Society for Conservation Biology
Ecological Footprint Committee

2010 Ecological Footprint Assessment

Author:
Stephen Handler, Northern Institute of Applied Climate Science

Contributors:
Lauren Krizel, Society for Conservation Biology
Tuyeni Heita Mwampamba, National Autonomous University of Mexico
Justin Kitzes, University of California-Berkeley
Jennifer Thornhill, National Science Foundation
Jason Koontz, Augustana College (IL)
Shonda Gilliland Foster, Society for Conservation Biology

Submitted November 17, 2011

Table of Contents

Introduction 3

2008-2010 Estimates of Greenhouse Gas Emissions and Ecological Footprint 5

Results: GHG Emissions and Ecological Footprint 11

Recommendations for Future Assessments 14

Decisions to be made by SCB Board of Governers 16

Annex 1: 2010 Ecological Footprint Assessment – Detailed Calculations 17

Annex 2: Assessment Process 36

Society for Conservation Biology
2010 Ecological Footprint Assessment

Introduction

The Ecological Footprint Committee (EFC) of the Society of Conservation Biology (SCB, the Society) is charged with three broad goals:[1]

a) to work with SCB staff to estimate SCB's ecological footprint and produce an Annual Report with recommendations to reduce such impacts.

b) to identify suitable projects that generate carbon dioxide reductions and purchase carbon offset rights through formal agreements to offset the greenhouse gas emissions of the Society that cannot practicably be reduced.

c) to disseminate information on these efforts through a variety of outlets.

The EFC was formalized as an official standing committee in 2011, but the committee has been active as an ad-hoc committee since 2007. The Ecological Footprint Assessment for calendar year 2010 marks our 3rd measurement of the environmental impacts of SCB's activities around the globe.[2] As in previous years, this report presents both an annual greenhouse gas (GHG) emissions assessment and an Ecological Footprint assessment for SCB's 2010 operations.[3] These companion metrics provide different information for analyzing SCB's environmental impacts.

- A GHG assessment, or "carbon footprint," converts activities such as air travel into the resulting amount of CO_2 emitted into the atmosphere.

- An Ecological Footprint assessment converts consumed resources into component raw materials, and finally to equivalent hectares of biologically productive land.

With these results in hand, SCB can have an understanding of both its contribution to global climate change in metric tons of CO_2 equivalent[4], as well as its demand for productive land and sea. Both concepts are important to keep in mind, and are relevant to SCB's primary focus. Global climate change and anthropogenic alteration of natural systems remain primary issues of concern for conservationists around the world.

With three annual assessments already completed, SCB is now in the position to track changes in the organization's

[1] Proposed charge for the Ecological Footprint Committee, to be included in the SCB bylaws in 2011.

[2] See the SCB 2008 and 2009 Ecological Footprint Assessments for reference and comparison. Previous assessments can be downloaded at: http://www.conbio.org/Activities/Committees/EcologicalFootprint/CarbonOffset/ecologicalfootprint.cfm

[3] See www.footprintnetwork.org/ for a more complete description of an Ecological Footprint.

[4] CO_2 equivalent, or CO_2 e, refers to the fact that emissions of all six classes of greenhouse gas are converted into an equivalent amount of carbon dioxide, based on relative global warming potentials.

environmental impacts over time. Ideally these reports will reveal the outcomes of major operational or institutional changes at SCB and make it possible to weigh those choices against their ecological results. SCB is still very early in building this "time series" of information, and conclusions must bear this in mind. Inconsistencies in data gathering and calculation methods continue to confound the results, making it impractical to strictly compare metric tons CO2e or hectares of land. All year-to-year differences highlighted by this assessment cannot totally be ascribed to a change in behavior on the part of SCB. Instances of these ambiguities are noted in the report. The EFC is working with SCB staff to improve the consistency of these assessments.

Rather than absolute comparisons of GHG or Ecological Footprint values, these assessments are useful for comparing more general trends. For example, it is quite informative to compare the relative contributions of different activities to SCB's overall carbon footprint. Additionally, now that the EFC has tracked SCB operations for 3 years, more interesting trends are apparent. Early conclusions or trends will be highlighted later in this report.

The 2010 Ecological Footprint Assessment will enhance SCB's understanding of the group's operations. With this understanding, future environmental improvements can be prioritized and achieved. The following sections of this report present the results from all three years for comparison, along with conclusions and recommendations for the SCB Board of Governors. The complete raw data for the 2010 Ecological Footprint Assessment can be found in **Annex 1** at the end of this report. **Annex 2** describes the boundary of included activities, data gathering processes, calculation methods, and assumptions.

The Ecological Footprint Committee and I hope this assessment is informative and useful. Thanks to everyone at SCB who contributed time and energy to complete this year's report. Please direct any questions and comments to Stephen Handler (ecofootprint@conbio.org).

Sincerely,

Stephen Handler
Chair, Ecological Footprint Committee

2008-2010 Estimates of Greenhouse Gas Emissions and Ecological Footprint

The following table presents the summary of GHG emissions and Ecological Footprint values for the activities included in this assessment. Values from 2008-2010 are presented side-by-side for comparison. Values that were calculated using different methods have been noted, and complete data and calculations for 2010 figures are presented in **Annex 1** at the end of this report. The boundary of included activities, data gathering processes, calculation methods, and assumptions are described in **Annex 2**. For complete descriptions of previous years' calculations, please refer to the 2008 and 2009 SCB Ecological Footprint Assessments.[5]

Activity (by Scope)	**2008 GHG Emissions** (metric tons CO2e)	**2008 Ecological footprint** (global ha-years)	**2009 GHG Emissions** (metric tons CO2e)	**2009 Ecological footprint** (global ha-years)	**2010 GHG Emissions** (metric tons CO2e)	**2010 Ecological footprint** (global ha-years)
Scope 1 activities (owned or directly controlled by SCB)						
Physical area of the SCB office	NA, 3,235 sq. ft	0.04 [a]	NA, 3,235 sq. ft	0.04 [a]	NA, 3,235 sq. ft	0.03 [a,h]
Scope 2 activities (purchased goods consumed by SCB)						
Electricity use at SCB EO	8.21 [a]		8.80 [a]		1.95 [a]	
Natural gas use at SCB EO	9.17 [a]		5.50 [a]		4.45 [a]	
SUB-TOTAL (Scope 1 and 2)	17.38		14.29		6.40	
Scope 3 activities (indirect impacts)						
SCB Executive Office Operations						
Water use	0.32 [a]		0.07 [a]		0.08 [a]	
Paper use	0.03 [a]	0.1 [b]	0.03 [a]	0.11 [b]	0.03 [f]	0.13 [b]
Waste generated	NA, 720 gal/year [g]		NA, 720 gal/year [f]		NA, 720 gal/year [f]	
Recycling generated	NA, 720 gal/year [g]		NA, 720 gal/year [f]		NA, 720 gal/year [f]	
Company air travel for SCB staff	43.44 [b]		91.42 [b]		17.60 [b]	

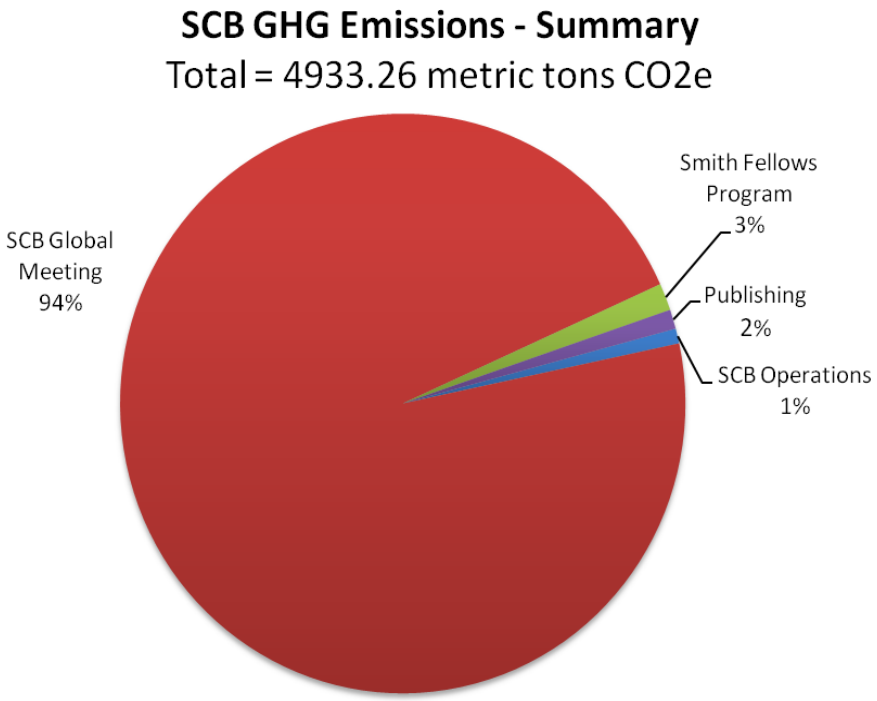
[5] Previous assessments can be downloaded at: http://www.conbio.org/Activities/Committees/EcologicalFootprint/CarbonOffset/ecologicalfootprint.cfm

