

Methods Appendix

Contents

1. World figures summary tables - Active programs, Programs in development, Global payments per annum, Area protected or restored per annum, Active and sold out banks (p.1)
2. Detailed list of Active programs (p.2)
3. Detailed list of Programs in development (p.4)
4. Detailed list of Global payments per annum (p.5)
5. Detailed list of Area protected or restored per annum (p.6)
6. Detailed list of Active and sold out banks (p.7)
7. Detailed list of Credit types (p.8)
8. Detailed methods for US aquatic compensatory mitigation data collection (p.12)
9. Detailed Method for US aquatic compensatory mitigation (banking) credit price average figures and price ranges (p.13)
10. Detailed Methods for US aquatic compensatory mitigation payment figures (p.13)
11. Detailed Methods for US aquatic compensatory mitigation area figures (p.14)
12. Detailed Methods for US conservation bank data collection (p.15)
13. Detailed Method for US conservation bank credit price average figures and price ranges (p.15)
14. Detailed Methods for US conservation bank payment figures (p.16)
15. Detailed Methods for US conservation bank area figures (p.16)
16. Detailed List of Canadian fish habitat compensation banks (p.16)
17. Detailed List of German compensation pools (p.19)

1. World figures summary tables

Active programs

North America	15
Australia/New Zealand	13
Europe	5
Central and South America	7
Asia	5
Africa	0
Global	0
Total ACTIVE Programs	45

Programs in development

North America	4
Australia/New Zealand	6
Europe	2
Central and South America	1
Asia	4
Africa	8
Global	2
Total Programs IN DEVELOPMENT	27

Global payments per annum

North America	\$2-\$3.6 billion
Australia/New Zealand	\$10.4 million
Europe	Unknown
Central and South America	>\$2.65 million
Asia	>\$390 million
Africa	Unknown
Total known GLOBAL PAYMENTS per annum	US\$2.4 - \$4 billion

Area protected or restored per annum

North America	> 105,000 ha
Australia/New Zealand	> 52,000 ha
Europe	> 2,900 ha
Central and South America	Unknown
Asia	> 26,000 ha
Africa	Unknown
Total known AREA PROTECTED or restored per annum	> 187,000 hectares

Active and sold out banks

North America	1,076
Australia/New Zealand	10
Europe	19
Central and South America	Unknown
Asia	2
Africa	0
Total known ACTIVE and SOLD OUT BANKS	1,107

2. Active programs

North America: 15

United States of America (US):

1. Aquatic compensatory 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
8. Willamette multi-credit watershed market

Canada:

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

Provincial wetland compensation programs in:*

11. Alberta

12. New Brunswick
13. Prince Edward Island
14. Nova Scotia

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

Mexico:

15. Program for Environmental Restoration and Compensation

Australia/New Zealand: 13

Australia:

16. BioBanking (New South Wales)
17. Property vegetation plan offsets (New South Wales)
18. Native vegetation offsets and BushBroker (Victoria)
19. Native vegetation and scattered tree offsets (South Australia)
20. Vegetation management offsets (Queensland)
21. Marine fish habitat offsets (Queensland)
22. Koala habitat offsets (Queensland)
23. Environmental offsets (Queensland, overarching policy)
24. Environmental offsets (Western Australia)
25. Biodiversity offsets (Tasmania)
26. Kingborough Council offsets (Tasmania)
27. Southeast regional planning offsets (Queensland)

New Zealand:

28. Biodiversity offsets under the Resource Management Act (New Zealand)

Europe: 5

29. Germany's Impact Mitigation Regulations (Eingriffsregelung)
30. European Union's Habitats and Birds Directives**
31. European Union's Environmental Liability Directive**
32. Sweden's environmental offsets***
33. French biodiversity banking

***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.*

Asia: 5

34. China's forest vegetation restoration fee
35. Saipan's Upland Mitigation Bank
36. Malua BioBank
37. Municipal compensatory mitigation ordinance in the Japanese city of Shiki (technically inactive)
38. Vietnam's biodiversity law/ Decree No. 113 that covers Compensation for Damage to Biodiversity

Central and South America: 7

39. Developer's offsets (Brazil)
40. Forest offsets (Brazil)
41. Environmental licensing (Colombia)
42. Conservation trust (Paraguay)
43. Environmental services certificates (Paraguay)
44. Environmental Impact Assessment law and environmental compensation fund (Argentina)
45. Costa Rica's Environmental Impact Assessment law

Africa: 0

Global: 0

3. Programs in development

North America: 4

US:

1. Habitat credit trading system
2. Bay Bank

Canada:

3. British Columbia's environmental mitigation and offsets policy project

Mexico:

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

Australia/New Zealand: 6

Australia:

5. Biodiversity offsets (Queensland)
6. Draft environmental offsets policy (Northern Territories)
7. Draft amendments to Environment Protection and Biodiversity Conservation Act (Australia Commonwealth)

New Zealand:

8. National Biodiversity Policy Statement (New Zealand)
9. Waikato Region proposed district plan (New Zealand)
10. Gisborne District Council Combined Regional Land and District Plan (New Zealand)

Europe: 2

11. UK biodiversity offsets
12. EU biodiversity offsets and habitat banking developments

Asia: 4

13. Multiple developments regarding biodiversity offsets in Indonesia
14. Mongolia's work with TNC on prioritizing areas suitable for offsets
15. Roundtable for Sustainable Palm Oil (RSPO)/GreenPalm certificates
16. Biodiversity offsets study group in Japan

Central and South America: 1

17. Colombian Ministry of Environment offset siting policy (with TNC, WWF, CI)

Africa: 6

18. National biodiversity offsets policy framework (South Africa)
19. Western Cape province draft guidelines (South Africa)
20. KwaZulu-Natal province draft guidelines (South Africa)
21. SANBI pilot wetland mitigation banking program (South Africa)
22. Draft biodiversity offset policy (Uganda)
23. PAE biodiversity offset policy (Madagascar)
24. Gauteng province draft biodiversity offset policy (South Africa)
25. Strategic Environmental Management Plan (Namibia)

