FEATURE ARTICLE

MESSING WITH MOTHER NATURE: THE QUAGMIRE OF WETLAND MITIGATION BANKING

*By Theodore J. Griswold**

Since the 1970s, federal, state, and local agencies have developed mitigation policies requiring developers, including public works facilities, to compensate for unavoidable damage to wetlands and other sensitive environmental habitats. Simply put, in exchange for permission to adversely affect the environment, the developer must promise to restore or enhance similar resources, either in the same area or elsewhere. Unfortunately, these promises have often been inadequately fulfilled.

Mitigation policies are costly and time-consuming, and the requirements often conflict among agencies. Developers complain that mitigation complicates the regulatory process and introduces uncertainty into project planning. Environmental groups often view mitigation as ineffective in protecting natural resources and as meager consolation in their effort to preserve natural areas. In general, current mitigation practices are economically inefficient and often unsuccessful in reproducing the habitat lost, leaving all parties dissatisfied.

The idea of "banking" mitigation efforts grew out of the frustration of development interests, environmental groups, and regulatory agencies. Mitigation banking occurs where one or more development interest agrees to restore or create significant natural habitat prior to impacting similar habitat. The developer receives "mitigation credits" for the amount of habitat successfully restored, much like a deposit in a mitigation "bank account." The developer is then allowed to use the credits as compensation for environmental impacts from future projects.

In theory, mitigation banking provides the potential for more successful mitigation projects, reduced mitigation costs, a streamlined regulatory process for development, greater regulatory predictability, and new business opportunities in restoration sciences.

The use of mitigation banking as a wetland management and planning tool is gaining notoriety, with considerable support and opposition to the concept, and is fast becoming one of the key natural resources issues of the 1990s. Once understood, it is an issue which prompts an immediate reaction. To developers, mitigation banking is a mechanism which satisfies environmental regulations and enables them to compensate for habitat loss in an efficient, predictable manner. To regulatory officials, it is an undesirable necessity of permitting in a densely populated, resource-depleted state. To scientists, it is a premature leap forward into an uncertain science of habitat restoration and creation. To planners, it is a broadbrush method of incorporating regional environmental concerns into the planning process. To conservationists, it represents a potential relaxation of environmental standards and a license to destroy an already scarce, valuable resource.

This disagreement reveals a central issue which must be addressed: Too little is known about the biological and economic success of mitigation banking, and this knowledge will improve only through practice and experimentation. This article introduces the reader to the issues surrounding mitigation and mitigation banking, and suggests the incorporation of experimentation as a supplement to wetland enhancement requirements to encourage and accelerate the likelihood of success as the concept evolves.

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PROBLEMS

PECULIAR TO CALIFORNIA

Over the past half-century, California has been a leader in social, political, and legal trends. Not all of these trends, however, are positive. California ranks among the leaders in the destruction of wetland resources, and wildlife habitats are becoming rapidly depleted in the face of domestic and industrial development. California's solutions to this destruction have been suitably trendy, and include the occasional use of mitigation banking as an answer to the struggle between enormous development pressures and the desire to preserve the region's natural biodiversity. Several peculiar California resource conditions deserve brief mention to permit a better understanding of why the mitigation banking debate has advanced so quickly in California.

Coastal Population Concentration. The impact of urban development on coastal wetland resources cannot be overstated: 64% of the state's population lives in the coastal counties, and 76% of these people live south of Ventura County.[1] In southern California, twenty million people live along 200 miles of shoreline.[2] These populations result in inordinate pressures to develop the remaining wetland and watershed lands,[3] with houses, marinas, and shopping centers replacing remnant wetlands.[4]

Transportation corridors within the coastal areas have resulted in direct and indirect impacts to wetland resources.[5] The direct impacts of urbanization include roads and rail lines located on wetland fill. In southern California, the emblematic coastal drive has altered the hydrology of nearly every coastal wetland by constricting the tidal openings to narrow bridge underpasses and inhibiting the natural migration of the openings. As a result, most southern California coastal wetlands are closed to tidal flushing for much of the year.

Indirect impacts from urban areas have been at least as devastating to the California wetland resource. Intrusion of domestic animals into wetland areas has led to predation on wetland-dependent birds and animals.[6] Moreover, the mere presence of humans in a salt marsh has been found to instigate a flight reflex in some marsh birds from as far as 195 feet away.[7] Other impacts are more subtle. Coastal sand dunes once created a barrier between many coastal wetland areas and the ocean. Most of these dunes have been developed for coastal housing. In the few areas where the dunes remain, foot traffic has killed much of the vegetation that once anchored the sand creating the dunes. Once denuded of vegetation, the sand is easily blown away or washed into the ocean, making the dune system gradually disappear. Eventually, the dunes become reduced to the point where storm surges can wash over them, pushing sand into tidal channels of the adjacent wetland. The constricted channels can lead to devastating effects on the wildlife of the wetland.[8]

Wetland Habitat Loss in California. Estimates of wetland habitat loss in California vary considerably depending on the scope of the estimate; however, any way the numbers are presented, the message is staggering.[9] Statewide, it is estimated that only 10% of the wetland acreage present in the mid-1800s remains today.[10] The largest loss of wetlands has occurred in the Central Valley and Sacramento–San Joaquin River Delta, where 95% of the four million acres of historic marsh and swamplands has been reclaimed for agriculture since the nineteenth century.[11] The Klamath Basin has lost 60% of historic wetlands to agricultural reclamation and federal water projects.[12] In the San Francisco Bay Area, about 75% of historic wetlands have been lost to port and harbor development, urban expansion, industrial development and military installations.[13] In southern California, over three-fourths of the coastal wetland habitat has been destroyed, with nearly all of the remaining habitat greatly disturbed.[14] In Los Angeles and Orange counties, tidal wetlands have been reduced by 90%, and are considered more "museum pieces" than wildlife habitat.[15] In fact, the only regions in the state which retain more than half of their historic wetland acreage are the north and central coast areas, where urban and agricultural pressures are minimal.[16]

The impact of the loss of wetland habitat is reflected in the decline of the plant and animal species which rely on it. At least 24 wetland-dependent animal species and several more plant species are currently listed as state or federal endangered species.[17] Many of the state's coastal fisheries declined rapidly after the turn of the century as intertidal and wetland areas were lost.[18] One of the best-documented declines has been the reduction in waterfowl and shorebirds.[19] Once a wintering and breeding haven for these migratory birds, California wetlands now represent an ecological bottleneck for waterfowl populations.[20]

Ironically, the lack of wetlands in California has compounded the mitigation problem by creating a shortage of potential wetland restoration or creation sites. In the San Francisco Bay Area alone, one million dollars has accrued from various projects which have triggered mitigation requirements, but there is no place to implement them.[21] In southern California, many coastal wetland areas are constrained in narrow valleys, restricting the ability to create "new" wetland habitat.[22]

Water Scarcity. The scarcity of water and the escalating demand for it have presented a myriad of problems for wetland areas throughout the state. In southern California, dams to create reservoirs for urban water supplies have altered the hydrology and sedimentation patterns of most streams, leading to a deficit in shoreline sand replenishment and accelerated coastal erosion.[23] At the same time, unregulated clearing and construction in watersheds has led to the deposit of excessive amounts of sediments in downstream wetlands where hydrology is insufficient to carry them offshore. As a result, wetlands become clogged with fine sediments, reducing the ability of the wetland to maintain tidal flushing.[24]

The uncertain nature of the California water supply for wetland management has led to indirect incentives for agricultural conversion in the Central Valley.[25] At the same time, increased demand for water in the state has led to net exports of streamflow from northern California, depriving many wetland areas of adequate water.

MITIGATION: AN OVERVIEW OF THE PROBLEM

In laying the groundwork for understanding the mitigation banking debate, it is necessary to understand that the controversy begins with widespread disagreement regarding the appropriate definition of the term "mitigation" itself in law, regulation, and practice.[26] The myriad of definitions of the term that have been adopted by the various parties involved in the mitigation debate make it difficult to offer any precise definition of "mitigation" as it relates to wetland policy. Much of the mitigation debate has centered on this very question.

Historical Use of Mitigation. The use of mitigation requirements in wildlife resource management dates back to the 1950s, when "resource mitigation" was used to compensate for the effects of dams on anadromous fish populations through the construction of hatcheries or fish passages to lessen the impact of development on a specific population of animals.[27] With the environmental movement in the 1970s came an expansion of the mitigation concept to address broader types of resource losses, and a new management emphasis on habitat preservation rather than single species preservation.[28] This shift in emphasis prompted calls for new kinds of mitigation, including the acquisition and preservation of natural habitat to compensate for habitat lost to development, reductions in pollutants from existing sources to compensate for new sources of pollution, and the creation, restoration, and enhancement of sensitive habitat to replace lost habitat values.[29]

Shortly thereafter, the federal Fish and Wildlife Coordination Act (FWCA)[30] and the National Environmental Policy Act (NEPA)[31] provided early statutory authority for mitigation requirements related to federal projects and federally-issued permits.[32] Additional authority was later provided by several executive proclamations.[33] These legislative and executive actions, however, amounted to little more than acknowledgements of mitigation requirements without providing guidance for how and when they should be applied.

A Federal Regulatory Definition. After a decade of misunderstanding and regulatory confusion regarding the meaning of the term "mitigation," the President's Council on Environmental Quality (CEQ) offered guidelines in 1978 which focused on five elements:

(a) avoiding the environmental impact altogether by not taking a certain action or parts of an action;

(b) minimizing the impact by limiting the degree or magnitude of the action and its implementation;

(c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

(d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and

(e) compensating for the impact by replacing or providing substitute resources or environments.[34]

This language became the accepted regulatory definition of "mitigation" and, for the first time, regulatory agencies could point to a single, concise set of words that codified the "official" meaning of the term. Unfortunately, no interpretive guidance accompanied the definition regarding the proper application of the five elements. Thus, the primary issue in mitigation policy shifted from the meaning of the term to the manner in which it should be applied.

Other Key Terms in the Mitigation Debate. Before discussing the issues surrounding the proper application of mitigation, it is worth noting that the inconsistent use of other terms by developers, public agencies, states, and municipalities has compounded the confusion surrounding mitigation. In an effort to provide some order to the terminology applied to wetland mitigation, the U.S. Environmental Protection Agency (EPA) coordinated a 1989 nationwide census of wetland scientists, regulators, and managers regarding the proper definitions of key terms.[35] The following frequently used terms deserve abbreviated definitions for a consistent understanding in the discussion to follow. These terms have been defined in different language by other sources; however, the following definitions represent the general consensus, according to the EPA survey.[36]

• ***Restoration***: returned from a disturbed or totally altered condition to a previously existing, natural, or altered condition by some action by man. Restoration refers to the return of a type of habitat to a preexisting condition.[37]

• ***Creation***: the conversion of persistent non-wetland area into a wetland through some activity of man. This definition presumes the site has not been a wetland within recent times (100–200 years) and thus restoration is not occurring. There are two types of created wetlands: artificial and man-induced. Artificial wetlands require some continuous or persistent activity of man (*e.g.*, irrigation or weeding) to exist. Man-induced wetlands generally result from a one-time action of man and persist on their own.[38] Of the various types of compensatory mitigation, this is the most technically challenging and the most uncertain of success.[39] Consequently, it is the least desirable form of manipulative mitigation.

• ***Enhancement***: the increase in one or more values of all or a portion of an existing wetland by man's activities, often with an accompanying decline in other wetland values.[40] Enhancement and restoration are often confused. Enhancement is considered the intentional alteration of an existing wetland to provide conditions which previously did not exist and which, by consensus, increase one or more values.[41]

• ***Success***: achieving established goals. Success in wetlands restoration, creation, and enhancement ideally requires that quantitative criteria be established prior to commencement of these activities. It is important to note that a project may not succeed in achieving its goals, yet may still provide some other values deemed acceptable upon evaluation. In such a case, the project may fail, but habitat is nevertheless established. In situations where poor or nonexistent goal-setting occurred, functional equivalency may be determined by comparison with a reference wetland, and success defined by this comparison.[42]

• ***Onsite Mitigation***: compensatory mitigation which occurs adjacent to or in the immediate vicinity of the impacted habitat. Generally considered to be a part of the same functioning ecosystem, and considered preferable to offsite mitigation.[43] Replacement wetlands should be created or restored as near the original wetland site as possible to ensure that the benefits of the original wetland continue to be enjoyed locally.[44]

• ***Offsite Mitigation***: compensatory mitigation occurring outside the ecosystem sustaining the impacts of the proposed development. Considered less preferable than onsite mitigation because compensation is geographically removed from impacts, leading to a localized depletion of resources.[45]

• ***In-kind Replacement***: providing or managing substitute resources to replace functional values of the resources lost, where such substitute resources are physically and biologically the same or closely approximate those lost.[46]

• ***Out-of-kind Replacement***: providing or managing substitute resources to replace functional values of the resources lost, where such substitute resources are physically or biologically different from those lost.[47] Out-of-kind replacement is generally avoided because it fails to restore the habitat values that were lost.[48]

Avoidance or Compensation? As various agencies attempted to implement the mitigation concept outlined by the CEQ in 1978, most failed to coordinate these efforts among themselves. As a result, single projects often received very different mitigation requirements from different agencies.[49] It became clear that a unified policy was necessary to provide consistency in the government's application of the concept; however, the resource community was sharply divided on which policy should be adopted. Through the 1970s, the common application of "mitigation" meant both avoiding damage to sensitive areas and carrying out some form of compensation for damage which has occurred.[50] This dual usage of the term became the root of the mitigation debate, as some agencies saw impact avoidance as a prerequisite to compensation, while others saw the use of avoidance as discretionary.

The first federal attempt to produce a uniform policy on mitigation application came in 1981, when the U.S. Fish and Wildlife Service (USFWS) published its FWS Mitigation Policy.[51] The FWS Mitigation Policy declared the elements in the CEQ definition,[52] in the order listed, as the desirable sequence of steps to be used in the mitigation planning process, and set guidelines for mitigation goals based on resource categories. Simply put, USFWS identified four resource categories, decreasing in importance, with corresponding mitigation goals with decreasing levels of stringency. The level of mitigation to be required corresponded with the value and scarcity of the habitat at risk.[53] USFWS' adoption of this policy of applying the mitigation definition sequentially, with an emphasis on the avoidance of impacts, has been identified as the turning point in the mitigation debate.[54] The Policy emphasizes that although "mitigation" is often defined in terms of habitat restoration, creation, or enhancement to compensate for project-related impacts, such compensation is viewed as the *least favored* method of mitigation. The heart of the Policy is the avoidance of damage altogether, rather than an attempt to repair damage after it occurs.[55] The FWS Mitigation Policy was eventually adopted by EPA.[56]

Some agencies—notably the U.S. Army Corps of Engineers (Corps)—resisted the "sequential" application of the mitigation definition, preferring instead to base mitigation requirements on a balancing of the public interest in a given project.[57] In 1985, the Corps explicitly adopted the position that "mitigation" (including compensation) should be considered throughout the permit process, and refused to view it in a step-wise fashion.[58] In balancing the public interest benefits of a project against its detriments, the Corps used "mitigation" to tip the public interest balance so that a

project might be found in the public interest.[59] According to David Barrows, formerly of the Office of the Chief of Engineers in Washington, D.C., the factors used to mitigate projects in this way include project adjustments relating to fish and wildlife resources, water quality, erosion control, navigation, historic properties, and economics.[60] The Corps viewed mitigation as a tool to allow the authorization of a construction project.[61]

The Corps' interpretation of federal mitigation policy acquired heightened importance because of its key role in reviewing dredge and fill permit applications under section 404 of the federal Clean Water Act (CWA) and section 10 of the River and Harbors Act.[62] Both of these Acts regulate activities limited to aquatic or wetland habitats. Section 404 of the CWA prohibits the discharge of any pollutants into the nation's waters without a permit.[63] Following considerable congressional debate regarding the proper agency to oversee the permit program,[64] a compromise enabled EPA and the Corps to share custody of the program.[65] It was decided that primary permitting authority under section 404 would be administered by the Corps,[66] with EPA maintaining statutory power to veto any Corps permits erroneously granted.[67] EPA was also required to produce specific guidelines ("404(b)(1) guidelines") with the Corps for use in Corps permit application decisions, and to help determine the extent of section 404 jurisdiction.[68] The mitigation requirements for the permitting program originate from these EPA guidelines, but are initially administered by the Corps. Unfortunately, the Corps and EPA have rarely agreed on the interpretation of these guidelines and have become the fighting Siamese twins of wetlands regulation.