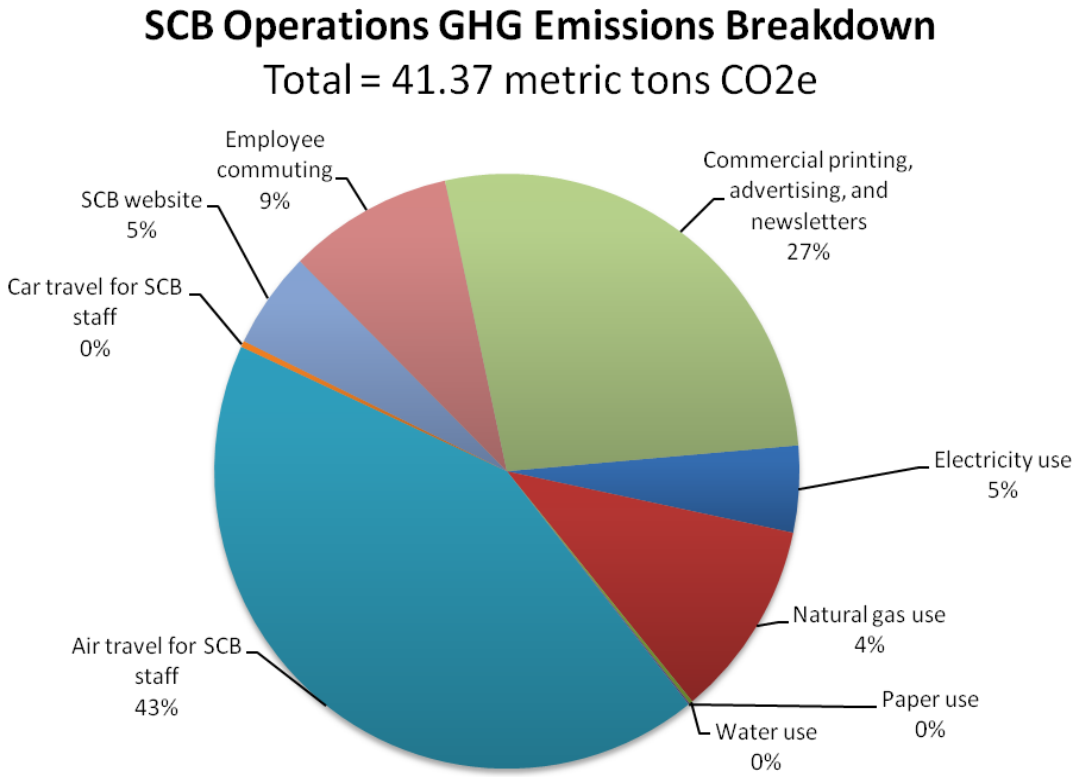
Activity (by Scope)	2008 GHG Emissions (metric tons CO2e)	2008 Ecological footprint (global ha-years)	2009 GHG Emissions (metric tons CO2e)	2009 Ecological footprint (global ha-years)	2010 GHG Emissions (metric tons CO2e)	2010 Ecological footprint (global ha-years)
Company car travel for SCB staff	0.38 [b]		0.87 [b]		0.14 [b]	
SCB website hosting and maintenance	NA (not available)		2.18 [d]		2.18 [f]	
Employee commuting	1.53 [b]		5.82 [b]		3.77 [b]	
Commercial printing, advertising, and newsletters	16.62 [e]	2.28 [b]	10.89 [e]	1.60 [b]	11.17 [e]	1.98 [b]
SUB-TOTAL (SCB Operations)	62.31		111.29		34.97	
ICCB Meetings	2008 meeting in Chattanooga, TN		2009 meeting in Beijing, China		2010 meeting in Edmonton, Alberta	
Attendee air travel	3026.63 [c]		3292.37 [c, h]		4484.79 [c, h]	
Attendee car travel	5.29 [c]		16.83 [c, h]		85.57 [c, h]	
Field trips and local tours	NA (not available)		59.82 [c]		7.34 [c]	
Hotel and dorm room accommodations	NA (not available)		121.75 [c]		59.95 [c,h]	
Catering (food and beverages)	56.50 [c,e,g]	1.32 [b,c]	18.28 [c,e,g,h]	0.81 [b,c]	125.23 [c,e,g,h]	4.94 [b,c,h]
Waste and recycling at conference	NA (not available)		NA (not available)		0.24	
Electricity use at conference venue	74.26 [c]		74.26 [f]		0.00 [c] (Shaw Conf. Center purchased renewable energy tags)	
Printing or advertising	1.01		1.01 [f]		1.01 [f]	
SUB-TOTAL (ICCB Meeting)	3163.69		3584.33		4764.13	
Smith Fellows Program						
Participant air travel	81.98 [b]		58.52 [b]		53.08 [b]	
Participant car travel	3.39 [b]		4.36 [b]		3.61 [b]	
Hotel accommodations	6.07 [b,g]		6.08 [b,g]		4.28 [b,g]	
Catering (food and beverages)	9.87 [b, e,g]	0.49 [b,c]	18.40 [b, e,g]	0.38 [b,c]	13.88 [b, e,g]	0.90 [b,c,h]
Trips	NA (not available)		2.48 [b]		NA (not available)	
SUB-TOTAL (Smith Fellows Program)	101.31		89.84		74.85	

Activity (by Scope)	2008 GHG Emissions (metric tons CO2e)	2008 Ecological footprint (global ha-years)	2009 GHG Emissions (metric tons CO2e)	2009 Ecological footprint (global ha-years)	2010 GHG Emissions (metric tons CO2e)	2010 Ecological footprint (global ha-years)
Conservation Magazine						
Printing and design	57.72 [e]	16.86 [g]	33.83 [e]	10.89 [g]	18.51 [e]	13.52 [g]
Shipping and distribution	4.18 [e]		5.05 [e]		4.40 [e]	
Other production tasks	NA (not available)		20.92 [e]		23.41 [e]	
Conservation Letters (online publication)						
Printing and design	NA (not available)		NA (not available)		NA (not available)	
Shipping and distribution	NA (not available)		NA (not available)		NA (not available)	
Conservation Biology						
Printing	NA (not available)	41.95 [b]	NA (not available)	27.61 [g]	NA (not available)	12.70 [g]
Shipping and distribution	25.00 [d]		NA (not available)		6.60 [d, h]	
SUB-TOTAL (Publishing)	86.90		59.80		52.92	
GRAND TOTAL ECOLOGICAL FOOTPRINT (EXCLUDING CO_2e)		63.04		41.44		34.21
GRAND TOTAL CARBON FOOTPRINT	**3431.60**	949	**3859.56**	1069.48	**4933.26**	1367.01
GRAND TOTAL ECOLOGICAL FOOTPRINT		**1012.04**		**1110.92**		**1401.22**

a = data gathered from bills and converted to consumption units
b = data gathered from staff notes and recollections
c = data gathered from conference registration records and converted based on reasonable assumptions
d = data provided from an external 3rd party (for example: Intermedia Web Hosting or Wiley Publishers)
e = data gathered from purchasing records and calculated using a Life-Cycle Assessment tool
f = data unavailable for current year, so values are assumed to be the same as last year
g = not recorded directly, used a reasonable estimate
h = calculated using slightly different methods from the previous year (new emissions factors or new data categorization - see Annex 1 for further details)

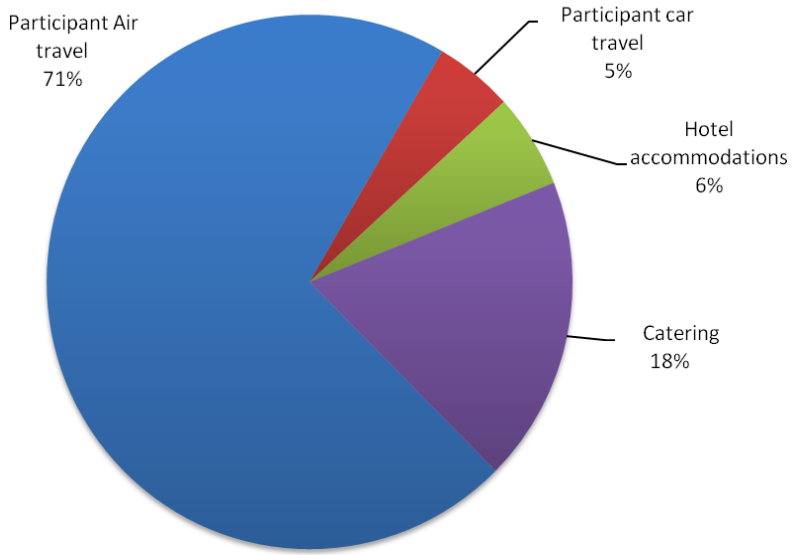
2010 Relative Contributions: The following charts present the relative contributions of the various activities to SCB's GHG emissions and Ecological Footprint values.





