

Methods Appendix

World Figures

Active Programs

North America	14
Central and South America	5
Africa	0
Europe	4
Asia	4
Australia/New Zealand	12
Total ACTIVE Programs	39

Programs in Development

North America	5
Central and South America	2
Africa	6
Europe	3
Asia	4
Australia/New Zealand	5
Total Programs IN DEVELOPMENT	25

Regional Payments

North America	\$1.4-\$2.5 billion
Central and South America	\$2.65 million
Africa	Unknown
Europe	Unknown
Asia	>\$390 million
Australia/New Zealand	\$1.3 million
Total known REGIONAL PAYMENTS per annum	US\$1.8 - \$2.9 billion

Area protected or restored

North America	> 50,000 ha
Central and South America	Unknown
Africa	Unknown
Europe	> 2,600 ha
Asia	> 26,000 ha
Australia/New Zealand	> 7,500 ha
Total known AREA PROTECTED or restored per annum	> 86,000 hectares

Active and sold out banks

North America	632
Central and South America	Unknown
Africa	Unknown
Europe	1
Asia	2

Australia/New Zealand	3
Total known ACTIVE and SOLD OUT BANKS	638

North America

Number of ACTIVE programs: 14

United States of America (US):

1. Compensatory wetland mitigation
2. Conservation banking
3. Recovery credit system
4. Bureau of Land Management Mitigation Policy
5. MD's forest offset law
6. NC's Buffer Mitigation Program
7. Acres for America

Canada:

8. National fish habitat ('HADD') compensation
9. Wetland compensation agreement between Manitoba's Infrastructure and Transportation agency and Manitoba Habitat Heritage Corporation

Provincial wetland compensation programs in:*

10. Alberta
11. New Brunswick
12. Prince Edward Island
13. Nova Scotia

Mexico:

14. Program for Environmental Restoration and Compensation

**Note: These programs reflect policies that incorporate some form of mitigation hierarchy and compensation guidelines, but more Canada has additional policies covering wetland compensation. See Rubec and Hanson 2008¹ for a comprehensive review.*

Number of programs IN DEVELOPMENT: 5

US:

1. Habitat credit trading system
2. Willamette Partnership's Ecosystem Marketplace
3. Bay Bank

Canada:

4. British Columbia's wetland mitigation and compensation strategy in development

Mexico:

5. Instituto Nacional de Ecología (INE) biodiversity banking initiative for SEMARNAT

Total known REGIONAL PAYMENTS per annum: US\$1.5 - \$2.5 billion

US: \$1.5 - \$2.4 billion (see methods below in US section)

Canada: > CAN\$7 - \$150 million or ~US\$6.8 - \$146.6 million (see methods below in Canada section)

Mexico: unknown

Total known AREA PROTECTED or restored per annum: > 50,000 hectares

US: 52,456 ha

- Compensatory mitigation (annually): 24,178 acres (9,784 ha)
- Conservation banking (2008): 2,444 acres (989 ha)
- Acres for America (annually): 103,000 acres (41,683 ha) (see methods below in US section)

Canada: >180 hectares annually (see methods below in Canada section)

Mexico: unknown

Total known ACTIVE and SOLD OUT BANKS: 632

US: 615 (see methods below in US section)

Canada: 17 (see methods below in Canada section)

Mexico: No known banks

United States of America

Number of ACTIVE programs: 7

1. Compensatory wetland mitigation
2. Conservation banking
3. Recovery credit system
4. Bureau of Land Management Mitigation Policy
5. Maryland's forest offset law
6. North Carolina's Buffer Mitigation Program
7. Acres for America

Number of programs IN DEVELOPMENT: 3

1. Habitat credit trading system
2. Willamette Partnership's Ecosystem Marketplace
3. Bay Bank

Total known REGIONAL PAYMENTS per annum: US\$1.5 - \$2.4 billion

- Wetland: \$1.1 - \$1.8 billion*
- Stream: \$240 - \$430 million*
- Conservation Banking: \$200 million*
- Acres for America: \$3.5 million. The program is expected to spend a total of \$35 million over its lifetime (from 2005-2015), or \$3.5 million per year.

**Note: see below for separate methods for wetland, stream, and conservation banking figures*

Known CREDIT TYPES: 168

- Species credit types: 92
- Habitat credit types under the conservation banking program: 51 (see details below)
- Wetland and stream types under compensatory mitigation program: 25

Total known AREA PROTECTED or restored: >700,000 cumulative acres (or 24,178 annually)

- Compensatory mitigation: 240,000 acres* cumulative or 24,178 acres annually (in active and sold-out wetland banks)

State of Biodiversity Markets Report Compendium: Methods Appendix

- Conservation Banking: 65,078 acres* cumulative or 2,444 acres in 2008 (in active and sold-out conservation banks)
- Acres for America: 412,000 acres cumulative or 103,000 acres annually. The program had conserved a total of 412,000 acres in the US from 2005 through 2008.²
- Species Recovery Credits: 1,400 acres. This is a published figure for the acreage conserved in the Fort Hood pilot project as of 2007.³

**Note: see below for separate methods for wetland and conservation banking figures*

Total known ACTIVE and SOLD OUT BANKS: 615

- Wetland and stream: 519
 - Active: 431
 - Inactive: 36
 - Pending: 182
 - Sold out: 88
 - Unknown: 60
- Conservation Banking: 96
 - Active: 77
 - Inactive: 4
 - Pending: 20
 - Sold Out: 19
 - Unknown: 3

General Data Collection Methods for US Wetland Mitigation

Three types of data were collected for this section of the report:

1. National-level data on area and type of wetland and stream mitigation,
2. Data on mitigation banking, and
3. Credit price data.