EPA incorporated the sequential application of the mitigation concept into the 404(b)(1) guidelines when they were promulgated in 1980.[69] As noted above, the Corps disagreed with the guidelines' emphasis on avoidance of impacts, preferring instead to sidestep the avoidance issue and consider compensatory mitigation throughout the permit process. While the Corps' approach permitted applicants to demonstrate their willingness to cooperate and contribute to wetland value concerns, it is also presupposed that a permit would not be denied. This latter factor was attractive to agency staff members who were under pressure to avoid lengthy delays and potential litigation because it eliminated the possibility of a fifth amendment "takings" challenge to the agency's actions, since the agency would not outright deny the permit.[70] At a time when the emphasis of Corps personnel was on processing permits and not on protecting the resource, this shortcut method through the permit process was extremely attractive.[71] The danger of this approach, according to EPA sources, was that it violated the basic definition of mitigation being used by other agencies.[72] By accepting mitigation proposals for habitat enhancement or replacement up front, mitigation became a sort of currency for the destruction of wetlands.[73]

The Corps' policy, which was widely supported by the development industry and adopted by some state and local regulatory agencies, caused many people to wrongly associate mitigation exclusively with terms such as the creation, restoration, or enhancement of wetland habitat.[74] This led to the tendency for many involved in the business of mitigation to begin debating the technical issues of individual proposals without first addressing the more important philosophical issue of whether the impacts to the resource were reasonable or justifiable in the first place.[75]

The conflicting mitigation policies of EPA and the Corps met head on in *Bersani v. U.S. Environmental Protection Agency*,[76] which tested the EPA's veto power under section 404 and the proper application of the section 404(b)(1) guidelines.[77] In *Bersani*, EPA vetoed the Corps' issuance of a section 404 permit on the basis of erroneous application of the 404(b)(1) guidelines and of the federal mitigation policy. The basic premise of the veto was that the 404(b)(1) guidelines do not allow mitigation as a remedy for destroying wetlands when practicable alternatives exist.[78] The developer sued to overturn the veto. The district court and the Second Circuit upheld the veto, noting that use of the 404(b)(1) guidelines in permit review is mandatory, while the public interest review, which the Corps used in approving the permit, is only discretionary.[79] The court also endorsed EPA's influence in the section 404 program by interpreting the guidelines to "provide an incentive to avoid choosing wetlands" for development.[80] EPA's policy against using mitigation to offset the filling of existing wetlands resources was also accepted as reasonable by the court.[81]

Current Federal Mitigation Policy: The EPA/Corps Mitigation MOA. The primary benefit of *Bersani* was that it forced the agencies to sit down and agree to a unified policy on mitigation. On November 15, 1989, the Department of the Army, USFWS, and EPA ended their protracted dispute over mitigation by signing a memorandum of agreement (MOA) stating that mitigation alone may not provide a basis for issuing a section 404 permit.[82] The MOA accepted EPA's longstanding sequencing approach to mitigation, permitting mitigation to be considered only after a project meets permit criteria without the aid of mitigation.[83] Compensatory mitigation is no longer allowed to reduce the environmental impacts in the evaluation of the least damaging practicable alternatives to a project.[84] The memorandum also adopts other mitigation criteria which were formerly only disputed policy, including an overall standard for mitigation as replacement of functional value, consistent with a "no net loss policy."[85]

The "no net loss" policy has become a favorite political catch phrase which many politicians and agency administrators have used to characterize their views as "pro-environment." These speakers interpret the phrase simplistically to mean that no wetland *acreage* will be lost on a specific project, either on a regionwide or nationwide basis. In other words, for every acre of wetland impacted or lost, a new acre must be created or restored so that there is "no net loss" of wetlands. However, this is not the intent of EPA's "no net loss" policy. The new memorandum of agreement corrected misinterpretations of the policy to require no net loss of *functional wetland values*.[86] The functional value of one acre of restored or created wetland is not equivalent to an acre of natural habitat; thus, if the "no net loss" policy is used on the basis of acreage, there would necessarily be a net loss of wetland functional values.

The effective date of the MOA was delayed twice by the White House in response to criticism from the Departments of Energy and Transportation, the oil and gas industry, and development interests in Alaska. The final version of the memorandum—which contained substantive revisions regarding Alaska—became effective on February 7, 1990.[87] These revisions—which allow for less than one-to-one functional replacement of wetlands filled in the state of Alaska—have been criticized as precluding a realistic national goal of "no net loss" of wetland functional values, making the agreement internally inconsistent.[88]

To reiterate, the current Corps/EPA/USFWS policy on mitigation explicitly states that the applicant may propose compensatory mitigation only as a last

resort. The applicant must first avoid impacts to the wetland; second, it must minimize those impacts, third, it must try to repair or rehabilitate the habitat that would be damaged. Therefore, it is essential to preface the forthcoming discussion of mitigation banking with the acknowledgement that the realm of mitigation banking applies only to projects resulting in *unavoidable* habitat loss. Before a project proponent reaches the stage where mitigation banking may be discussed, the first three steps of the mitigation policy must be carried out to their fullest extent.

California Mitigation Policy. California wetlands protection law consists of a patchwork of state and local laws, ordinances, regulations, and policy statements that at times are redundant, and at others leave regulatory gaps.[89] This fragmentation has left California without a unified or predictable statewide mitigation policy. Compounding this problem is the fact that the state has an abundance of environmental statutes which require some form of mitigation.[90] In the absence of a clear statewide policy, it may be helpful to understand the mandates of a few of the major agencies which influence mitigation practices in California.

Department of Fish and Game. The primary role of the Department of Fish and Game (DFG) is trustee for the welfare of the state's fish, wildlife, and plant resources.[91] DFG has no direct permit or regulatory authority over wetlands, but does regulate construction activities which may "divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake designated by [DFG]...."[92] DFG's role in wetlands regulation on private land is limited to reviewing projects and providing advisory comments and information.[93] Permitting agencies must consult with DFG as the "trustee agency" for natural resources whenever a project impacts fish and wildlife resources.[94] Additionally, DFG is authorized by the Fish and Wildlife Coordination Act to provide comments on federal projects impacting California's natural resources, including all section 404 permits.[95]

DFG and the Fish and Game Commission[96] have adopted a policy regarding protection of wetlands which reflects an extremely optimistic view of man's capability to create or restore functional wetland habitats.[97] The policy's basic tenet is that projects should not result in a net loss of either wetland acreage or wetland habitat value.[98] The policy also states that "mitigation and compensation of project impacts through acquisitions and restoration has been the responsibility of project beneficiaries."[99] DFG conveys this message through project review, analysis, and negotiations with other resource agencies and private individuals using several "wetland impact minimization techniques."[100]

Coastal Regulation. The most important state provision regarding coastal wetlands and mitigation is the Coastal Act of 1976.[101] The Coastal Act prohibits coastal development projects involving the diking, dredging, or filling of wetlands unless they fit into one of eight categories.[102] Ironically, several of these categories have been major causes of degradation of the coastal wetlands resource.[103] The Coastal Act is primarily administered by the California Coastal Commission, which may require mitigation before approving a coastal development project.[104] Coastal Commission staff considers the Coastal Act "internally balanced"—that is, the statute already balances economic and development concerns with wildlife and environmental concerns.[105] As such, there is no need to balance the Coastal Act provisions against economic concerns when making permitting decisions.

The Coastal Commission also administers the federal Coastal Zone Management Act (CZMA).[106] Pursuant to the CZMA, the Commission implements the California Coastal Management Program, which clarifies the state coastal resources policy, and allows for the delegation of the Commission's duties to local governments upon approval of a local coastal program (LCP).[107] Pursuant to this program, the Coastal Commission (or a certified local government) issues coastal development permits for all projects and structural activities in the coastal zone.[108]

Before a coastal development permit to dike, fill, or dredge wetlands is issued, the Commission must find that there is not a feasible, less damaging alternative, that feasible mitigation measures have been provided to minimize adverse environmental impacts, and that the functional capacity of wetland areas are maintained or enhanced.[109] In this respect, the Commission apparently uses the "common law" definition of mitigation, which emphasizes compensation for wetland impacts rather than avoidance of impacts altogether.[110] The continued use of this definition of mitigation adds confusion to the state/federal permitting scheme.

Water Resources Control Board. The Water Resources Control Board (WRCB)[111] regulates wetlands indirectly through section 401 of the Clean Water Act. Section 401 requires state water quality certification as a prerequisite to issuance of a section 404 dredge and fill permit.[112] The WRCB may indirectly influence mitigation plans by instilling conditions on the 401 certification which must be accounted for in a mitigation plan.[113]

The Water Resources Control Board is currently considering whether to reissue nationwide permits under the section 404 permit program.[114] The WRCB has the option of requiring individual section 401 water quality certification for each project falling under the jurisdiction of the nationwide permit program. If the Board decides to exercise this authority, its ability to condition permit approval upon specific mitigation needs will vastly increase.

Problems with Mitigation. As state and federal agencies have struggled to interpret, apply, and enforce mitigation requirements in development projects within their jurisdiction, several problems and criticisms have emerged which have resulted—in part—in the concept of mitigation banking. The following discussion provides an overview of the main criticisms of mitigation policies which have surfaced over the last ten years.

One of the primary criticisms of wetland mitigation is that it is used as a justification for wetland alteration. As noted earlier, EPA and USFWS view mitigation as a "last resort" form of compensation for unavoidable environmental impacts. These agencies require that efforts to avoid wetland impacts be exhausted before compensation is considered. However, the reality in many projects is that the developer ignores the avoidance prerequisite and comes to the table with a project which is sited in a wetland area and is accompanied by either a mitigation plan or a proposal to consult agency officials on mitigation. Even when this approach is rebuffed by resource agencies, however, few developers are discouraged to the point of abandoning their projects.[115]

The uncertainty of success of wetland restoration and creation projects is perhaps the most important hurdle which mitigation policy must overcome. While some types of habitats have apparently been successfully restored, the technology for restoring most types of habitats is completely inadequate. For example, some riparian habitats located in southern California have been restored fairly successfully.[116] However, these projects were sited in areas which probably

would have revegetated on their own in only slightly more time than it took with the restoration effort.[117] On the other hand, many mitigation projects try to create too many types of habitat in one area in order to accommodate more species at one site. These projects propose increasing the quality of habitat in exchange for quantity, but generally result in uncertainty or—more likely—a decrease in both quantity and quality.[118]

Mitigation involving compensation, particularly with regard to habitat creation and restoration, is still considered an experimental process (at best) that has been applied only on a limited basis.[119] The degree of uncertainty associated with mitigation parallels the amount of manipulation necessary to satisfy project needs. Wetland enhancement has the highest relative probability of success, followed by wetland restoration, and—finally—wetland creation.

In almost any mitigation project, some wetland vegetation can usually be planted and survive. However, it is has yet to be shown that an entire ecosystem can be replaced or restored. The various functions of very complicated natural systems are simply not totally understood.[120] Thus, the assumption upon which most mitigation projects rely is only that—an assumption which has often been unquestioned, even by resource agencies.

By conceding the loss of wetland habitat values and moving directly to discuss the issues of mitigation and the technical merits of a proposal, a regulatory agency loses sight of the big picture. The more important philosophical question is whether mitigation practices such as habitat restoration and creation are reasonable or justifiable in light of the overall costs to the resource. For example, regardless of the quality or good intentions of a mitigation project, some known habitat will be lost, and the short- and long-term success of the mitigation project may remain uncertain for a number of years. Thus, there is necessarily a trade-off of the loss of a known commodity in exchange for an uncertain commodity.

The conspicuous absence of data relating to large-scale creation of wetland ecosystems is even more troubling in light of the assumptions of success often made in mitigation policies. Historical attempts to revegetate dredge spoils and marsh areas with limited plantings do not create a functioning ecosystem.[121] Even when a wetland area is carefully planted and monitored, the functional success may not be attained for many, many years.[122] As such, wetland creation should be a last resort, compensating for completely unavoidable impacts associated with water-dependent projects. Moreover, wetland creation should never be used to justify destruction of productive wetlands.

It can hardly be denied that habitat restoration and enhancement benefit a degrading wetland system. However, the real issue is whether to allow wetland destruction conditioned upon promises or guarantees of wetland restoration or creation, when both practices are based upon an imperfect science and raise substantial institutional problems.[123]

Even if a project is successful in taking on many of the attributes of a natural habitat, there is still the intangible loss of the character and history of the habitat which is irreplaceable. To say that habitats may be destroyed because we can recreate them is much like saying that once we have the technology to balance stones on top of each other, we can recreate Stonehenge and build a shopping mall over the original.[124] Much of the value of any natural ecosystem is that each has its own history and no two are identical. This value is not static; rather, it is temporal and is difficult to quantify—in fact, so difficult that it is routinely ignored in habitat value assessments.

Another critical issue is whether a mitigation project should replace precisely the same functions that are being lost by the development project. In other words, should wetland replacement be in-kind (the same habitat type and size) or out-of-kind (of different type and size)? The danger of out-of-kind mitigation is that habitats which are difficult to restore or enhance may be depleted and not effectively replaced if they can be mitigated for by restoring a different type of wetland. Out-of-kind mitigation leads to a net loss of habitat values of the impacted habitat type. On the other hand, out-of-kind mitigation may be desirable if a more scarce or valuable habitat is in critical need of expansion and the habitat lost to development is relatively abundant.

Another controversial mitigation issue is whether mitigation should take place onsite (on or immediately adjacent to the impacted site) or offsite (within a reasonable distance from the impacted site). One of the dangers in allowing offsite mitigation is that it promotes fragmentation of wetland habitat. USFWS' mitigation policy states that first priority will be given to recommendation of a mitigation site within the planning area, and then adjacent to the project area; last priority is given to recommendation of mitigation sites elsewhere within the same ecoregion of the project.[125]

The parties responsible for carrying out mitigation projects have also become increasingly frustrated with mitigation policies due to the costs and delay associated with mitigation. Developers saw the costs of mitigation projects skyrocket in the 1980s. The constantly changing regulatory environment and shifting agency policies have created an uncertain backdrop in which developers must estimate project costs. Lengthy project delays are common as permit applicants and regulatory agencies discuss the details of mitigation requirements. If a project is materially changed during construction, delays of months or even years may result due to a backlog of permit applications and/or the refusal of one party to change the mitigation agreement.