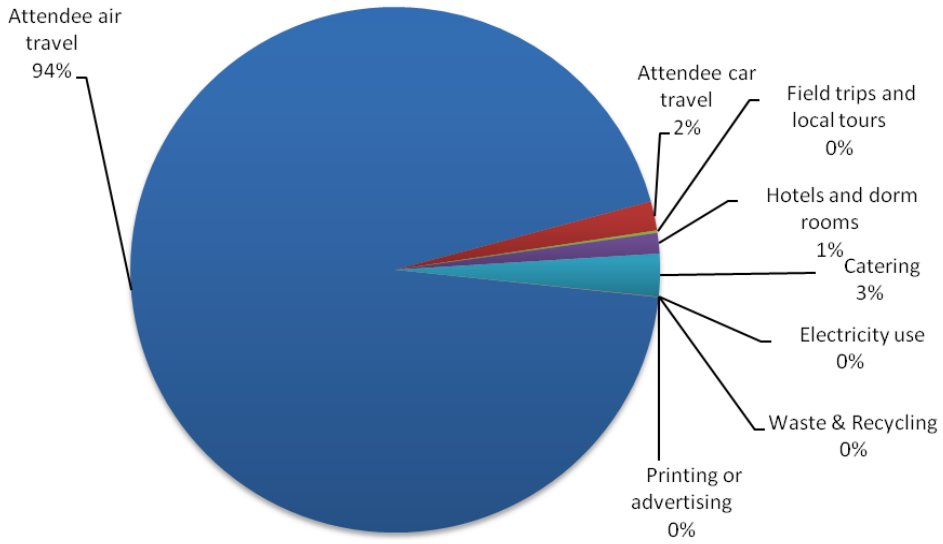
Smith Fellows Program GHG Emissions

Total = 74.85 metric tons CO2e



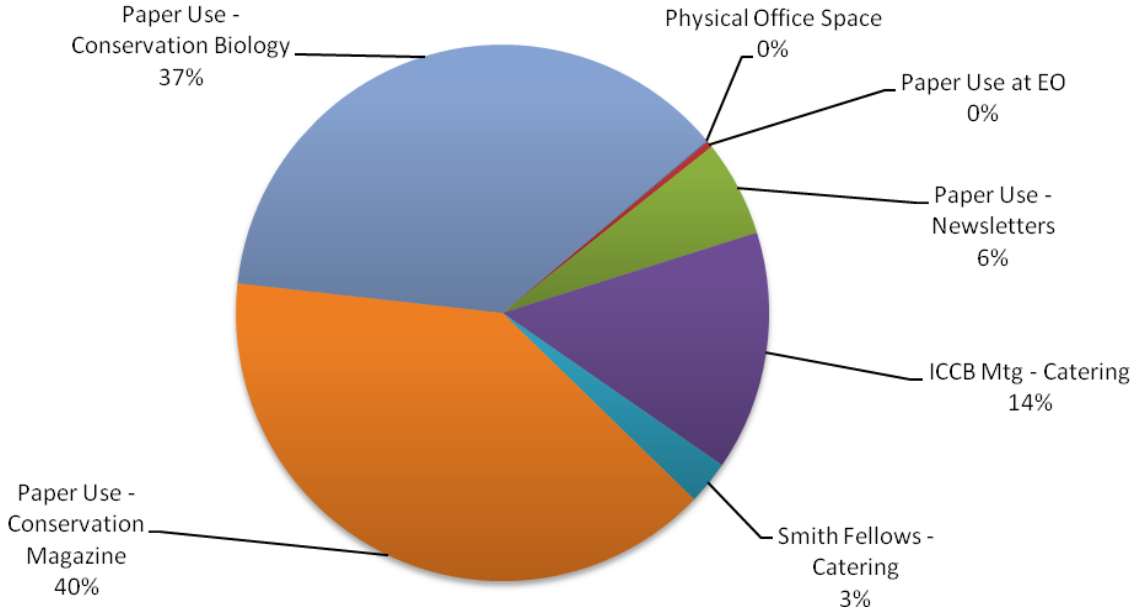
2010 ICCB Meeting GHG Emissions

Total = 4764.13 metric tons CO2e

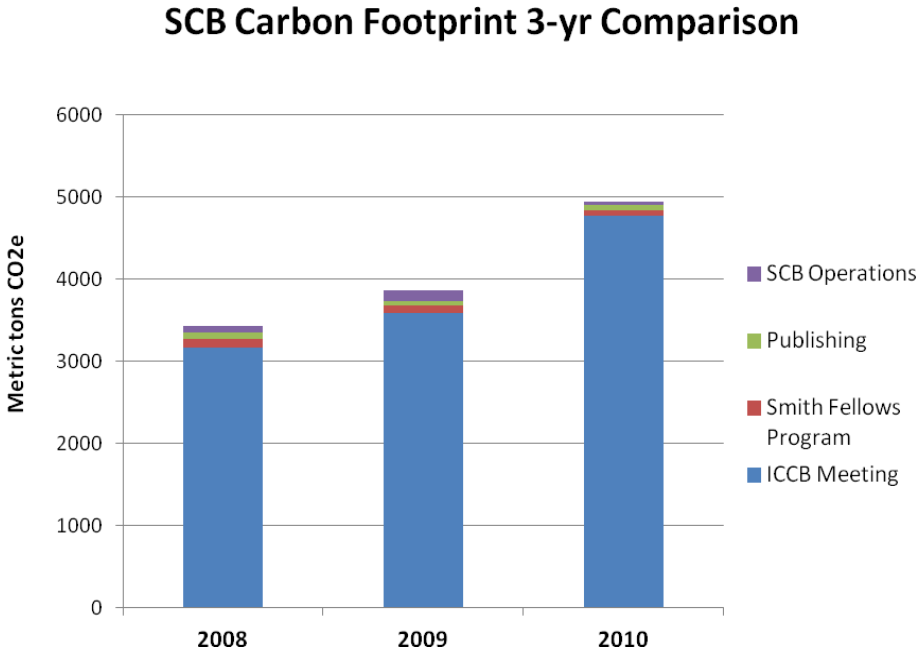


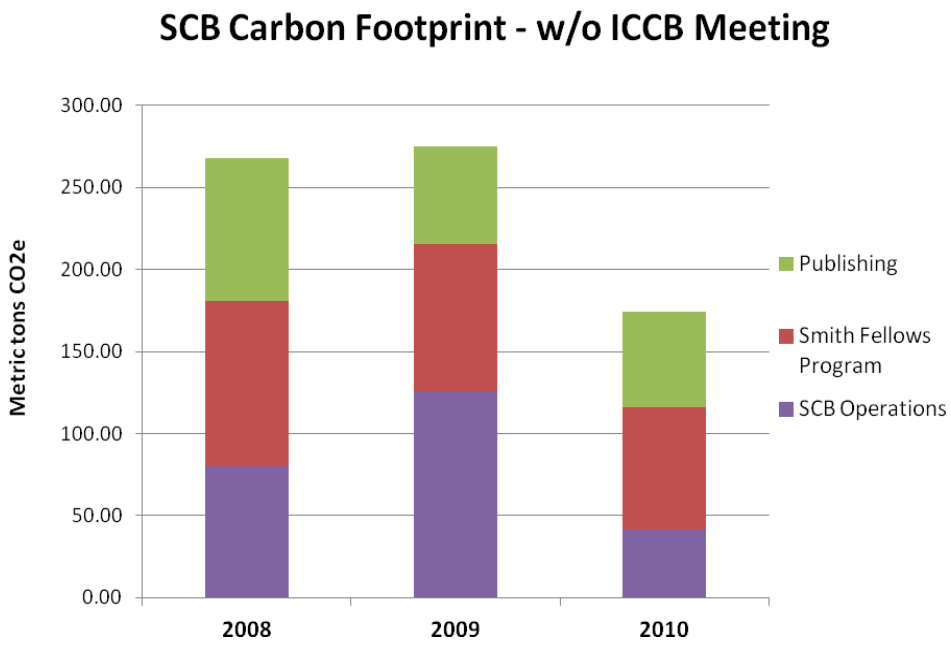
Ecological Footprint Summary

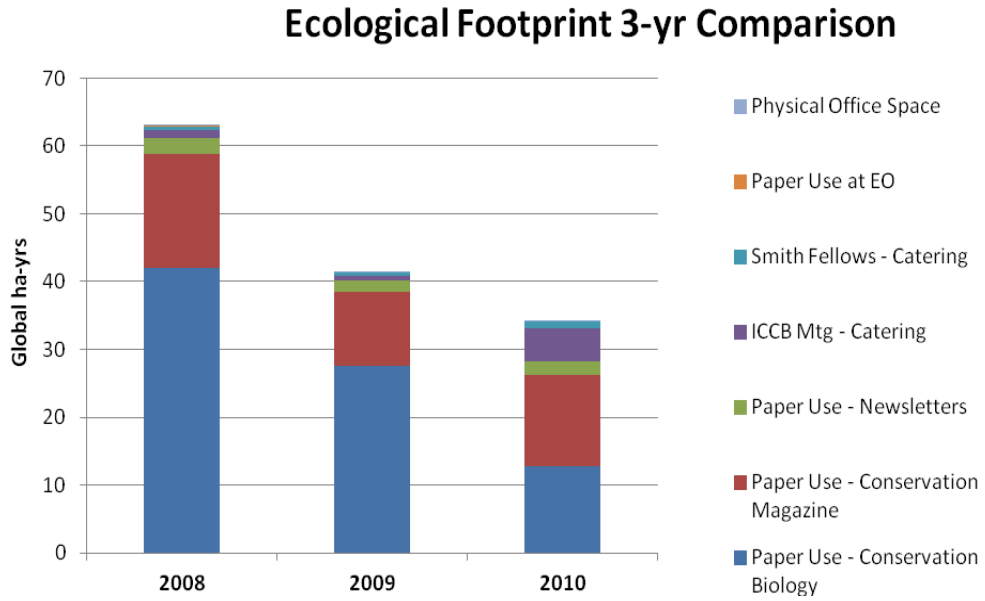
Total = 34.21 global ha-yrs (exluding GHG emissions)



3-Year Trends: The following graphs present the trends of the various activities to SCB's GHG emissions and Ecological Footprint from 2008 to 2010.







