

Status of Species Conservation Banking in the United States

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Abstract: *Receiving financial gains for protecting habitat may be necessary to proactively protect endangered species in the United States. Species conservation banking, the creation and trading of "credits" that represent biodiversity values on private land, is nearly a decade old. We detail the biological, financial, and political experience of conservation banking in the United States. We contacted agencies, nongovernmental organizations, and bank owners and compiled comprehensive accounts of the experiences of current banks. There are 76 properties identified as conservation banks in the United States, but only 35 of these are established under a conservation banking agreement approved by the U.S. Fish and Wildlife Service (USFWS). The 35 official conservation banks cumulatively cover 15,987 ha and shelter a range of biodiversity, including more than 22 species listed under the U.S. Endangered Species Act. Financial motives drove the establishment of 91% of conservation banks, and the majority of for-profit banks are breaking even or making money. With credit prices ranging from \$3,000 to \$125,000/0.41 ha (1 acre), banking agreements offer financial incentives that compete with development and provide a business-based argument for conserving habitat. Although the bureaucracy of establishing an agreement with the USFWS was burdensome, 63% of bank owners reported they would set up another agreement given the appropriate opportunity. Increasing information sharing, decreasing the time to establish agreements (currently averaging 2.18 years), and reducing bureaucratic challenges can further increase the amount of private property voluntarily committed to banking. Although many ecological uncertainties remain, conservation banking offers at least a partial solution to the conservation versus development conflict over biodiversity.*

Key Words: conservation incentives, credit trading, endangered species, private property

El Estatus de la Banca para la Conservación de Especies en Estados Unidos

Resumen: *La recepción de ganancias financieras por la protección del hábitat puede ser necesaria para la protección preactiva de especies en peligro en los Estados Unidos. La banca para la conservación de especies, la creación y comercio de "créditos" que representan valores de biodiversidad en terrenos privados, comenzó hace casi una década. Aquí detallamos la experiencia biológica, financiera y política de la banca para la conservación en los Estados Unidos. Contactamos agencias, organizaciones no gubernamentales y propietarios de bancos y compilamos información integral de las experiencias de los bancos actuales. Hay 76 propiedades identificadas como bancos de conservación en los Estados Unidos, pero solo 35 están establecidos bajo un acuerdo de banca para la conservación aprobado por el U.S. Fish and Wildlife Service (USFWS). Los 35 bancos para la conservación oficiales cubren 15,987 ha y protegen a una amplia gama de biodiversidad, incluyendo más de 22 especies enlistadas en el Acta de Especies en Peligro de E.U.A. El establecimiento de 91% de los bancos para la conservación tuvo motivos financieros, y la mayoría de los bancos operan con ganancias o en equilibrio. Con precios de créditos entre \$3,000 y \$125,000 por 0.41 ha (1 acre), los acuerdos bancarios ofrecen incentivos que compiten con la banca de desarrollo y proporcionan un argumento para la conservación del hábitat basado en negocios. A pesar de que la burocracia involucrada en el establecimiento de un convenio con*

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USFWS fue agobiante, 63% de los propietarios de bancos reportaron que volverían a establecer un convenio si hay una oportunidad apropiada. El incremento del flujo de información, la disminución del tiempo para el establecimiento de convenios (actualmente 2.18 años en promedio) y la reducción de los retos burocráticos pueden impulsar el aumento de la propiedad privada consignada a la banca voluntariamente. Aunque permanecen muchas incertidumbres ecológicas, la banca para la conservación por lo menos ofrece una solución parcial al conflicto conservación versus desarrollo.

Palabras Clave: especies en peligro, incentivos para la conservación, mercado de crédito, propiedad privada,

Introduction

The tension between the ostensibly competing outcomes of conservation and economic progress received increased attention during the last decade. To secure the ecosystem services necessary for the proper functioning of life, it is critical to address the conflict between conservation and development to more successfully protect dwindling natural resources. Conservation banking is an innovative U.S.-based approach that offers a potential solution for protecting imperiled biodiversity while allowing for economic growth.

A conservation bank is a parcel of private property that is conserved and managed in perpetuity under a conservation easement for the benefit of rare species. The party that holds the easement is granted credits by a federal or state agency for the land's species and habitat value. A bank owner may use or sell the credits within a pre-designated service area to address mitigation required by state or federal law (USFWS 2003). Overall, the practice of conservation banking refers to the process of setting up species credits via a banking agreement and the "trading" (i.e., using or selling) of those credits.

The first policy defining species credit trading was released by the state of California in 1995 (Wheeler & Strock 1995). This policy coined the phrase *conservation banking* and initiated the practice within California and across the United States. The federal guidance for the establishment, use, and operation of conservation banks released in May 2003 by the U.S. Fish and Wildlife Service (USFWS) was modeled after California's policy and trailed the beginnings of the practice by nearly a decade (USFWS 2003). On a federal level, conservation banking is facilitated by the legal requirements of the U.S. Endangered Species Act (ESA) that protect threatened and endangered species. Once a species is listed as endangered or threatened, it can be used as the basis for a conservation bank. By issuing the federal guidance, USFWS hoped that the practice of conservation banking, as one tool to achieve recovery of endangered species, would become more widespread and accessible across the country.

In the United States, impacts to federally protected species have usually been mitigated on a project-by-project basis at the risk of creating isolated habitat pockets that are difficult to maintain (Wheeler & Strock 1995).

The ability to bank species credits for future use may allow land managers to optimize habitat connectivity by concentrating mitigation in large areas. Many recognize the potential of conservation banks to allow landowners flexibility in complying with the ESA while ensuring that conservation needs are met (Bonnie 1999; Bean & Dwyer 2000; Heal 2000; Bayon 2002; Wilcove & Lee 2004). From an economic perspective, banking is advantageous because it allows a private landowner to transform a former legal liability (i.e., the species) into a financial asset (i.e., the credit). The existence of the bank provides an alternative for landowners who are looking for a rapid, legitimate, and cost-effective mitigation option. From a conservation perspective, because the use of credits represents impacts to habitat elsewhere, banking may not result in an increase in quantity of suitable habitat for a particular species, but it may result in higher quality of habitat being conserved for an individual species (e.g., decreased edge effects, more species corridors, larger areas with higher population viabilities). The innovation in the approach stems from the potential for receiving a profit through supporting healthy populations of endangered species. Although conservation banking is not a panacea for mediating all conservation-development conflicts, it does demonstrate that conservation and economic growth are not always mutually exclusive.