National- and District-level information on area of mitigation, losses of wetlands, and categories of suppliers of offsets and categories of types of offset creation were obtained from the US ACE headquarters ORM database via a Freedom of Information Act request.⁴

Information collected on mitigation banking builds upon the research of the Environmental Law Institute and their comprehensive report on US compensatory mitigation from 2005.⁵ Ecosystem Marketplace spent over 250 hours from October 2008-July 2009 searching and requesting information on mitigation banking to update ELI's 2005 study. The information in this report represents the most up-to-date, publically available information gathered from:

- regional and national US ACE 'RIBITS' mitigation banking websites,⁶
- fifteen US ACE District websites,⁷
- eight state agency wetland mitigation banking websites,⁸
- public articles,
- wetland mitigation bank websites,
- and over thirty formal and informal information requests to US ACE headquarters and District offices.

Despite our efforts, about 40% of the information we have on banks is based on information dated to 2005.⁹ The US ACE is developing a centralized national bank information site (RIBITS) that may be complete as soon as the spring of 2010. Until then, we present our admittedly flawed information on

mitigation banking as the best available, and note that data from 2005-2009 is incomplete. Any new or corrected bank information for inclusion in follow-up reports should be directed to: info@ecosystemmarketplace.com. All aggregate bank information presented in this section represents active and sold out banks unless otherwise noted.

Price information for wetland and stream compensatory mitigation is based on our dataset of 140 price points or ranges, including 33 prices provided anonymously by mitigation bankers. All data are from 2005-2009.

US wetland and stream mitigation

Total known WETLAND and STREAM PAYMENTS per annum: US\$1.3 - \$2.2 billion (for the year 2008)

As noted in the report, a credit can represent anything from an acre to multiple acres to a functional unit. Therefore, we acknowledge that aggregating prices of varying units with acreage data of area of compensatory mitigation is not an ideal method for calculating the total dollar volume of the compensatory mitigation market. Nevertheless, we have estimated the total yearly dollar volume to be \$1.3 - \$2.2 billion. This figure adds the total wetland payment and total stream payment – see below.

Wetland: US\$1.1 - \$1.8 billion

We tried two methods for estimating the total volume of compensatory wetland mitigation, and reported the range that we found from the two methods:

- 1) First, we multiplied the national average non-tidal/vernal pool wetland credit price (see method for getting average price below), \$74,535, by the acres of compensatory mitigation required in 2008,¹⁰ 24,178 acres = \$1,802,107,230.
- 2) Next, we assumed that the mitigation bank credit price would be higher than the cost of mitigation from ILFs or from permittee-responsible mitigation. Therefore, we used the following formula:

$$\begin{aligned} & [(\text{acres of compensatory mitigation required in 2008: } 24,178) * (\text{the amount of} \\ & \text{mitigation coming from mitigation banks: } 35.3\%) * \text{average credit price: } \$74,535] \\ & + \\ & [(\text{acres of compensatory mitigation required in 2008: } 24,178) * (\text{the amount of} \\ & \text{mitigation coming from ILFs and permittee-responsible: } 64.7\%) * \text{average credit creation} \\ & \text{price as reported by Noon \& Ward, 2007}^{11}: \$30,000] \\ & = \$1,105,438,832 \end{aligned}$$

Stream: US\$240 - \$430 million

We tried two methods for estimating the total volume of compensatory wetland mitigation, and reported the range that we found from the two methods:

- 1) First, we multiplied the national average stream credit price (see method for getting average price below), \$260.27, by the linear feet of compensatory mitigation required in 2008,¹² 1,647,360 linear feet (312 miles reported by US ACE * 5,280 linear feet/mile) = \$428,758,387.
- 2) Next, we assumed that the mitigation bank credit price would be higher than the cost of mitigation from ILFs or from permittee-responsible mitigation. Therefore, we used the following formula:

$$\begin{aligned} & [(\text{linear feet of compensatory mitigation required in 2008: } 1,647,360) * (\text{the amount of} \\ & \text{mitigation coming from mitigation banks: } 11.2\%) * \text{average credit price: } \$260.27] \\ & + \end{aligned}$$

[(linear feet of compensatory mitigation required in 2008: 1,647,360) * (the amount of mitigation coming from ILFs and permittee-responsible: 88.8%) * (1/2 * average credit price: \$130.14)]
= \$238,388,099

Known CREDIT TYPES: 25

We found 25 different credit types during research:

- | | |
|-----------------------------------|------------------------------|
| 1. Wetland | 14. Tidal/intermediate marsh |
| 2. Stream | 15. Wet coastal prairie |
| 3. Tidal wetland | 16. Riparian willow scrub |
| 4. Palustrine forested wetland | 17. Riverine aquatic bed |
| 5. Emergent wetland | 18. Shaded riverine aquatic |
| 6. Upland wetland | 19. Freshwater forested |
| 7. Mixed palustrine wetland | 20. Freshwater herbaceous |
| 8. Palustrine scrub shrub wetland | 21. Low marsh |
| 9. Emergent high marsh wetland | 22. High marsh |
| 10. Aquatic bed | 23. Riverine intermittent |
| 11. Non-tidal fresh marsh | 24. Riparian buffer |
| 12. Bottomland hardwoods | 25. Eelgrass |
| 13. Cypress/tupelo | |