Results: GHG Emissions and Ecological Footprint

Carbon Footprint - GHG Emissions

In 2010 SCB was responsible for a total of approximately 4,938.63 metric tons of CO_2e emissions. This compares with roughly 3,400 metric tons of CO_2e in 2008 and 3,800 metric tons of CO_2e in 2009. This notable increase is primary due to greater emissions due to the ICCB meeting. Although they are a small proportion of the overall carbon footprint, the Executive Office (EO) operations and Publishing witnessed substantial decreases in emissions. Explanation of these differences are described below, along with some interesting trends from 2008-2010.

International Congress for Conservation Biology

The GHG emissions from the ICCB meeting in 2010 were about 1,200 metric tons greater than in 2009, and about 1,500 metric tons greater than in 2008. There are two main reasons for this increase:

1) Attendee air travel to the 2010 meeting was accounted for a much larger carbon footprint (~1,200 tonnes more in 2010). The increase in GHG emissions due to air travel is not surprising, given that there were over 1,500 attendees at the 2010 meeting in Edmonton and only ~650 attendees at the 2009 meeting in China. There were almost 1,200 attendees at the 2008 meeting in Tennessee. This highlights the importance of the meeting location in determining the carbon footprint of the event, given that over 75% of ICCB attendees are from the USA and Canada (2010 figures).

2) There was a substantial increase in GHG emissions estimated for catering (125 metric tons CO_2e in 2010, 57 metric tons in 2008). In the 2010 assessment, we had much more available information on field trips, food consumed, and waste generated at the meeting.

In addition to the absolute carbon footprint figures, it's interesting to note the carbon footprint of the past 3 ICCB meetings in relative terms of *CO_2e per attendee*:

Meeting	**CO_2e per attendee**[6]
2010 - Edmonton, AB	3.17
2009 - Beijing, China	5.51
2008 - Chattanooga, TN	2.63

From this perspective, the 2009 ICCB meeting in Beijing clearly stands out as the highest emitter of GHGs. While there were differences in the calculation methods between these three years, especially in terms of attendee travel, it is reasonable to assume that this trend would still hold true.

The increase in absolute emissions could have been much larger, as GHG emissions from electricity use at the conference venue are not included in this carbon footprint assessment. This is because the Shaw Conference Center purchased renewable energy certificates for the period of the ICCB event.

It is an oversimplification to assume that there were no GHG emissions due to electricity use at the conference venue, because even renewable power involves some degree of upstream and downstream energy use. The common practice in carbon footprinting is to reward renewable energy purchases, so we chose to maintain that practice in this assessment.

[6] Attendee figures from conference registration records.

SCB Operations
GHG emissions resulting from natural gas and electricity use at the SCB Executive Office (EO) declined from 2009 to 2010, however it is unknown if SCB staff have implemented any specific changes that led to this decline. The $/kwh rate paid by SCB was reduced by ~33% in 2010, but the monthly electricity bills were reduced by over 75% ($230/month in 2010, $52/ month in 2010). Staff air travel in 2010 decreased sharply, due to fewer staff trips and no long trips to Beijing.

Smith Fellows Program
The carbon footprint of the Smith Fellows Program continued a pattern of reducing carbon emissions, with a 16% reduction from 2009. This is due to small reductions in air travel, car travel, hotel rooms, and catering. This is likely a function of the event locations (which vary from year to year) and the number of attendees at each event. Each meeting averaged ~70 hotel-nights in 2009, and only ~55 hotel-nights in 2010.

Publishing
SCB publishing showed a small decrease in GHG emissions, but this sector still suffers from information shortages and inconsistent calculation methods. Wiley-Blackwell provided useful information for the number of Conservation Biology subscriptions mailed around the globe, and provided their own internal figures for the carbon footprint of shipping this publication. If the EFC can establish more consistent communication with W-B and review their carbon footprint calculation methods, perhaps we could apply their methods to Conservation Magazine as well.

Overall
Overall, in 2010, core SCB operations (Scope 1, 2, and 3) account for only 1 % of the total carbon footprint, while publishing and the Smith Fellows Program each account for an additional 2% and 3% of the total. The ICCB Meeting accounts for the other 94% of SCB's total carbon footprint.

It will be interesting to observe if the 3-yr trend of increasing GHG emissions continues for SCB and the ICCB meeting in particular. If so, the organization may have to take extra steps to acquire additional carbon offsets to mitigate these increases. More importantly, it may be necessary to evaluate the sustainability of these events more carefully and look for ways to reduce their impacts in the future.

Ecological Footprint
SCB's Ecological Footprint is about 1400 global hectare-years, meaning that about 14 km^2 of land worldwide is needed to support or offset annual operations. The bulk of our Ecological Footprint (97%) is comprised of global hectare-years of forest land that would be required to sequester SCB's GHG emissions. Excluding GHG emissions, SCB's Ecological Footprint declined by approximately 17% from 2009 to 2010 (41.44 to 34.21 global ha-years). This reduction can primarily be attributed to reduced impacts from newsletters and publishing. As mentioned earlier, this sector still suffers from incomplete data so conclusions should bear this in mind. With new Conservation Biology circulation information, it was clear that paper consumption for this journal should be reduced. We applied almost a 50% reduction in our estimate of the number of copies of the magazine (12,000 total compies), but we are not sure how accurate this may be.

Ecological footprint values for food production were much higher in 2010 than previous years. This can be attributed to better record-keeping at the 2010 ICCB meeting, which allowed us to have a much more accurate tally of meals and snacks provided to attendees. Additionally, based on menus provided from the Smith Fellows program and the Shaw Conference Center, we altered the

typical meal composition to include red meat and fish, which were lacking from previous assessment calculations. Therefore, it is likely that the 2010 Ecological Footprint estimates are much more accurate than previous figures. The 2010 ICCB also had to cater to a much larger crowd than the 2009 ICCB, as mentioned above (1,500 attendees compared to 650 attendees).

Recommendations for Future Assessments

This report is only as accurate as the data and assumptions that feed the calculations. To improve data and assumptions in future assessments, we offer the following recommendations:

- The EO and organizers of our ICCB Meetings should continue to record more detailed information to upgrade components of the assessment. The Local Organizing Committee (LOC) for the Edmonton meeting provided excellent information for this assessment, and the EFC worked with the LOC ahead of time to make sure any questions were handled beforehand. For future meetings, SCB should make it a prerequisite that certain information will be shared in a timely manner between the LOC and the EFC.

- For ICCB meeting registration, it would assist the EFC greatly if we could add two questions to the registration process:
  1. Do you plan to drive or fly to the meeting?
  2. If flying, what will be your starting airport?

  We realize that there is resistance to adding more questions to the meeting registration. The Africa Section included these questions for their 2011 meeting, and the LOC reported that it was a great help in figuring the carbon footprint of the event. EFC member Tuyeni Mwampamba (thmwampamba@gmail.com) can provide more details about the Africa Section meeting.

- The EO should modify its accounting procedures to track raw figures of resources used (instead of dollars spent) wherever possible. For instance, SCB should record actual kWh of electricity, therms of natural gas, reams of paper used in printing newsletters, etc. This will make calculations more accurate, avoiding assumptions on electricity delivery charges or printing costs. Our goal is to use the Economic Input-Output Life Cycle Assessment (EIO LCA) models as rarely as possible (See Annex 2 for more information about calculation methods). The EFC can inform EO staff what information is required, but this change will require internal support.

- Similarly, the EO should track employee travel (plane & car trips) as they happen so the Committee doesn't have to rely on personal recollections at the end of the year. A simple record-keeping system tacked onto the timesheet process can make this easy. Lauren Krizel in the EO can spearhead this effort (lkrizel@conbio.org).

