). The first task in defining a service area is to identify the geography of the affected aquatic resources from a landscape perspective. Is the distribution of the affected resource related to a watershed, eco-region, or another feature?

Watersheds

Water quality at a given point on a stream reflects the aggregate of natural and anthropogenic characteristics upstream or upgradient of that point to the drainage divide of the watershed including land use and landscape characteristics. Thus, watersheds are often regarded as suitable for considering spatial aspects of ecosystem management (Omernik & Bailey 1999). With this understanding the National Research Council advocated a watershed approach for compensatory mitigation decisions (National Research Council 2001). U.S. Geological Survey hydrologic units or hydrologic unit codes (HUCs) are not necessarily true topographic watersheds but portions of a watershed (Omernik & Bailey 1999). However, they are watershed-based units representing aggregates of similar characteristics for a portion of a larger watershed, and representative of similar hydrologic conditions in that watershed. HUCs vary in size and scale; for example, the average HUC-6 or accounting unit is approximately 10,600 square miles, the average HUC-8 or catalog unit is 700 square miles, and the average HUC-10 ranges from 60 to 390 square miles. A survey of Corps districts in 2010 showed that service areas in most Corps districts are defined in terms of one or more HUC-8s (Womble & Doyle 2010).

In some settings, watersheds may be of little use for defining service areas. In marine environments it may be impossible to define a watershed, while in areas with low topographic relief, like the lower Mid-Atlantic Coastal Plain, surface waters may flow in different directions depending upon prevailing wind conditions, making definition of watersheds difficult. It may be difficult to define watersheds in regions where much of the surface water does not directly drain into streams, such as nearly level karst and continental glacial deposits pocked with potholes and lakes.

Ecoregions

Ecological regions, or ecoregions, are based on the premise that regions can be delimited through consideration of patterns or biotic and abiotic features, including soils, physiography, climate, vegetation, and hydrology (EPA Ecoregion Maps; Omernik & Bailey 1999). Ecoregions may be useful for defining service areas in landscapes where aquatic communities occur in predictable patterns, for example, in the Prairie Pothole Region or the vernal pool regions of California. A focus on habitat-based functions is more likely to lead to consideration of ecoregions than HUCs, especially when a bank provides compensatory mitigation under both the Clean Water and Endangered Species Acts. The two ecoregion classifications most widely applied in the United States are the U.S. Environmental Protection Agency's (EPA's) (developed by Omernik) and the USDA's (developed by Bailey). Both have four levels with the smallest, Levels III and IV, being the most commonly considered in setting service areas. One issue in setting service areas is that ecoregion boundaries may not be as distinct as topographic divides. Setting a service area by simply circumscribing an ecoregion, such as a Level III ecoregion, can result in a large variation in service area size or cutting across a large number of watersheds. One EPA Level III ecoregion extends from Biloxi, Mississippi to Baltimore, Maryland. Using such an ecoregion may require limiting the service area to a Corps district or a portion of a district.

Administrative Boundaries

Administrative boundaries, such as county or state borders, have been used to define service areas. Banks developed for use by a single permittee, like a government agency, military installation, or department of transportation (DOT), may have service areas limited to that government unit. In some cases, groups of counties may be used as bank service areas; for example, under the Illinois Wetland Protection Act service areas are defined as Illinois DOT regions. Local governments may require that impacts be compensated within their borders, thus limiting service areas for actions requiring local authorization. For example, in the Chicago and Minneapolis metropolitan areas, local government regulation can complicate service area definition (Robertson & Hayden 2008). Administrative boundaries may not reflect the distribution of aquatic resources or their interactions, especially when those resources are found across a large region, such as a Corps District.