AREA PROTECTED or restored: 240,000 cumulative acres (or 24,178 acres in 2008)

We tried two methods for estimating the land area protected, and reported the lower of the two figures as a rough estimate:

- 1) First, we first took the US ACE figure of 24,178 acres mitigated in 2008¹³ and multiplied it by 10 years* = 240,000 acres
**Note: although the first wetland mitigation bank was established in 1980, it has been most active in the last decade.*
- 2) Next, we used information collected from our research on wetland mitigation banks. We collected information on the size of mitigation banks for about 40% (n=315) of the banks in our database. If the total acreage (of 315 banks) is 208,752 acres, then, using the average size of the banks for which we have acreage (662.7 acres) and multiplying the average bank size by the missing banks (n=482) and adding it to the 208,752 acres for which we can account, the total acreage protected could be as high as 528,175 acres.

Total known ACTIVE and SOLD OUT BANKS: 519

- o Active: 431
- o Inactive: 36
- o Pending: 182
- o Sold out: 88
- o Unknown: 60

This is the total number of banks that we found in our research.¹⁴

Wetland credit pricing

National Range: \$3,000 - \$653,000

Average: \$74,535 (Note: if include tidal or vernal pool credit prices, the average would be: \$112,449)

For wetlands, credit prices are based on our dataset of 107 price points or price ranges, including 27 price points or price ranges provided anonymously by wetland mitigation bankers. All prices are

mitigation bank asking prices, mitigation bank sales prices, or in-lieu-fee prices that were verified as being close to market prices by mitigation bankers. All price points or price ranges are from 2005-2009. Tidal wetland credits and vernal pool wetland credits are generally much higher than regular wetland credit prices, so we provided an average credit price both with and without consideration of these credit types.

Stream credit pricing

National Range: \$15 - \$700

Average: \$260

For streams, our national average price, and national average low and high end prices are based on our dataset of 33 price points or price ranges, including 6 price points or price ranges provided anonymously by wetland mitigation bankers. All but three prices are either mitigation bank asking prices, mitigation bank sales prices, or in-lieu-fee prices that were verified as being close to market prices by mitigation bankers. Three cost points were also included. All price points or price ranges are from 2005-2009.

Breakdown of Mitigation Supplied by Mitigation Banks, ILFs, or Permittee-Responsible Mitigation by US ACE District



Graphic courtesy of Resource Environmental Solutions, LLC and the National Mitigation Banking Association¹⁵

General Data Collection Methods for US Conservation Banking

Information on conservation banking is based on Ecosystem Marketplace’s www.SpeciesBanking.com project, with a concerted push from January-July 2009 to update information via online research, information collected from several agency websites, and informal requests to US Fish and Wildlife and California Department

of Fish and Game offices.¹⁶ Our dataset only includes conservation banks that, to our knowledge, include permanent protection. We believe our data posted on SpeciesBanking.com is the most up-to-date national list of conservation banks, but acknowledge that there may be banks that we have missed – if that is the case, please contact us to help us improve our information in follow-up reports: info@ecosystemmarketplace.com.

Information at the national level on total area of conservation banks or total area of offsets under the Endangered Species Act is not available from the US FWS. However, this information is expected to be available from the US FWS by the end of 2010.

Price information for conservation banking is based on our dataset of 51 price points or ranges, including 35 prices provided anonymously by mitigation bankers. All data are from 2005-2009.

US conservation banking

Total PAYMENTS for conservation banking per annum: US\$200 million

A credit from a conservation bank can represent anything from acreage-based habitat to an individual species. Most of the conservation banks in our database and most of the credit prices we collected, however, were related to acres of habitat.

In our database of conservation banks, we had figures for credits sold for 48 banks. For the remaining 34 banks, we found an average ratio of acres to credits for non-vernal pool banks (1.78:1) and applied this ratio to estimate credits awarded (the four vernal pool banks in our database all had credits awarded figures). We made an assumption that a bank would sell out of credits in seven years, therefore the annual credits sold would be the total credits awarded divided by seven. The ‘annual credit sales figure’ was then multiplied by the average credit price of \$31,683, and the four vernal pool banks’ annual credit sales were multiplied by the vernal pool credit average of \$67,500. Summing up all these annual sales = \$200,116,582.

**Note: We only considered active and sold out banks in these calculations. We excluded from consideration four banks which did not have a close relationship between bank size (acreage) and number of credits, either because the banks were dual species and wetland banks, the credits were unit-based, and in one instance, because we believe there was an error in the credits awarded figure.*

***Note: although the first conservation mitigation bank was established in 1991, it has been most active in the last decade.*

Known CREDIT TYPES: 143

We found 92 different species credit types and 51 different habitat credit types on SpeciesBanking.com.