Global: 2

26. Business and Biodiversity Offsets Program
27. Green Development Initiative

4. Global payments per annum

North America: US\$2 - \$3.6 billion

US: \$2 - \$3.4 billion

- Aquatic compensatory mitigation - wetland: \$1.4 - \$2.5 billion (see detailed methods on p.13)
- Aquatic compensatory mitigation - stream: \$430 - \$683 million (see detailed methods on p.14)
- Conservation banking: \$200 million (see detailed methods on p.16)
- 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 year².
- Recovery Credit System: \$1,140,691. The cumulative payments of the Fort Hood pilot project were reported in a 2010 evaluation - \$3,442,073. This is the only RS project as of June 2011. We assumed the program was active for three years, so the annual payment would be \$1,140,691.³
- Willamette multi-credit watershed market: \$594,385 to \$894,385. This represents a range of the amount spent on two pilot projects in 2010: Half Mile Lane: \$500,000 to \$800,000 spent; and OR Dept of Forestry: cost of \$94,385.⁴
- Maryland Forest Conservation Act: \$13,907 (average annual figure). This annual figure is a *minimum* amount, as it represents the amount of money given in grants for replanting projects, not the entire amount of forest offsets under the program. The figure is an average, derived by taking a cumulative payments figure from 1992-2002 and dividing by ten.⁵

Canada: > CAD 7.5 - 165 million or ~US\$7.7 - \$170 million

- Fish Habitat Compensation: > CAD 7.5 - 165 million or ~US\$7.7 - \$170 million⁶
We tried three methods for estimating the total volume of investment in fish habitat compensation, and reported the range that we found from the two methods:
 1. Number of authorizations issued in 2008-2009: 287⁷ *(percent of authorizations which included compensatory habitat plan: 75%⁸)* (average cost of compensation project: CAD 34,707⁹)
= CAD 7,470,682
 2. Land area (in meters squared) protected or restored (see method below):
1,881,651m²*(range of per unit compensation costs: CAD 10-15/m²¹⁰)
= CAD 19,363,300 - 29,044,950
 3. Land area (in meters squared) protected or restored (see method below):
1,881,651m²*(mean of CAD 85/m² for construction costs¹¹)
= CAD 164,588,048

Australia: US\$10.4 million

- BushBroker: USD 6.4 million.
BushBroker staff reported that the program had facilitated AUD 34 million (USD 32 million) in credit sales cumulatively (2007-2011), and an average of AUD 6.8 million annually over the last two years (or USD 6.4 million)^{12,13}. This is higher than we estimated using low-end or average prices and credit volumes found on the BushBroker program's "Price History" webpage¹⁴. Just to emphasize, this only represents credit sales within BushBroker, and perhaps 75-80% of native vegetation offsets in Victoria occur outside the sphere of BushBroker (although these are generally smaller-scale offsets created by a landowner on their own land). In terms of area, BushBroker staff reported that the program has facilitated 3,420 hectares of credits since May 2007, or 855 hectares annually.
- BioBanking: USD 1.5 million (2010)

The annual payment figure reported here represents transactions that occurred from the first BioBank that was established in the summer of 2009. The transactions occurred in 2010 (AUD 1,555,741, or USD 1,498,614, converted in Dec 2010).

- Native vegetation and scattered tree offsets (South Australia): USD 2.5 million (average 2008-2010)¹⁵

Asia: > US\$390 million

- China's forest vegetation restoration fee: > US\$390 million

The program reported collecting total of RMB 8.044 billion from 2003-2005, or around RMB 2.7 billion annually (about US\$393 million).¹⁶ We used the following currency calculator:

<http://www.xe.com/ucc/> in February 2010.

Central and South America: > 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. We only considered those funds that had actually been used for compensation. We used the following currency calculator: <http://www.xe.com/ucc/> in February 2010.

5. Global area protected or restored per annum

North America: > 105,000 hectares

US: 105,090 ha

- Aquatic compensatory mitigation (annually): 33,488 acres (13,552 ha) in 2010; 426,207 acres cumulatively conserved in active and sold-out wetland *banks* - *this cumulative figure does not include permittee-responsible mitigation* (see detailed methods on p.14)
- Conservation banking (2010): 4,211 acres (1,704 ha); 74,807 acres cumulative in active and sold-out conservation banks (see detailed methods on p.16)
- Acres for America (annually): 218,000 acres in 2010 (88,221.5 ha). The program had conserved a total of 625,000 acres in the US from 2005 through 2010, and a 2010 press release reported that 218,000 acres were conserved in 2010.¹⁷
- Recovery Credit System: 312 acres (minimum). A 2010 evaluation of the pilot project (Fort Hood) noted the total acreage conserved as 938 acres. This is the only RS project as of June 2011. We assumed the project was active for three years prior, so divided 938 by 3 to arrive at the annual acreage conserved. Note that this project does not offer permanent protection.¹⁸
- Willamette multi-credit watershed market: 34.18 acres (and 15,680 linear feet of stream). This represents the area (and linear feet) of three pilot projects in 2010: Half Mile Lane: 23.9 acres (and 1,300 linear feet); OR Dept of Forestry: 4 acres (and 9,630 linear feet); and Mohawk Creek: 6.28 acres (and 4,750 linear feet).¹⁹
- Maryland Forest Conservation Act: 3,638 acres (2010). This figure represents the acres placed in long-term protection in 2010, as reported by MD DNR staff.²⁰

Canada: >180 hectares annually

- Fish Habitat Compensation: >180 hectares annually

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 hectares²¹ *

(number of authorizations issued in 2008-2009 from a DFO Habitat Annual Report: 287²²) *
(percent of authorizations which included compensatory habitat plan: 75%²³)
= 188,1651 hectares (or 1,881,651 m²)

[Also note, the total area of the 43 Canadian habitat banks that we have collected is around 200 hectares]