- Record-keeping for the Smith Fellows Program can also be improved and standardized, so it is easier to determine air travel for attendees, hotel-nights, and how many meals were consumed. Again, this is a simple process that needs to happen at the time of the event, rather than being recalled 8-12 months after the fact.

- If greenhouse gasses emissions for publications continue to be included in future assessments, the EO and this committee should work with the various publishing teams to ensure a consistent approach for each publication. The staff members of Conservation Magazine and Conservation Biology are not currently prepared to support these assessments with actual data. This is an instance where the SCB EO either needs to formally request that certain information be tracked and shared, or we should quit trying

to estimate the impacts from these publications.

- The SCB Board of Governors has decided that carbon offset fees collected from Global Meeting attendees will be used to purchase offsets for attendee travel as well as the other estimated impacts of the meetings (energy use, local tours, etc). We should be sure to re-check that the carbon offset fees are sufficient to offset these calculated impacts, in case another fee adjustment is warranted. In SCB's current carbon offset project, the Wild Rose Conservation Area, the project has a "capped" number of offsets than can be claimed. We need to be sure that we are not on track to exceed this cap, and that the fees generated at ICCB meetings are enough to cover contract obligations. With the substantial increase in GHG emissions in 2010, we may need to think about additional opportunities to offset the organization's impacts.

- Similarly, the Smith Fellows Program and the EO should be sure that there is sufficient funding allocated in their annual budgets to offset estimated GHG emissions.

Decisions to be made by SCB Board of Governors

We recommend that the Board of Governors consider the following issues, and respond either by a formal Board vote, or communicating the sense of the Board to our Committee and to the staff of the Executive Office:

Will SCB continue to take responsibility for the GHG emissions and Ecological Footprint of our publications?

If so, we will need to make formal requests for information and coordinate this effort across publications. This would likely increase the overall SCB carbon footprint.

Will SCB Sections be encouraged to follow a similar model for estimating environmental impacts?

SCB Sections likely have similar impacts, and if these impacts are measured then the Sections can contribute more effectively to SCB's indentified carbon offset projects and take steps to reduce their GHG emissions and Ecological Footprints. This assessment could be a model for all SCB Sections.

Will SCB continue with the current model of selecting and sponsoring carbon offset projects?

SCB's participation in the Baviaanskloof thicket restoration project in South Africa ended in 2009, and we are still waiting for data on the acres planted and planting survival of that project before releasing the remainder of our allocated funds. The EFC negotiated a new carbon offset contract with the Wild Rose Conservation Site in Alberta, Canada to purchase the carbon offset rights for 2010- 2013 (to cover our next 3 Global Congress meetings).[7] This process was started without the express permission or guidance of the BoG, and it is worth settling a few questions:

1) *Should SCB continue with the model of sponsoring a project for the estimated future carbon benefits, as opposed to purchasing already certified carbon offsets from an international carbon market?*

   Our current model gives SCB much more familiarity with the project and generally a cheaper price per tonne of purchased CO_2. On the other hand, it is a great burden to negotiate a binding Emissions Reduction Purchase Agreement, as well as monitoring and reporting guidelines for tracking the progress of the projects. Purchasing certified carbon offsets from a carbon market registry would likely be more expensive, but would probably be more straightforward.

2) *If SCB continues with the model of sponsoring the future performance of carbon offset projects, should there be a more formal process for soliciting and selecting projects?*

   To-date, the projects have been selected without the wider input of the SCB membership, and screening the projects has been an informal process. The EFC has included a Request for Proposal[8] for carbon offset projects in several newsletters to the general membership, but haven't received much input to date.

[7] You can learn more about the Wild Rose Conservation Site at www.conbio.org/Activities/Committees/EcologicalFootprint/CarbonOffset/wildrose.cfm.

[8] See http://www.conbio.org/Activities/Committees/EcologicalFootprint/Carbon%20Offset%20Project%20RFP_1-10-11.pdf

Annex 1

2010 Ecological Footprint Assessment – Detailed Data and Calculations

This Annex is included to provide detail on the data gathered for each segment of the GHG Assessment, and the assumptions and calculation methods used to arrive at a final emissions output. In order to be transparent with our approach and to allow for consistency in calculation methods across years, we have included as much information as possible.

The following color code is used in each of the following tables:

	Information provided by SBC staff
	Standard conversion factor
	Calculated figure
	Greenhouse Gas (GHG) figure

SCB Operations

2010 Monthly Electricity Consumption

Date	Amount	Minus delivery charge [1]	Rate [1]	Electricity Use	Emissions Factor [2]	Line loss factor [3]	GHG Emissions [4]
	($)	($)	($/kWh)	(kWh)	(lbs CO2e/kWh)		(metric tons CO2e)
01/27/2010	16.05	1.09	0.11	10.03	1.09	1.072	0.01
02/24/2010	141.76	126.80	0.11	1166.51	1.09	1.072	0.62
03/17/2010	98.39	83.43	0.11	767.53	1.09	1.072	0.41
04/27/2010	40.02	25.06	0.11	230.54	1.09	1.072	0.12
05/26/2010	34.62	19.66	0.11	180.86	1.09	1.072	0.10
06/17/2010	32.28	17.32	0.11	159.34	1.09	1.072	0.08
07/29/2010	30.61	15.65	0.11	143.97	1.09	1.072	0.08
08/26/2010	41.01	26.05	0.11	239.65	1.09	1.072	0.13
09/22/2010	29.75	14.79	0.11	136.06	1.09	1.072	0.07
10/20/2010	62.24	47.28	0.11	434.96	1.09	1.072	0.23
12/22/2010	37.31	22.35	0.11	205.61	1.09	1.072	0.11
Nov	51.28	36.32	0.11	334.10	1.09	1.072	0.18
Total:	564.04			3675.07			**1.95**

[1] = Delivery charge from Pepco rate sheet, http://www.pepco.com/home/
[2] = Washington DC average kWh emission factor is 1.09 lbs/kWh (EPA E-Grid 2005).
[3] = Standard line loss for electricity transmission = 7.2% (http://climatetechnology.gov/library/2003/tech-options/tech-options-1-3-2.pdf)
[4] = 1 metric ton = 2205 lbs

2010 Monthly Natural Gas Consumption

Date	Amount	Minus Fee [1]	Billing Rate [1]	Natural Gas	Emissions Factor [2]	Total building area [3]	SCB office area [3]	GHG Emissions [4]
	($)	($)	($/therm)	(therms)	(kg CO2e/therm)	sq. ft	sq. ft	(metric tons CO2e)
01/29/2010	202.48	197.42	0.3592	549.61	5.914	4495	3235	2.34
03/03/2010	83.48	78.42	0.3592	218.32	5.914	4495	3235	0.93
03/31/2010	34.69	29.63	0.3592	82.49	5.914	4495	3235	0.35
04/28/2010	44.17	39.11	0.3592	108.88	5.914	4495	3235	0.46
09/29/2010	5.06	0	0.3592	0.00	5.914	4495	3235	0.00
11/17/2010	7.95	2.89	0.3592	8.05	5.914	4495	3235	0.03
11/24/2010	20.92	15.86	0.3592	44.15	5.914	4495	3235	0.19
12/31/2010	17.48	12.42	0.3592	34.58	5.914	4495	3235	0.15
	Total:			1046.07				**4.45**

[1] = Fee schedule from http://www.washgas.com/pages/TariffsandRateSchedules
[2] = Emissions factor from the US Energy Information Administration (http://eia.doe.gov/oiaf/1605/coefficients.html).
[3] = Total natural gas use must be subdivided to represent the proportion of the total building occupied by SCB, because the building is metered as a whole.
[4] = 1000 kg equals 1 metric ton.

Monthly Water Use

Date	Amount	Amount Minus Delivery [1]	Rate [1]	Water	Water	Electricity Use [2]	kWh	Line loss multiplier [3]	Emissions factor [4]	Total building area [5]	SCB office area [5]	GHG Emissions [6]
			$/ccf	CCF	Gallons	kWh/1000 gal			(lbs CO2e/kWh)	sq. ft	sq. ft	(metric tons CO2e)
01/27/2010	40.59	36.59	5.77	6.34	4743.71	3.09	14.66	1.072	1.09	4495	3235	0.01
02/24/2010	40.59	36.59	5.77	6.34	4743.71	3.09	14.66	1.072	1.09	4495	3235	0.01
03/17/2010	27.21	23.21	5.77	4.02	3009.06	3.09	9.30	1.072	1.09	4495	3235	0.00
04/27/2010	40.59	36.59	5.77	6.34	4743.71	3.09	14.66	1.072	1.09	4495	3235	0.01
05/26/2010	34.53	30.53	5.77	5.29	3958.06	3.09	12.23	1.072	1.09	4495	3235	0.00
07/21/2010	99.93	95.93	5.77	16.63	12436.85	3.09	38.43	1.072	1.09	4495	3235	0.01
08/26/2010	78.73	74.73	5.77	12.95	9688.38	3.09	29.94	1.072	1.09	4495	3235	0.01
09/22/2010	47.28	43.28	5.77	7.50	5611.04	3.09	17.34	1.072	1.09	4495	3235	0.01
10/20/2010	38.97	34.97	5.77	6.06	4533.69	3.09	14.01	1.072	1.09	4495	3235	0.01
11/24/2010	44.73	40.73	5.77	7.06	5280.44	3.09	16.32	1.072	1.09	4495	3235	0.01
12/22/2010	48.28	44.28	5.77	7.67	5740.68	3.09	17.74	1.072	1.09	4495	3235	0.01
June	49.22	45.22	5.77	7.84	5862.67	3.09	18.12	1.072	1.09	4495	3235	0.01
Total												**0.08**