Past studies, most notably Bonnie (1999) and Bean and Dwyer (2000), reported on the history, background, and potential of species conservation banking. More recently, Wilcove and Lee (2004) evaluated the performance of three incentive-based programs and provided figures on the current practice of species banking. These reports, however, did not assess the success or failure of banking, in part because of the lack of a centralized list of existing activities in species credit trading. Government-initiated Web sites maintaining conservation bank data are out of date, incomplete, and not useful for gaining a comprehensive understanding of the practice. The growing interest of private property owners in banking has been stymied by this lack of comprehensive data on existing banks. Many basic questions remain unanswered: How widespread is the practice? Who participates in banking? What species are protected? The deeper sociopolitical and economic experiences of banking, particularly the motivations, successes, and challenges of ownership,

have also gone unexplored. Here we report summary statistics for established conservation banks in the United States. Our results provide a benchmark for gauging past experiences, future successes, and the potential for banking to address the conflict between conservation and development.

Methods

We compiled lists of conservation banks in the United States from federal and state natural resource agencies, including 7 regional offices and more than 15 field offices of the USFWS and 7 regional offices of the California Department of Fish and Game. We also contacted other non-governmental organizations that are involved in wildlife-crediting activities. After we compiled initial lists of all potential banks in a database, we contacted bank owners, managers, and agency staff involved in establishing each banking agreement to confirm the general status and basic statistics: size, species, location, ownership, year established, and credit ratio. For those banks whose owners or managers did not respond after repeated attempts, we contacted informed state or federal employees to verify statistical information. In total, we contacted more than 100 individuals to verify the general status of all species-credit-trading activities in the United States.

In addition to collecting general statistical data, we conducted anonymous in-depth interviews regarding the financial and sociopolitical experiences of owning and operating banks. All banks with agreements modeled after California's Policy for Conservation Banking (which contains the same substantive elements as the federal guidance for conservation banks) or based on the federal guidance were contacted. Interviews were conducted with 31 individuals (bank owners or managers) representing 21 of the 35 confirmed conservation banks. Five bank owners representing 10 banks did not respond to our inquiries or directly declined to participate in the in-depth interview.

Results

Practice of Species Credit Trading

As of December 2003 there were 76 banks reported by federal and state agencies or self-identified as conservation banks. Not all of these, however are legally backed by a conservation banking agreement. The general practice of species credit trading has taken place within six different legal frameworks in the United States. Eighteen of the conservation banks were established under wetland banking agreements, 5 under habitat conservation plans, 6 under memorandums of agreement, 6 under safe harbor agreements, and 3 are "pseudobanks." Three of the agreements were never finalized. Only 35 are based on

conservation-banking agreements modeled after either the federal guidance or California's state policy.

Species crediting began in the United States with the establishment of the 2453-ha (6059-acre[ac]) Coles Levee Ecosystem Preserve, located in California and owned by Aera Energy. The bank used a 1992 memorandum of agreement that awards tradable species credits in exchange for protecting habitat for the San Joaquin kit fox (*Vulpes macrotis mutica*), tipton kangaroo rat (*Dipodomys nitratooides nitratooides*), and the blunt-nosed leopard lizard (*Gambelia sila*). The frequently cited Red-cockaded Woodpecker (*Picoides borealis*) banks in the Southeast are set up under safe harbor agreements (Bonnie 1999; Bean & Dwyer 2000; Bayon 2002; Wilcove & Lee 2004), with only one of these having actually sold a credit as mitigation for development (University of California Development Foundation) (Table 1). In California, groups are selling species credits for habitat that was simply placed under a conventional conservation easement and marketing these areas as conservation banks (frequently referred to as pseudobanks). This review presents summary statistics and experiences for the 35 official banks that were legally established under a federally or state-approved conservation banking agreement as of December 2003.

Profile of Official Conservation Banks

California has 30 of the nation's official conservation banks (11 in San Diego County) (Table 2). The banks cumulatively cover 15,987 ha (39,488 ac) of habitat and protect a variety of plants and animals (Table 2). We found 22 threatened and endangered species that are the official basis for the banks (Table 3) with many other common and rare species being protected including the Western Burrowing Owl (*Athene cunicularia hypugaea*), the western spadefoot toad (*Spea hammondi*), western pond turtle (*Emys marmorata*) and the California tiger salamander (*Ambystoma californiense*). Many habitat types are also protected, including chaparral, woodlands, riparian areas, and grasslands (Table 3).

The rate of bank establishment has varied since 1995. The greatest establishment in any single year was in 1997, when eight banks were set up in California (Fig. 1). Not until 2002 were banks established in other states, when five banking agreements were signed outside California.

Landowners currently engaged in conservation banking represent the entire spectrum of private to public organizations, including timber corporations, nongovernmental organizations, family ranches, and municipalities. Some of the bank owners established banks on property that they already owned, whereas others purchased property specifically for the purpose of establishing a bank. Overall ownership is split between private and public organizations, with the intended credit usage varying significantly with ownership (Fig. 2). We classified credit usage

Table 1. Species credits outside of California without a conservation banking agreement as of December 2003.