Australia: >52,000 hectares

- NSW's Property Vegetation Plan offsets: 21,199.62 ha in 2010. Cumulatively (12/20/2005-6/2/2011) there have been 46,450.86 ha of offsets within the program.²⁴
- BushBroker: The program delivered 855 ha annually, and 3,420 ha cumulatively (2007-2011).²⁵
- BioBanking: 80 ha in 2010²⁶
- Native vegetation and scattered tree offsets (South Australia): 24,281 ha (average of 2008-2010)²⁷
- Vegetation management offsets (Queensland): 640 ha (2011) at minimum. Ecofund's Projects webpage highlights one vegetation offset - 640 ha Bigalow ecosystem offset project listed as of 5/26/2011.²⁸
- Marine fish habitat offsets (Queensland): 5,300 ha (2011) at minimum. Ecofund's Projects webpage highlights one coastal wetland offset project (which we assume is a Marine Fish Habitat Offset) of 5,300 ha listed as of 5/26/2011.²⁹
- Koala offsets (Queensland): 2.5 ha (2011) at minimum. Ecofund's Projects webpage highlights one koala offset project of 2.5 ha listed as of 5/26/2011.³⁰

Europe: > 2,957 hectares

- Germany's Impact Mitigation Regulations: >2,600 ha
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 (in 2008-2009)³¹.
- France's first habitat bank (the Saint Martin de Crau site) is 357 hectares (established in 2009). A second site is in the planning stage in the Poitou-Charentes region.

Asia: >26,000 hectares

- China's forest vegetation restoration 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).³² RMB2.7bill/10m² = 268,133,333 m² = 26,813 hectares

6. Active and sold out banks

North America: 1,076

US: 1,044 (see detailed methods on p.12)

- Active and sold out aquatic compensatory mitigation banks³³: 935
 - Active: 798
 - Inactive: 45
 - Pending: 125
 - Sold out: 137
 - Unknown: 32

- Active and sold out conservation banks³⁴: 109 (see detailed methods on p.15)
 - Active: 90
 - Inactive: 4
 - Pending: 17
 - Sold Out: 19
 - Unknown: 2
- Note: although we suspect Maryland Forest Conservation Act has many more forest banks, we only have a dated (2007) figure of 70 banks of unknown status, and only in Carroll county, Maryland. Until we can verify information further, we are not including these banks.³⁵

Canada: 32 (see detailed list on p.16)

- Active and Sold Out Fish Habitat Compensation banks: 32
 - Active: 30
 - Pending: 11
 - Sold out: 2

Australia: 10

- BushBroker: 5ⁱ
While the BushBroker program does not formally recognize or track 'banks,' there are cases of landowners, developers, and the government (in the case of Melbourne "reserves") creating larger sites of multiple credits which are then sold to multiple parties needing offsets. To date, there are three unofficial active and sold-out banks and now two government reserves in the Melbourne area (the Western Grassland Reserve of 15,000 ha and another grassy woodlands reserve of 1,300 ha).
- BioBanking: 5ⁱⁱ

Europe: 19

- France: 1
We are only aware of one active biodiversity bank in Europe, CDC Biodiversité's pilot habitat bank in the south of France. There is also one French biodiversity bank in development.³⁶
- Germany: 18 (see detailed list on p.19)
This is the number of compensation pools that we have found in our research.
- UK: 0
There are 2 banks in development as of June 2011, but land has not yet been secured so we are not yet counting these.

Asia: 2

- Saipan Upland Mitigation bank
- Malua BioBank

7. Credit types

US: 168

US Conservation Banking known credit types: 143 (species credit types: 92, habitat credit types: 51)
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

ⁱ Crowe, personal communication, 2009.

ⁱⁱ Biobank register, accessed May 25, 2011 at <http://www.environment.nsw.gov.au/bimspr/index.htm>

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
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

US wetland and stream known credit types: 25

The following are different categories of credit types that we found in our research:

- Wetland
- Stream
- Tidal wetland
- Palustrine forested wetland
- Emergent wetland
- Upland wetland
- Mixed palustrine wetland
- Palustrine scrub shrub wetland
- Emergent high marsh wetland
- Aquatic bed
- Non-tidal fresh marsh
- Bottomland hardwoods
- Cypress/tupelo
- Tidal/intermediate marsh
- Wet coastal prairie
- Riparian willow scrub
- Riverine aquatic bed
- Shaded riverine aquatic
- Freshwater forested
- Freshwater herbaceous
- Low marsh
- High marsh
- Riverine intermittent
- Riparian buffer
- Eelgrass

Canada: 5

While there may be a number of other ecosystem types, we only found specific mention of four ecosystem types in our research:³⁷

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

Australia: 42

NSW BioBanking: 15 ecosystem credit types listed on the BioBanking registry's 'Expressions of Interest.'³⁸

- Dry sclerophyll forests (shrub/grass)
- Dry sclerophyll forests (shrub/grass) & others
- Dry sclerophyll forests (shrubby) & others
- Forested wetlands & others
- Freshwater wetlands & others
- Grasslands & others

- Grassy woodlands
- Grassy woodlands & others
- Rainforests
- Rainforests & others
- Semi-arid woodlands (grassy)
- Semi-arid woodlands (grassy) & others
- Semi-arid woodlands (shrubby) & others
- Wet sclerophyll forests (grassy) & others
- Wet sclerophyll forests (shrubby) & others³⁹

Victoria's BushBroker: 27 credit types

- 'large old tree' (LOTs) credits⁴⁰
- 'new recruits' credits⁴¹

25 'ecological vegetation class' (EVC) types on the 'List of Wanted EVCs per Bioregion as of September 2009':⁴²

- Blackthorn Scrub
- Dry Valley Forest
- Foothill Box Ironbark Forest
- Riparian Shrubland
- Riverine Escarpment Scrub
- Valley Slopes Dry Forest
- Banksia Woodland
- Plains Grassy Woodland
- Riparian Scrub
- Swampy Woodland
- Damp Heathy Woodland
- Valley Grassy Forest
- Riverine Grassy Woodland
- Woorinen Mallee
- Herb-rich Foothill Forest
- Shrubby Foothill Forest
- Creekline Grassy Woodland
- Grassy Woodland
- Plains Woodland
- Plains Grassland
- Escarpment Shrubland
- Plains Grassland
- Plains Grassy Woodland
- Rocky Chenopod Woodland
- Stony Knoll Shrubland

8. Detailed Methods for US Aquatic Compensatory Mitigation Data Collection

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

- National-level data on area and type of wetland and stream mitigation,
- Data on mitigation banking, and
- 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 in 2009⁴³ and again in early 2011⁴⁴

Information collected on mitigation banking builds upon the research of the Environmental Law Institute and their comprehensive report on US compensatory mitigation from 2005.⁴⁵ Ecosystem Marketplace spent over 250 hours from October 2008-July 2009 searching and requesting information on mitigation banking to update ELI's 2005 study, gathered from:

- regional and national US ACE 'RIBITS' mitigation banking websites,⁴⁶
- fifteen US ACE District websites,⁴⁷
- eight state agency wetland mitigation banking websites,⁴⁸
- public articles,
- wetland mitigation bank websites,
- and over thirty formal and informal information requests to US ACE headquarters and District offices.