[1] = Delivery charge from DCWASA rate sheet
[2] = Electricity use rate from Cascadia Seattle Climate Partnership tool
[3] = Standard line loss for electricity transmission = 7.2% (http://climatetechnology.gov/library/2003/tech-options/tech-options-1-3-2.pdf)
[4] = Washington DC average kWh emission factor is 1.09 lbs/kWh (EPA E-Grid 2005).
[5] = Total water use must be subdivided to represent the proportion of the total building occupied by SCB, because the building is metered as a whole.
[6] = 1 metric ton = 2205 lbs

Paper Use at the EO

Activity	Amount	Emission Factor [1]	GHG Emissions
	(reams)	(mt CO2e/ream)	(metric tons CO2e)
Paper Use	30.00	0.0010	**0.03**
Total:			

[1] = The emissions factor for Paper Use comes from the Seattle Climate Partnership CO2 tool, based on standard copy paper with 30% recycled content.

Air Travel

Employee	Origin	Layover [1]	Destination	Round-trip?	Number of Trips	Leg 1 [2]	Leg 2	Leg 1 [3]	Leg 2	GHG Emissions [4]
				1=no, 2=yes		miles	miles	metric tons CO2e	metric tons CO2e	metric tons CO2e
Anne Hummer	Baltimore		Seattle	2	1	2331		1.11	0.00	2.23
Anne Hummer	Baltimore		San Jose, CA	2	1	2435		1.16	0.00	2.33
Anne Hummer	Baltimore		Austin, TX	2	1	1348.5		0.64	0.00	1.29
Shonda Foster	BWI		Denver	2	1	1508		0.72	0.00	1.44
Shonda Foster	BWI	Minneapolis	Edmonton	2	1	938	1082	0.52	0.52	2.07
Shonda Foster	BWI		Chicago	2	1	606		0.33	0.00	0.67
Heather DeCaluwe	DC		Edmonton	2	1	1986		0.95	0.00	1.90
Heather DeCaluwe	DC		Boston	2	1	394		0.22	0.00	0.43
Anne Hummer	DC		Boston	2	1	394		0.22	0.00	0.43
Ellen Main	Fort Myers, FL	Chicago	Edmonton	2	1	1102	1437	0.53	0.69	2.43
Margaret Flagg	Gainsville, FL		Edmonton	2	1	1,334		0.64	0.00	1.27
Autumn-Lynn Harrison	San Francisco		Edmonton	2	1	1170		0.56	0.00	1.12
Totals										**17.60**

[1] = Exact itineraries were not provided, so direct flight or single-stop itineraries were gathered from orbitz.com.
[2] = Flight leg distance determined using www.distance.to
[3] = Emissions factors for short, medium, and long (0.2897, 0.2028, 0.177 kg CO2/mile, respectively) are taken from the World Resources Institute GHG Protocol for Mobile Sources (http://www.ghgprotocol.org/). Short flights are up to 281 miles, medium flights are 281 to 994 miles, long flights are greater than 994 miles (single-leg distances).
[4] = We include a Radiative Forcing Index of 2.7 (IPCC 2007). 1000 kg equals 1 metric ton.

Car Travel

Employee	Destination	Number of Trips	Miles Driven	Estimated MPG [1]	Gallons of Gasoline	GHG Emissions [2]
						(metric tons CO2e)
Anne Hummer	Front Royal, VA	1	200	23	8.70	0.10
Shonda Foster	Bowie, MD to Elkridge, MD to DC to Bowie	1	73	23	3.17	0.04
Heather DeCaluwe	McLean, VA	6	12	23	0.52	0.01
Totals						**0.14**

[1] = Car MPG estimated to be 23 MPG on average. City bus/train/metro emissions per passenger mile (0.30 lb CO2/pass-mile) is a composite figure for local bus and subway, averaged from WRI GHG Protocol for Mobile Sources from the US EPA.
[2] = Emissions factor for a gallon of gasoline is 24.692 lbs CO2e/gallon, which includes upstream and downstream emissions, reported in the (Argonne GREET Fleet Footprint Calculator 1.0) and (US EPA Climate Leaders by way of WRI GHG Protocol Spreadsheet for Mobile Sources (April 2003)). 2205 lbs equals 1 metric ton.

2010 Website Server Electricity Consumption

Electricity Use [1]	Electricity Use [2]	Emissions Factor [3]	Line loss factor [4]	GHG Emissions [5]
(kWh/day)	(kWh/year)	(lbs CO2e/kWh)		(metric tons CO2e)
11.52	4120.70	1.09	1.072	**2.18**

[1] = The SCB website is hosted on a dedicated server by Intermedia. We received the following update from our Network Engineer: "The server is a dell 1950 with two 146g drives. At the low end, when it is doing virtually nothing, the server will pull 1.8amps @ 120volts. With busy disks, it could hit 2.2 amps. You should double this power usage to account for cooling and UPS overhead/inefficiencies." To estimate average energy use from the server, we assumed 2.0 amps and 120 volts. This means that the server uses approximately 240 watts of electricity each hour, or 5760 watts per day, which is doubled to equal 11.52 kWh/day.
[2] = We assume that the server is up and running for 98% of the time over the course of a year.
[3] = Washington DC average kWh emission factor is 1.09 lbs/kWh (EPA E-Grid 2005).
[4] = Standard line loss for electricity transmission = 7.2% (http://climatetechnology.gov/library/2003/tech-options/tech-options-1-3-2.pdf)
[5] = 1 metric ton = 2205 lbs

Employee Commuting

Name	Days Commuted	Miles Per roundtrip	Total Miles commuted	Vehicle Type	Estimated MPG [1]	Gallons of Gasoline	GHG Emissions [2]
							(metric tons CO2e)
Cathy McIntosh	12	80.4	964.8	2011 Toyota Sienna Minivan	23	41.95	0.47
Anne Hummer	52	20	1040	2010 Chevrolet Malibu Maxx LT	23	45.22	0.51
Shonda Foster	36	20	720		23	31.30	0.35
Shonda Foster	36	30	1080	Metro train	0.30 lb C02/pass-mile		0.15
Heather DeCaluwe	208	14	2912	Acura Integra	23	126.61	1.42
Heather DeCaluwe	52	14	728	Metro train	0.30 lb C02/pass-mile		0.10
Alan Thornhill	64	8	512	Bus/Metro	0.30 lb C02/pass-mile		0.07
	32	8	256	Car	23	11.13	0.12
John Fitzgerald	235	17	3995	Bus/Metro	0.30 lb C02/pass-mile		0.54
	5	17	85	Car	23	3.70	0.04
Totals			**12292.8**				**3.77**

[1] = Car MPG estimated to be 23 MPG on average. City bus/train/metro emissions per passenger mile (0.30 lb CO2/pass-mile) is a composite figure for local bus and subway, averaged from WRI GHG Protocol for Mobile Sources from the US EPA.
[2] = Emissions factor for a gallon of gasoline is 24.692 lbs CO2e/gallon, which includes upstream and downstream emissions, reported in the (Argonne GREET Fleet Footprint Calculator 1.0) and (US EPA Climate Leaders by way of WRI GHG Protocol Spreadsheet for Mobile Sources (April 2003)). 2205 lbs equals 1 metric ton.

Newsletter	2010 Dollars	1997 Dollars [1]	Emission Factor [2]	GHG Emissions [3]	EIO-LCA Sector
			kg C02e/$	metric tons CO2e	
Printing and Reproduction	10,329.73	7,595.39	0.477	3.62	Commercial printing
Postage and Shipping	2,649.22		0.257	0.68	
Total:	**$12,978.95**			**4.30**	

[1] = When possible, we made use of the Cascadia Climate Partnership Tool, which uses an input in 2010 dollars. For those activities that require the EIO-LCA analysis, the EIO-LCA model that we use for Printing requires an input in 1997 dollars. We used the inflation calculator at www.usinflationcalculator.com to convert from 2010 to 1997 dollars.
[2] = Emissions factors come from the Economic Input Output Life Cycle Analysis tool produced by the Green Design Institute at Carnegie Mellon University. Those activities not converted to 1997 dollars are calculated using the Cascadia Seattle Climate Partnership Tool. Specific EIO-LCA sectors are listed in the righthand column.
[3] = 1 metric ton = 1000 kg.