Name of bank and location	Hectares (acres)	Species	Agreement	Year established	Bank owner
Habitat Conservation Bank for Gopher Tortoises, AL	90 (222)	gopher tortoise (<i>Gopherus polyphemus</i>)	habitat conservation plan	2001	Mobile Area Water & Sewer System
Platt Branch Mitigation Park, FL	692 (1,710)	Florida Scrub-Jay (<i>Aphelocoma coerulescens</i>), Red-cockaded Woodpecker, gopher tortoise, eastern indigo snake (<i>Drymarchon corais couperi</i>) and 16 others plants & animals	memorandum of agreement	1993	Florida Department of Transportation
TM Ranch, FL	2,025 (5,000)	Red-cockaded Woodpecker	safe harbor agreement	pending 2004	Holland Properties
Southlands Mitigation Bank, GA	2,146 (5,300)	Red-cockaded Woodpecker	habitat conservation plan	1999	International Paper
Shortgrass Prairie Initiative, CO	>6,074 (>15,000)	up to 44 species	memorandum of agreement	2003	The Nature Conservancy
Calloway Tract, NC	1,012 (2,500)	Red-cockaded Woodpecker	memorandum of agreement	2002	The Nature Conservancy
Palmetto Pear Tree Preserve, NC	4,049 (10,000)	Red-cockaded Woodpecker	memorandum of agreement	1999	The Conservation Fund
Heartwood Forestland Fund IV, TX	720 (1,777)	Red-cockaded Woodpecker	safe harbor agreement	2003	Heartwood Forestland Fund IV
Texana Timber, LP, TX	90 (225)	Red-cockaded Woodpecker	safe harbor agreement	2003	Texana Timber, LP
Brosnan Forest, SC	5,669 (14,000)	Red-cockaded Woodpecker	safe harbor agreement	1999	Norfolk Southern Railroad
USC Development Foundation, SC	445 (1,100)	Red-cockaded Woodpecker	safe harbor agreement	2001	University of South Carolina Foundation
Friendfield Plantation, SC	1,336 (3,300)	Red-cockaded Woodpecker	habitat conservation plan	1997	Friendfield Plantation
Black River Tract, SC	648 (1,600)	Red-cockaded Woodpecker	safe harbor agreement	1998	Friendfield Plantation

under the following categories: for sale to third parties, for addressing internal mitigation needs, or for a combination of selling and using credits internally.

Biological Details

To the degree that they are compatible with the bank’s primary ecological purposes, multiuse activities are allowed on bank land. Of 32 reporting banks, 66% allow for multiple uses that are compatible with the primary ecological purpose of the bank. These activities include cattle grazing, hunting, biking, horseback riding, hiking, and fishing. In some cases, the multiuse activity contributed to the health of the habitat as was reported for controlled cattle grazing and hunting of invasive species.

Ninety-one percent of banks base credits on area of habitat, 3% on the number of breeding pairs, and 6% on a combination of amount of habitat and breeding pairs. Although the majority of banks were occupied habitat, there were only a few cases in which the bank specifically classified credits as occupied verses unoccupied.

Banks ranged from 10.2 to 4,210 ha (25.3 to 10,400 ac). The average was 456.76 ha (median 238.9 ha). Forty-four percent of banks (14 of 32) were located adjacent to land that is generally managed for the protection of habitat (e.g., national parks, other banks, preserves, or conservation easements). Twenty-two percent of banks were not adjacent, and 34% of bank managers did not know whether their banks were adjacent to protected habitat.

Sixty-five percent of the banks have a credit ratio of 1 credit to 0.4 ha (1 ac), but 11% of banks are awarded more credits than hectares. Wright Preservation Bank had the highest ratio, 1 credit to every 0.04 ha (1/10 ac) because of the unusually high ecological value of a site that has 68.8 ha (170 ac) for the Sebastopol meadowfoam (*Limnanthes vulcans*), Burke’s goldfields (*Lasthenia burkei*), and California tiger salamander (*A. californiense*).

Ninety-four percent of reporting banks (30 of 32) are based on preserved habitat with no or only minor enhancement. Of the remaining two banks, one was restored and the other was created.

Financial Details

Detailed financial records for privately owned banks are proprietary. Therefore, the economic findings we report focus on qualitative responses of bank owners (representative as of December 2003). Whereas three banks reported conservation as their foremost objective, financial motives were the basis of 91% of banks. The two primary financial reasons for establishing banks are to sell credits for a profit or to use credits internally to reduce permitting costs. The ownership of financially motivated banks is split between nonprofit organizations (38%) and for-profit organizations (62%) (Fig. 3). The likelihood of breaking even on the funds initially invested was much

Table 2. Official conservation banks in the United States as of December 2003.