<u>Species</u>		<u>Habitat</u>
Alameda whipsnake	Palmate-bracted bird's beak	alkali playa pool
Baker's stickyseed	Pima pineapple cactus	Annual grassland
Bakersfield cactus	Preble's meadow jumping mouse	bunchgrass grassland
Bakersfield Saltbush	Quino Checkerspot	chamise chaparral
Ben Lomond's buckwheat	Red-cockaded woodpecker	chaparral
Ben Lomond's spineflower	Rufous-crowned sparrow	Cliff/Rock outcrop
Black-capped vireo	Rush-like Bristleweed	coastal sage scrub
Blunt-nosed leopard lizard	Sacramento Orcutt grass	Diegan coastal sage scrub
Bogg's Lake hedge hyssop	Sacramento splittail	emergent marsh
Bone cave harvestman spider	San Bernadino kangaroo rat	freshwater marsh
Bonny Doon manzanita	San Diego thorn-mint	freshwater seep

State of Biodiversity Markets Report Compendium: Methods Appendix

Brittlescale	San Joaquin kit fox	grassland
Burke's goldfield	San Joaquin orcutt grass	Great Valley Cottonwood riparian
Butte County meadowfoam	Sand Skink	inland sage scrub
California black rail	Sanford's arrowhead	live oak woodland
California red-legged frog	Santa Ana River woolly star	mafic coastal sage scrub
California tiger salamander	Santa Cruz monkeyflower	mafic northern mixed chaparral
Carolina heelsplitter	Santa Cruz wallflower	maritime succulent scrub
Cheat Mountain salamander	Sebastopol meadowfoam	marsh/riparian scrub
Chinook salmon	Slender Orcutt grass	mix chaparral
Coastal California Gnatcatcher	Slender-horned spineflower	mudflat
Coffin cave mold beetle	Sonoma sunshine	native grassland
Conservancy fairy shrimp	Steelhead	non-native grassland
Contra Costa goldfields	Stephens' kangaroo rat	northern mixed chaparral
Curly-leaved monardella	Succulent owl's clover	oak riparian woodland
Delhi Sands Flower-loving Fly	Suisun aster	oak savannah
Delta green ground beetle	Suisun song sparrow	oak woodland
Delta smelt	Swainson's hawk	perennial wetland
Delta tule pea	Tipton kangaroo rat	riparian
Dwarf downingia	Tooth cave ground beetle	riparian oak woodland
Eastwood's Manzanita	Tricolored blackbird	riparian scrub
Florida panther	Utah Prairie dog	riparian woodland/scrub
Florida scrub jay	Valley elderberry longhorn beetle	Riversidian alluvial fan sage scrub
Gaviota tarplant	Vernal pool fairy shrimp	Riversidian sage scrub
Giant garter snake	Vernal pool tadpole shrimp	Riversidian sage scrub
Giant kangaroo rat	West Virginia northern flying squirrel	San Joaquin Valley Saltbrush scrub
Golden eagle	Western burrowing owl	sancaton grassland
Golden-cheeked warbler	Western pond turtle	seasonal ponds
Gopher tortoise	Western spadefoot toad	seasonal wetland
Greene's Tuctoria	Yellow-breasted chat	serpentine habitat
Heartscale	Zayante Band-winged grasshopper	shaded riverine
Least Bell's vireo		sloughs
Legenere		southern coast live oak woodland
Longfin smelt		southern maritime chaparral
Mason's lilaeopsis		southern mixed chaparral
Mount Hermon June Beetle		southern willow scrub
Nightingale reed-warbler		upland
Northwestern pond turtle		valley saltbrush scrub
Orange throated whiptail		valley sink scrub
Oregon Chub		vernal playas
Otay tarplant		vernal pool

AREA PROTECTED or restored in ACTIVE and SOLD OUT conservation banks: 65,078 cumulative acres (26,336 hectares) (or 2,444 acres, 989 hectares, in 2008)

This is the total area of land protected in active and sold-out conservation banks in the SpeciesBanking.com database. For information, there is additional acreage in inactive banks (1,636 acres); pending banks (23,906 acres), and banks with unknown status (10,538 acres). Four banks did not have acreage data.

The total area of land protected in active and sold-out conservation banks in the SpeciesBanking.com database for the year 2008 was 2,444 acres (989 ha).

Total known ACTIVE and SOLD OUT BANKS: 96

- Active: 77
- Inactive: 4
- Pending: 20
- Sold Out: 19
- Unknown: 3

This is the total number of banks that we found in banks in the SpeciesBanking.com database.

Conservation banking credit pricing

National Range: \$2,500 - \$300,000

Average: \$31,683

**Note: if include vernal pool and unit-based credit prices, the average would be: \$33,027*

Price information for conservation banking is based on our dataset of 51 price points or ranges, including 35 prices provided anonymously by mitigation bankers. All of the prices are mitigation bank asking prices or mitigation bank sales prices. All data are from 2005-2009. Six unit-based credit price points (for gopher tortoise relocation (2 price points), least vireo breeding pair, bone cave harvestman and coffin cave mold beetle in the 'irrevocable impact zone', and valley elderberry longhorn beetle VELB units), and two vernal pool price points were not used in determining the average credit price.

Canada

Number of ACTIVE programs: 6

1. National fish habitat ('HADD') compensation
2. Wetland compensation agreement between Manitoba's Infrastructure and Transportation agency and Manitoba Habitat Heritage Corporation

Provincial wetland compensation programs in:*

3. Alberta
4. New Brunswick
5. Prince Edward Island
6. Nova Scotia

**Note: the programs above reflect policies that incorporate some form of mitigation hierarchy and compensation guidelines, but Canada has additional policies covering wetland compensation. See Rubec and Hanson (2008) for a comprehensive review.*

Number of programs IN DEVELOPMENT: 1

1. British Columbia's wetland mitigation and compensation strategy in development

Total known REGIONAL INVESTMENT per annum: > CAN\$7 - \$150 million

This figure represents investments in fish habitat compensation, the only program for which we found information on payments.