Activity	2010 Dollars	1997 Dollars [1]	Emission Factor [2]	GHG Emissions [3]
			kg C02e/$ (1997)	metric tons CO2e
Advertising and Marketing	17,045.43	12,533.40	0.55	**6.87**

[1] = The EIO-LCA model that we use for Printing requires an input in 1997 dollars. We used the inflation calculator at www.usinflationcalculator.com to convert from 2010 to 1997 dollars.
[2] = Emissions factors come from the Economic Input Output Life Cycle Analysis tool produced by the Green Design Institute at Carnegie Mellon University. We used the "Advertising and Marketing" sector.
[3] = 1 metric ton = 1000 kg.

2010 SCB Global Congress in Edmonton, Alberta

Air Travel and Car Travel for Attendees

This calculation is representative of how GHG emissions from air travel and car travel were calculated from the 2010 SCB Global Congress, because it would be impractical to list the raw data for all attendees. Because so many of the meeting attendees travel from overseas and from different regions of the world, a different method was employed to more accurately reflect the number of flight legs and layovers in a typical travel itinerary. This method strikes a balance between over-estimating on a given leg of an itinerary, but under-estimating (most likely) the number of flights taken per attendee.

For each attendee, SCB records show the work city, state, and country. Online travel sites (Orbitz.com) were used to construct a "typical" travel itinerary for a registrant's particular city or country, based on the cheapest travel options. The typical itineraries were split into numbers of flights in different distance categories. In the GHG Protocol, short flights are up to 280 miles, medium flights are 281-994 miles, long flights are 995-2,500 miles, and extended flights are over 2,500 miles (single-leg distances). Each flight category has a specific emissions factor (kg CO_2e/ passenger-mile). Because of a recording mix-up, the flight categories in our assessment are grouped from 0-140 miles, 141-497 miles, 498-1250 miles, 1251-2500 miles, 2501-5000 miles, and 5000+ miles. We still used the appropriate emissions factor for these more accurate flight categories. We assumed the following flight distances and GHG emissions for our calculations:

Single-leg distance	**0 - 280**	**281 - 994**	**995 - 2500**	**2501 - 5000**	**5001 - 10000**
Miles assumed	200	640	1750	3750	7500
RFI	2.7	2.7	2.7	2.7	2.7
Emissions factor	0.2897	0.2028	0.177	0.177	0.177
GHG emissons (round-trip x 2, metric tons CO2e)	0.312876	0.7008768	1.67265	3.58425	7.1685

For cities that were very far from the nearest major airport, we assumed that the attendees drove to the airport using an average vehicle. We also assumed that attendees within a driving distance < 6 hours one way decided to drive instead of fly. Everyone living distance of < 25 miles one way decided to drive daily to the meeting . We also decided to add 34 miles to all arrivals to Edmonton international airport for car distance to Edmonton City (17 miles one way).

The full attendee list and calculation of GHG emissions is available from the EFC upon request (email ecofootprint@conbio.org).

Hotel and dorm room accommodations			
Hotel-Nights [1]	**Emission Factor [2]**	**GHG Emissions [3]**	
	(kg CO2/room-night)	(metric tons CO2e)	
1430	29.53	**42.23**	single rooms
1200	14.765	**17.72**	dorm rooms/ double occupancy

[1] = Hotel nights gathered from conference registration figures at conference associated hotels.
[2] = Emissions associated with a one-night stay in a hotel are calculated at 29.53 kg CO2 per room per day for an average hotel. (Environmental Protection Agency). Occupants of dorm rooms or double-occupancy rooms are rated at half the emissions value of average hotel rooms.
[3] = 1000 kg equals 1 metric ton.

Catering						
Meals	**Boxed Lunches**	**Snacks**	**% Vegetarian [1]**	**Estimated Cost [2]**	**Emission Factor [3]**	**GHG Emissions [4]**
					(kg CO2/$)	(metric tons CO2e)
183	2198	10167	50	132621	1.1953	**125.23**

[1] = Estimated, this information was unavailable.
[2] = Assumed $25 for each meal $12 for each boxed lunch, and $10 for each snack - from Conference Registration data sheet.
[3] = Emissions factor from the Cascadia Seattle Climate Partnership tool. Vegetarian meals are assumed to emit only 58% of the GHG emissions of a non-vegetarian meal, according to the Nature Conservancy's online carbon footprint calculator.
[4] = metric ton = 1000 kg

Waste and recycling at the conference

Total Waste	**Landfill Rate**	**Total Landfilled Waste**	**Emissions Factor [1]**	**GHG Emissions [2]**
(kg)		(kg)	(kg CO2e/kg waste)	(metric tons CO2e)
1073.5	47.70%	512.06	0.46	**0.24**

[1] Emission factors for waste is 420 kg CO2/2000 lbs and for recycling -970 kg CO2/2000 lbs (Cascadia Seattle Climate Partnership CO2 Tool) and 1000 kg equals one metric ton.
[2] = metric ton = 1000 kg

Smith Fellows Program

Smith Fellows Air Travel

Name	Origin	Layover [1]	Destination	Round-trip?	Number of Trips	Leg 1 [2]	Leg 2	Leg 1 [3]	Leg 2	GHG Emissions [4]
				1=no, 2=yes		Miles	Miles	metric tons CO2e	metric tons CO2e	metric tons CO2e
Shonda Foster	Bal	Cin	Denver	2	1	1093	423	0.52	0.23	1.51
Clare Aslan	Sacramento, CA		Denver	2	1	888		0.49	0.00	0.98
Clare's dad	Flagstaff, AZ	PHX	Denver	2	1	105	586	0.08	0.32	0.81
Clare's son (6 months old)	with Clare		Denver	2	1	888		0.49	0.00	0.98
Keryn Gedan	Washington, DC		Denver	2	1	1491		0.71	0.00	1.42
Ben Sikes	Austin, TX	Houston	Denver	2	1	147	879	0.12	0.48	1.20
Liana Joseph	Australia	LAX	Denver	2	1	7511	831	3.59	0.46	8.09
Raina Plowright	Bozeman, MT		Denver	2	1	514		0.28	0.00	0.57
Kiki Jenkins	Seattle, WA		Denver	2	1	1021		0.49	0.00	0.98
Jodi Hilty	Bozeman, MT		Denver	2	1	514		0.28	0.00	0.57
Kent Redford	NYC		Denver	2	1	1629		0.78	0.00	1.56
Kelly Matheson	NYC		Denver	2	1	1629		0.78	0.00	1.56
John Hall	Washington, DC		Denver	2	1	1491		0.71	0.00	1.42
Dickson	Flagstaff, AZ	PHX	DC	2	1	105	586	0.08	0.32	0.81
Gibbs	SFO	DEN	DC	2	1	950	1491	0.52	0.71	2.47
Jensen	Seattle, WA	DEN	DC	2	1	1021		0.49	0.00	0.98
Mabey	Hiram, OH		DC	2	1	274		0.21	0.00	0.43
Salomon	Vancouver		DC	2	1	2360		0.71	0.00	1.42
Theobald	Den		DC	2	1	1491		0.71	0.00	1.42
Mike D	Stevens Point	CHI	Baltimore	2	1	123	606	0.10	0.33	0.86
RP	Bozeman, MT	DEN	Bal	2	1	514		0.28	0.00	0.57
SR	DEN		BAL	2	1	1491		0.71	0.00	1.42
LP	RENO	DEN	BAL	2	1	789	1491	0.43	0.71	2.29
JB	San Antonio	Houston	BAL	2	1	190	1252	0.15	0.60	1.49
EF	Santa Barbara	DEN	BAL	2	1	890	1491	0.49	0.71	2.40
SJ	Chicago		BAL	2	1	606		0.33	0.00	0.67
KJ	Seattle, WA	DEN	BAL	2	1	1021	1491	0.49	0.71	2.40

GH	Boston		BAL	2	1	360		0.20	0.00	0.40
Mike Dombeck	Stevens Point, WI		CHI	2	1	123		0.10	0.00	0.19
Shonda Foster	Baltimore, MD		CHI	2	1	606		0.33	0.00	0.67
Debra Moniz	Boston, MA		CHI	2	1	851		0.47	0.00	0.94
Sarah Reed	Denver, CO		CHI	2	1	918		0.51	0.00	1.01
Kiki Jenkins	Seattle, WA		CHI	2	1	1735		0.83	0.00	1.66
Raina Plowright	Bozeman, MT	DEN	CHI	2	1	514	918	0.28	0.51	1.58
Ben Sikes	Austin, TX		CHI	2	1	978		0.54	0.00	1.08
Keryn Gedan	Washington, DC		CHI	2	1	595		0.33	0.00	0.66
Clare Aslan (plus her mom)	Sacramento, CA		CHI	2	1	1790		0.85	0.00	1.71
Liana Joseph	NYC		CHI	2	1	713		0.39	0.00	0.79
Patty Zaradic	Philadelphia, PA		CHI	2	1	665		0.37	0.00	0.73
Jeff Camm	Cincinnati, OH		CHI	2	1	251		0.20	0.00	0.39
Totals										**53.08**

[1] = Exact itineraries were not provided, so direct flight or single-stop itineraries were gathered from orbitz.com.