Other Physical Features

Other physical features, such as physiographic provinces, littoral drift cells, or reef complexes, may be useful for defining service areas. Combinations of features have also been used to define service areas. In Minnesota, service areas can be based upon local government units (LGUs) and watersheds. In Virginia, state law defines bank service areas as the HUC-8 in which the bank is located and adjoining HUC-8s in the same river basin. The interagency review team in Virginia further reduces the service area to the same physiographic province (e.g., coastal plain, piedmont) that the bank occurs in because of differences in aquatic resource characteristics (gradient, substrate, stratigraphy, and climate) between the provinces. In the Colorado Rocky Mountain Front Range, elevation is used to partially delimit service areas. The 6,000-foot elevation contour coincides with other changes—physiographic and ecoregional—that divide portions of a watershed (comprised of two HUC-8s) into separate service areas.

A number of districts have authorized banks with multiple service areas (e.g., primary, secondary, and tertiary service areas). In part, these different orders of service areas are intended to address scarcity of mitigation banks in some geographic areas. Secondary and tertiary service areas may ensure that third-party compensation is available for more remote impacts, but it may come at a cost to the permittee. The permittee may have to provide additional compensation to offset the lost functions for those projects located in a bank's secondary service area, or the use of the secondary service area may be limited to only projects with minimal impacts to aquatic resources, such as impacts under Nationwide Permits.

The Rule allows the Corps to require a combination of on-site and off-site compensation to offset functions lost through permitting. This implies that each function may have a different geographic and landscape scale (33 C.F.R. pts. 332.3(d) and (e)). So how might service areas be established to reflect the spatial diversity of important function-scapes . . . or "function sheds" to better ensure compensation for lost functions? Is it possible to have different service areas associated with different functions that may be the critical function to replace? For instance, might a service area for offsetting losses of biogeochemical functions differ from service areas for losses of habitat functions? These questions are central to consideration of a watershed approach, which the Mitigation Rule fully supports in compensatory mitigation decisions. ■

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THE AUTHORS RESPOND

Driving Ecologically Significant Site Selection

By Paul Amato

Several considerations are presented that help demonstrate the complexities of determining service areas under the Mitigation Rule. It will always be a challenge to do so in a way that ensures mitigation projects fully offset impacts. After all, it is an inherently challenging situation and one best avoided by reducing the need for mitigation in the first place. Under current practices, there is likely great variability among and even within U.S. Army Corps of Engineers districts and interagency review teams with regard to setting service areas. But steps can be made to improve our understanding and to improve consistency and certainty. Ideas from the different perspectives can be combined to outline a possible framework for improvement.

At the foundation is the need to better understand and execute a watershed approach that identifies priority resources to preserve and locations where mitigation efforts will have the greatest ecological benefits. Efforts like California's statewide policy for wetland and riparian protection[1] may help to further our understanding by requiring that decisionmaking consider watershed profiles of the abundance, diversity, and conditions of aquatic resources in a watershed, as well as watershed and regional planning efforts like habitat conservation plans. Other efforts to implement the watershed approach are described in the previous issue of this newsletter.[2] As our understanding improves and more tools are developed that enable the effective implementation of the watershed approach, so too will our ability to scale proper service areas.

Regulators and the mitigation banking community could benefit from the quantitative assessment tool proposed by Holland and DeYoung as a way of evaluating the regional benefits of a mitigation site. Key to this is doing so in the context of watershed planning efforts. Benefits could include a defensible prioritization of potential mitigation projects within a watershed and, hopefully, a driver for the implementation of projects at the most ecologically significant locations. Regional significance based on location and priority restoration outcomes should be factored into both the credit allocation and the geographic reach, or service area, of a project.

A quantitative assessment tool could include a process that factors in the rather novel and provocative question raised by Martin and Brumbaugh whether it is possible to have different service areas associated with different functions. Admittedly, the idea that one project could have several function-based service areas adds another layer of complexity to the process, but ecological, economic, and regulatory arguments can be made in favor of sizing service areas based on the reach of a project's functional gains.