<i>Bank name, location</i>	<i>Hectares (acres)</i>	<i>Habitats and species</i>	<i>Year established</i>	<i>Bank owner</i>
Palo Alto Ranch Conservation Bank, AZ	411 (1,016)	pima pineapple cactus	2002	Ross and Susan Humphreys
Swan Road Conservation Bank, AZ	239 (590)	pima pineapple cactus	2002	Pima County
Bryte Ranch, CA	232 (573)	vernal pool fairy shrimp, vernal pool tadpole shrimp	2001	Thomas B. Hughes
Agua Fria Multi-species Conservation Bank, CA	1,309 (3,233.5)	San Joaquin kit fox, Western Burrowing Owl	2002	Donn Campion
Brushy Creek Conservation Bank, CA	49 (120)	Western Burrowing Owl	2000	Wildlands, Inc.
Byron Conservation Bank, CA	57 (140)	Western Burrowing Owl, California tiger salamander, California red-legged frog, San Joaquin kit fox, western pond turtle	2000	California Department of Fish and Game
Carlsbad Highlands Conservation Bank, CA	106 (263)	coastal sage scrub, chaparral, grassland, Coastal California Gnatcatcher	1995	Tech-Bilt, Inc.
Chiquita Canyon Conservation Bank, CA	479 (1,182)	coastal sage scrub, Coastal California Gnatcatcher	1996	Foothill/Eastern Transportation Corridor Agency
Cornerstones Conservation Bank, CA	4,211 (10,400)	coastal sage scrub, non-native grassland	1997	City of San Diego, Water Dept
Crestridge Conservation Bank, CA	962 (2,377)	coastal sage scrub, chaparral, oak woodland, Coastal California Gnatcatcher	1995	California Wildlife Foundation
Daley Ranch Conservation Bank, CA	1,150 (2,842)	coastal sage scrub, chaparral, coast live oak, non-native grassland	1997	City of Escondido
Dolan Ranch Conservation Bank, CA	102 (252)	giant garter snake, vernal pool tadpole shrimp,	1998	Wildlands
Fitzgerald Ranch, CA	327 (808)	Swainson's Hawk, Western Burrowing Owl	1998	Marden Wilber Jr.
Hacra Wildlife Conservation Bank, CA	228 (562)	vernal pool fairy shrimp, California tiger salamander, western spadefoot toad	2001	Wildlands
Heights of Pala Mesa Conservation Bank, CA	91 (225)	Western Burrowing Owl, San Joaquin kit fox	2000	Heights of Pala Mesa Property Owners, LLC
Hidden Ranch Conservation Bank, CA	318 (783)	coastal sage scrub, northern mixed chaparral, native grassland, freshwater seep, Coastal California Gnatcatcher	2000	Hidden Ranch Conservancy
Kern Water Bank, CA	1,323 (3,267)	unconfirmed	1997	Kern Water Bank Authority
Manchester Avenue Conservation Bank, CA	50 (123)	San Joaquin kit fox, Tipton kangaroo rat, blunt-nosed leopard lizard	1997	Tech-Bilt, Inc.
Ohlone Preserve Conservation Bank, CA	259 (640)	southern maritime chaparral, coastal sage scrub, Coastal California Gnatcatcher	pending 2004	Fletcher Conservation Properties
Orchard Creek Conservation Bank, CA	256 (632)	California red-legged frog, California tiger salamander, Alameda whipsnake	1997	Wildlands
Pleasanton Ridge, CA	265 (654)	vernal pool fairy shrimp	1999	East Bay Regional Park District
Pope Ranch, CA	158 (391)	California red-legged frog, Alameda whipsnake	2001	Wildlands
Rancho San Diego Mitigation Bank, CA	742 (1,832)	giant garter snake	1996	U.S. Fish and Wildlife Service
San Miguel Conservation Bank, CA	480 (1,186)	coastal sage scrub, riparian woodland/scrub, chaparral, marsh/riparian scrub, oak woodland, native grassland, Coastal California Gnatcatcher, Least Bell's Vireo	1997	Emerald Properties

continued

Table 2. (continued)

Bank name, location	Hectares (acres)	Habitats and species	Year established	Bank owner
San Vicente Conservation Bank, CA	130 (320)	coastal sage scrub, southern mixed chaparral.	1996	Boys and Girls Club and State of California
Sedco Hills, CA	73 (180)	Riversidean sage scrub, chamise chaparral, Coastal California Gnatcatcher	pending signature, selling since 2000	The Environmental Trust
Silverado Ranch, CA	972 (2,400)	Quino checkerspot, Stephen's kangaroo rat	1999	Greg Rede
Singing Hills Conservation Bank, CA	32 (79.4)	coastal sage scrub, Coastal California Gnatcatcher	1998	County of San Diego
Viejo Conservation Bank, CA	41 (101)	coastal sage scrub, Coastal California Gnatcatcher	pending 2004	Southern California Edison
Whelan Ranch Conservation Bank, CA	55 (136)	coastal sage scrub, Coastal California Gnatcatcher	1997	BA Properties, Bank of America
Wright Preservation Bank, CA	69 (170)	Sebastopol meadowfoam, Burke's goldfields, California tiger salamander	1997	California Department of Fish and Game
East Plum Creek (Castle Rock), CO	10 (25.3)	Preble's meadow jumping mouse	2003	Colorado Department of Transportation
Saipan Upland Mitigation Bank, Saipan	419 (1,035)	Nightingale Reed-Warblers	2002	Dept. of Land and Nat'l Resources of CNMI
Hickory Pass Ranch Conservation Bank, TX	304 (750)	Golden-cheeked Warbler	2002	Hickory Pass, LP
Williamson County Karst Preserve, TX	81 (200)	bone cave harvestman spider, coffin cave mold beetle, tooth cave ground beetle	2002	Williamson County Karst Conservation Foundation

higher for banks owned by for profit groups, of which 35% reported breaking even or better, with an additional 25% owned by one organization cumulatively breaking even or better. In contrast, only 8% of financially driven nonprofit banks reported breaking even. The experience of the financially motivated banks that did not break even ranged from anticipating becoming profitable in 2004 to an inability to sell any credits because of a lack of buyers.

Although many bank owners reported credit-asking prices, few shared the actual transaction price. Of the 22 reporting banks, asking prices ranged from \$3000 for 0.4 ha (1 ac) of San Joaquin kit fox (*V. macrotis mutica*) habitat to \$125,000 for 0.4 ha with a breeding pair of Least Bell's Vireo (*Vireo bellii pusillus*).

Banking agreements offered financial incentives that competed with building golf courses and homes and provided a business argument for conserving land. For example, the 972-ha (2400-ac) Silverado Ranch is a privately owned bank originally purchased to subdivide and build residential homes. Because of healthy populations of the federally protected Stephen's kangaroo rat (*Dipodomys stephensi*); however, the owners had the option to establish a bank. Because banking had the potential to generate revenue, the landowners could justify this land management strategy rather than implementing mitigation measures to develop the site. Overall, 49% of banks with habitat covering 11,058 ha (27,313.5 ac) would most likely have been destroyed or seriously degraded by competing land uses if banking had not been an option (with presumably some of those impacts being mitigated).

Sociopolitical Details

Thirty-one people representing 21 conservation banks anonymously shared their sociopolitical experiences. Overall, the diversity of personal politics and local realities were the most important factors that determined experiences, and each bank owner told his or her unique story. A few common trends, however, emerged from the accounts.

The bureaucracy of establishing a banking agreement was the most common hurdle reported by bank owners and managers. Sixty-seven percent (14 of 21) stated specifically that they had technical and political challenges with state and federal agencies. Common problems included completing the same paperwork twice, agency staff turnover in the middle of agreement negotiations followed by a lack of adequate project hand-off, and difficulty bringing issues to upper management because of an absence of contacts at USFWS. The role of personal dynamics also influenced the process of establishing agreements. One bank owner's representative anonymously stated, "The process depends directly on the people involved. Both parties [USFWS and the bank owner] have the same objective, but they sit on opposite sides of the table. It's highly political."