We tried three methods for estimating the total volume of investment in fish habitat compensation, and reported the range that we found from the three methods:

1. Number of authorizations issued in 2007-2008: 208¹⁷ *(percent of authorizations which included compensatory habitat plan: 75%¹⁸)* (average cost of compensation project: \$34,707¹⁹)
= \$7,288,470

2. Annual land area (in meters squared) protected or restored (see method below): 1,835,757m²
*(range of per unit compensation costs: \$10-\$15/m²ⁱ)
= \$18,357,570 - \$27,536,355
3. Annual land area (in meters squared) protected or restored (see method below): 1,835,757m²
*(mean of \$85/m² for construction costs²⁰)
= \$156,039,345

Known CREDIT TYPES: 5

While there may be a number of other ecosystem types, we only found specific mention of four ecosystem types in our research:²¹

1. Salt marsh
2. Tidal river
3. Intertidal
4. Subtidal habitat
5. We are also counting 'wetlands' as a broad category of ecosystem type covered by Canadian wetland compensation programs.

Total known AREA PROTECTED or restored per annum: >180 hectares

This figure represents the area of land conserved from fish habitat compensation, the only program for which we found information that allowed us to estimate area of land conserved.

Mean compensation area per authorization: 8741.7m² or 0.87417 hectares²² * (number of authorizations issued in 2007-2008 from a DFO Habitat Annual Report: 280²³) * (percent of authorizations which included compensatory habitat plan: 75%²⁴)
= 183.5757 hectares (or 1,835,757 m²)

Total known ACTIVE and SOLD OUT BANKS: 17^{25,26,27,28,ii}

1. 10 habitat banks created by Nova Scotia's Department of Transportation and Public Works
2. Graise River habitat bank and the Ouareau River habitat bank (Quebec)
3. Pipestone Creek Habitat Bank (Manitoba)
4. Yarrow Creek habitat bank (Alberta)
5. North Fraser Harbour habitat bank (British Columbia)
6. Burnaby habitat bank (British Columbia)
7. Timberland Basin habitat bank (British Columbia)

Mexico

Number of ACTIVE programs: 1

1. Program for Environmental Restoration and Compensation

Number of programs IN DEVELOPMENT: 1

1. INE biodiversity banking initiative for SEMARNAT

ⁱ Pett, personal communication, 2009.

ⁱⁱ Koster, personal communication, 2009.

Central and South America

Number of ACTIVE programs: 5

1. Forest offsets (Brazil)
2. Developer's offsets (Brazil)
3. National environmental legislation (Colombia)
4. Compensation for requirements under the Paraguay Constitution (Paraguay)
5. Compensation for requirements under the Forestry Law (Paraguay)

Number of programs IN DEVELOPMENT: 2

1. Environmental Framework Law (Argentina)
2. Colombian Ministry of Environment offset siting policy (with TNC, WWF, CI)

Total known REGIONAL PAYMENTS per annum: > US\$2.65 million

Brazil's 'developer's offsets': \$21.2 million cumulative payments*, \$2.65 million per annum

**Note: The Chico Mendes Institute for Biodiversity Conservation reported that from 2000 to 2008, the amount in the Compensation Fund equaled approximately R\$500 million (US\$214 million). However, only R\$49.5 million (US\$21.2 million) of the Fund has been executed.*

Africa

Number of ACTIVE programs: 0

Number of programs IN DEVELOPMENT: 6

1. National offsets policy framework (South Africa)
2. Western Cape provinces' draft guidelines (South Africa)
3. KwaZulu-Natal province draft guidelines (South Africa)
4. SANBI pilot wetland mitigation banking program (South Africa)
5. UWA biodiversity offset policy (Uganda)
6. PAE biodiversity offset policy (Madagascar)

Europe

Number of ACTIVE programs: 4

1. Germany's Impact Mitigation Regulations (Eingriffsregelung)
2. European Union's Habitats and Birds Directives*
3. European Union's Environmental Liability Directive*
4. Sweden's environmental offsets**

**Note: we acknowledge that these may be better defined as law rather than programs, but we decided to count them because we feel that these two laws stimulate offsets or compensation within member countries.*

***Note: offsets are infrequently mandatory.*

Number of programs IN DEVELOPMENT: 3

1. UK biodiversity offsets
2. French biodiversity banking
3. EU habitat banking*

**Note: 'development' is restricted to research on feasibility as of this writing*

Land AREA PROTECTED or restored per annum: >2,600 hectares

This figure only represents the hectares in compensation pools in Bavaria, under Germany's impact mitigation regulation. This is the data on the area of land conserved that we found in Europe. Compensation sites in Bavaria (including currently operating sites and those that have sold their credits) total about 19,880 hectares, cumulative, or about 2,600 hectares per year.

Total known ACTIVE and SOLD OUT BANKS: 1

We are only aware of one biodiversity bank in Europe, CDC Biodiversité's pilot habitat bank in the south of France.