These problems with mitigation policy have been relatively easy to identify. Finding their solutions is much more difficult. The need for increased certainty of success in mitigation projects, preferably ascertained before impacting the resource, is viewed by biologists as the top priority. Standardizing and consolidating regulatory requirements is also necessary to instill predictability into the planning process. In troubling economic times, the development industry wants to reduce the costs of mitigation as much as possible. Regulatory agencies that are finding themselves overworked and understaffed need a way to manage their resources in a more efficient way. The proposed use of mitigation banking is seen as a potential method of resolving many of these issues. Unfortunately, it may exacerbate some of the existing problems and create new ones.

MITIGATION BANKING

GENERALLY

The term "mitigation bank" has been used to describe a wide variety of habitat management policies, only some of which are truly considered mitigation banks.[126] The U.S. Fish and Wildlife Service[127] defines mitigation banking as "...habitat protection or improvement actions taken expressly for the purpose of compensating for unavoidable, necessary losses from specific future development actions."[128] In practice, there is no such thing as a "typical" mitigation bank, and mitigation banking can work many variations off this central theme.[129]

A simple, one-party mitigation bank is similar to maintaining a bank ac-

count.[130] A developer "opens an account" by entering into a memorandum of agreement with regulatory agencies to create, restore, or preserve wildlife habitat in advance of an anticipated need for mitigation of impacts from a project. The benefits of these efforts are quantified by regulatory officials, and the developer receives a "balance" of mitigation credits in his or her account. Later, when the developer proposes a project that includes unavoidable losses of fish and wildlife habitat, the losses are quantified and withdrawn from the mitigation bank account. Withdrawals may be repeated as long as mitigation credits remain in the bank. The one-party mitigation bank has been used by individuals who frequently impact small or isolated areas of sensitive habitat and who have sufficient capital to create the bank. These include large development and energy corporations and state Department of Transportation.

A variation on the one-party mitigation bank is the cooperative banking group. In a mitigation bank co-op, several development interests agree to pool their resources to create a mitigation bank. Each party to the agreement receives mitigation credits proportionate to their investment. Co-ops provide the small and medium-sized developer with an opportunity to enjoy the benefits of mitigation banking while sharing the threshold costs of regulatory review, land acquisition, and habitat restoration. This type of bank is likely to appeal to homebuilder associations and other mutual interest organizations.

Another increasingly popular variation of mitigation banking is the third-party mitigation bank, which creates a market for mitigation credits. Under this scenario, an environmental restoration business independently acquires land and creates or restores wildlife habitat in order to create a mitigation bank account. Mitigation credits are then sold to development interests whose projects impact similar habitat types in the area. The benefit of this type of mitigation banking is that it makes optimal use of market forces through specialization, thus theoretically reducing the cost of mitigation to the developer.

A true mitigation bank is markedly different from an "in-lieu fee program." In-lieu fee programs are processes whereby several developers agree with resource agencies to pay fees into an account that, when enough money has accumulated, is used to purchase and enhance a sensitive habitat area. In-lieu fee programs accumulate funds slowly, and years may pass before a mitigation project is initiated and habitat losses are compensated.[131]

As a result, in-lieu fee programs generally lead to temporary losses of habitat value. For example, in San Diego County, an in-lieu fee program was initiated to compensate for damage to vernal pool habitats. An agreement was signed by DFG, USFWS, the U.S. Army Corps of Engineers, and the City of San Diego which allowed development and sale of certain lands in exchange for deposits into an account to purchase sensitive property with vernal pools. The project was flawed in its initial design and was universally considered a dismal failure.[132] On the day the agreement was signed, the arrangement facilitated the loss of considerable vernal pool habitat and, even in a best-case scenario, would compensate for less than 10% of that loss. The reason for the "guaranteed failure" of this program was a refusal to require fees sufficient to acquire the necessary land. The total funds available through the program were sufficient to purchase only 10% of the land based on per-acre values at the time the agreement was signed. After the agreement was signed, land prices escalated and the program became essentially useless in preserving the vernal pools.

Elements of a Mitigation Bank. As noted, there is no such thing as a "typical" mitigation bank. However, there are certain elements which all mitigation banks must have in order to be identified as such.

Bank Sponsor. First, there must be a project sponsor which develops a plan for creating new wetlands or restoring degrading wetlands in some other area. Mitigation bank sponsors historically have been industry or government entities. The plan developed by the bank's sponsor provides the basis for a memorandum of understanding among the various agencies which have permitting authority over the mitigation bank.

One of the bank sponsor's most difficult tasks is coordinating and mediating issues among the multitude of agencies and concerned interest groups that are involved in the design and implementation of a mitigation bank. At minimum, these agencies include state and federal permitting agencies such as the California Coastal Commission, the U.S. Army Corps of Engineers, and the regional water quality control boards; local permitting agencies such as city and county planning commissions; commenting agencies such as DFG, USFWS, EPA, and the National Marine Fisheries Service; environmental interest groups such as the Sierra Club and Audubon Society; and local development interest groups.[133] With these cumbersome bureaucracies and interest groups, keeping the process moving toward a consensus on the myriad of decisions and issues among parties with diverging interests is one of the primary challenges which the bank's sponsor will encounter.[134]

Written Agreement. The key to successful establishment of a mitigation bank is a written banking agreement which formalizes the consensus among signatory agencies about the characteristics and use of the bank. The interagency agreement establishes guidelines for bank use and defines the allowable, required, and prohibited actions for all of the parties involved.[135] A formal bank agreement, usually known as a memorandum of understanding (MOU), generally involves all federal, state, and local permitting and commenting agencies with an interest in the outcome of the project. The consensus among federal agencies is that a mitigation bank MOU should accomplish all of the following goals:

- specify that the bank may be used only when the permitting and commenting agencies agree that onsite mitigation and other offsite mitigation options are not appropriate, and that the bank has the appropriate habitat value available;
- include or reference comprehensive regional plans and goals to which the bank plan is related;
- define the obligations and interests of each of the parties involved;
- designate a mitigation bank overview team, if that team is different from the signatories to the formal banking agreement;
- incorporate, at least by reference, the habitat enhancement plan, including a long-term management plan, a list of maintenance activities, and the entities responsible for these activities;
- define the decisionmaking process that will be used if conflicts arise concerning the agreement or the use of the bank;
- establish who will hold legal title to the land and other legal arrangements for the bank land;
- limit the use of the bank to a clearly defined geographic area;
- establish the size of the bank;
- include the methodology that will be used to determine bank credits and project debits, and the crediting and debiting process;
- establish a bank manager or coordinator who will maintain the official re-

cord of credit and debit transactions for the bank;

• identify the particular types of habitat eligible to be offset by the bank;

• specify the procedure for continued monitoring and evaluation of the bank and related adjustments in bank management or credits; and

• include any other restrictions appropriate for the bank.[136]

In addition, the mitigation banking agreement should preserve the autonomy of the individual agencies. The signing of the MOU should not preclude any of the agencies from enforcing their responsibility to take appropriate action should the bank later be used to facilitate inappropriate development projects or provide inadequate mitigation for project losses.

Methods of Evaluating Success. The primary assumption in establishing a mitigation bank is that the restored or created habitat will be successful in duplicating the habitat values lost from the impacted site. Therefore, a clear, scientifically acceptable method of determining existing habitat values and evaluating habitat values following enhancement of the bank site is an absolute necessity to any mitigation banking project. This is one of the most important and most controversial elements of the mitigation banking concept. However, finding a system which is technically defensible, replicable, consistent, and applicable to different types of habitat has proven problematic.[137]

The U.S. Fish and Wildlife Service's habitat evaluation procedure (HEP) has been commonly used in California; however, other permitting agencies question the system's reliability and flexibility in evaluating mitigation success.[138] HEP analysis is susceptible to extreme bias and can be used to hide impacts caused by the mitigation project itself.[139] In addition to HEP, other methods of habitat evaluation have been developed or modified to specific projects, but these have also been sharply criticized.[140]

Duration. Nearly all agencies involved in mitigation banking agree that if a development is permanent, then the mitigation bank should also be created in perpetuity. Failure to create a permanent wetland bank and adhere to this commitment is dangerous because land—particularly in California—becomes increasingly valuable as it becomes scarce. Wetland mitigation sites are already becoming increasingly scarce, and pressure will build to begin whittling away at the remaining sites as land values rise further. If the land is not dedicated in perpetuity, the bank's effective period should be at least as long as the impact from the project which it mitigates.

Other Features. Another key feature in establishing a mitigation bank is deciding whether the land for the mitigation site will be publicly or privately owned. One advantage of keeping the land in private ownership is that it retains a local property tax base[141] and maintains a lead agency's role as risk manager, rather than landlord. Some projects have kept the site in private ownership until all of the mitigation credits are distributed, at which time the land is deeded to a resource agency or nature conservancy for management responsibility in perpetuity.[142] Finally, a mitigation bank must have a managing agency which will oversee the management and maintenance of the habitat in perpetuity.[143]

Prerequisites to Establishing a Mitigation Bank. Projects for which mitigation banking is an option are a small subset of projects requiring mitigation. A majority of projects which are originally designed to impact wetlands should be filtered out before reaching the question of whether the use of a mitigation bank is appropriate.[144] Even among those few projects which may propose mitigation banking, the practice is only appropriate for a few. Most agencies involved in environmental permitting require the following prerequisites before considering use of a mitigation bank:

• all attempts to avoid or minimize impacts and to provide onsite mitigation have been absolutely exhausted;[145]

• there is a demonstrated public benefit associated with the project which outweighs the foreseeable detrimental impacts on fish and wildlife resources;

• if the project is sited in a wetland, the development project must be water-dependent;[146] and

• onsite mitigation means are unavailable or insufficient to meet project mitigation needs.[147]

If all of these prerequisites are met, then the possibility of creating (or using) a wetland mitigation bank exists.

REGULATORY ACTION

Federal Mitigation Banking Guidelines. There are currently no comprehensive guidelines for establishing a mitigation bank acceptable to all federal regulators.[148] As a result, project proponents must piece together a general federal policy from independent actions of various agencies.

The most well-known federal guidelines on mitigation banking originate from USFWS' Interim Guidance on Mitigation Banking, which was adopted in 1983.[149] USFWS considers this Interim Guidance its current statement on the use of mitigation banks. The Interim Guidance is used for all habitat types and is not restricted to wetland applications.[150] It also emphasizes that banking is but one tool of many available to mitigate unavoidable resource losses. The steps recommended by USFWS in creating a mitigation bank include the following:

• identify the agency or agencies with which it seems appropriate to consider a mitigation bank and form an interagency team;

• identify an involved entity that is willing to develop the bank's site prior to its use as mitigation for project impacts;

• identify the types of wetlands that should be included in the bank, emphasizing in-kind mitigation requirements;

• identify potential bank sites;

• evaluate the potential bank sites and select the most suitable candidate sites;

• select the bank site and acquire the land;

• complete a detailed site development plan and identify responsible entities for bank development and long-term management;

• develop (restore or create habitat) the bank site and determine available credits using the selected evaluation methodology;

• agree to the bank credit and debit procedures, including any restrictions on the use of bank credits; and

• use the bank, as appropriate, to mitigate for necessary and unavoidable project impacts.[151]

The Interim Guidance sets forth ten factors which must be considered in establishing and administering a wetland mitigation bank (the list is not inclusive).[152] In addition to its Interim Guidance, USFWS has also released a short synopsis of mitigation banks with Fish and Wildlife Service involvement.[153] This booklet expands on the principles of the Interim Guidance and reviews several mitigation banks in progress or planned for the near future.

EPA has not issued any formal nationwide policy on mitigation banking; however, EPA's Office of Wetlands Protection released a policy statement to the National Wetlands Policy Forum in 1991.[154] The policy reiterates EPA's position on strict mitigation sequencing and applies this policy to mitigation banking as well. EPA defines wetlands mitigation banking as "a comprehensive advanced

planning approach for compensating for the unavoidable loss of wetlands or wetland functions resulting from development actions where mitigation cannot be achieved at the site of impact."[155] The EPA definition includes restoration of existing wetlands and the creation of new wetlands from uplands;[156] however, EPA considers the simple purchase or "preservation"[157] of existing wetlands as acceptable mitigation in very rare instances.[158]

In general, EPA considers mitigation banking as an experimental concept which should not be widely used.[159] EPA has also established several prerequisites to the consideration of a wetlands mitigation bank.[160] Once the prerequisites are met, the project satisfies the 404(b)(1) guidelines, and all other impacts are minimized, mitigation banking may be considered to reduce the remaining unavoidable impacts below a level of significant degradation.

The National Marine Fisheries Service (NMFS) also provided informal comments to the National Wetlands Policy Forum on its position on mitigation banking. NMFS expressed concern about the feasibility of mitigation banking and the affordability of obtaining land in the coastal zone for habitat improvement.[161] NMFS also criticized current habitat credit/evaluation procedures, which it believes are overly complex and unreliable in estuarine or marine areas.[162] NMFS agreed with EPA and USFWS that preservation is a mitigation technique used only in the rarest of occasions. However, NMFS differs from the other federal resource agencies in viewing fees paid in exchange for banking credits as a new step in mitigation sequencing.[163]

The U.S. Army Corps of Engineers has generally not accepted the concept of mitigation banking, preferring instead to consider each permit request on its own merits.[164] In response to a North Carolina mitigation bank created by USFWS, the Nature Conservancy, and the North Carolina Department of Transportation, the Corps bristled at the idea of granting habitat credits when it was not involved in the planning and design stages of the mitigation bank. The Corps has not produced any formal or informal guidelines on mitigation banking.

The executive branch has been active in providing policy regarding mitigation banks. In August 1991, the Bush administration proposed to create an interagency panel to rank the environmental value of various wetlands and to create "a market-oriented mitigation banking system" to let developers obtain and trade credits for restoring and filling wetlands.[165] At the time, then-President Bush stated that this proposal would "balance two important objectives: the protection, restoration, and creation of wetlands, and the need for sustained economic growth and development."[166] This statement is in direct contradiction to Mr. Bush's previous campaign statements that "my position on wetlands is straightforward: all existing wetlands, no matter how small, should be preserved."[167]

With a new presidential administration and at least forty bills currently pending before Congress regarding wetland issues, it is probable that a federal statutory scheme of mitigation banking will be produced within the current congressional session. Congress has already shown its interest in mitigation banking by passing the Surface Transportation Act, which includes a provision authorizing funding for state transportation departments to establish wetland mitigation banks.[168] Until a uniform federal policy is established, project applicants must discern and apply the policy of the particular agency or agencies reviewing their project.

State Mitigation Banking Guidelines. To date, the only state guidelines for mitigation banking originate from the Department of Fish and Game. The guidelines are more specific—and much more optimistic—than those of any federal agency. DFG's Guidelines on Mitigation Banking (DFG Guidelines) were formulated in 1991 to "achieve a high degree of uniformity and consistency in the establishment of [mitigation] banks throughout the state."[169] They are to be applied at all future wetland mitigation banks.

The DFG Guidelines state that whenever possible, projects should be designed so they do not impact wetlands. However, DFG notes that impact avoidance is not always feasible, in which case impacts to wetland habitat must minimized.