Table 3. Threatened and endangered species protected in conservation banks in the United States.

Common name, scientific name	Federal status	Global status*
Alameda whipsnake, <i>Masticophis lateralis euryxanthus</i>	threatened	G4
Blunt-nosed leopard lizard, <i>Gambelia sila</i>	endangered	G1
Bone cave harvestman spider, <i>Texella reyesi</i>	endangered	G2
Burke's goldfields, <i>Lasthenia burkei</i>	endangered	G1
California red-legged frog, <i>Rana aurora draytonii</i>	threatened	G4
Coastal California Gnatcatcher, <i>Polioptila californica californica</i>	threatened	G3
Coffin cave mold beetle, <i>Batrissodes texanus</i>	endangered	G1
Giant garter snake, <i>Thamnophis gigas</i>	threatened	G2
Golden-cheeked Warbler, <i>Dendroica chrysoparia</i>	endangered	G2
Least Bell's Vireo, <i>Vireo bellii pusillus</i>	endangered	G5
Nightingale Reed-Warblers, <i>Acrocephalus luscini</i>	endangered	none
Pima pineapple cactus, <i>Coryphantha scheeri var. robustispina</i>	endangered	G4
Preble's meadow jumping mouse, <i>Zapus hudsonius preblei</i>	threatened	G5
Quino checkerspot, <i>Euphydryas editha quino</i>	endangered	G5
San Joaquin kit fox, <i>Vulpes macrotis mutica</i>	endangered	G4
Sebastopol meadowfoam, <i>Limnanthes vincularis</i>	endangered	G2
Stephen's kangaroo rat, <i>Dipodomys stephensi</i>	endangered	G2
Swainson's Hawk, <i>Buteo swainsoni</i>	none (state threatened)	G5
Tipton kangaroo rat, <i>Dipodomys nitratoides nitratoides</i>	endangered	G3
Tooth cave ground beetle, <i>Rhadine persephone</i>	endangered	G1
Vernal pool fairy shrimp, <i>Branchinecta lynchi</i>	threatened	G3
Vernal pool tadpole shrimp, <i>Lepidurus packardii</i>	endangered	G3

* Conservation status ranks are based on a one to five scale: G1, critically imperiled; G2, imperiled; G3, vulnerable to extirpation or extinction; G4, apparently secure; G5, demonstrably secure (NatureServe 2004).

Bureaucratic frustrations such as repetitious conversations, phone calls, and paperwork were individually minor but mounted to produce real consequences. The process to establish an agreement took an average of 2.18 years (ranging from 8 months to 6 years; median 2 years). The financial burden of land management and property

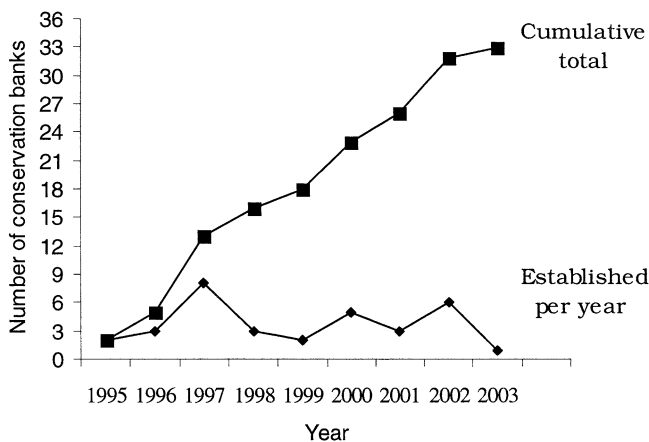


Figure 1. Rate of conservation bank establishment. A bank under the year 2000 started selling credits that year but is still waiting for the banking agreement to be signed. Two banks that have formal banking agreements drafted but are waiting for final signature and have not sold any credits are not included in the figure.

taxes during the interim between beginning negotiations with USFWS and actually signing an agreement was more than some bank owners were prepared to support. Especially in California, where frequently both the federal and state agencies sign agreements, the cost of legal consultants hired by prospective bank owners swelled as revisions and edits were passed back and forth between USFWS and the state Department of Fish and Game. Outside California other regional factors delayed the process, where the average time to generate a signed agreement was 2.6 years. These issues, compounded with the stress of engaging in a speculative investment, resulted in a common story that was summarized by one anonymous owner, "The longer the agreement process dragged on, the harder it was to own a piece of property that was financially dead [until I could sell credits]. Wondering if it was a good idea to tie myself up in such an investment kept me up at night."

The second most common issue was largely specific to California and arose after the agreement was signed. Bank owners reported a lack of agency support after the in-perpetuity conservation easement was placed on the bank property. Complaints included not helping to identify credit buyers, obstructing specific credit sales, and reducing previously approved service territories where credits could be sold.

Despite the bureaucratic challenges of establishing agreements and the hurdles to selling credits, nearly all bank owners expressed great pride and satisfaction when reflecting on the ecological contribution that their banks