Following this initial effort, we undertook another data collection effort from October 2010-January 2011 (~200 hours), with a brief follow-up data collection in June 2011 (~15 hours). Corrections were made based on the "District Mitigation Summary" reporting query function within the US Army Corps of Engineer's [RIBITS](#) (Regional In-Lieu Fee and Bank Information Tracking System) wetland mitigation banking database. All data entries in our dataset include the date of the data used to inform the entry and the data source(s).

In this second dataset, we applied the following assumptions:

- As RIBITS does not yet keep a comprehensive record of historic bank data, information on 'sold out' banks is often not available. In instances where we had collected 'sold out' banks that are not reflected on RIBITS, we kept these banks in our dataset.
- In instances where we had collected 'approved-inactive' banks that are not reflected on RIBITS, we kept these banks in our dataset.
- In instances where we had previously collected 'active' bank data, but we have not been able to update since 2005 or verify on RIBITS, we assumed these banks had changed to 'sold out' status (n=59).
- For 'pending' or 'unknown' banks that we have not been able to update or verify since 2005, we removed these banks from our dataset (n=97 'pending' banks and n=18 'unknown' banks).

Just prior to completing our analysis, we noted that a large number of banks had been uploaded to RIBITS, so in early June 2011 we quickly gathered 305 additional data points. While we did not thoroughly QAQC these banks due to time constraints (eg - check for duplicate entries, verify whether an entry is a free-standing bank or whether it is a site within an umbrella bank, or verify the state

location of some banks), we thought it more important to represent the fullest data available. After this upload, our new complete dataset includes 1,137 banks or sites.

All aggregate bank information presented in this section represents active and sold out banks unless otherwise noted.

Credit 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. Credits are not necessarily area-based.

9. Detailed Method for US Aquatic Compensatory Mitigation (Banking) Credit Price Average Figures and Price Ranges

US 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.

US 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.

10. Detailed Methods for US Aquatic Compensatory Mitigation Payment Figures

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 dollar volume per annum for wetland and stream mitigation.

US Wetland Mitigation: US\$1.4 - \$2.5 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 above), \$74,535, by the acres of compensatory mitigation required in 2010,⁴⁹ 33,488 acres= \$2,496,028,080.
- 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:

$$\begin{aligned}
 & [(\text{acres of compensatory mitigation required in 2008: } 33,488) * (\text{the amount of} \\
 & \text{mitigation coming from mitigation banks: } 26\%^{50}) * \text{average credit price: } \$74,535] \\
 & + \\
 & [(\text{acres of compensatory mitigation required in 2008: } 33,488) * (\text{the amount of} \\
 & \text{mitigation coming from ILFs and permittee-responsible: } 74\%^{51}) * \text{average credit creation} \\
 & \text{price as reported by Noon \& Ward, 2007}^{52}: \$30,000] \\
 & = \$1,392,400,901
 \end{aligned}$$

Stream: US\$430 - \$683 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 2010,⁵³ 2,624,905.5 linear feet (or 497 miles) = \$683,184,154.
- 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:

$$\begin{aligned}
 & [(\text{linear feet of compensatory mitigation required in 2010: } 2,624,905.5) * (\text{the amount of} \\
 & \text{mitigation coming from mitigation banks: } 26\%^{54}) * \text{average credit price: } \$260.27] \\
 & + \\
 & [(\text{linear feet of compensatory mitigation required in 2010: } 2,624,905.5) * (\text{the amount of} \\
 & \text{mitigation coming from ILFs and permittee-responsible: } 74\%^{55}) * (1/2 * \text{average credit} \\
 & \text{price: } \$130.14)] \\
 & = \$430,415,729
 \end{aligned}$$

11. Detailed Methods for US Aquatic Compensatory Mitigation Area Figures

US Wetland and Stream area protected or restored per annum: 33,488 acres in 2010 / 13,552 hectares

Annual area of wetland and stream mitigation was reported by the US ACE as 33,488 acres in 2010, 76,660 acres in 2009, and 24,178 acres in 2008.^{56 57}

US Wetland and Stream area protected or restored cumulatively: 426,206.9 acres

We tried several methods for estimating the cumulative land area protected in wetland and stream mitigation banks, and reported what we consider to be a conservative but realistic figure:

- 1) First, we first took the US ACE figure of 24,178 acres mitigated in 2008⁵⁸ and multiplied it by 10 years*= 240,000 acres, AND then added the US ACE figures of 76,660⁵⁹ acres mitigated in 2009 and 33,488 acres mitigated in 2010 = 350,148 cumulative 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 did not consider area of stream mitigation banks because they are occasionally incorrectly entered as acres when indeed the size reflects linear feet. We collected information on the size of

mitigation banks for 663 active and sold out banks with acreage information (there were 229 active and sold out banks with no acreage information). There was one extreme outlier - the Mississippi Delta ILF whose acreage (434,414 acres) we believe reflects the potential total size, not the current actual size. After taking out this outlier, the acreage under all wetland mitigation banks is 426,206.9 acres.

- 3) Finally, a US ACE staff member reported at the 2011 National Mitigation and Ecosystem Banking conference that the RIBITS database contains banks which cumulatively have conserved 443,364 acres in active and sold out banks.

We decided to use our dataset's cumulative figure (eg - #2 above, 426,206.9 acres) as a conservative figure

12. Detailed Methods for US Conservation Bank Data Collection

General Data Collection Methods for US Conservation Banking



Information on conservation banking is based on Ecosystem Marketplace's www.SpeciesBanking.com project, with concerted data collection efforts in January-July 2009, June 2010, and March-April 2011. Data collection efforts include updates of information via online research, information collected from several agency websites, informal requests to US Fish and Wildlife and California Department of Fish and Game offices, and occasional update requests from conservation bankers. 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.