DFG also recognizes that onsite mitigation is at times either infeasible or undesirable from a biological perspective.[170] Citing piecemeal urban development as a cause of wetland loss and encroachment upon seasonal and permanent wetlands, DFG supports regional planning prior to urban expansion so that wetland impacts are minimized. The Guidelines are not optimistic that wetland impacts can be eliminated in the future and make no strong statement that such a policy should be instituted.[171]

The Department's Wetland Resource Policy[172] requires that establishment of a mitigation bank must be accomplished through the conversion of an upland area to wetland habitat.[173] Conversion of upland area to wetland habitat is to be achieved by reconfiguring the area through excavation and/or construction of levies so that the area remains inundated long enough to assume characteristics of a wetland.[174] The precise character of a wetland present in a wetland mitigation bank is to be controlled through management practices applied to that area and, once established, wetland habitat values in the bank will be determined by a team of wetland experts.[175]

Once a mitigation bank is approved, the project proponents may mitigate the wetland impacts of their projects by purchasing an appropriate number of mitigation credits from the owner of the bank. The guidelines define a mitigation credit as "a unit of measured area supporting wetland habitat and wetland habitat values not pre-existing at the bank site prior to bank development. Each such unit shall have been assigned a habitat value by the DFG in consultation with other appropriate resource agencies."[176]

The DFG Guidelines require that banks be established near areas of expected future wetland impacts to ensure that those wetland resources being impacted will benefit from bank establishment. Wetland mitigation banks are therefore required to be created within 40 miles of the impacted area.[177] Mitigation banks must also be sited in areas that minimize potential conflicts with present and future adjacent land uses.

Under the Guidelines, wetland mitigation banks also may not result in the loss of upland habitat which is especially valuable to wildlife, and may not result in any uncompensated adverse impacts to existing wetlands.[178]

Wetland mitigation banks are also required to include buffer zones from which no wetland mitigation credits of any kind may accrue. The use of buffer zones is designed to minimize disturbance on the most sensitive species inhabiting the wetland habitat.[179]

The DFG Guidelines also require that no uses of bank sites may reduce wetland acreage or habitat values onsite, and DFG will limit land uses adjacent to established mitigation banks to those which are compatible with bank operations. In the alternative, DFG will seek the provision of expanded buffer zones and other mitigation actions to assure that future incompatible land uses will

not result in diminished habitat values.[180]

Perhaps most important, the DFG Guidelines set a minimum size of 50 acres of newly created wetland habitat for wetland mitigation banks unless special circumstances warrant otherwise.[181] The DFG Guidelines promote the establishment of a few relatively large banks, rather than the development of many small banks.[182]

DFG does not always require mitigation to occur before credits are issued. Newly formed wetland mitigation banks which are planned but not yet implemented may be used to offset project impacts with the prior approval of the DFG Director. These approvals must be obtained strictly on a case-by-case basis, and the ratio of mitigation credits to project-induced wetland losses must exceed one-to-one to ensure that no net loss of either wetland acreage or wetland habitat values results from the project.[183]

The DFG Guidelines require adequate funding for operation and maintenance of restored habitat in perpetuity, and require that title to privately-held mitigation bank lands shall be encumbered by a permanent conservation easement in favor of DFG or a nonprofit conservation organization. The DFG Guidelines also require that each mitigation bank be supplied with a guaranteed and permanent source of water of adequate quantity and quality to permanently support continual optimum wetland acreage and maximize wetland habitat values.[184]

Only in the final paragraph of its Guidelines does DFG note that current technology is insufficient to ensure the duplication of the ecology of any type of wetland, and this language is limited to man's inability to duplicate vernal pools. Otherwise, the rather naive assumption that wetland habitats may be recreated permeates the DFG Guidelines.

Most mitigation banking in California has been limited to compensating the loss of deep water marine habitat through the creation of shallow subtidal estuarine areas.[185] DFG claims that this program possesses a high probability of success because of the relative ease of creating shallow subtidal habitat for nearshore fishes. However, there is considerable disagreement as to whether mitigation of such subtidal habitats actually creates a working ecosystem.[186] The Guidelines state hopefully that "there does not appear to be any reason, however, why the same banking principles cannot be successfully employed to compensate the loss of wetland habitat provided that the conditions for wetland mitigation bank establishment defined in these guidelines are implemented."[187] This statement is troubling because DFG equates the relative ease of (apparently) duplicating fish habitat with the ability to reconstruct a complex wetland ecosystem. The available evidence points in precisely the opposite direction.

POLICY ISSUES REGARDING MITIGATION BANKS

Potential Benefits. The premise underlying mitigation is protection of valuable natural resources. Therefore, by definition, the habitat must be the primary beneficiary of a mitigation bank and these benefits should be the reason the bank project is undertaken.

The habitat potentially benefits from banking because mitigation efforts are concentrated on creating expansive, quality wildlife habitat rather than fragmented, project-specific efforts. The diversity of species in an ecosystem is often correlated with the size of habitat area, and the larger the habitat area, the greater the potential for a self-sustaining ecosystem. Because banking provides a mechanism for regional planning and implementation of more general wetland protection policies, mitigation banks allow for the consolidation of mitigation from small wetland losses.[188] This is important for several reasons. It provides a fine mesh sieve to catch wetland losses resulting from numerous piecemeal decisions which individually account for negligible wetland losses, but cumulatively represent some of the most significant wetland losses.[189] By satisfying the mitigation needs of a number of projects that are small in terms of impacted area, a larger and more environmentally valuable area may be restored and/or preserved in a more efficient manner than the several scattered sites. This will slow the current process of whittling away the wetland resource.[190]

Perhaps the most significant benefit of mitigation banking is an enhanced ability to predict success of compensation when the mitigation action is initiated. Most mitigation bank MOUs require that the mitigation be done in advance of the impacts and that the restoration be considered successful prior to project approval. Thus, mitigation banking theoretically provides the opportunity to assess the success of a mitigation project prior to agencies "signing off" on the project. Through the terms specified in an MOU, adjustments can be made in the restoration actions so that specific objectives may be achieved.[191]

If resource agencies stringently adhere to this requirement, mitigation banking could result either in an acceleration of wetland restoration technology because of the increased demand for successful projects, or—if early efforts prove unsuccessful—the mitigation-in-advance requirement could become a significant deterrent to projects with wetland impacts.[192]

Mitigation banking can also benefit participating businesses through reduced mitigation costs. Instead of each developer fronting the costs of mitigation design, permitting, construction, and monitoring, these expenses are pooled, reducing threshold costs. Mitigation banking relieves project proponents of the need to individually locate mitigation sites to compensate for their wetland impacts and create or restore the required wetland acreage.[193] Specialization and economies of scale can reduce the per unit cost of mitigation. Moreover, mitigation requirements are better defined up front, avoiding costly delays during construction.

The entrepreneur restoration business benefits through the creation of a new market for proactive habitat restoration and preservation efforts. In addition, some businesses have found that the best return on their investment in non-developable land may be to sell the land for use as a mitigation site. Alternatively, they may donate the land to a nature conservancy for banking purposes, obtaining a valuable tax break and public relations bonus.

In addition, the mitigation bank may provide an opportunity to consolidate the financial and management resources of a number of different entities, supporting mitigation projects that would not be feasible for a single permit applicant.[194] For example, in the Tijuana River Valley in south San Diego County, a major tidal restoration plan has been designed to enhance hundreds of acres of sensitive salt marsh habitat. The price tag on the entire project will likely exceed $30 million, an amount that is unlikely to come from any single funding source.[195]

Mitigation banking also streamlines the regulatory process by bringing the necessary agencies together at an early stage of the planning process, minimizing conflicts which can be costly and time-consuming down the road. This shift provides predictability and lowers the costs of the planning process. Because mitigation banking actions should be approved and implemented prior to permit actions taking place, conflicts such as misunderstandings, uncertainty of success, and delayed permit reviews are minimized. In addition, because

banking proposals often encourage or incorporate comprehensive planning efforts, they may receive closer scrutiny than conventional mitigation plans, increasing the quality of review and the quality of the project.[196]

Mitigation banking is also more efficient for regulatory agencies. Resource agencies typically lack the personnel and funds to monitor compliance, and permit applicants often fail or neglect to implement mitigation requirements.[197] Instead of evaluating and monitoring scattered piecemeal mitigation projects, agencies could concentrate their efforts on fewer, more defined projects. The savings in staff time allows a more efficient allocation of regulatory resources. And because success may be required prior to granting mitigation credits, monitoring and evaluation are easier, more efficient, and better organized with the fewer, larger sites used in mitigation banks. In addition, the formal mitigation banking agreement (MOU) can be used as a legal commitment to establish responsibility for follow-up evaluation activities and for reaching parties after the mitigation credits are granted.

Mitigation banking also increases the potential for offsetting agency costs associated with the bank development through the sale of mitigation credits. The California Coastal Conservancy has recommended a premium of 10% of project costs to offset the sponsor's administrative costs. Such a premium may be used to help fund some of the agencies which must review mitigation bank plans.[198]

The consolidation of mitigation efforts also limits the number of parties involved in the restoration or creation of habitat. With fewer opportunities available to restore larger wetland areas and a high demand for restoration and creation services, the consolidation of mitigation should provide a competitive advantage to those who can successfully create or restore habitats. Thus, the science and technology of wetland restoration and creation should improve with mitigation banking.[199]

Finally, wetland mitigation banking establishes a market price for habitat loss. Once the mitigation bank has been established and is deemed successful, the charge for mitigation credits may be set and resource agencies can give applicants a ball-park figure on the cost of mitigation.[200] At this point, the expense of mitigation may deter some applicants from proceeding with projects that impact wetlands. Knowing the established price up front may also induce the permit applicant to fund a more cost-effective project, or redesign the development project to lessen wetland impacts.[201]

Potential Hazards. As desirable as mitigation banking appears to be, the concept has its share of critics. One of the primary complaints from these critics is that most of the policy and technical issues raised by the typical mitigation project must also be resolved with regard to a mitigation bank. Moreover, since mitigation banks generally involve larger habitat areas, the risks associated with mitigation practices are magnified. Because it may take several years to evaluate the success of a mitigation bank, design flaws and poor decisions early in the process may lead to an unsuccessful project which fails to compensate for impacts from several development projects which have already been built. The issue then becomes whether the bank sponsor will be required to invest additional funds for remedial efforts. The extensive planning and consultation process required in most mitigation bank agreements theoretically lessens the likelihood of the problem of large-scale failures; however, several other hazards of mitigation banks are not as easily resolved. A summary of these problems follows.

Mitigation banking raises the fundamental question whether it is possible or even desirable to attempt to recreate an ecosystem. In 1985, the EPA began a multi-level research program to examine scientific issues which result from wetland creation and restoration projects. The work resulted in a two-volume publication examining regional success in wetland creation and restoration projects and provided scientific commentary and policy outlays for future mitigation.[202] The EPA program concluded that duplication of naturally occurring wetlands is impossible, and that partial project failures are common.[203] The ability to restore and create particular wetland functions varies by the nature of that function. However, successful habitat created should reproduce *all* of the functional attributes of a naturally occurring ecosystem. Characteristics such as topography may be created with relative ease, while the creation of microbiological soil processing may be exceedingly difficult. While structural characteristics may be attainable, functional characteristics are more difficult to assess and do not lend themselves to reliable predictions of success in the planning stages.

Another finding of the EPA study was that long-term success may be quite different from short-term success, and long-term success often depends upon the ability to assess, recreate, and manipulate the hydrology of the wetland system.[204] Other factors contributing to probability of success include the long-term ability to manage, protect, and manipulate the wetlands and adjacent buffer zones, and the relative level of expertise in project design and supervision. The study emphasized that the establishment of the proper topography and hydrology alone will not assure success of a restoration or creation project. Instead, considerable energy must be spent in replanting, regrading, removal of exotics, periodic dredging, adoption of pollution controls for streams and drainage ditches running into the wetlands, construction of fences and other barriers to restrict intrusion by humans and domestic animals, and systematic monitoring and adjustments in order to fill the gaps in scientific knowledge.[205]

The consensus reached by all reviewers of mitigation efforts across the country is that mitigation efforts cannot yet claim to have duplicated lost wetland functional values. Constructed or restored wetlands do not yet maintain regional biodiversity or recreate functional ecosystems and, while constructed wetlands may look like natural wetlands, few data are available to show that they behave like natural ones.[206] Thus, the science of wetland restoration and creation—one of the most important premises upon which mitigation banking relies—is also one of the most clearly underachieved aspects of the mitigation process.

A related criticism of mitigation and mitigation banking is the inability to establish universal objective criteria for measuring "success." Often blanket statements of success are provided by project proponents without data to verify the claim.[207] Several assessment systems have been produced; however, their effectiveness in measuring habitat values and providing indicia of success over a broad array of habitat types has been questioned. For example, USFWS' habitat evaluation procedures (HEP)[208] have been criticized for the limited number of factors used in estimating success,[209] and has been considered by the U.S. Army Corps of Engineers to be inapplicable to coastal wetland evaluations.[210] Other evaluation techniques have met with similar criticism.[211] The establishment of some consensus on the system or systems to be used in verifying the "success" of mitigation banks is an immediate necessity if mitigation banks are to be compared and mitigation credits traded.

Mitigation efforts have historically focused on creating habitat for one or more target species, and have not maintained a larger focus on restoring habitat. As a result, mitigation criteria for assessing success of past projects have emphasized the presence or absence of certain species, or a certain density of plants, to signify successful restoration efforts. These criteria simplify and skew the evaluation process in favor of finding regulatory compliance by measuring only a fraction of the components of the habitat. For example, projects measured solely by sufficient plant densities may resemble gardens more than natural habitat; however, in terms of regulatory compliance, the project would be a "success." Moreover, appearances of success can be deceiving.[212] Ecosystems are extremely complex and, in order to assess functional success in establishing a viable ecosystem, all aspects of the restored habitat must be monitored and evaluated. Finally, even after the project has been evaluated for functional success, the habitat values should be maintained over time—at least as long as the time the destroyed habitat would have functioned.

To illustrate an additional problem in assessing success, what happens when the mitigation bank is designed to create a certain type of habitat, but another type actually results? For example, if a project is designed to create salt marsh habitat on dredge spoils for the endangered light-footed clapper rail, but the vegetation fails to survive because the habitat elevation is too high, should the project proponent receive mitigation credit if other important birds use it as a nesting site (*e.g.*, the endangered least tern)? The habitat that is unintentionally created is clearly valuable, but the end result is a net loss of one type of habitat with no measurable in-kind compensation. Moreover, is it proper to reward mitigation failures? On the other hand, the project proponent has invested a large sum of money in the attempted mitigation and would undoubtedly object to the imposition of new mitigation requirements, particularly if the development project has already been constructed. These types of evaluation issues must be resolved before a mitigation bank is created.

Even assuming relative success in some types of habitat manipulation and an ability to evaluate and verify that success, some ecosystems are more complicated and more difficult to duplicate than others. Increased complexity generally translates into increased risks and costs for the project proponent(s). As a result, project proponents will favor creating or restoring habitats that are relatively simple to understand and recreate, and guarantee a greater likelihood of success. This situation becomes problematic when these restored habitats differ fundamentally from the habitat that is impacted by the development project. When the mitigation bank is created by a private "restoration corporation" which creates or restores habitat for profit,[213] the corporation will seek to restore that habitat on which it can maintain a decent profit margin. Logically, it will develop the easiest habitats to restore, and such habitats may become abundant at the expense of more complex habitats.