Doyle raises critical research questions, though answering them before more money is spent on mitigation projects is not necessarily practical in the regulatory setting where good compensation projects are always needed. Any framework for setting service areas will benefit from a better understanding of past practices and the demonstrable benefits of mitigation projects in a regional watershed-planning context. ■

Endnotes

1. California Environmental Protection Agency, State Water Resources Control Board, California's Wetland and Riparian Area Protection Policy, *available at* http://www.waterboards.ca.gov/water_issues/programs/cwa401/wrapp.shtml.
2. *See* 35 Nat'l Wetlands Newsl. 1 (Jan.-Feb. 2013).

Flexible Service Areas Could Allow Regulators to Reward Success

By Martin Doyle

This series of articles, pivoting on the rationale laid out by Martin and Brumbaugh, draws attention to the much-ignored issue of geographic service areas. These authors make us step back and think about the landscape, economic, and regulatory realities that should inform and constrain future decisions.

Amato lays out sound principles for regulators to consider for establishing service areas. My primary concern is that emphasis continues to be placed at the front end rather than at the back end. That is, service areas for projects are set at the planning stage and by watershed plans and by negotiations early in the process, and there is less emphasis given to potentially modifying the service area based on ecological performance as empirical evidence rolls in. Perhaps this is the next needed policy step: establish a range of possible service areas that can be expanded if the site performs certain functions during the monitoring period, and contracted or left static otherwise.

This appears to be in line with some of the thinking in Holland and DeYoung, who emphasize some flexibility. Holland and DeYoung rightfully note two things: first, that all banks cannot be treated equally, as some produce more important ecological outcomes than others, and some of these functions are more important in some regions than others. Second, that there are different risk trade offs associated with bankers and regulators, a topic that several of my colleagues have begun to analyze as an essential element of mitigation banking and ecosystem service markets generally (BenDor et al. 2011). I strongly agree that the contrasting sources of risk need greater consideration—and appreciation—by all parties involved.

Addressing risk and addressing nuances of individual trade offs may be directly addressed by having a temporally malleable service area. During the project planning, the geographic service area and the monitoring program could be more formally linked, and the service area could be contingent upon performance of the project through the monitoring period. This would be a way of acknowledging sources of risk and rewarding performance. Setting a small service area at the beginning of the project reduces risk on the regulator, but the opportunity to have a larger service area potentially offsets the long-term risk that entrepreneurs must be willing to take on for larger, ecologically significant projects. But having larger service areas contingent on performance in turn balances risk: entrepreneurs may only be willing to have this long-term reward if they have sufficient confidence in their proposed project. The expansion of a service area could be contingent on specific functions meeting specific, quantifiable metrics of success that are in line with regional goals of regulatory agencies and broader society. Setting a small service area at the start then at least sets a base-case for the entrepreneur, but allowing expansion gives regulators a useful tool to reward those genuinely, demonstrably successful projects. ■

References

BenDor, Todd et al., *Risk and Markets for Ecosystem Services*, 45 Envtl. Sci. & Tech. 10322-30 (2011).

Balancing Ecological and Economic Needs With Planning Frameworks

By Hal Holland and Greg DeYoung

The greatest strength of mitigation banking is its reliability as an implementation tool. In 2001, the National Research Council identified that many of the failures of mitigation stemmed from faults in implementation (e.g., mitigation was not even completed 34% of the time). Subsequent to the 2008 Mitigation Rule, banking incorporates clear performance standards and success monitoring to create lasting restoration projects with easements and long-term funding.

We disagree with Doyle's assertion that most mitigation is limited in scale and currently ineffective at improving watershed functions, at least with respect to post-Rule mitigation banks; however, we concur that more emphasis needs to be placed on the mitigation components Doyle identified. Regulators currently attempt to address these factors when evaluating the types of projects that can utilize bank credits (ecological relevance) and the number of credits required (temporal and spatial calculations). This can be a subjective process, and belies a larger issue; mitigation overall is operating in a resource planning vacuum. For example, Doyle suggests that spatial proximity is critical to evaluating mitigation site effectiveness, but if watershed-scale historical degradation is added to the evaluation, less proximate sites may actually contribute most to a watershed's functional improvement.