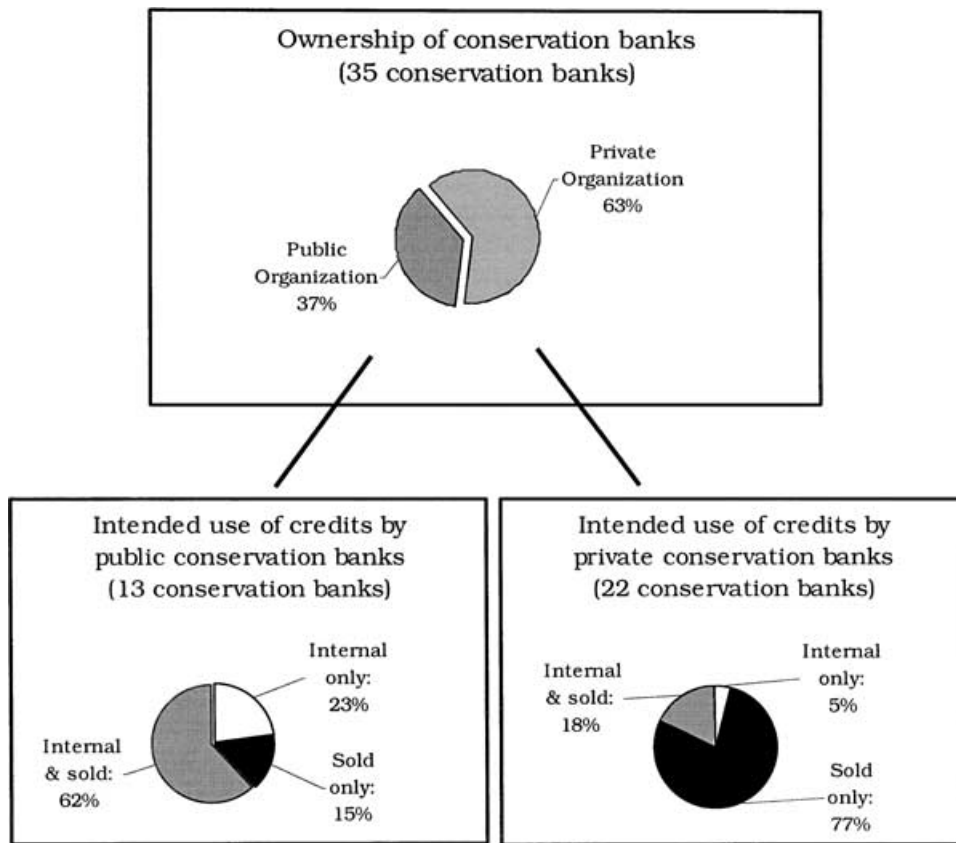


Figure 2. Conservation bank ownership type and intended use of credits. Percentages represent the number of banks in each category, not the percentage of total credits.

have made. Several bank owners expressed the intrinsic value of owning property that made a spiritual and ecological contribution to the larger landscape. This may be one of the reasons, combined with anticipated financial success, that 63% of bank owners reported they would set up another banking agreement given the appropriate opportunity. Wildlands Inc., a for-profit California business established to sell credits for wetland and species banks, already owns five conservation banks and is identifying more opportunities. Tech-Bilt, Inc., a residential housing developer in Southern California that uses their credits to mitigate internal projects, owns a 106.5-ha (263-ac) bank established in 1995 and a second bank of 49.8 ha (123 ac) established in 1997. Several other bank owners are already in the process of identifying new opportunities and establishing multiple banks.

Discussion

Possibly the most important factor governing the political and ecological potential of conservation banking is the enforcement of mitigation requirements for impacts to threatened and endangered species. This enforcement

generates the underlying demand for credits. When impacts to protected species are rigorously required, the need for mitigation rises. This leads to an increased demand for credits and the bank owners can commensurately raise prices based on conventional supply and demand factors. In California, where implementation of both federal and state biodiversity protection laws is strong, the potential pool of credit buyers is large and high credit prices attract the establishment of new banks. It is critical to recognize this link between the enforcement of regulatory controls and the potential of conservation banking; without serious and predictable mitigation requirements for impacts to rare species, demand for credits will be sporadic and the success of banking will be limited.

Although agencies have a role in generating credit demand, they do not oversee banking economics. The financial outcome is the bank owner's responsibility and depends on various elements, including the cost of establishment and the demand for credits. A competitive market dictates credit prices, but monopolies have developed in areas where only one bank offers a particular credit type. In contrast, competition is relatively active in California, where multiple banks offer the same credit type in overlapping mitigation areas (service territories).