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.

13. Detailed Method for US Conservation Bank Credit Price Average Figures and Price Ranges

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.

14. Detailed Methods for US Conservation Bank Payment Figures

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

The US FWS (the regulator of conservation banking) does not collect payment information for conservation bank credits, nor do they report volume of annual credit sales transactions. Below describes the methodology for our rough estimate of payments per annum in conservation banking in the US.

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.*

15. Detailed Methods for US Conservation Bank Area Figures

Conservation banking area protected or restored per annum: 4,211 acres in 2010 / 1,704 hectares

The total area of land protected in active and sold-out conservation banks in the SpeciesBanking.com database for the year was 4,211 acres in 2010, 7,248 acres in 2009, and 2,812 acres in 2008⁶⁰.

Conservation banking area protected or restored cumulatively: 74,807 acres

This is the total area of land protected in active and sold-out conservation banks in the SpeciesBanking.com database as of June 2011. For information, there is additional acreage in four inactive banks (1,636 acres); 17 pending banks (24,606 acres), and three banks with unknown status (10,538 acres).

16. Detailed List of Canadian Fish Habitat Compensation Banks

CANADA BANKS

Total known ACTIVE and SOLD OUT BANKS: 32

43 total: 30 active, 11 pending, 2 sold out

Bank Name	Date	Province	Status	Notes	References
Cheverie Creek	2001	Nova Scotia	active	Halifax	http://www.gov.ns.ca/tran/enviroservices/enviroSaltM

Habitat Bank				25 hectares	arsh.asp http://www.gov.ns.ca/tran/enviroservices/Mustard/TAC_2006%20Env%20Achievement%20Award_reprint.pdf
Walton River Salt Marsh HADD Compensation Project	2005	Nova Scotia	active	Hants County 10 hectares	http://www.gov.ns.ca/tran/enviroservices/enviroSaltMarsh.asp www.cbwes.com/documents/walton_factsheet.pdf http://www.gov.ns.ca/tran/enviroservices/Walton%20Monitoring_Year%203_2009.pdf http://www.gov.ns.ca/tran/enviroservices/Mustard/TAC_2006%20Env%20Achievement%20Award_reprint.pdf
Smith Gut Salt Marsh HADD Compensation Project	2006	Nova Scotia	active	Pictou County 2 hectares	http://www.gov.ns.ca/tran/enviroservices/enviroSaltMarsh.asp http://www.cbwes.com/documents/smithgut_factsheet_2010_final.pdf http://www.gov.ns.ca/tran/enviroservices/Smith%20Gut%20monitoring_Year%202_2009.pdf http://www.gov.ns.ca/tran/enviroservices/Mustard/TAC_2006%20Env%20Achievement%20Award_reprint.pdf
Lawrencetown Salt Marsh HADD Compensation Project	2007	Nova Scotia	active	Halifax County 1.5 hectares	http://www.gov.ns.ca/tran/enviroservices/enviroSaltMarsh.asp http://www.gov.ns.ca/tran/enviroservices/Lawrencetown%20Monitoring_Year%201_2009.pdf http://www.gov.ns.ca/tran/enviroservices/Mustard/TAC_2006%20Env%20Achievement%20Award_reprint.pdf
St. Croix River Salt Marsh Wetland and HADD Habitat Bank	2007	Nova Scotia	active	West Hants County 10 hectares Nova Scotia	http://www.gov.ns.ca/tran/enviroservices/enviroSaltMarsh.asp http://www.gov.ns.ca/tran/enviroservices/St%20Croix%20Baseline_2009.pdf http://www.gov.ns.ca/tran/enviroservices/Mustard/TAC_2006%20Env%20Achievement%20Award_reprint.pdf
St. Francis Harbour Restoration	2007	Nova Scotia	active	Guysborough County 13 hectares	http://www.gov.ns.ca/tran/enviroservices/enviroStreamRest.asp http://www.gov.ns.ca/tran/enviroservices/Mustard/TAC_2006%20Env%20Achievement%20Award_reprint.pdf
Ducks Unlimited Atwater - Crosby Lake Bank	0	Nova Scotia	Pending		Pett, personal communication, 2011
Big Lake Bank	0	Nova Scotia	Pending		Pett, personal communication, 2011
Margaree River Bank	0	Nova Scotia	Pending		Pett, personal communication, 2011
Irish Cove Brook Bank	0	Nova Scotia	Pending		Pett, personal communication, 2011
Pipestone Creek Habitat Bank	2008	Manitoba	active	Sifton 2.9 hectares	DFO, Agreement for Habitat Banking Credits for Pipestone Creek Riparian Fencing at 19-8-25, Rural Municipality of Sifton, Manitoba, 2006.
Yarrow Creek habitat bank	2005	Alberta	active	Lethbridge 1.9 hectares	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.
North Saskatchewan River Habitat Bank	2005	Alberta	active	Edmonton 945 m2	Janowicz, personal communication, 2010
North Fraser Harbour habitat bank	1993	British Columbia	active	Vancouver 0.55 hectares	Koster, personal communication, 2009. Fraser River Estuary Management webpage: http://www.bieapfrempp.org/frempp/partners/northfraserport.html p.144 of http://www.iwr.usace.army.mil/docs/iwrreports/95r12.pdf p.150 of www.bcgrasslands.org/docs/5AA9AC327C765248.doc www.bcgrasslands.org/docs/5AA9AC327C765248.doc
Burnaby habitat bank		British Columbia	active		www.bcgrasslands.org/docs/5AA9AC327C765248.doc
Timberland Basin habitat bank	1978	British Columbia	active		Koster, personal communication, 2009; p.88 of http://ir.lib.sfu.ca/bitstream/1892/9339/1/etd3039.pdf
NBDOT TCHP HADD	2005	New	sold out	45.36 hectares	http://www.tac-