In addition, the well-intended act of mitigation by habitat manipulation may actually have adverse effects on a natural habitat. Habitat manipulation necessarily disturbs an ecosystem by changing the physical characteristics of the environment.[214] This practice encourages the proliferation of species which can tolerate disturbance (*e.g.*, exotic species) and inhibits more sensitive, specialized species. As a result, many mitigation projects fall short of projected biodiversity and are often colonized by the wrong species.[215] Worse, further manipulation is not necessarily the remedy; once the habitat is colonized, it may take years to eradicate exotic or opportunistic species.[216]

The invasion of exotic plants and animals is a serious problem in sensitive habitats everywhere, and the problem is potentially exacerbated by large mitigation projects which manipulate habitat near existing natural habitat. Unless proper controls are used, invasive species will likely colonize a restored habitat, and then spread to nearby natural habitat. The resulting degradation of the natural habitat is generally unaccounted for in the mitigation process and represents potential impacts from the act of mitigation itself. Such impacts would clearly reduce the number of available mitigation credits available in a bank system; however, it is unclear if such impacts are ever considered when calculating mitigation credits.

Critics of mitigation banking also fear that widespread use and acceptance of the concept will be interpreted as a relaxation of regulatory standards or, at the very least, a regulatory compromise, instead of a change in the method of implementing those standards. These fears stem from at least two sources. First, mitigation banking combines the regulatory requirements of several potentially conflicting state and federal laws. Some of these regulations are considered "internally balanced," meaning that resource interests and development interests were balanced when the laws and regulations were drafted and no further balancing is necessary.[217] Other statutes require a further balancing of these interests on a case-by-base basis.[218] By integrating the two applications, the internally balanced regulations may be balanced against the development interest a second time, diluting the effectiveness of the regulation.[219]

A second basis for the fear of regulatory relaxation is an expectation of some interests that key factors in section 404 permit processing will be relaxed where ambitious compensatory mitigation projects are proposed.[220] The Foundation for Environmental and Economic Progress has opined that adherence to requiring avoidance of impacts before considering banking proposals could fatally defer meritorious mitigation banking projects.[221] Such relaxation of standards, while not yet evident, remains an inherent danger of mitigation banking.

Conservation groups and regulatory agencies also fear that large-scale habitat loss may result due to "bounced checks" from ineffective mitigation bank efforts. This fear stems from the reality that mitigation banking currently brings with it substantial risks which can only be partially resolved in the planning process.[222] Because the current status of the science of habitat creation and restoration is uncertain, each project carries a risk of failure. "Bounced checks" are possible in light of likely political pressures to allow the project proponent off the hook if it makes a good faith effort to comply with the agency's mitigation requirements. Forcing supplemental mitigation efforts on the project proponent would likely result in litigation and lengthy delays, at the expense of the habitat.

Finally, several key problems with mitigation banks are based on the economics of the process. A key concern is whether the price of the mitigation credits sold for a bank will equal, exceed, or fall short of the cost of creating or restoring the habitat.[223] Estimating the cost of mitigation is almost as uncertain a venture as predicting probability of success. The cost of mitigation for individual developers is already high. While mitigation banks will theoretically reduce costs, until mitigation banking has been tried and evaluated, the degree to which the concept will actually reduce costs to the developer is unclear. For example, because a third party may be involved in the bank (the restoration spe-

cialist), this third party will want to be compensated for the risk of not being able to produce acceptable habitat. Some estimates of the overhead necessary to make a restoration specialist profitable in mitigation banking are upwards of five to six times upfront costs.[224]

If the costs of a mitigation bank exceed the amount paid out by developer interests for mitigation credits, a new problem arises: Who gets stuck with the remainder of the costs? If the government is forced to pick up the tab, then we have created an externality wherein the government (*i.e.*, the taxpayer) is subsidizing the development interests.[225] Public agencies such as the California Coastal Conservancy often sponsor mitigation banks and run the risk of not getting reimbursed. However, if mitigation banking is to become a viable alternative in the permitting process, this risk must be assumed by the developers.

CONCLUSION

Mitigation banking is seen by many as an inevitable force in future California habitat management practices. The pressures to develop sensitive resources and the scarcity of those resources overwhelmingly favor some sort of regional, permanent wildlife management. However, in light of the significant flaws in the concept itself and in the available information regarding ecosystem reproduction, the immediate use of mitigation banking should be tempered. As EPA has noted, the concept is experimental, and should be treated cautiously. Moreover, as mitigation banking is implemented, each project should be used as a vehicle to improve upon the system and begin to eliminate some of the uncertainties and problems in implementation.

Despite the recognized scientific uncertainty in restoration ecology and the creation of functionally equivalent habitats, resource agencies are reluctant to include experimental procedures in mitigation plans. According to EPA's Region IX Office of Wetlands Protection, EPA's primary concern is for mitigation on the basis of acreage and EPA does not approve of the inclusion of experimentation in a mitigation/restoration plan. This attitude promotes maintenance of the status quo—scientific uncertainty—at a time when scientific advances are clearly needed.

The rationale for EPA's position is understandable: With experimentation necessarily comes some uncertainty and, in any experiment, certain treatments will succeed better than others. When habitat values are at such a premium, it is difficult to defend the use of mitigation requirements for experimentation. However, it is essential that mitigation practices begin not only to account for losses of habitat acreage, but also to promote the advancement of the science by setting aside enough resources to include experimentation in the mitigation plan.[226]

Knowledge should be gained and the status of the science should be advanced at every possible point. Currently, there is no unified effort to gain any scientific knowledge from routine projects, and there is certainly no mechanism for assimilating information learned in projects throughout the nation or state. Mitigation banking practices should be adapted to help resolve some of these problems.

By incorporating scientific research programs into individual mitigation bank projects, the science of wetland restoration can become an iterative process. Restoration and experimentation should occur in phases, with each successive phase using the knowledge gained from the previous phase to refine future mitigation design and techniques. Through this sequence, the problem of scientific uncertainty may slowly be resolved with minimum damage to the natural habitat.

Integration of experimental treatments into mitigation plans also makes sense from an economic standpoint. Classical economists may purport that scientific advancement and more successful mitigation projects will evolve via the market system. That is, as projects become more efficient and effective at restoring habitat due to technological and scientific advances, the market system will favor these projects and encourage further research and development of restoration techniques. Unfortunately, the market system in the wetland mitigation arena lacks several fundamental prerequisites. Not only is the market for restorable habitat extremely constrained, parties seeking restoration are also limited. These limitations mean the market system will work much too slowly to advance the science of restoration at a pace greater than habitat loss in California.

As noted, the wetland resource in California is greatly depleted and diminishing on a daily basis. If the market system is the only force encouraging scientific advances in restoration ecology, the resource will be eliminated by the time the science advances to the point necessary for successful functional replacement (assuming that is possible). In other words, California simply does not have the luxury of relying solely on the market system to adjust the status of the science of wetland mitigation; the resource is simply too scarce. Moreover, the permit applicant should not be allowed to consider the partial expenditure of mitigation funds to further the science as compensation for lost habitat; rather, the cost of funding research is partial compensation for the risks of failure in restoring the habitat values lost to development.[227]

To summarize, state and federal agencies should agree to and implement a policy that will routinely assimilate experimentation into project designs, not at the expense of the resource but in addition to mitigation requirements. Parallel to these efforts, a data bank should be created to establish goals for scientific progress and to coordinate and disseminate information as it arrives. This means extensive consultation with scientific experts and an increased emphasis on the roles of universities in establishing a viable statewide mitigation plan. Through the cooperation of private industry, public agencies, and academic institutions, the science of wetland habitat creation and restoration, and mitigation banking, could have a bright future. If these institutions do not work together, the concept of mitigation banking may face early foreclosure.

ENDNOTES

1. Nona B. Dennis & M. Laurel Marcus, *Status and Trends in Protection of California Wetlands*, 4(1) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 9, 11 (Jan–Feb. 1984) (hereinafter "*Status and Trends*").

2. Joy B. Zedler, *Mitigation Problems on the Southern California Coast: An Ecologist's View*, 3(1) CAL. WATERFRONT AGE (Cal. Coastal Conservancy) 32 (1987) (hereinafter "*Mitigation Problems*").

3. *Status and Trends*, *supra* note 1, at 11.

4. *Mitigation Problems*, *supra* note 2, at 32.

5. *See* Entrix, Inc., Pacific Estuarine Research Laboratory, & Philip Williams & Associates, Ltd., *Tijuana Estuary Tidal Restoration Program: Draft Environmental Impact Report/Environmental Impact Statement* (1991) (Cal. Coastal Conservancy and U.S. Fish & Wildlife Service, Lead Agencies) (available at the Tijuana National Estuarine Research Reserve Visitors Center) (hereinafter "Draft EIR/EIS"). *See also* Joy B. Zedler, Jor-

dan D. Covin, Christopher S. Nordby, Phil Williams & John Boland, *Catastrophic Events Reveal Dynamic Nature of Salt Marsh Vegetation*, 9 ESTUARIES 75–80 (1986) (hereinafter "*Catastrophic Events*").

6. For example, domestic cats have been seen leaving the salt marsh at Tijuana Estuary dragging light-footed clapper rails, a federally listed endangered species. For a general discussion of the impacts of human's recreational use of wetlands, *see* MICHAEL JOSSELYN ET AL., PUBLIC ACCESS AND WETLANDS: IMPACTS OF RECREATIONAL USE (Technical Report #9, Romberg Tiburon Centers, Center for Environmental Studies, San Francisco State University, 1989).

7. Wetlands Evaluation Class, The Famosa Slough Channel: Resource Evaluation and Recommendations for Enhancement (unpublished 1981 report; available at the San Diego State University Library). *See also* Abigail N. White, Effects of Habitat Type and Human Disturbance on an Endangered Wetland Bird: Belding's Savannah Sparrow (1986) (unpublished master's thesis available at the San Diego State University Library).

8. JOY B. ZEDLER ET AL., THE ECOLOGY OF TIJUANA ESTUARY, CALIFORNIA, A NATIONAL ESTUARINE RESEARCH RESERVE (U.S. Dep't of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Resource Management, Sanctuaries and Reserves Division, 1992) at 15–20. *See also Catastrophic Events*, *supra* note 5.

9. For excellent summaries of the history and status of California wetlands, *see Status and Trends*, *supra* note 1.

10. *Id.* Biologists Dennis and Marcus estimate that five million acres of native wetland habitat had been reduced to less than 500,000 acres by 1984. *Id.* at 9.

11. *Id.* at 10. Approximately 240,000 acres of these wetlands remain. These wetlands, which must be managed by manipulating water levels and flooding periods, support less than half of the historic waterfowl population. *Id.*

12. *Id.*

13. *Id.*

14. *Mitigation Problems*, *supra* note 2.

15. *Status and Trends*, *supra* note 1, at 10.

16. *Id.*

17. *Id.* at 11. State-listed endangered plant and animal species are found at 14 CAL. CODE REGS. §§ 670.2 and 670.5, respectively; federally-listed endangered animal and plant species are found at 50 C.F.R. §§ 17.11 and 17.12, respectively.

18. *Status and Trends*, *supra* note 1, at 11. These include salmon, sturgeon, flounder, clam, and oyster populations.

19. *Id.* For example, seasonal concentrations of waterfowl in the Klamath Basin have fallen from six million to one million.

20. *Id.*

21. Barry Nelson, *Mitigation in San Francisco Bay: But Where and How?* 3(1) CAL. WATERFRONT AGE (Cal. Coastal Conservancy) 23, 25 (1987). Agencies have allowed these projects to contribute "in-lieu" fees for later wetland creation. *See infra* text at notes 131–32 for a discussion of "in-lieu program fees."

22. JOY B. ZEDLER, ECOLOGY OF SOUTHERN CALIFORNIA SALT MARSHES: A COMMUNITY PROFILE (U.S. Dep't of the Interior, Fish & Wildlife Service FWS/OBS-81-54, 1982) at 4.

23. *Id.* at 5; *see also* Draft EIS, *supra* note 5.

24. Draft EIS, *supra* note 5; *see also Mitigation Problems*, *supra* note 2, at 34.

25. *Status and Trends*, *supra* note 1, at 11. The issues surrounding the Central Valley Project and the recently-enacted Central Valley Project Improvement Act, Pub. L. No. 102-575, are summarized in Katherine Streimer, *The Central Valley Project Improvement Act*, 2(1) ENV. L. SEC. NEWSLETTER (California State Bar) at 2 (1993).

26. *See generally* 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) (Sept.–Oct. 1986), which is entirely devoted to various perspectives and controversial issues regarding the use of mitigation in wetlands. *See also* 14(1) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) (Jan.–Feb. 1992), a focus issue on mitigation banking.

27. Edward T. LaRoe, *Wetland Habitat Mitigation: A Historical Perspective*, 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 8, 9 (Sept.–Oct. 1986) (hereinafter "*Wetland Habitat Mitigation*").

28. *Id.* The concept of mitigation came about when the nation was finally recognizing the need to make industrial growth compatible with environmental concerns. The term "mitigation" served to smooth the rough edges off industry and development practices. The term was not used in the context of elimination or avoidance of projects; rather, it served to make development consider and adjust for the environmental consequences of its action.

29. *Id.*

30. 16 U.S.C. § 661 *et seq.* (1958).

31. 42 U.S.C. § 4321 *et seq.* (1969).

32. More subtle statutory authority for mitigation requirements was cited by USFWS in its initial official Mitigation Policy published in 1981, *see infra* text accompanying notes 51–56, including the Federal Water Pollution Control Act, 33 U.S.C. § 1251 *et seq.*; the Federal Power Act of 1920, 16 U.S.C. §§ 791(a), 803, 811; the Estuary Protection Act, 16 U.S.C. § 1221 *et seq.*; the Coastal Zone Management Act of 1972, 16 U.S.C. § 1451 *et seq.*; the Water Bank Act, 16 U.S.C. § 1301 *et seq.*; the Wild and Scenic Rivers Act, 16 U.S.C. § 1271 *et seq.*; the Geothermal Steam Act of 1970, 30 U.S.C. § 1001 *et seq.*; the Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. § 1201 *et seq.*; the Outer Continental Shelf Lands Act of 1978, 43 U.S.C. § 1801; the Mineral Lands Leasing Act of 1920, 30 U.S.C. § 181; the Cooperative Unit Act, 16 U.S.C. § 753(a)–(b); the Airport and Airway Development Act, 49 U.S.C. § 1716 (repealed 1982); and one provision of the Department of Transportation Act, 49 U.S.C. § 1653(f) (repealed 1983). U.S. Fish and Wildlife Mitigation Policy, 46 Fed. Reg. 7644–7663 (Appendix A) (1981).

33. *See, e.g.*, Exec. Order No. 11,990 (1977); Exec. Order No. 11,988 (1977).

34. 40 C.F.R. §1508.20(a)–(e).

35. *See* Roy R. Lewis, III, *Wetland Restoration/Creation/Enhancement Terminology: Suggestions for Standardization* in 2 WETLAND CREATION AND RESTORATION: THE STATUS OF THE SCIENCE 1–8 (Jon A. Kusler & Mary E. Kentula eds. 1989) (U.S. Environmental Protection Agency EPA/600/3-89/038) (hereinafter "*Terminology*"). The glossary of terms was actually assembled by Lewis and included in the larger work, STATUS OF THE SCIENCE, sponsored by EPA.

36. *Id.*

37. *Id.* at 2.