Amato accurately states the need for "a blueprint of compensatory needs." The 2008 Rule requires a compensatory planning framework for in-lieu fee (ILF) programs; this is precisely what is needed for the banking program, and the interagency review team agencies are best qualified and positioned to undertake this effort. Amato calls for national and regional service area guidance; this could help direct the compensatory planning framework approach.

Banking and ILF programs have the benefit of forethought in where and how restoration projects are established. Compared to other forms of mitigation, banking has the additional advantage of reliable implementation and reduction of temporal loss. If this power of forethought and implementation could be combined with the benefit of watershed planning and prioritization, the results could be significant for all stakeholders.

A compensatory planning framework for banks could provide the foundation for service areas that address the watershed and ecoregional needs, while fostering a system of mitigation banks that have a fair shot at being economically viable. Doyle's three key qualities—ecological, spatial, and temporal—combined with Martin and Brumbaugh's focus on functions ("function-scapes") could be the conceptual grid upon which we arrange our service area building blocks. Bank sponsors would then know what is expected and what would generate a large service area supporting large, ecologically significant restoration projects.

If we are fortunate enough to create these compensation blueprints, a major issue still remains: how do Habitat Conservation Plans and related Regional General Permits fit in? The imposition of these administrative boundaries, truncating existing and future bank service areas, undermines the economic viability of banks that have been established based on the types of watershed and ecoregional blueprints to which we aspire. This is a current issue that will need to be addressed as we strive for national and regional guidance on service areas. ■

Searching for Approaches to Stretch Limited Resources

By Steve Martin and Robert Brumbaugh

To paraphrase Paul Amato, there is no single way to establish a geographic service area. Appropriately sized service areas should reflect the types and magnitudes of functions expected to be lost at impact sites and may vary by watershed/landscape position, climate, and aquatic resource type. Often, the distribution of impacted resources is not tied to watersheds, for example, California vernal pools. Alternative organizing features such as landform or ecoregion may be more appropriate depending on the mitigation resource.

Service area establishment should be addressed early in the development of third-party compensatory mitigation. It can affect the viability of the enterprise and the degree to which impacted functions can be offset. We should consider whether third-party mitigation sited using a landscape perspective may be more ecologically successful than small, scattered permittee-responsible mitigation projects and make better use of limited agency resources The suggestion to establish regional (or watershed-based) priorities for functions provided by mitigation projects and to assign service areas based on expected outcomes is consistent with the Mitigation Rule, although it entails the allocation of scarce resources to planning.

Empirical documentation of ecological performance of mitigation projects in the context of a watershed or other landscape unit is important. More are undertaking that effort, for example, Dr. Doyle's work in eastern North Carolina. More effort is needed to examine the landscape perspective as it relates to mitigation projects and their intended functions. These studies may improve our ability to establish meaningful service areas. We have a growing capability to evaluate project performance through assessment methods (hydrogeomorphic, condition assessments, etc.), but more work is needed to better consider aquatic resource functions at a landscape level. It is important to examine whether compensatory mitigation is providing expected functions regionally. Womble and Doyle (2012) identifies trade offs in sizing a service area. A small service area may better ensure, that the functions of permitted impacts are offset at the mitigation bank site but limit use of the bank. A large geographic service area may ensure use of the bank as compensatory mitigation but reduce its potential to fully replace lost functions at a landscape level.

One approach (Womble & Doyle 2012; Layne 2011) is credit bundling where a mitigation credit may be used to offset impacts to multiple resources or functions (nutrient loading, habitat, etc.) associated with a permitted impact, but once debited is retired (no "double dipping"). This approach has worked well for providing compensation for wetland and endangered species impacts. This could lead to different service areas for different functions, or "function-scapes."

There are constraints to the development of better ecological criteria for establishing geographic service areas. Better use of limited resources could be made through coordination between agencies in approving research. There may be creative options for funding research, for example, dedicating a portion of credit proceeds to fund mitigation research. Development of appropriate service areas is an ongoing process. Regulators, bank sponsors, and researchers should periodically examine performance and scientific issues, question their assumptions, and apply the lessons learned. ■

References

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