Asia

Number of ACTIVE programs: 4

1. China's forest vegetation restoration fee
2. Saipan's Upland Mitigation Bank
3. Malua BioBank
4. Municipal compensatory mitigation ordinance in the Japanese city of Shiki

Number of programs IN DEVELOPMENT: 4

1. Multiple developments regarding biodiversity offsets in Indonesia
2. Vietnam's biodiversity law that covers Compensation for Damage to Biodiversity
3. Mongolia's work with TNC on prioritizing areas suitable for offsets
4. Roundtable for Sustainable Palm Oil's research on using biodiversity offsets in conjunction with certification

Total known REGIONAL PAYMENTS per annum: > US\$390 million

This figure represents fees collected in China's forest vegetation restoration fee, the only program for which we found information on payments. The program reported collecting total of RMB 8.044 billion from 2003-2005, or around RMB 2.7 billion annually (about US\$393 million).²⁹ We used the following currency calculator: <http://www.xe.com/ucc/>

Total known AREA PROTECTED or restored per annum: >26,000 hectares

China's forest revegetation fee: 26, 813 ha

Estimate of area conserved from China's forest revegetation fee: to estimate conservatively, we divided the total annual payments of RMB 2.7bill by the highest category of payment with the fee structure (10RMB/m²).³⁰ $RMB2.7bill/10m^2 = 268,133,333 m^2 = 26,813 \text{ hectares}$

Total known ACTIVE and SOLD OUT BANKS: 2

1. Saipan Upland Mitigation bank
2. Malua BioBank

Australia/New Zealand

Number of ACTIVE programs: 12

1. BioBanking (New South Wales)
2. Property Vegetation Plan Offsets (New South Wales)
3. BushBroker (Victoria)

4. Native vegetation and scattered tree offsets (South Australia)
5. Vegetation management offsets (Queensland)
6. Marine fish habitat offsets (Queensland)
7. Koala habitat offsets (Queensland)
8. Environmental offsets (Queensland, overarching policy)
9. Environmental offsets (Western Australia)
10. Biodiversity offsets (Tasmania)
11. Kingborough Council offsets (Tasmania)
12. Biodiversity offsets (New Zealand)

Number of programs IN DEVELOPMENT: 5

1. Biodiversity offsets (Queensland)
2. Regional planning offsets (Queensland)
3. Darwin Harbour offsets (Northern Territories)
4. Environmental offsets policy (Commonwealth)
5. Waikato Region biodiversity offsets (New Zealand)

Known CREDIT TYPES: 42

NSW BioBanking: 15 ecosystem credit types listed on the BioBanking registry's 'Expressions of Interest'.³¹

1. Dry sclerophyll forests (shrub/grass)
2. Dry sclerophyll forests (shrub/grass) & others
3. Dry sclerophyll forests (shrubby) & others
4. Forested wetlands & others
5. Freshwater wetlands & others
6. Grasslands & others
7. Grassy woodlands
8. Grassy woodlands & others
9. Rainforests
10. Rainforests & others
11. Semi-arid woodlands (grassy)
12. Semi-arid woodlands (grassy) & others
13. Semi-arid woodlands (shrubby) & others
14. Wet sclerophyll forests (grassy) & others
15. Wet sclerophyll forests (shrubby) & others³²

Victoria's BushBroker: 27 credit types

16. 'large old tree' (LOTs) credits³³
17. 'new recruits' credits³⁴

25 'ecological vegetation class' (EVC) types on the 'List of Wanted EVCs per Bioregion as of September 2009'.³⁵

18. Blackthorn Scrub
19. Dry Valley Forest
20. Foothill Box Ironbark Forest
21. Riparian Shrubland
22. Riverine Escarpment Scrub
23. Valley Slopes Dry Forest

24. Banksia Woodland
25. Plains Grassy Woodland
26. Riparian Scrub
27. Swampy Woodland
28. Damp Heathy Woodland
29. Valley Grassy Forest
30. Riverine Grassy Woodland
31. Woorinen Mallee
32. Herb-rich Foothill Forest
33. Shrubby Foothill Forest
34. Creekline Grassy Woodland
35. Grassy Woodland
36. Plains Woodland
37. Plains Grassland
38. Escarpment Shrubland
39. Plains Grassland
40. Plains Grassy Woodland
41. Rocky Chenopod Woodland
42. Stony Knoll Shrubland

Total known ACTIVE and SOLD OUT BANKS: 3

BushBroker: 3ⁱⁱⁱ

Total known REGIONAL PAYMENTS per annum: USD\$1.3 million

BushBroker: AUS\$1,406,915 (for 2008/2009).

This figure was calculated as:

11.23 habitat hectares * (the average of the average prices for all bioregions, or \$110,500)
+ 166 'large old trees' * Average price per habitat hectare (\$1,000)
= AUS\$1,406,915^{iv,36}

South Australia's native vegetation program: AUS\$50,000/year

This only represents the funding coming from a unique offset program in which the State allowed a tourism operation company to pay a levy to the government over a ten-year period to be used for biodiversity offsetting. The levy is expected to bring in around AUS\$50,000 annually.^v

Total known AREA PROTECTED or restored per annum: >7,500 hectares

NSW's Property Vegetation Plan offsets: 7,341 ha for the year 2009. Cumulatively there have been 25,564 ha of offsets within the program.

BushBroker: The program delivered 700 ha cumulatively.^{vi} If this figure is divided by the 3 years of the program (2006-2008), the annual area protected would be 233 ha.

ⁱⁱⁱ Crowe, personal communication, 2009.

^{iv} Ibid.

^v Dendy, personal communication, 2009.

^{vi} Crowe, personal communication, 2009.