38. *Id.*

39. *Id.* Some critics claim that there has yet to be a wetland creation project which has successfully created a fully functioning wetland ecosystem. *See* M.S. Race, *Critique of Present Wetlands Mitigation Policies in the United States Based on an Analysis of Past Restoration Projects in San Francisco Bay*, 9 ENVTL. MGMT. 71–82 (1985); *see also* Millicent L. Quammen, *Measuring the Success of Wetlands Mitigation*, 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 6 (Sept.–Oct. 1986).

40. Although wetlands are often thought of for their considerable value as wildlife habitat, they have also been

described as "the kidneys of the landscape" for the important functional values they hold in flood control, water quality purification, and groundwater replacement. WILLIAM J. MITSCH & JAMES G. GOSSELINK, WETLANDS 3 (1986). Though more difficult to estimate, the economic benefits of these hydrologic functions of wetlands greatly exceed the economic benefit derived from commercial and recreational activities. *See* NATIONAL WILDLIFE FEDERATION, STATUS REPORT ON OUR NATION'S WETLANDS 8–9 (1987).

41. *Terminology*, *supra* note 35.

42. *Id.*

43. CATHLEEN SHORT, MITIGATION BANKING 8 (88(41) U.S. Fish & Wildlife Service Biological Report 1988) (hereinafter "MITIGATION BANKING").

44. Francis C. Golet, *Critical Issues in Wetland Mitigation: A Scientific Perspective*, 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 3, 4 (Sept.–Oct. 1986) (hereinafter "*Critical Issues*").

45. *Terminology*, *supra* note 35.

46. *Id.*

47. *Id.*

48. *Critical Issues*, *supra* note 44, at 4.

49. *Wetland Habitat Mitigation*, *supra* note 27, at 9.

50. Scott McCreary, *Toward Affirmative Restoration*, 3(1) CAL. WATERFRONT AGE (Cal. Coastal Conservancy) 11, 12 (1987).

51. U.S. Fish and Wildlife Service Mitigation Policy: Notice of Final Policy, 46 Fed. Reg. 7644–7663 (1981) (hereinafter "FWS Mitigation Policy").

52. *See supra* text accompanying note 34.

53. FWS Mitigation Policy, *supra* note 51, at 7657–7658. A detailed analysis of USFWS' mitigation goals and specific guidelines for prescribing various types of mitigation is beyond the scope of this work. Nevertheless, a brief overview of USFWS' framework for determining whether mitigation is needed or permitted is helpful.

As noted, USFWS identified four resource categories. Category 1 resources includes unique or irreplaceable resources which should not be impacted at all (thus, mitigation is inappropriate). Category 2 resources have a high value for evaluation species, and are becoming increasingly scarce, requiring a goal of no net loss of habitat value. Category 3 resources, having high to medium value for evaluation species and considered abundant, are mitigated to avoid net loss of habitat value, while minimizing in-kind habitat loss. Goals for category 4 resources—medium/low value for evaluation species—are merely to minimize loss of habitat value. In determining "value" for each of these categories, USFWS considers suitability to important species, populations, or communities of plants and animals, and/or the maintenance of overall biological diversity, involving ecological, institutional, social, and other considerations. *See* Nevin D. Holmberg & Robert Misso, *Mitigation: Determining the Need*, 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 10 (Sept.–Oct. 1986) (hereinafter "*Determining the Need*").

54. *Critical Issues*, *supra* note 44, at 4.

55. *Determining the Need*, *supra* note 53, at 11.

56. 40 C.F.R. § 230 *et seq.* Prior to adoption by other federal and/or state agencies, the Policy was strictly advisory and applied in no regulatory context except USFWS' ordinary permitting authority.

57. David R. Barrows, *Mitigation in the Army Corps of Engineers Regulatory Program*, 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 11 (Sept.–Oct. 1986) (hereinafter "*Army Corps of Engineers Regulatory Program*").

58. Implementation of Fish and Wildlife Mitigation in the Corps of Engineers Regulatory Program, U.S. Army Corps of Engineers Regulatory Guidance Letter No. 85-8 (1985). The Corps applied this policy to mitigation under the CEQ definition, as well as to the parallel mitigation requirements found in the Clean Water Act's section 404(b)(1) guidelines. *Army Corps of Engineers Regulatory Program*, *supra* note 57, at 12. This position was eventually overturned by the Second Circuit Court of Appeals; *see infra* text accompanying notes 62–81.

59. *Army Corps of Engineers Regulatory Program*, *supra* note 57, at 11. The Corps would limit such mitigation to that necessary to tip the balance of the project such that it was no longer against the public interest. *Id.* This policy was upheld at the district court level, when the Corps used mitigation as a basis for not preparing an environmental impact statement. Oklahoma Wildlife Federation v. U.S. Army Corps of Engineers, 681 F. Supp. 1470 (N.D. Okla. 1988).

60. *Army Corps of Engineers Regulatory Program*, *supra* note 57, at 11. Using these factors, it was theoretically possible that a resource-sensitive project could be required to mitigate its impact on economic or navigation interests before a section 404 permit was issued. This type of "mitigation" does not appear to conform with the goals of the Clean Water Act, which is to "restore and maintain the chemical, physical and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a).

61. *Army Corps of Engineers Regulatory Program*, *supra* note 57, at 11.

62. Clean Water Act of 1972, 33 U.S.C. § 1251 *et seq.* (1986); Rivers and Harbors Act of 1899, 33 U.S.C. § 401 *et seq.* (1986). Because these two permit programs often overlap in wetlands regulation, they will be collectively referred to hereinafter as the "404 program." It is important to note, however, that the jurisdiction and purposes of the acts are slightly different. *See Wetland Habitat Mitigation*, *supra* note 27, at 9.

63. 33 U.S.C. §§ 1311(a), 1344 (1986). Such pollutants include solid fill material such as dredge spoil or upland soil and debris. 33 U.S.C. § 1344(f)(2) (1986).

64. The measure presented by the House granted primary administrative authority to the Army Corps of Engineers, with EPA having authority to designate critical areas where particular pollutants would be prohibited. H.R. 11896, 92d Cong., 2d Sess. § 404 (1972), *reprinted in* 1 A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, 93d Cong., 1st Sess., Ser. No. 93-1 (1973) at 1063–1064 (hereinafter "LEGISLATIVE HISTORY"). The House rationale was that because the Corps was already regulating construction and fill activities in traditionally navigable waters and the ocean under section 10 of the Rivers and Harbors Act of 1899, 33 U.S.C. § 401 *et seq.*, the final authority for permitting decisions should rest with the Corps. The Senate bill contained no separate dredge and fill program, treating such activities the same as other pollutants, and regulated the same way by EPA. S. 2770, 92d Cong., 1st Sess. § 402 (1972), *reprinted in* 2 LEGISLATIVE HISTORY, *supra*, at 1685–1692. Senator Muskie argued for EPA administration based on the dichotomous missions of the two agencies: The Corps' mission was to protect navigation and easy access to the nation's waterways, while EPA's mission was to protect the environment. *See* Shannon L. Kilgore, Comment, *EPA's Evolving Role in Wetlands Protection: Elaboration in* Bersani v. U.S. EPA, XVIII:11 ENVTL. L. REP. (Envtl. L. Inst.) 10479, 10480 (1988). This uncertain beginning with a mixed alliance of agencies holding divergent wetlands interests has led to a permitting program that has been repeatedly

revised in response to court actions and indecisive administration.

65. 1 LEGISLATIVE HISTORY, *supra* note 64, at 324–25. This shared custody has hampered the effectiveness of the section 404 program in realizing its goals. *See* OFFICE OF TECHNOLOGY ASSESSMENT, WETLANDS: THEIR USE AND REGULATION (1984) at 167.

66. 33 U.S.C. § 1344(a) (1986).

67. EPA may veto a permit "whenever [the EPA administrator] determines...that the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas..., wildlife, or recreation areas." 33 U.S.C. § 1344(c) (1986).

68. 33 U.S.C. § 1344(b)(1) (1986).

69. 45 Fed. Reg. 85,336–57 (Dec. 24, 1980), codified at 40 C.F.R. § 230 *et seq.* The sequential application of mitigation requires avoidance first, minimization second, and mitigation as compensation as a last resort. *See supra* text accompanying note 34.

70. *See Critical Issues*, *supra* note 44, at 4.

71. *See* GENERAL ACCOUNTING OFFICE, THE CORPS OF ENGINEERS' ADMINISTRATION OF THE SECTION 404 PROGRAM 37 (1988) (hereinafter "GAO REPORT"); *see also* Theodore J. Griswold, Comment, *Wetland Protection Under Section 404 of the Clean Water Act: An Enforcement Paradox*, 27:1 SAN DIEGO L. REV. 139 (1990).

72. *See Critical Issues*, *supra* note 44, at 4.

73. *Id.*

74. These terms apply only to compensatory mitigation, which is theoretically a small subset of the total mitigation concept. *See infra* text accompanying notes 144–47.

75. *Critical Issues*, *supra* note 44, at 4.

76. 674 F. Supp. 405 (N.D.N.Y. 1987), *aff'd sub nom.* Bersani v. Robichaud, 850 F.2d 36 (2d Cir. 1988), *cert. denied*, 489 U.S. 1089 (1989) (hereinafter "*Bersani*").

77. The case involved a development company proposing a project in a 50-acre wetland area which would alter or fill 32 acres of wetlands, create nine replacement acres of wetlands from nine acres of onsite uplands, and alter another 13 wetland acres onsite to enhance their habitat value. An additional 36 acres of replacement wetlands were proposed to be create offsite. The Corps notified EPA of its intent to issue the permit for the project, reasoning that the proposed mitigation would allow the project to satisfy the Corps' public interest test.

78. *Bersani*, *supra* note 76, 850 F.2d at 42–43. *See also* WILLIAM L. WANT, LAW OF WETLANDS REGULATION 6–28 (1989).

79. *Bersani*, *supra* note 76, 850 F.2d at 39–40. The district court's decision was based more on deference to EPA than on a tacit approval of EPA mitigation policy, 674 F. Supp. at 413; the appellate court somewhat reluctantly affirmed, 850 F.2d at 45. Thus, after a drawn-out legal proceeding, the mitigation debate remained unresolved and the interagency battle resumed.

80. *Bersani*, *supra* note 76, 850 F.2d at 44.

81. *Id.* at 46. For an in-depth review of *Bersani* and its enhancement of EPA's role in the section 404 program, *see* Shannon L. Kilgore, Comment, *EPA's Evolving Role in Wetlands Protection: Elaboration in* Bersani v. U.S. EPA, XVIII:11 ENVTL. L. REP. (Envtl. L. Inst.) 10479, 10480 (1988).

82. Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines, 54 Fed. Reg. 51,320 (Dec. 14, 1989), amended 55 Fed. Reg. 1726 (Jan. 18, 1990), revised 55 Fed. Reg. 9211 (Mar. 12, 1990) (hereinafter "EPA/Army MOA"). For a detailed analysis of the MOA, *see* William L. Want, *The Army-EPA Agreement on Wetlands Mitigation*, XX:6 ENVTL. L. REP. 10209 (1990); Oliver A. Houck, *More Net Loss of Wetlands: The Army-EPA Memorandum of Agreement on Mitigation Under the §404 Program*, XX:6 ENVTL. L. REP. 10212 (1990) (hereinafter "*More Net Loss*").

83. The MOA states in part: "The Corps...first makes a determination that potential impacts have been avoided to the maximum extent practicable; remaining *unavoidable impacts* will then be mitigated to the extent appropriate and practicable by requiring steps to minimize impacts, and, finally, compensate for aquatic resource values." EPA/Army MOA, *supra* note 82, at Part II(C) (emphasis added).

84. *Id.* at Part II(C)(1). However, other agencies still view compensatory mitigation as serving this function. *See* NATIONAL MARINE FISHERIES SERVICE, SOUTHWEST REGION, HABITAT PROTECTION POLICY: OVERVIEW OF NMFS ACTIVITIES IN CALIFORNIA (U.S. Dep't of Commerce, National Oceanic and Atmospheric Administration 1978).

85. EPA/Army MOA, *supra* note 82, at Part III(B). The overall standard for the amount of mitigation required under the Memorandum is that functional value must be replaced consistent with the no net loss policy, with an adequate margin of safety to reflect the expected degree of success associated with the mitigation plan. *Id.* Less than one-to-one acreage replacement is allowed where the functional values of the impacted area are low and the likelihood of successful mitigation is high.

86. *Id.*

87. *Id.*

88. *More Net Loss*, *supra* note 82, at 10212.

The MOA was challenged for failure to comply with the rulemaking procedures of the federal Administrative Procedure Act, but the case was dismissed as not ripe for judicial review. Municipality of Anchorage, et al. v. United States of America, et al., No. A89-503 (1990). Also, the Bush administration attempted to amend the section 404(b)(1) guidelines to exempt the filling of wetlands in Alaska from the sequential mitigation steps. 57 Fed Reg. 52,716 (1992). The Bush proposal identified several special circumstances in Alaska which purportedly warrant deviation from the sequential mitigation requirements. These include Alaska's historical loss of less than 1% of the state's wetland acreage; the fact that a dominant proportion (40%) of Alaska's wetlands are already in state or federal conservation units, including parks, refuges, and other controlled ownerships; and the claim that the high percentage of land in Alaska identified as wetlands creates a situation where no practicable alternatives to wetlands filling for development are available. *Id.* at 52,717. At this writing, EPA is receiving comments on this proposed amendment.

89. WILLIAM L. WANT, LAW OF WETLANDS REGULATION 13–11(1989).

90. *See, e.g.*, California Environmental Quality Act, CAL. PUB. RES. CODE § 21000 *et seq.*; California Endangered Species Act, CAL. FISH & GAME CODE § 2050 *et seq.*; California Coastal Act of 1976, CAL. PUB. RES. CODE § 30000 *et seq.*

91. 14 CAL. CODE REGS. § 15386 (Resources Agency's Guidelines for Implementation of the California Environmental Quality Act).

92. CAL. FISH & GAME CODE §§ 1601(a), 1603 (West 1993).

93. DFG is authorized by the California Environmental Quality Act, Pub. Res. Code § 21000 *et seq.*, the California Endangered Species Act, Fish & Game Code § 2050 *et seq.*, and the Fish and

Game Code generally to comment on the adequacy of measures to protect these resources from project impacts.

94. PUB. RES. CODE §§ 21080.2, 21080.4, 21153; 14 CAL. CODE REGS. §§ 15063(g), 15086, 15386. DFG's comments must be consistent with the state Resources Agency's "policy for preservation of wetlands in perpetuity." Mira Monte Homeowners Ass'n v. County of Ventura, 165 Cal. App. 3d 357, 364 (1985).

95. 16 U.S.C. § 662; *see also* 33 C.F.R. § 320.3(e).

96. The Fish and Game Commission is DFG's policymaking board. CAL. FISH & GAME CODE § 100 *et seq.* The Commission codifies its formal regulations in Title 14, Division 1, of the California Code of Regulations.

97. The policy was actually adopted by the Fish and Game Commission in 1987. *See* 8:3 CAL. REG. L. REP. 112 (Summer 1988); 8:1 CAL. REG. L. REP. 94–95 (Winter 1988). DFG subsequently adopted an informal "position" on mitigation and wetland protection which the Department believes is wholly consistent with the Commission's policy. That policy is contained in Don Lollock, *The Status of Wetland Habitat and Its Protection, Enhancement, and Expansion* (Cal. Dep't of Fish and Game, Envtl. Services Division, 1987) (hereinafter "DFG Policy").