Bank		Brunswick			atc.ca/english/resourcecentre/readingroom/conference/conf2008/docs/a2/clowater.pdf
NBDOT HADD Bank		New Brunswick	pending	14.3 hectares	http://www.tac-atc.ca/english/resourcecentre/readingroom/conference/conf2008/docs/a2/clowater.pdf
MTQ Québec riv. Jacques-Cartier fish habitat bank	2004	Quebec	active	Ste-Catherine-de-la-Jacques	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011 Monitoring report: http://www.google.ca/url?sa=t&source=web&cd=1&ved=0CUBUQFjAA&url=http%3A%2F%2Fwww.cbjc.org%2FAxisDocument.aspx%3Fid%3D158%26langue%3Dfr%26download%3Dtrue%26document%3DRapportsuiviMTQ_final.pdf&rct=j&q=habitat%20de%20r%C3%A9serve%20 Quebec
Makivik Corporation Rivière-Koksoak fish habitat bank	2008	Quebec	active	Rivière-Koksoak	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Montreal port authority St-Laurent fish habitat bank	2008	Quebec	active	Boucherville	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Sept-Îles port authority rivière Ste-Marguerite fish habitat bank	2008	Quebec	active	Sept-Îles	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Montérégie Ouest rivière à la Grasse fish habitat bank [TO REPLACE/COMBINE WITH 'GRAISSE RIVER HABITAT BANK']	2001	Quebec	sold out	Coteau-du-Lac	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011; Koster, personal communication, 2010; Lapare, Richard, Ministère des Transports Québec (MTQ), Presentation: Fish Habitat Project, Rivière à la Grasse, Muni
MTQ Outaouais rivière Blanche fish habitat bank	2008	Quebec	active	Lochaber	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Sept-Îles port authority Baie des Sept-Îles fish habitat bank (wharf removal)		Quebec	active	Baie des Sept-Îles	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Laval Milles-Îles rivière Ouareau fish habitat bank [TO REPLACE/COMBINE WITH OUAREAU RIVER HABITAT BANK]	2007	Quebec	active	Crabtree	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011; Koster, personal communication, 2010
MTQ Québec baie de Beauport fish habitat bank	2010	Quebec	pending	baie de Beauport	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Mauricie St-Laurent fish habitat bank	2007	Quebec	active	Bécancour	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Québec et Saguenay lac Beloeil fish habitat bank	2008	Quebec	active	réserve faunique des Laurentides	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Montérégie Est lac St-Pierre fish habitat bank	2008	Quebec	active		DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Maritime terminal of Sorel-Tracy Île du Milieu fish habitat bank	2009	Quebec	active	Berthierville	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011; Department of Fisheries and Oceans Canada, Habitat Reserve Procedures and Conditions of Operation:

					Water regulation control for the marsh of l'île du Milie
MTQ Québec Baie Beauport et ruisseau Moulin fish habitat bank	2010	Quebec	pending	baie de Beauport	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011; Department of Fisheries and Oceans Canada, Habitat Reserve Procedures and Conditions of Operation: Project Management of the Mill Creek Marsh in the Bay of
MTQ Montérégie Ouest rivière à la Graise fish habitat bank	2009	Quebec	active	Coteau-du-lac	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Bas St-Laurent Rivière-du-Loup fish habitat bank	2010	Quebec	pending	Ville de Rivière-du-Loup	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Hydro-Québec lac Mogridge fish habitat bank	2009	Quebec	active	lac Mogridge, Fermont	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Garde côtière canadienne lac St-Pierre fish habitat bank	2009	Quebec	active	lac St-Pierre, Municipalité de Val-Des-Monts	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Makivik Corporation l'île Smith fish habitat bank	2008	Quebec	active	l'île Smith, Akulivik	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Transports Canada et MPO- PPB baie de Plaisance fish habitat bank	2009	Quebec	active	Îles de la Madeleine	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Québec rivière Noire fish habitat bank	2011	Quebec	pending	Stoneham-Tewkesbury 20000 m2	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011; Department of Fisheries and Oceans Canada, Habitat Reserve Procedures and Conditions of Operation: Project of Creating a Lake Habitat on the Course of the
Développements Lanak inc rivière Chicot fish habitat bank	2011	Quebec	pending	Mirabel	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
MTQ Saguenay rivière Chigoubiche fish habitat bank	2010	Quebec	active	Chibougameau	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Parcs Canada Anse-aux-Sauvages fish habitat bank	2011	Quebec	pending	Gaspé	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011
Sept-Îles port authority baie de Sept-Îles fish habitat bank (transplanting Spartina marsh grass)	2004	Quebec	active	Baie des Sept-Îles	DFO Québec list of known habitat banks in Québec, from personal communication, Domonic Boula, 2011

17. Detailed List of German Compensation Pool Agencies

Total known Compensation Pools: 18

All pools are active as far as we understand.

Name	Date	Area	Notes and Reference(s)
bbv-LandSiedlung GmbH - Beratung & Entwicklung		Bayern	BBV-Land Settlement GmbH is a German 'area agency' which manages and consults on a number of land management projects in Bavaria, including developing area compensation pools, implementing compensation measures, and the transfer of compensation obligations. Limited information is available. https://www.bbv-ls.de/
Flächenagentur Brandenburg GmbH -	2002	Brandenburg	Brandenburg GmbH is an 'area agency' that develops regional compensation pools for impact mitigation purposes, acting as an intermediary between investors, land