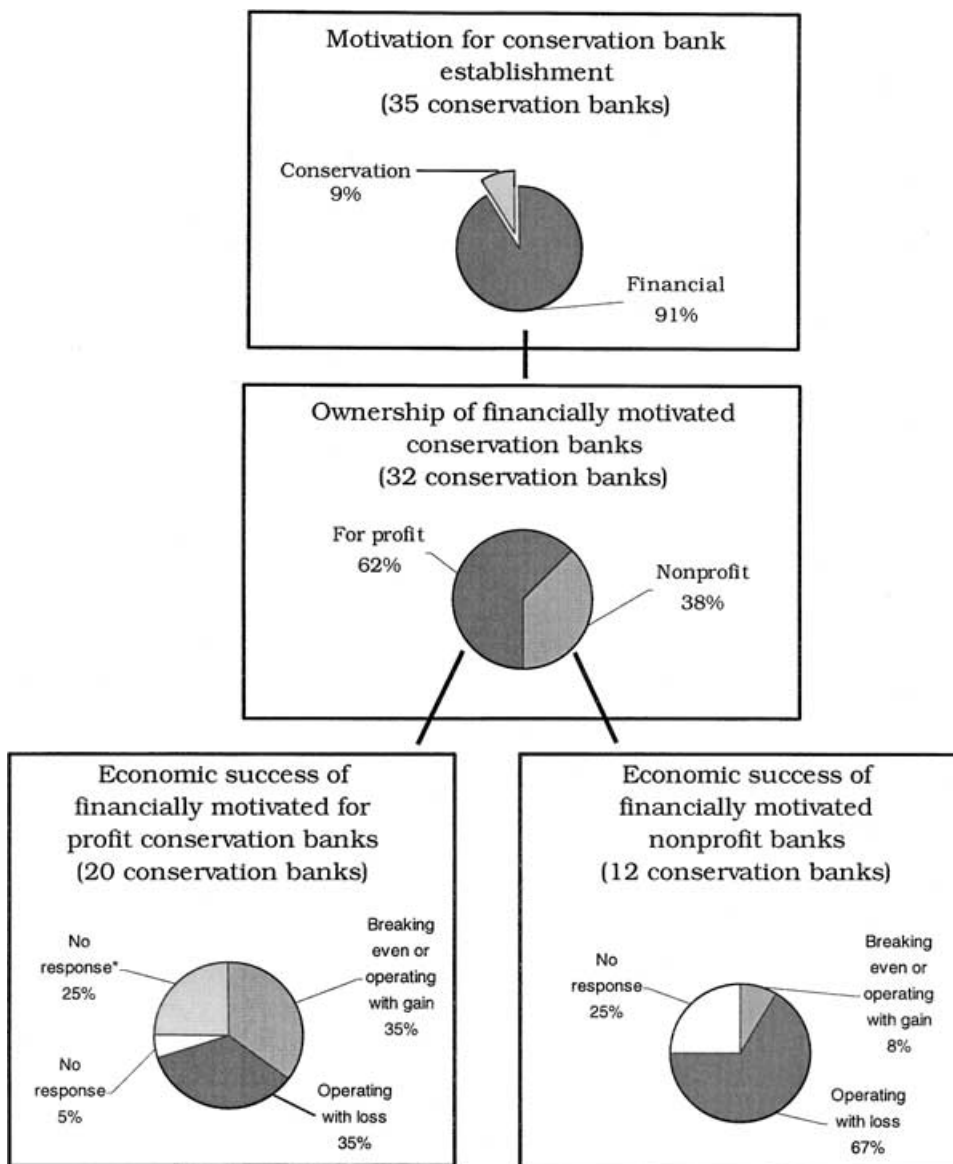


Figure 3. Financial success by ownership category. These five banks, owned by one bank owner, did not give individual financial status reports. However, they cumulatively broke even. Overall economic success for for-profit banks would have increased significantly if these had been included under the broke-even category.

Overall economic success is related to the investment necessary to obtain the property, the time required to establish the banking agreement, and the supply and demand of credits. Banks designed around credit demand, either based on internal needs or the marketplace, benefited the most financially. Factors that negatively affected the accounts of many banks stemmed from the lack of guidance from experienced parties regarding optimization of legal, biological, and economic elements. The majority of banks were established without experience in establishing legal agreements or working with endangered species, and many did not know whether to seek expert counsel. It is likely that as species banking grows, the characteristics of a well-designed and effectively managed bank will emerge and the frequency of meeting financial goals will increase. Although there is room for improving the economic outcome of banking, the fact that the

nascent practice is profitable in more than half the for-profit ventures is encouraging.

Clarifying the potential contribution of banking to the protection of rare species can frame the overall ecological expectations of the practice. Banks are intended to provide options for mitigating impacts to protected species. Substantial efforts beyond simply accounting for impacts will be required to achieve recovery. It is unlikely that banking, even under its most refined implementation, will by itself result in species recovery. Conservation banking has the potential, however, to provide a badly needed mitigation alternative that can ensure the maintenance of quality habitat and play a role in the eventual de-listing of species.

Bauer et al. (2004) recently described the terms of banking agreements and the specifics of the federal guidance. The banking agreement defines several elements that

ultimately determine the ecological outcome of the practice. These are conservation in perpetuity, multiuse purposes of the property, bank currency, property size, credit ratio, endowment fund (financial assurances), and ecological status of the habitat. Species credits sold under other legal agreement types do not necessarily have comparable requirements. For example, although a species credit has been sold under a safe harbor agreement, from a legal perspective this does not necessarily conserve the habitat to the same degree as a conservation banking agreement unless a conservation easement is layered on top of the safe harbor agreement.

Although pseudobanks are generally backed by in-perpetuity clauses, use of credits from these banks typically requires project-by-project approval, and easements are limited specifically to the habitat for credits sold in a particular transaction (a practice that is similar to conventional piecemeal mitigation except that the new easement is generally placed directly adjacent to the previous one). Thus, pseudobanks can provide the same ecological protection as official conservation banks only when enough credits are sold to result in a significant aggregation of individual easements. On the ground, the differences across agreement types may ultimately whittle down to semantics. Nevertheless it is important to recognize the generic reference to any mitigation site that is selling species credits as a conservation bank, whether or not it is legally established by a conservation-banking agreement.

The 35 banks legally established under a conservation banking agreement do not necessarily meet the ideal ecological profile outlined in federal and state guidance. According to the federal guidance (USFWS 2003), banks should be large enough "to ensure the maintenance of ecological integrity in perpetuity (p. 7)" and ideally be located adjacent to "an existing area managed for the conservation of that species (p. 5)." To evaluate sustainability, the ecological needs of the species for which the bank is established must be considered in conjunction with the overall size of the bank and proximity to preserves. Fewer than half of the banks were located adjacent to existing habitat. The smallest bank in our research, 10 ha, was not adjacent to another preserve and may seem too small to be sustainable. The needs of the species, the Preble's meadow jumping mouse (*Zapus hudsonius preblei*), however, may be satisfied on this small parcel.

Although wetland banks differentiate credits based on whether the habitat was preserved, restored, or created, it is yet to be determined whether conservation banks will consistently include this type of distinction in their banking agreements. Neither the federal guidance nor California's policy expresses an inclination for preserved, restored, enhanced, or created habitat. Despite this, 94% of banks are preserved, and the argument that has plagued wetland banking questioning the ecological value of created habitat has not yet been applied to conservation

banking. Another ecological problem may arise, however: unless habitat maintenance requires the active management committed to under a conservation banking agreement (e.g., controlled burning, grazing, invasive weed control), mitigating impacts to species using preserved habitat could result in a net loss of suitable acres on the landscape for a particular species. This concern can be buffered if the area preserved is of higher quality than the area that was lost.

The credit ratio reflects the rate that credits will be exchanged for impacts occurring outside the bank. Two credit ratios are important to banking: the ratio assigned to the bank property and the ratio assigned to the mitigation seeker. The merging of these ratios determines whether the impacts are ecologically equal to the mitigation. The ratio assigned to the bank property reflects the ecological value of the bank's habitat. Banks with pristine habitat are awarded more credits than those that are degraded. The credit ratio and resulting number of awarded credits are subject to a relatively high degree of judgment on the part of the agencies. The resulting flexibility this judgment affords has been used to offer incentives in the form of high credit ratios to commit particular tracts of land to conservation banking.