98. *Id.* at 3.

99. *Id.* This phrase is ambiguous, and is not further defined in the California Code of Regulations.

100. *Id.* These techniques are apparently used both individually and in concert; however, there is no policy requiring DFG to apply them sequentially, as EPA and USFWS do. *See* text accompanying notes 34 and 51–56.

101. CAL. PUB. RES. CODE § 30000 *et seq.*

102. CAL. PUB. RES. CODE § 30233(a)(1)–(8). These "limited" categories include port facilities, coastal-dependent industrial facilities, restoration projects, navigation maintenance, entrances for boating facilities (and creation of boating facilities if wetland is already "degraded"), incidental public services such as cable and pipeline construction and maintenance, mineral extraction (except in environmentally sensitive areas), and nature study, aquaculture, or other resource-dependent activities.

103. *See generally Status and Trends, supra* note 1.

104. *See, e.g.*, CAL. PUB. RES. CODE § 30607.1 (1992). The Coastal Commission was established by the Coastal Act of 1976 to regulate conservation and development in the coastal zone. The Commission is empowered to control all development in the coastal zone and maintain coastal access in all areas of the state except San Francisco Bay (which is under the independent jurisdiction of the San Francisco Bay Conservation and Development Commission). CAL. PUB. RES. CODE §§ 30000–30900.

105. Address by Paul Webb, California Coastal Commission Regional Staff, *Wetlands: Critical Land Use and Development Issues in California* (CLE International Seminar), in Los Angeles, California (June 13–14, 1991).

106. 33 U.S.C. § 1451 *et seq.*; CAL. PUB. RES. CODE § 30330.

107. LCP requirements are found in section 30500 *et seq.* of the California Public Resources Code. An LCP includes a land use plan and implementing ordinances, and must be certified by the Coastal Commission, whereupon authority to enforce it transfers to the local government. This authority is subject to appeal to the Commission. As of January 1992, a little over half of the 125 certifiable local areas in the state had received certification. 13:1 CAL. REG. L. REP. 112 (Winter 1993).

108. CAL. PUB. RES. CODE § 30500 *et seq.*

109. *Id.* at § 30233(a), (c); *see also id.* at § 30607.1. The criteria used in evaluating coastal development activities are set forth in §§ 30200–30265.

110. The Coastal Act does not define the term "mitigation." The "common law" definition of mitigation refers to "methods of reducing potential damage or destruction to habitat, and ways to repair, restore, or compensate for damage." Jon A. Kusler & Hazel Groman, *Mitigation: An Introduction*, 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 2 (Sept.–Oct. 1986). This impression of Coastal Commission mitigation policy is based on the author's review of a great many Coastal Commission project approvals in which mitigation requirements are attached.

111. CAL. WATER CODE § 174 *et seq.*

112. 33 U.S.C. § 1251(g) (1986).

113. 33 U.S.C. § 1252; CAL. WATER CODE § 13160.

114. Water Resources Control Board, Division of Water Quality, *Notice of Public Review of Proposed Negative Declaration for the Water Quality Certification of Nationwide Permits Issued by the U.S. Army Corps of Engineers Pursuant to Section 404 of the Clean Water Act* (November 1992).

115. For example, in 1990 the Disney Corporation approached the Coastal Commission, the Port of Los Angeles, and the U.S. Army Corps of Engineers regarding a massive waterfront amusement park in Los Angeles Harbor. The project was met with a negative response from Coastal Commission staff and other resource agencies, and the Disney Corporation was advised that it should not plan to proceed with the project. Nevertheless, Disney opted to continue with the project, apparently hoping that political influence would save the day. *See* 11:3 CAL. REG. L. REP. 164–65 (Summer 1991); 11:1 CAL. REG. L. REP. 124 (Winter 1991). In 1991, the corporation convinced state Senator Ken Maddy to carry a bill exempting the project from the Coastal Act, but strong environmental group pressure caused Maddy to drop the bill and Disney to abandon the proposal in December 1991. 12:1 CAL. REG. L. REP. 158 (Winter 1992); 11:4 CAL. REG. L. REP. 174 (Fall 1991).

116. "Success" in these projects is determined by the presence or absence of the target species—the endangered Least Bell's Vireo. It is important to note that while these projects have generally been accepted as "successful," the criteria for success did not include a measurable, fully functioning ecosystem.

117. For example, a riparian area in the Mission Trails Regional Park area east of San Diego was revegetated with willows and other native species to compensate for nearby roadwork; these species established themselves rapidly and appeared similar in value to surrounding habitat. However, biologists working on the project noted that the same or similar species probably would have revegetated the site naturally almost as quickly. The net effect of the project therefore appears to be acceleration of revegetation rather than increasing habitat values.

118. Even where part of the habitat has been "restored" or "enhanced," the net effect is decline in total wetland habitat. *See Mitigation Problems, supra* note 2, at 33. Therein, biologist Zedler noted that "the assumption behind many mitigation projects is that native species can be concentrated in smaller areas by manipulating the habitat. This might be true for humans, but not for wildlife." By attempting to crowd native populations into smaller and smaller areas ("high-rise wetlands"), long-term persistence of these species often fails.

119. *Determining the Need, supra* note 53, at 11.

120. This problem is not unique to mitigation projects in California or even in the United States. In Great Britain, the

feasibility of ecosystem creation has been questioned as often exacerbating problems rather than increasing resource values. *See* William Sutherland & Chris Gibson, *Habitats to Order: Man Made Habitats Are No Substitute for the Real Thing*, 117 NEW SCIENTIST 70 (1988) (hereinafter "*Habitats to Order*").

121. *See generally* Pacific Estuarine Research Laboratory, *A Manual for Assessing Restored and Natural Coastal Wetlands With Examples From Southern California* (San Diego State University Biology Department 1990); 1 & 2 WETLAND CREATION AND RESTORATION: THE STATUS OF THE SCIENCE (Jon A. Kusler & Mary E. Kentula eds. 1989) (U.S. Environmental Protection Agency EPA/600/3-89/038).

122. *Id.*

123. Jon A. Kusler & Hazel Groman, *Mitigation: An Introduction*, 8(5) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 2 (Sept.–Oct. 1986).

124. This analogy was first stated in *Habitats to Order*, *supra* note 120.

125. *See supra* text accompanying notes 51–56.

126. A mitigation bank differs from a mitigation project in that it is designed to compensate for habitat losses resulting from one or more development projects, not just one. Theoretically, a mitigation bank is always established in advance of the impacts that will result from the development project. Elizabeth P. Riddle, *Mitigation Banks: Unmitigated Disaster or Sound Investment?* 3(1) CAL. WATERFRONT AGE (Cal. Coastal Conservancy) 37 (1987) (hereinafter "*Mitigation Banks*").

127. USFWS is generally considered the primary authority on assessing impacts to sensitive habitat areas. It is the only federal agency that has published guidelines for both mitigation (*see supra* text accompanying notes 51–56) and mitigation banking (*see infra* text accompanying notes 149–53). *See also* MITIGATION BANKING, *supra* note 43.

128. FWS Mitigation Policy, *supra* note 51. *See also* MITIGATION BANKING, *supra* note 43, at 1.

129. *See* Diane M. Niedzialkowski & John A. Jaksch, *Wetlands Mitigation Banking as an Innovative Approach to Wetlands Regulation* in FRESHWATER WETLANDS AND WILDLIFE (U.S. Dep't of Energy, Office of Scientific and Technical Information, Oakridge, Tennessee) (R.R. Saritz & J.W. Gibbons eds. 1989) (hereinafter "*Wetlands Mitigation Banking*").

130. This general scheme has been used since 1985 when it was introduced by USFWS biologist David Soileau:

> A developer undertakes measures to create, restore, or preserve fish and wildlife habitat in advance of an anticipated need for mitigation for project construction impacts. The benefits attributable to these measures are quantified, and the developer receives mitigation credits from the appropriate regulatory and/or planning agencies. These credits are placed in a mitigation bank account from which withdrawals can be made. When the developer proposes a project involving unavoidable losses of fish and wildlife resources, the losses (debits) are quantified using the method that was used to determine the credits, and a withdrawal equal to that amount is deducted (debited) from the bank. This can be repeated as long as mitigation credits remain available in the bank.

David M. Soileau, Jim D. Brown & David W. Fruge, *Mitigation Banking: A Mechanism for Compensating Unavoidable Fish and Wildlife Habitat Losses*, 50 TRANS. N.AM. WILDL. NAT. RES. CONF. 465–74 (1985).

131. *Mitigation Banks*, *supra* note 126, at 38.

132. Telephone interview with Robert Radovich, Associate Fisheries Biologist, California Department of Fish and Game (Apr. 28, 1992).

133. *Mitigation Banks*, *supra* note 126, at 4.

134. *Id.*

135. MITIGATION BANKING, *supra* note 43, at 11.

136. *Id.* at 11–12.

137. In fact, no single habitat evaluation system has been demonstrated to be successful in reliably measuring habitat values. *Id.* at 14.

138. For a critical analysis of the HEP procedure in coastal habitats, *see* David A. Nelson, *Use of Habitat Evaluation Procedures in Estuarine and Coastal Marine Habitats* (U.S. Dep't of the Army E.L.-87-7, Waterways Experiment Station, Vicksburg, Mississippi 1987).

139. For example, in the Batiquitos Lagoon enhancement project in San Diego County, the HEP analysis contained a list of 30 target species of animals which were to be compared in a before-and-after analysis. The area impacted by the project was a subtidal embayment area in Los Angeles Harbor which was inhabited by nearshore fish species and nearshore bird species such as seagulls. The proposed mitigation site, Batiquitos Lagoon, is a shallow semitidal brackish lagoon which provides largely shallow water, mudflat, and wetland habitat for shore birds, marsh birds, insects, and waterfowl. The indicator species in the HEP analysis consisted of 28 species of fish and two groups of birds (seagulls and diving ducks). The effect of choosing these 30 types of animals was to ensure that the habitat lost in Los Angeles Harbor would be evaluated for replacement, but it ignored the existing habitat value of the lagoon. As a result, significant habitat loss would go unnoticed.

140. *See, e.g.*, MEC Analytical Systems, Inc., *Evaluation of Habitats: Section 9, Revised Batiquitos Lagoon Enhancement Project* (1990). A modified version of the HEP analysis, combined with the U.S. Army Corps of Engineers' ratio to references (RTR) technique, was used, after the original HEP analysis was abandoned as inadequate. The Metropolitan Water District in Southern California has also recently developed a new method for use in a proposed mitigation bank involving impacts from reservoir construction. *See* Deborah Drezner, Diane Concannon & Jud Monroe, *Mitigation Banking: A Quantitative and Ecological Approach to Regional Site Selection and Habitat Quality Assessment*, presented to the Association of Environmental Professionals Annual Meeting, San Diego, California (Apr. 24–26, 1992).

141. The advantage of keeping land in private ownership for maintaining a local property tax base is somewhat tempered by state laws providing for special reduced tax assessments for properties subject to conservation easements and other wildlife protection agreements. *See* CAL. REV. & TAX. CODE §§ 422, 423.3, 423.7.

142. This is the pattern preferred by the California Department of Fish and Game; *see infra* text accompanying note 184.

143. Monitoring and maintenance differ slightly from value assessment in that a monitoring and maintenance program is specific in the field procedures for collecting data regarding all aspects of the restored ecosystem (these include surveys of bird and animal use, soil processing, vegetation, and other physical factors in the environment). By contrast, value assessment is the assimilation of the information collected in a monitoring and maintenance program and a deduction from that information the degree of success (*i.e.*, the analysis and mathematical modeling of those data).

144. The "filtering" process occurs in the sequential application of mitiga-

tion goals; *see supra* text accompanying note 34.

145. This includes the requirement that the development project must have no practicable alternative location or construction methods that would have less adverse consequences on the wetlands system while still accomplishing the project objectives. In the early 1980s, mitigation project proponents often tried to define their project so narrowly that there could be no alternative site or design. *See* GAO REPORT, *supra* note 71, at 26. The USFWS and EPA no longer tolerate these strained definitions of "project objectives."

146. Some development interests have encouraged the relaxation of this requirement when large-scale restoration projects are proposed. This request has met with an emphatic denial from the resource agencies.

147. MITIGATION BANKING, *supra* note 43, at 8.

148. *Wetlands Mitigation Banking*, *supra* note 129, at 1089.

149. Rolf J. Wallenstrom, Acting Associate Director, *U.S. Fish and Wildlife Service Interim Guidance on Mitigation Banking* (ES Instruction Memorandum No. 80, June 23, 1983) (hereinafter "USFWS Interim Guidance").

150. *Id.*

151. *Id. See also* MITIGATION BANKING, *supra* note 43, at 8–9.

152. The points which must be addressed in a mitigation banking proposal include the following:

• All losses must be unavoidable and necessary.

• All onsite mitigation alternatives must be pursued first.

• Property must be available and susceptible to mitigation banking requirements. These requirements include an evaluation of the ability to acquire the site by easement, fee title, or other legally binding agreement; ability to manage the property for increased habitat value; and ability to locate the bank within the same ecoregion, habitat type, and state boundary as the impacts being mitigated.

• In-kind mitigation is required for Resource Category 2 and is the first priority for Categories 3 and 4.

• Simple purchase of habitat is not mitigation banking unless "loss avoidance" can be unquestionably demonstrated. The extant habitat value of the mitigation site will not be considered a bank credit.

• Consideration should be given to establishing an interagency team to evaluate sites and select suitable candidate sites for the specific types of mitigation required. While developers may be considered as team members, they should not be in the position of having veto power or final approval of bank procedures.

• The interagency team could also "manage" the established bank by approving "credits" and "withdrawals." If the team approach is not used, it is suggested that a third party (such as an organization primarily interested in public trust properties) be used as the "banker."

• In no case will financial contributions to a trust fund for future land acquisition and management be considered as a mitigation bank.

• Means for long-term operation and maintenance shall be agreed upon before any area, facility, or improvement is accepted as a mitigation bank. For an action to be considered as a mitigation bank or bank "component," there must be agreement among all parties involved that the action increases habitat value in excess of the value occurring naturally during the life of the bank.

• Areas managed or authorized to be managed by USFWS shall not be considered susceptible to mitigation banking without specific approval by the Director.

USFWS Interim Guidance, *supra* note 149, at 3–4.

153. MITIGATION BANKING, *supra* note 43, at 39–94.

154. Michael L. Davis & Gregory E. Peck, *Wetlands Mitigation Banking* (U.S. Environmental Protection Agency, Office of Wetlands Protection 1991) (policy paper submitted to National Wetlands Policy Forum) (hereinafter "EPA Policy Paper").

155. *Id.* at 2.

156. Uplands are areas of dry land adjacent to wetland areas.

157. Developers will often offer to donate and/or dedicate property to be preserved as natural habitat in exchange for the destruction of nearby wetland habitat. EPA and USFWS discourage this type of exchange because, while it offers increased protection for some wetlands, it necessarily results in a net loss of wetland habitat.

158. EPA Policy Paper, *supra* note 154, at 2.

159. The rationale for this conservative approach stems from concern over the following factors: potential misuse of compensatory mitigation to "buy down" environmental impacts of one alternative when another less damaging alternative exists; the technical uncertainties associated with creating and restoring wetlands; potential misunderstandings when applicants construe or anticipate the establishment of a bank as implying ultimate authorization of specific projects; the adequacy of habitat evaluation techniques; administrative burdens of establishing a bank on the agency; the legal complexities associated with implementing a banking agreement; and the need for long-term monitoring and maintenance requirements. *Id.* at 2.