Brandenburg			managers, and regulatory authorities. Land is generally purchased by Brandenburg GmbH on behalf of the local public foundation Conservation Fund Brandenburg, which secures the land for conservation. Limited information is available. http://www.flaechenagentur.de/index.htm
Flächenagentur GmbH im Städtequartett Damme Diepholz Lohne Vechta	2008	Lower Saxony	The area agency for the four cities in the 'Cities Quartet' (Damme, Diepholz, Lohne, and Vechta) undertakes the development of area compensation pools through the purchase and restoration of agricultural land. The agency's first project, a 35-ha site, has been completed. Restoration benefits have been sold as 'ecological value points' to the 'Cities Quartet' to offset urban development. Plans are underway for an additional 110 ha in the 'compensation' pools program. http://www.staedtequartett.de/experia-cgi/v2.2/viewhtml.pl?DescriptionFile=staedtequartett-menu.def&calling=flaechenpool_de&menudepth=1&language=de&User=&navigate_path=@2;flaechenagentur2&menu=kopf&opened_navigate=0&Oscsid=&
Hanseatische Naturentwicklung GmbH (h a n e g)		Bremen	Hanseatic natural GmbH (Haneg) is an area agency for the state of Bremen that restores and maintains sites for its area compensation pool that offset development impacts. Limited information is available. http://www.haneg.de/home-news/
Hasemann GmbH	2000	Bavaria, Hessen, Mecklenburg-Western Pomerania, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saxony-Anhalt	Hasemann GmbH is an area agency offering development, consulting and marketing services for ecological compensation pools. It manages sales of ecopoints as well as construction and placement of area pools, in a number of states. Limited information is available. http://www.hasemann-gmbh.de/
Hessische Landgesellschaft mbH - Ökoagentur für Hessen		Hessen	Land Hessen mbH - Ökoagentur for Hesse is an area agency that develops and manages compensation projects for impact mitigation. Activities include sponsorship of conservation projects, sale of ecopoints, implementation of compensation measures, and construction and placement of area pools. Limited information is available. http://www.xn--koagentur-hessen-lwb.de/
Landgesellschaft Sachsen-Anhalt	2000	Saxony-Anhalt	The Land Company of Saxony-Anhalt is an area agency which handles a range of rural development projects, including development of area compensation pools and marketing of 'eco-points' for impact mitigation. Limited information is available. http://www.lgsa.de/
Landkreis Wesermarsch	2000	Lower Saxony	Wesermarsch is an area agency in Lower Saxony that develops and manages ecological restoration projects for inclusion in compensation pools. To date, Wesermarsch has begun projects on three sites totalling at least 28 ha (the land area of one of the projects is unknown). Limited information is available. http://www.flaechenagentur-wesermarsch.de/
Niedersächsische Landesforsten (NLF)		Lower Saxony	The Lower Saxony State Forests (NLF) is a public area agency that manages impact mitigation for private- and public-sector development by developing and managing ecological restoration projects in Lower Saxony feeding the area compensation pool. The NLF handles sponsorship of conservation projects, implementation of compensation measures and long-term management, marketing of 'eco-points' and release of compensation obligations from its clients. Limited information is available. http://verzeichnis.verband-flaechenagenturen.de/mitglieder/steckbrief/?tx_experts_pi1[expert_id]=144
Niedersächsische Landgesellschaft mbH		Lower Saxony	The Lower Saxony Land Company (NLG) is a public company involved in rural development in Lower Saxony, Hamburg, and Bremen. Its activities include land acquisition and restoration for the area ecological compensation pool, wherein compensation pool projects are used to offset development elsewhere. NLG's compensation work includes the 'Hasetal' project which included 10 ha for conservation purposes, and impact mitigation for the A33 Osnabrück-Bielefeld motorway where 22 ha were conserved as a compensatory measure. http://nlg.de/
Sächsische Ökoflächen-Agentur	2008	Saxony	The Saxon Ecological Areas Agency was appointed by the Saxon State Ministry of Environmental and Agricultural Agency in 2008. The Ecological Areas Agency handles siting and development of restoration projects for compensation pools to mitigate

			impacts elsewhere. The Agency also manages the sale of 'ecopoints' and transfer of compensation obligations. Data on total project area and sales is unavailable; however current listings of 'eco-points' for sale is available here: http://www.oekokontosachsen.html . http://www.sls-sachsen.de/
Stiftung Naturschutz Schleswig-Holstein		Schleswig-Holstein	Schleswig-Holstein's compensation agency works as an intermediary between project sponsors, regulators, and conservation managers to acquire and ecologically restore sites for the Schleswig-Holstein compensation pool; sites are used to offset habitat impacts elsewhere. Revenues from compensation measures are used to finance new conservation projects. The compensation works closely with the Schleswig-Holstein Foundation for Nature Protection to ensure long-term maintenance of sites. As of May 2010, 555 hectares had been restored, generating 'eco-points' available for sale. http://www.ausgleichsagentur.de/index.php?id=253
Stiftung Umwelt- und Naturschutz Mecklenburg-Vorpommern		Mecklenburg-Vorpommern	The Foundation for the Environment and Conservation Mecklenburg-Vorpommern is a public foundation responsible for developing and managing conservation areas. It is currently developing a compensation pool of projects that can be used to offset development elsewhere. Limited information is available. www.stun-mv.de
Thüringer Landgesellschaft mbH		Thuringia	The Thuringian Land Company/ Area Agency manages rural development in Thuringia. Its activities include the development of regional compensation pools, through restoring sites and marketing them via 'ecological value points' for impact mitigation purposes. Currently the agency is restoring three different pilot sites for compensation purposes, at Old Werra, Alperstedter Ried, and along the Felda. http://www.thlg.de/index.php?id=50
uventus GmbH		North Rhine-Westphalia	Uventus GmbH is a regional planning office in the states of North Rhine-Westphalia. The bulk of its work concerns planning and managing a compensation pool. Limited information is available. http://www.uventus.de/uventus/oekologie/8/oekologie
Berlin-Brandenburg Area Development Company		Brandenburg	The Berlin-Brandenburg Area Development Company (BADC) manages a compensation pool for businesses developing in the area of the Berlin-Brandenburg International Airport to mitigate their ecological impacts. The BADC has initiated eleven projects to date feeding into the compensation pool. http://www.badc-gmbh.de/
Stiftung Rheinische Kulturlandschaft		Rhine	The Rhine Cultural Landscape Foundation acts as an intermediary between investors, regulators, and land managers to plan compensation measures. To date, it has managed at least six compensatory projects. Limited information is available. http://www.rheinische-kulturlandschaft.de/srk_dll?pageID=77
Sächsische Ökoflächen Agentur		Saxony	The Saxon Ecological Areas Agency is responsible for managing the area compensation pool, including working with groups to measure and compensate impacts, and acquiring and developing sites for conservation. The Agency works closely with the Saxon State Conservation Foundation in this capacity. Limited information is available about projects. http://www.lanu.de/de/Naturschutzfonds/Oekoflaechen.html