A balance needs to be reached between the motivation of the bank owner to maximize the inventory of natural resources and the inclination of the mitigation seeker to minimize the assessment of impacts. Several people in our survey reported that biological surveys completed to support a banking agreement recognized more ecological value than previous environmental impact surveys conducted for the purposes of mitigating development. Impact assessments may underestimate ecological consequences, thereby reducing mitigation requirements, whereas a prospective conservation bank may inflate ecological values to optimize numbers of credits awarded. Ultimately, when the mitigation seeker is matched to a credit seller, there is likely to be a net loss of ecological value. Accurately assigned credit ratios, both those of the bank and those of the mitigation seeker, can help align ecological values. It is critical that USFWS ensure that both mitigation requirements and species credits accurately reflect natural resource values.

Conducting a comprehensive investigation into the success or failure of banking from the perspective of the endangered species will require reviewing individual credit transactions, assessing the project impacts for which the credits were applied, and asking whether the purchasing of species credits from a conservation bank resulted in a superior ecological outcome relative to other mitigation options. Until such a study is completed, the ecological role of conservation banking will remain uncertain. Although our results will raise concern, including the possible net loss of habitat because of high credit ratios and the use of preserved habitat, we could not make a reliable conclusion regarding the ecological success or

failure of banking. It is possible that even with these factors taken into account, the benefit of consolidating habitat onto larger preserves and ensuring the appropriate management of those preserves in perpetuity will more effectively support species compared to conventional mitigation that results in pockets of habitat which are hard to manage, have little oversight, and are too small to support breeding populations.

Reflected by the number of bank owners that have already broken even financially and those that would establish another bank given the opportunity, it appears that conservation banking is offering incentives to protect species on private lands. Even in the face of competing land-management alternatives and investment options, nearly 16,000 ha have been protected under official conservation banking agreements. Increasing the transparency of banking through information sharing, decreasing the time to establish agreements, and reducing the bureaucracy involved in signing an agreement can further increase the amount of private property voluntarily committed to banking. By simultaneously addressing underlying ecological elements, the practice can also be improved from the perspective of the endangered species. More specifically, we offer the following suggestions: create a clearinghouse for information, identify a primary contact at the federal level, reduce transaction costs, and reduce regulatory uncertainty.

A centralized national database that lists all existing banks could assist prospective bank owners by providing current market information and help existing banks by matching up credit buyers and sellers. Such a clearinghouse could also be used to conduct basic research regarding species credit trading activities and to track the growth of the practice. The information sharing facilitated by a central clearinghouse would also be useful to USFWS staff, who are generally unfamiliar with species banking activities outside the jurisdiction of their particular field office. Consolidating information and generating a contact list of USFWS staff involved in the practice could provide a forum for improving the practice. Our results can be used as the basis for the initial database.

The bank owners' complaints regarding changes to previously approved service territories and difficulty getting agreements signed confirm previous findings (Bean & Dwyer 2000). Although a few reports indicate a degree of negligence on the part of agency staff, some of the experiences most likely stemmed from miscommunication and lack of experience on the part of both the bank owners and the agencies. Many of the bank owners said they did not have someone to contact when problems arose at the local field office. Although currently two contacts at the federal level of USFWS oversee conservation banking activities, many bank owners were not aware they existed. Assigning a primary contact at USFWS who is responsible for tracking the status of banking, resolving conflicts at

field offices, and ensuring the overall integrity of conservation banking is maintained across regional objectives and personal politics would be useful. In addition, establishing a transparent conflict resolution process would prevent scattered complaints and expedite problem solving.

Although agency staff have used the flexibility of banking agreements to increase incentives to prospective bank owners, including offering to find credit buyers and favorably adjusting credit ratios, a more direct approach of reducing transaction costs by providing financial assistance and limiting the agreement processing time may generate a more robust incentive structure. For example, if USFWS targeted completing agreements in 12 months or less, bank owners could make more-informed choices about their plans for purchasing property, timing credit sales, and identifying buyers. An application fee might provide the resources necessary to finalize banking agreements more quickly. This fee could fund additional resources dedicated to expediting the application process. Permit processing fees are common nationwide and might be readily accepted if they expedited access to credits and thereby reduced overall transaction costs. Offering federal grants to reduce the burden of land acquisition fees, biological surveys, and consultant fees would further encourage private landowners to participate in conservation banking.

An important regulatory uncertainty limiting the growth of banking is the fear that investigating opportunities will reveal previously unrecognized endangered species and, in the event that a bank is not established, result in increased enforcement of the ESA. For this reason, efforts by corporations that own large tracts of land to actively investigate banking opportunities are curtailed. A public statement from USFWS that addresses this concern could provide the reassurance necessary to conduct initial studies that would lead to bank establishment. Lastly, as discussed above, the vigorous and committed enforcement of biodiversity mitigation requirements will be critical to the success of banking.

Over the last decade, a growing number of conservation biologists and practitioners have arrived at the realization that past conservation efforts have been inadequate on both scientific and social fronts. Although over 1200 species have been listed as either threatened or endangered during the 30-year lifespan of the ESA, only 16 have been recovered (USFWS 2004). Given this limited success, it is critical to promote the protection and recovery of endangered species by implementing politically feasible options that are compatible with economic and developmental goals. Our results provide the first point of reference to assess the potential of conservation banking as one of these options.

Banking is an incredibly flexible tool, as demonstrated by the wide variety of situations in which it is applied, and

it has already brought disparate parties together, including ranchers, biologists, consultants, county planners and timber companies. These collaborative partnerships transcend the antagonistic relationships usually associated with conservation and development. Even with competing land management options, individuals and business are opting to establish banks and protect species. The initial profitability associated with endangered species protection provides a welcome respite from the arguments that have historically polarized conservation and economic growth. Opportunities to further improve the practice are definable and can be realistically addressed. Although the success of banking from the perspective of the endangered species needs further investigation, politically the practice seems to be enabling a future where species protection and economic success are no longer mutually exclusive.

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