160. These prerequisites, *see id.* at 3, are similar to those established by USFWS in its Interim Guidance; *see supra* note 152.

161. Service Opinion Letter from Nancy Forster, Director, Office of Protected Resources, National Marine Fisheries Service, to Suzanne E. Schwartz, Director, Regulatory Activities Division, U.S. Environmental Protection Agency (1991).

162. *Id.* NMFS also notes that staffing and funding of federal programs is insufficient to carry out protracted habitat evaluation procedures, which may preclude attainment of no net loss goals in the near future.

163. NMFS views money in lieu of compensation or restoration of habitat as a valuable method to augment budgets for expensive programs which otherwise might go unfunded, such as anadromous fish restoration. *Id.*

164. *See, e.g., Wetlands Bank May Not Mitigate Later Damage*, ENGINEERING NEWS-RECORD, Sept. 5, 1985, at 19.

165. *See, e.g., Wetlands: Bush Defends New Policy Against Critics*, AM. POL. NETWORK GREENWIRE, Aug. 12, 1991.

166. *Id.*

167. SPORTS AFIELD, Oct. 1988, at 15.

168. Intermodal Surface Transportation Efficiency Act of 1991, Pub. L. No. 102–240, 105 Stat. 1914 (1991).

169. California Department of Fish and Game, *Guidelines for the Establishment of Wetland Mitigation Banks* (1991) at 3 (hereinafter "DFG Guidelines").

170. *Id.* at 2.

171. *Id.*

172. DFG Policy, *supra* note 97. This policy is separate from the DFG Guidelines on Mitigation Banking; however, the two policies are largely consistent with each other regarding management issues.

173. This policy prohibits the conversion of one wetland habitat type to another under the guise of mitigation of impacts from development elsewhere; however, this policy is not always followed. *See, e.g.*, note 139 regarding the

Batiquitos Lagoon Enhancement Project, in which wetland habitat will be partially used to mitigate for lost subtidal habitat.

174. It is noteworthy that the DFG Guidelines do not require that the mitigated habitat be functionally equivalent to the wetland being lost; rather, the mitigated are need only assume the *likeness* of a wetland.

175. DFG Guidelines, *supra* note 169, at 2–3.

176. *Id.* at 4. The federal guidelines do not elaborate on the meaning of "mitigation credits." This definition appears to discount existing wetland habitat value because it does not require a deduction for possible wetland habitats that are lost in the creation of the mitigation bank.

177. *Id.* at 5. It is unclear exactly how the 40-mile limit was established, or what relevance it has to the ability to create in-kind compensation.

178. *Id.* This requirement is particularly puzzling, because most wetland species are at least partially dependent upon adjacent upland areas. Therefore, the upland habitat immediately adjacent to a wetland area is necessarily valuable to wildlife. This policy and the premise that all wetland mitigation banks must be created from uplands are contradictory.

179. However, many mitigation projects use "buffer zones" for bike paths and other uses which severely disturb bird use.

180. DFG Guidelines, *supra* note 169, at 6.

181. Such special circumstances may be approved only after review by the affected DFG regional office, DFG's Environmental Services Division, and DFG's Wildlife Management Division.

182. DFG Guidelines, *supra* note 169, at 6. Despite the policy to create large banks, some of the first California banks were less than ten acres. *See, e.g.*, MITIGATION BANKING, *supra* note 43, at 46 (summary of Bracut Wetland Mitigation Marsh Bank).

183. DFG Guidelines, *supra* note 169, at 7. This statement is wholly unrealistic in that there is ample authority to show that even with a one-to-one mitigation ratio, lost habitat acreage and lost habitat values will result from project impacts. This clause will undoubtedly result in heavy lobbying of the DFG Director to approve banks with a one-to-one mitigation ratio prior to the establishment of the wetland habitat.

184. However, this requirement ignores the ephemeral nature of many wetland areas in California. A permanent and constant source of water in many wetland areas would change their natural state. DFG should require further research in this area and qualify this language such that the timing of seasonal flows is added to the Guidelines.

185. DFG Guidelines, *supra* note 169, at 3. *See, e.g.*, note 139 regarding the Batiquitos Lagoon Enhancement Project.

186. Mark Fonseca, *Regional Analysis of the Creation and Restoration of Seagrass Systems*, 1 WETLAND CREATION AND RESTORATION: THE STATUS OF THE SCIENCE 175 (Jon A. Kusler & Mary E. Kentula eds. 1989) (U.S. Environmental Protection Agency EPA/600/3-89/038).

187. DFG Guidelines, *supra* note 169, at 3.

188. These include instances where impacts cannot be mitigated onsite yet are so small that offsite mitigation is unlikely to be required.

189. MITIGATION BANKING, *supra* note 43, at 2; *see also Wetlands Mitigation Banking*, *supra* note 129, at 1095.

190. *Id.*

191. *Id.*

192. The mitigation-in-advance policy is a far different situation from historic (and some current state) mitigation requirements, which were generally imposed by permit agencies and occurred concurrently with impacts, and sometimes subsequent to impacts. Because wetland restoration and creation projects often take several years to become fully functioning (if they ever do), there can be a considerable period of time during which habitat has been lost and the habitat is dysfunctional; these temporal losses are often not considered in mitigation requirements. *See* MITIGATION BANKING, *supra* note 43, at 6.

193. DFG Guidelines, *supra* note 169, at 3.

194. For example, homebuilders associations and construction coalitions may pool their funds to locate and purchase property which may then be restored for mitigation credit. In the Chicago area, the Lake County Home Builders Association and the Greater Chicago Home Builders Association have invested over $40,000 to fund a site selection study as the first step in creating a wetland mitigation bank. *Wetlands: A Swamp of Uncertainty*, CHI. TRIB., Aug. 25, 1991 (Real Estate) at 1.

195. Draft EIR/EIS, *supra* note 5.

196. MITIGATION BANKING, *supra* note 43, at 4.

197. A weak link in the section 404 permit process is noncompliance with mitigation requirements and lack of agency resources to monitor and evaluate mitigation actions. *Id.* This problem is also prevalent at the state regulatory level. For example, the California Coastal Commission staff had only one enforcement position in 1991 to ensure compliance with mitigation requirements pursuant to the Coastal Act. 11:2 CAL. REG. L. REP. 153 (Spring 1991).

198. Alternatively, a major complaint within the development industry is that mitigation requirements are already too expensive. The addition of a premium (10%), while extremely attractive, may serve the additional function of deterring plans to develop the wetland resource.

199. MITIGATION BANKING, *supra* note 43, at 2. The science of habitat restoration also benefits. By requiring evaluation of mitigation efforts in advance of the impacts, banking creates an incentive to refine restoration techniques and increase the probability for success. Where there is a required threshold for success, the enterprise is only lucrative if it is successful. Thus, the science of wetland restoration and creation should benefit from renewed efforts in research and development.

200. *Mitigation Banks*, *supra* note 126, at 3.

201. *Id.*

202. *See generally* 1 & 2 WETLAND CREATION AND RESTORATION: THE STATUS OF THE SCIENCE (Jon A. Kusler & Mary E. Kentula eds. 1989) (U.S. Environmental Protection Agency EPA/600/3-89/038).

203. *Id.* The reasons for partial or total failures differ; however, common problems include lack of basic scientific knowledge, inadequate design, lack of staff expertise and project supervision, invasion by exotic species, improper site conditions (*e.g.*, hydrology, wave action, substrate, nutrient concentration, light availability, sedimentation rate, improper grade slopes), grazing by animals, destruction of vegetation or substrate by catastrophic events, failure of projects to be carried out as planned, and failure to protect projects from onsite and offsite impacts such as off-road vehicles, groundwater supply pumping, toxics, etc.

204. *Id.*

205. *Id.*

206. Joy B. Zedler & Milton Weller, *Overview and Future Directions* in 1 WETLAND CREATION AND RESTORATION: THE STATUS OF THE SCIENCE 465 (Jon A. Kusler & Mary E. Kentula eds. 1989) (U.S. Environmental Protection Agency EPA/600/3-89/038).

207. *See, e.g., Corps Issues Permit for Solid Waste Resources Recovery Plant*, BUSINESS WIRE, May 15, 1989. *See also* Port of Long Beach, *Protecting the Environment* (1991) (promotional pamphlet).

208. *See supra* text accompanying notes 137–40. HEP uses mathematical modeling to estimate success, and relies on the assumption that habitat quality and quantity for selected species can be numerically expressed. DIVISION OF ECOLOGY, U.S. FISH AND WILDLIFE SERVICE, HABITAT EVALUATION PROCEDURES (1980).

209. HEP analysis limits the number of species evaluated to about 30. This limitation becomes a problem, especially when two types of habitats are being assessed. *See supra* note 139.

210. *See* David A. Nelson, *Use of Habitat Evaluation Procedures in Estuarine and Coastal Marine Habitats* (U.S. Dep't of the Army E.L.-87-7, Waterways Experiment Station, Vicksburg, Mississippi 1987).

211. *See, e.g.*, Paul R. Adamus, Ellis J. Clairain, Jr., R. Daniel Smith & Richard E. Young, II *Wetlands Evaluation Technique Methodology* (prepared for the U.S. Dep't of the Army, Corps of Engineers, and the U.S. Dep't of Transportation 1987). More recently, an adaptation of several procedures has been produced. Deborah Drezner, Diane Concannon & Jud Monroe, *Mitigation Banking: A Quantitative and Ecological Approach to Regional Site Selection and Habitat Quality Assessment*, presented to the Association of Environmental Professionals Annual Meeting, San Diego, California (Apr. 24–26, 1992). This procedure was accepted for the project for which it was created; however, it has been rejected for widespread use by the California Department of Fish and Game.

212. For example, at the Chula Vista Wildlife Preserve in south San Diego Bay, two extensive dredge spoil areas were partially planted with cordgrass to establish intertidal salt marsh and mudflat habitat in compensation for the impacts from the creation of a marina. The site was monitored with photographs for three years and, by all visual accounts, the vegetation appeared to have established a healthy cordgrass marsh and the marsh was considered a success. However, in the fourth year, scale insects infested the cordgrass and the quality of the habitat rapidly declined. As it turned out, the scale insect is a common inhabitant of salt marshes, but is normally kept in check by predatory beetles. This particular "restored" salt marsh was virtually devoid of the predatory beetle, which allowed the scale insect to proliferate uncontrolled. Sampling of the insect community of the salt marsh as part of the criteria for success may have alerted project personnel that there was a problem, and the beetle could have been introduced to the marsh to combat the scale insect. Ultimately, the habitat was identified as a "success" when in fact it lacks substantial components to the ecosystem.

213. The establishment of a new industry of "restoration corporations" was envisioned by the Bush administration. The new restoration corporation will develop a commodity (restored habitat area) and create a market for it (with mitigation credits sold for profit). This new industry has already begun to develop. *See, e.g., Wetlands Proposal Disputed—Biringer Farm Would Be 'Bank' to Mitigate for Filling Other Sites*, SEATTLE TIMES, Jul. 22, 1991, at E3; *From Strawberries to Salt Marsh—Wetlands Bank Idea Worth Serious Study*, SEATTLE TIMES, Jul. 19, 1991, at A10.

214. In ecological terms, "disturbance" refers to random and localized changes to the physical characteristics of an ecosystem. When kept at a low frequency of occurrence, disturbance actually helps increase biodiversity by providing windows of opportunity for new species to colonize. However, when disturbance is large-scale, drastic, and/or chronic, only species which can colonize and grow quickly can survive. R.E. RICKLEFS, THE ECONOMY OF NATURE 415–16 (2d ed. 1983). The disturbance associated with major mitigation projects includes wholesale manipulation of the habitat, such as changing the hydrology of a wetland, disking a road to overturn the soil, etc., which is potentially harmful enough to limit biodiversity.

215. *See, e.g., Habitats to Order, supra* note 120.

216. *Id.* For an excellent discussion of this "planet of the weeds" concept, *see* David Quammen, *Dirty Word, Clean Place*, XVI(8) OUTSIDE MAGAZINE 25 (August 1991).

217. For example, the California Coastal Act of 1976 is considered to be "internally balanced" by the Coastal Commission. Address by Paul Webb, California Coastal Commission Regional Staff, *Wetlands: Critical Land Use and Development Issues in California* (CLE International Seminar), in Los Angeles, California (June 13–14, 1991).

218. For example, the U.S. Army Corps of Engineers has historically used a public interest balancing test in section 404 permit decisions. *See supra* text accompanying notes 57–61; *see also* Theodore J. Griswold, Comment, *Wetland Protection Under Section 404 of the Clean Water Act: An Enforcement Paradox*, 27:1 SAN DIEGO L. REV. 139 (1990).

219. Letter from Janice Goldman-Carter and J. Scott Feierabend to David G. Davis, Director, Office of Wetlands Protection, U.S. Environmental Protection Agency (Mar. 15, 1991) (regarding National Wildlife Federation position on mitigation banking in the section 404 regulatory program).

220. Beveridge & Diamond, P.C., Comments on Behalf of the Foundation for Environmental and Economic Progress, Inc., Concerning Mitigation Banking in the Section 404 Regulatory Program (Jan. 25, 1991) (submitted to Office of Wetlands Protection, U.S. Environmental Protection Agency).

221. This argument was also stated by the National Wetlands Coalition in its Comments on Policy Considerations With Regard to Mitigation Banking (Feb. 4, 1991) (submitted to Office of Wetlands Protection, U.S. Environmental Protection Agency). The Coalition also argued against requiring projects sited in wetlands to be "water-dependent." *Id.*

222. Issues such as the scientific uncertainty of success and the ability to attract some of the species the habitat is designed to benefit cannot be resolved in the planning process.

223. Dennis M. King, *Avoiding Another Taxpayer Bailout*, 14(1) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 11 (1992); *see also Mitigation Banks, supra* note 126, at 38.

224. King, *Avoiding Another Taxpayer Bailout*, 14(1) NAT'L WETLANDS NEWSLETTER (Envtl. L. Inst.) 11 (1992).

225. It should be noted that unless the government recoups administrative costs from the bank operator, taxpayer dollars are also used to establish the bank when the real beneficiary is the private sector interest deriving benefits from the development. Letter from Janice Goldman-Carter and J. Scott Feierabend to David G. Davis, Director, Office of Wetlands Protection, U.S. Environmental Protection Agency (Mar. 15, 1991) (regarding National Wildlife Federation position on mitigation banking in the section 404 regulatory program).

226. Most of the sources of knowledge currently used in mitigation techniques stem from controlled university research which must then be extrapolated to larger, often very difficult, ecosystems.

227. In any valuation of resources, if there is uncertainty in the cost of the resource, the market accounts for this uncertainty by adding a premium on the cost of the resource. This premium theoretically incorporates the cost of the uncertainty into the price of the commodity. By analogy, wetland restoration creation projects which are used for mitigation and which incorporate a design that has considerable uncertainty in it must incorporate such a premium in the price of the resource loss commensurate with the uncertainty. This premium should then be used to resolve that uncertainty. The premium can be in the form of additional financial costs, or in the form of additional dedication of lands for experimental purposes (which thereafter would be restored).