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- 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 Robertson Consulting Group, 2010, accessed in March 2011 at http://rcs.tamu.edu/Final_RCS_Eval_Report_March_2010.pdf
- ⁴ Bobby Cochran, personal communication, 2011
- ⁵ Maryland Department of Natural Resources, 2002, "Forest Conservation Act: 10 Year Review," accessed in October 2010 at http://www.dnr.state.md.us/forests/download/FCA_10_year_review.pdf
- ⁶ Currency converted as of June 1, 2011 from rate on: http://www.xe.com/ict/?basecur=CAD&historical=true&month=6&day=1&year=2011&sort_by=name&image.x=42&image.y=10
- ⁷ 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, 2008 to March 31, 2009)*, section 3.2.4 "Advice Provided and Authorizations Issued," 2009. <http://www.dfo-mpo.gc.ca/habitat/role/141/reports-rapports/2008-2009/page07-eng.asp#c324>
- ⁸ 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
- ⁹ 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.
- ¹⁰ Pett, personal communication, 2009.
- ¹¹ Ibid. Quigley and Harper 2005.
- ¹² Anne Buchan, personal communication, June 14, 2011
- ¹³ AUD converted to USD using the exchange rate on June 1, 2011, from: http://www.exchangerates.org.uk/AUD-USD-01_06_2011-exchange-rate-history.html
- ¹⁴ Victoria Government Department of Sustainability and the Environment, "Price History", accessed May 11, 2011, <http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/29F2EEFD882B07D5CA2574D400070D92544ABC860B2506F7CA257004002550C>
- ¹⁵ Dr. Andrew Fisher, Department of Environment and Natural Resources - South Australian Government, personal communication, May 18, 2011.
- ¹⁶ 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>
- ¹⁷ National Fish and Wildlife Foundation, *9 December 2010 press release*, , available at http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=18361
- ¹⁸ See note 5 (Robertson Consulting Group)
- ¹⁹ See note 4 (Cochran)
- ²⁰ Marion Honeczy, Maryland Department of Natural Resources, personal communication, March 2011
- ²¹ Ibid. Quigley and Harper 2005.
- ²² 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, 2008 to March 31, 2009)*, section 3.2.4 "Advice Provided and Authorizations Issued," 2009. <http://www.dfo-mpo.gc.ca/habitat/role/141/reports-rapports/2008-2009/page07-eng.asp#c324>
- ²³ Ibid. OAG 2009.
- ²⁴ NSW OEH, "Public register of approved clearing PVPs and development applications," <http://www.environment.nsw.gov.au/vegetation/approvedclearing.htm>
- ²⁵ Anne Buchan, personal communication, June 14, 2011
- ²⁶ "BioBanking Public Register," New South Wales Office of Environment and Heritage (NSW OEH), accessed May 11, 2011, <http://www.environment.nsw.gov.au/bimspr/index.htm>
- ²⁷ Dr. Andrew Fisher, Department of Environment and Natural Resources - South Australian Government, personal communication, May 18, 2011.
- ²⁸ Projects webpage, Ecofund, accessed 5/26/2011, <http://www.ecofund.net.au/projects/projects.html>
- ²⁹ Ibid.
- ³⁰ Ibid.
- ³¹ Ohlenburg, personal communication, 2010
- ³² Ibid. Michael Bennet, 2009.
- ³³ Ecosystem Marketplace, *Wetland mitigation banking database*, Unpublished.
- ³⁴ SpeciesBanking.com website, <http://www.speciesbanking.com>

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- ³⁵ http://articles.baltimoresun.com/2007-06-03/news/0705250025_1_forest-conservation-carroll-county-trees/4
- ³⁶ The use of market-based instruments for biodiversity protection - Habitat Banking case studies: Appendix – Case Studies: France, Australia, South Africa, Germany, Sweden, USA, other European Examples, References, available at http://www.forest-trends.org/~foresttr/publication_details.php?publicationID=2410
- ³⁷ 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
- ³⁸ 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>
- ³⁹ Ibid. NSW DECCW 2009.
- ⁴⁰ VIC DSE, “Price History: Average BushBroker Credit Agreement prices,” <http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/29F2EEFD882B07D5CA2574D400070D92544ABC860B2506F7CA257004002550CC>
- ⁴¹ Ibid. VIC DSE, “Price History: Average BushBroker Credit Agreement prices.”
- ⁴² VIC DSE, “Opportunities for landowners: Actively seeking native vegetation types,” <http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/02AB1847A6C8C0DCCA2574D4000527A5544ABC860B2506F7CA257004002550CC>
- ⁴³ US ACE, 2009. 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.)
- ⁴⁴ US ACE, 2011. Dataset on US compensatory mitigation in 2009 and 2010. Through a Freedom of Information Act (FOIA) request, Ecosystem Marketplace obtained data to answer the following four questions:
- 5) National (& if possible) District-level total acreage of compensatory wetland mitigation/ linear feet of stream mitigation in 2009 and 2010
 - 6) National (& if possible) District-level total acreage of permitted impacts and loss to wetlands / streams in 2009 and 2010
 - 7) 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)
 - 8) 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.)
- ⁴⁵ 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
- ⁴⁶ 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
- ⁴⁷ 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>

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- 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.sfn.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/ro/Mitigation_Banks/Banks.htm
 - p. US ACE Wilmington District <http://www.saw.usace.army.mil/wetlands/Mitigation/Banks/imap1/index.html>
- ⁴⁸ State Agency Websites, 2009
- n. State of Michigan, *List of wetland banks (as of October 2008)*, 2009, available at http://www.michigan.gov/documents/deg/lwm-wetlands-regOct08_255104_7.pdf
 - o. Michigan Department of Environmental Quality, "Wetland banking," http://www.michigan.gov/deg/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
- ⁴⁹ Ibid. USACE 2011
- ⁵⁰ Ibid.
- ⁵¹ Ibid.
- ⁵² 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
- ⁵³ Ibid. USACE 2011
- ⁵⁴ Ibid.
- ⁵⁵ Ibid.
- ⁵⁶ Ibid.
- ⁵⁷ Ibid. USACE 2009
- ⁵⁸ Ibid. USACE 2009
- ⁵⁹ Ibid. USACE 2011
- ⁶⁰ SpeciesBanking.com website, <http://www.speciesbanking.com>