¹ Clayton D. A. Rubec and Alan R. Hanson, "Wetland mitigation and compensation: Canadian experience," *Wetlands Ecology and Management*, 17 (2008):3-14.

² Wal-Mart, *Fact Sheet: Acres for America*, September 1, 2009, available at walmartstores.com/download/2333.pdf

³ Mark Clayton, "Warblers, vireos, and tanks: Army tries new approach," *The Christian Monitor*. August 6, 2007. <http://www.csmonitor.com/2007/0806/p01s10-usmi.html>

⁴ US ACE, 2009b. Dataset on US compensatory mitigation in 2008. Through a Freedom of Information Act (FOIA) request, Ecosystem Marketplace obtained data to answer the following four questions:

- 1) National (& if possible) District-level total acreage of compensatory wetland mitigation/ linear feet of stream mitigation in 2008
- 2) National (& if possible) District-level total acreage of permitted impacts and loss to wetlands / streams in 2008
- 3) A National (& if possible) District-level break-down of compensatory mitigation occurring through permittee-responsible vs. mitigation banks vs. in-lieu fee funds (ie - 33% permittee-responsible, 33% mitigation banks, 33% in-lieu fee funds)
- 4) A National (& if possible) District-level break-down of mitigation occurring through restoration vs. establishment vs. enhancement vs. preservation (ie - 60% restoration, 20% establishment, etc.)

⁵ ELI (Environmental Law Institute), *2005 Status Report on Compensatory Mitigation in the United States*, Washington, D.C.: Environmental Law Institute, April, 2006, available at http://www.elistore.org/reports_detail.asp?ID=11137

⁶ US ACE 2009, RIBITS (Regional Internet Bank Information Tracking System) web databases of wetland mitigation banks

- a. US ACE Norfolk District RIBITS: <https://155.78.20.213/ribits/viewbanks.php?all=all>;
- b. US ACE Mobile District RIBITS: <https://samribits.sam.usace.army.mil/>;
- c. US ACE National RIBITS: http://216.83.232.125:443/pls/htmldb/f?p=101:2:3328820440517333::NO:RP:P27_BUTTON_KEY:9

⁷ USACE 2009a, US ACE District webpages on mitigation banking

- a. US ACE Charleston District <http://www.sac.usace.army.mil/permits/mitigate.html>
- b. US ACE Fort Worth District <http://www.swf.usace.army.mil/pubdata/environ/regulatory/PDF/Mitigation%20Bank%20Contacts%20Info.pdf>
- c. US ACE Galveston District http://www.swg.usace.army.mil/reg/mitigation/bank/swg_mit_banks.asp
- d. US ACE Huntington District http://www.lrh.usace.army.mil/Documents/index.cfm?id=4889&pge_prg_id=6303&pge_id=1514
- e. US ACE Kansas City District <http://www.nwk.usace.army.mil/regulatory/regulatory.htm>
- f. US ACE Little Rock District <http://www.nwk.usace.army.mil/regulatory/regulatory.htm>
- g. US ACE Memphis District http://www.mvm.usace.army.mil/regulatory/MBL/mitigation_bank_listing.htm
- h. US ACE New Orleans District <http://www.mvn.usace.army.mil/ops/regulatory/activebanks.htm>
- i. US ACE Rock Island District http://www2.mvr.usace.army.mil/Regulatory/Documents/Illinois_Mitigation_Banks.pdf
- j. US ACE San Francisco District <http://www.spn.usace.army.mil/regulatory/banks.htm>
- k. US ACE Savannah District <http://www.sas.usace.army.mil/AllBanksJul07.pdf>

- l. US ACE St. Louis District <http://www.mvs.usace.army.mil/permits/banksMO-IL.html>
- m. US ACE Vicksburg District
<http://www.mvk.usace.army.mil/offices/od/odf/PubNotice/mitigation.pdf>
- o. US ACE Walla Walla District
http://www.nww.usace.army.mil/html/offices/op/rf/Mitigation_Banks/Banks.htm
- p. US ACE Wilmington District
<http://www.saw.usace.army.mil/wetlands/Mitigation/Banks/imap1/index.html>

⁸ State Agency Websites, 2009

- n. State of Michigan, *List of wetland banks (as of October 2008)*, 2009, available at http://www.michigan.gov/documents/deq/lwm-wetlands-regOct08_255104_7.pdf
- o. Michigan Department of Environmental Quality, "Wetland banking,"
http://www.michigan.gov/deq/0,1607,7-135-3313_3687-10426--,00.html
- p. State of New Jersey, *List of wetland banks (as of 7/21/2009)*, 2009, available at http://www.state.nj.us/dep/landuse/forms/wmcbank_list.pdf
- q. California Wetland Mitigation Banking - *Report to the Legislature by the State of California Resources Agency, Department of Fish and Game, Aug. 1, 2005*, available at <http://www.dfg.ca.gov/habcon/conplan/mitbank/Wetlands%20Bank%20Leg%20Report%202005.pdf>
- r. California Wetland Mitigation Banking - *Report to the Legislature by the State of California Resources Agency, Department of Fish and Game, Aug. 1, 2007*, available at <http://www.dfg.ca.gov/habcon/conplan/mitbank/WMB%20Legislative%20Rept%202007%20Final%2010-24-07.pdf>
- s. Washington State Department of Ecology, 2009. Webpages on mitigation banking.
<http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/map.html> and
<http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/public-notice.html>
- t. Washington State Department of Transportation, 2009. Webpage on mitigation.
<http://www.wsdot.wa.gov/Environment/Biology/alternativemitigation.htm>
- u. Wisconsin Department of Natural Resources, "Wetland Compensatory Mitigation: Mitigation Bank Registry," 2009. <http://dnr.wi.gov/wetlands/mitigation/mitigationbanks.html>
- v. North Carolina Ecosystem Enhancement Program (EEP), *NC EEP 2007-2008 Annual Report*, 2008, available at http://www.nceep.net/news/annualreport/2008/2007_08_Annual_Report_HotTopics.pdf
- w. North Carolina Division of Water Quality, "List of approved mitigation banks,"
http://h2o.enr.state.nc.us/ncwetlands/documents/mitigation_banks_3.doc

⁹ Ibid. ELI 2006

¹⁰ Ibid. USACE 2009b

¹¹ Kevin F. Noon, and Judith A. Ward, *Green Wealth: how to turn unusable land into moneymaking assets* (New York: Square One Publishers, 2007). Preview available at http://books.google.com/books?id=E-53ESJihbsC&pg=PT46&lpg=PT46&dq=black+capped+vireo+credit+price&source=bl&ots=3m8Ybl07dH&sig=vVZO9DIefJOltCXg0mkidah59s&hl=en&ei=ELoKS7aHKMfVIAeQs6CFBA&sa=X&oi=book_result&ct=result&resnum=1&ved=0CAgQ6AEwAA#v=onepage&q=&f=false

¹² Ibid. USACE 2009b

¹³ Ibid. USACE 2009b

¹⁴ Ecosystem Marketplace, *Wetland mitigation banking database*, Unpublished.

¹⁵ Resource Environmental Solutions, LLC and NMBA (National Mitigation Banking Association), Unpublished. USACE Mitigation Types.

-
- ¹⁶ Fox and Anamaria Nino-Murcia, "Status of Species Conservation Banking in the United States," *Conservation Biology* 19:4 (2005): 996-1007
- ¹⁷ DFO (Fisheries and Oceans Canada). *Annual Report to Parliament on the Administration and Enforcement of the Fish Habitat Protection and Pollution Prevention Provisions of the Fisheries Act (April 1, 2007 to March 31, 2008)*, section 3.2.4 "Advice Provided and Authorizations Issued," 2008. http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/measuring-mesures/reports-rapports/ann07/page07_e.asp#324
- ¹⁸ OAG (Office of the Auditor General of Canada), *2009 Spring Report of the Commissioner of the Environment and Sustainable Development*, 2009, available at http://www.oag-bvg.gc.ca/internet/English/parl_cesd_200905_01_e_32511.html
- ¹⁹ J. T. Quigley and D. J. Harper, "No Net Loss of Fish Habitat: A Review and Analysis of Habitat Compensation in Canada," *Environmental Management* 36:3 (2005): 343–355.
- ²⁰ Ibid. Quigley and Harper 2005.
- ²¹ TAC (Transportation Association of Canada), *2006 TAC Environment Achievement Award* (presented to Nova Scotia Department of Transportation and Public Works), 2006, available at http://www.gov.ns.ca/tran/enviroservices/Mustard/TAC_2006%20Env%20Achievement%20Award_reprint.pdf
- ²² Ibid. Quigley and Harper 2005.
- ²³ Ibid. DFO 2008.
- ²⁴ Ibid. OAG 2009.
- ²⁵ DFO, *Agreement for Habitat Banking Credits for Yarrow Creek Culvert Replacement with a Single Clear-Span Bridge in SW 22-03-30-W4M*, Lethbridge, Alberta, 2005.
- ²⁶ DFO, *Memorandum of Understanding Concerning Procedures for Operation of the North Fraser Harbour Habitat Compensation Bank between The North Fraser Harbour Commission and The Department of Fisheries and Oceans*, 1993.
- ²⁷ Ibid. TAC 2006.
- ²⁸ Voora Vivek et al., *Ecosystem Service Markets and Green Products in North America: A survey and analysis framework*. Prepared for the Commission for Environmental Cooperation. November 2009.
- ²⁹ Michael Bennet, *Markets for Ecosystem Services in China: An Exploration of China's "Eco-Compensation" and Other Market-Based Environmental Policies*, 2009, available at <http://www.forest-trends.org/documents/index.php?pubID=2317>
- ³⁰ Ibid. Michael Bennet, 2009.
- ³¹ NSW DECCW, "BioBanking public registry, Expressions of Interest" (from search of 1-1,000,000 ha sites) <http://www.environment.nsw.gov.au/bimsprapp/SearchBiobankingEOI.aspx?Start=1>
- ³² Ibid. NSW DECCW 2009.
- ³³ VIC DSE, "Price History: Average BushBroker Credit Agreement prices," <http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/29F2EEFD882B07D5CA2574D400070D92544ABC860B2506F7CA257004002550CC>
- ³⁴ Ibid. VIC DSE, "Price History: Average BushBroker Credit Agreement prices."
- ³⁵ VIC DSE, "Opportunities for landowners: Actively seeking native vegetation types," <http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/02AB1847A6C8C0DCCA2574D4000527A5544ABC860B2506F7CA257004002550CC>
- ³⁶ Ibid. VIC DSE, "Opportunities for landowners: Actively seeking native vegetation types."