[2] = Flight leg distance determined using www.distance.to

[3] = Emissions factors for short, medium, and long (0.2897, 0.2028, 0.177 kg CO2/mile, respectively) are taken from the World Resources Institute GHG Protocol for Mobile Sources (http://www.ghgprotocol.org/). Short flights are up to 281 miles, medium flights are 281 to 994 miles, long flights are greater than 994 miles (single-leg distances).

[4] = We include a Radiative Forcing Index of 2.7 (IPCC 2007). 1000 kg equals 1 metric ton.

Smith Fellows Car Travel

Employee	Departure	Arrival	Distance [1]	Estimated MPG [2]	Gallons of Gasoline	GHG Emissions [3]
			(miles)			(metric tons CO2e)
Mike D	Stevens Point	Loveland, CO	2082	23	90.52	1.01
Sarah	Ft. Collins	Loveland, CO	27	23	1.17	0.01
Dave T	Ft. Collins	Loveland, CO	27	23	1.17	0.01
Will S	Denver	Loveland, CO	105	23	4.57	0.05
12 people	Denver	Loveland, CO	1260	23	54.78	0.61
Tania	Boulder	Loveland, CO	65	23	2.83	0.03
20 people	Lily Lake	Edmonton, AB	800	23	34.78	0.39
Mike S	Moscow, ID	Lily Lake	1390	23	60.43	0.68
11 people	DC	Elkridge, MD	726	23	31.57	0.35
Shonda	Bowie, MD	Elkridge, MD	41	23	1.78	0.02
Person	Harrisonburg, VA	Elkridge, MD	320	23	13.91	0.16
JS	LaCrosse	CHI	566	23	24.61	0.28
Totals			**7409**			**3.61**

[1] = Driving distance estimated from Google.com.
[2] = MPG estimated to be 23 MPG on average.
[3] = Emissions factor for a gallon of gasoline is 24.692 lbs CO2e/gallon, which includes upstream and downstream emissions, reported in the Argonne GREET Fleet Footprint Calculator 1.0 and US EPA Climate Leaders by way of WRI GHG Protocol Spreadsheet for Mobile Sources (April 2003).

Smith Fellows Hotel Stays

Trip	Hotel-Nights	Emission Factor [1]	GHG Emissions [2]
		(kg CO2/room-night)	(metric tons CO2e)
CO	55	29.53	1.62
AL	56	29.53	1.65
DC	34	29.53	1.00
MD	42	29.53	1.24
IL	43	29.53	1.27
Totals	**230.00**		**4.28**

[1] = Emissions associated with a one-night stay in a hotel are calculated at 29.53 kg CO2 per room per day for an average hotel. (Environmental Protection Agency). ClearSky assumes that Smith Fellows stayed in average hotel rooms.
[2] = 1000 kg equals 1 metric ton.

Smith Fellows Meals

Trip	Meals	Snacks	% Vegetarian [2]	Estimated $ Spent [3]	Emission Factor [4]	GHG Emissions [5]
					kg CO2/$	(metric tons CO2e)
CO			50	4200	1.1953	3.97
AL			50	3360	1.1953	3.17
DC			50	2040	1.1953	1.93
MD			50	2520	1.1953	2.38
IL			50	2580	1.1953	2.44
Totals						**13.88**

[2] = Estimated from meal menus and attendee lists for the various trips, or assumed where this information was unavailable.
[3] = Shonda Foster advised that $60/day is a rough estimate for food expenses. $60 estimated for each hotel-night on the trip.
[4] = Emissions factor from the Cascadia Seattle Climate Partnership tool. Vegetarian meals are assumed to emit only 58% of the GHG emissions of a non-vegetarian meal, according to the Nature Conservancy's online carbon footprint calculator.
[5] = metric ton = 1000 kg

SCB Publications

Conservation Magazine	2010 Dollars	1997 Dollars [1]	Emission Factor [2]	GHG Emissions [3]	EIO-LCA Sector
			kg C02e/$	metric tons CO2e	
Printing and Reproduction	48,734.37	35,834.10	0.477	17.09	Commercial printing
Postage and Shipping	17,131.26		0.257	4.40	
Accounting, Legal, Editorial services	5,921.33	4,353.92	0.326	1.42	Accounting and bookkeeping
Office supplies	2,594.29		0.355	0.92	
Computers and hardware	72.17		0.282	0.02	
Telecommunications and internet	490.85	360.92	0.476	0.17	Telecommunications
Illustrations	7,163.63	5,267.38	0.398	2.10	Independent artists and writers
Building expenses	35,025.15	25,753.79	0.400	10.30	Sevices to buildings and dwellings
Books and publications	43.46		1.100	0.05	
Travel	4,750.03	3,492.67	1.330	4.65	Air travel
Advertising and marketing	12,913.99	9,495.58	0.548	5.20	Advertising and marketing
Misc		0.00	0.315	0.00	Misc professional and technical services
Total:				**46.32**	

[1] = When possible, we made use of the Cascadia Climate Partnership Tool, which uses an input in 2010 dollars. For those activities that require the EIO-LCA analysis, the EIO-LCA model that we use for Printing requires an input in 1997 dollars. We used the inflation calculator at www.usinflationcalculator.com to convert from 2010 to 1997 dollars.
[2] = Emissions factors come from the Economic Input Output Life Cycle Analysis tool produced by the Green Design Institute at Carnegie Mellon University. Those activities not converted to 1997 dollars are calculated using the Cascadia Seattle Climate Partnership Tool. Specific EIO-LCA sectors are listed in the righthand column.
[3] = 1 metric ton = 1000 kg.

2010 Ecological Footprint

For the following sections, please refer to the following color codes:

	Data directly from SCB
	Assumptions
	Data directly from National Footprint Accounts (Global Footprint Network)
	Ecological Footprint in hectares or global hectares

The source for all of the following calculations is the Global Footprint Network, National Footprint Accounts, 2008 Edition. (Available at www.footprintnetwork.org)

Office space

Built-up area for office space	
3235	sq feet
0.00001	ha / sq ft
3	building floors
0.0100	ha built up area for office space
1.46	US YF cropland
2.64	EQF cropland
0.0386	global ha for office space

Food and Beverage

Cropland for meals

690	meals Smith Fellows
460	snacks Smith Fellows
50%	percent vegetarian
2381	meals Edmonton meeting
10167	snacks Edmonton meeting
60%	percent vegetarian
0.0010	ha-yr / kg of meal Smith
0.0012	ha-yr / kg of meal Edmonton
0.0013	ha-yr / kg of snack
0.5	kg food / meal
0.04	kg food / snack
2.51	EQF cropland
0.3579	ha-yr world avg cropland for meals + snacks Smith
1.9698	ha-yr world avg cropland for meals + snacks Edmonton
0.8984	global ha-yr for meals + snacks Smith
4.9443	global ha-yr for meals + snacks Edmonton
5.8427	global ha-yr for all meals + snacks

Meal compositions assumed below

	Smith non-veg	Smith veg	Edm non-veg	Edm veg	Reception/Snacks
beef	0.1		0.1		
chicken	0.1		0.05		0.1
turkey	0.1		0.1		
fish	0.05				
cheese		0.05	0.1	0.1	0.15
bread	0.23	0.33	0.23	0.33	0.43
apple	0.05	0.1	0.1	0.15	0.15
lettuce	0.2	0.3	0.1	0.2	0.15
potato	0.15	0.2	0.2	0.2	
oil	0.02	0.02	0.02	0.02	0.02

	ha-yr / kg	gha-yr / t
beef	0.0072	18.04
chicken	0.0007	1.85
turkey	0.0005	1.19
fish	0.0000	0.03
cheese	0.0047	11.72
bread	0.0004	0.92
apple	0.0001	0.22
lettuce	0.0001	0.14
potato	0.0001	0.18
butter	0.0149	37.41

EQF crop
2.51

Paper Use

30	reams paper SCB office			
2.265	kg / ream			
67.95	kg paper SCB office			
22,000	sheets of 25"x30" paper for SCB newsletter			
10.16	8.5"x11" sheets in one sheet 25"x30" paper			
223,520	equivalent number 8.5"x11" sheets of paper for SCB newsletter			
500	sheets in a ream			
447	equivalent number reams paper for SCB newsletter			
2.265	kg / ream			
1,013	kg paper SCB newsletter			
30,000	copies of Conservation Magazine printed			
0.23	kg/copy (estimated)			
6,900	kg paper Conservation Magazine			
12,000	copies of Conservation Biology printed			
0.7	kg/copy (estimated)			
6,480	kg paper Cons Bio			
14,460	total kg paper all sources			
0.002	ha-yr world average forest / kg printing paper			
32.13	ha-yr world average forest			
1.26	EQF forest land			
			0.47%	% SCB office
40.49	global ha-yr, of which -->		7.0%	% SCB newsletter
			47.72%	% Cons Magazine
			44.81%	% Cons Bio
30%	% recycled			
22.49	ha-yr world avg forest with recycling credit			
28.34	global ha-yr with recycling credit			

Carbon Sequestration

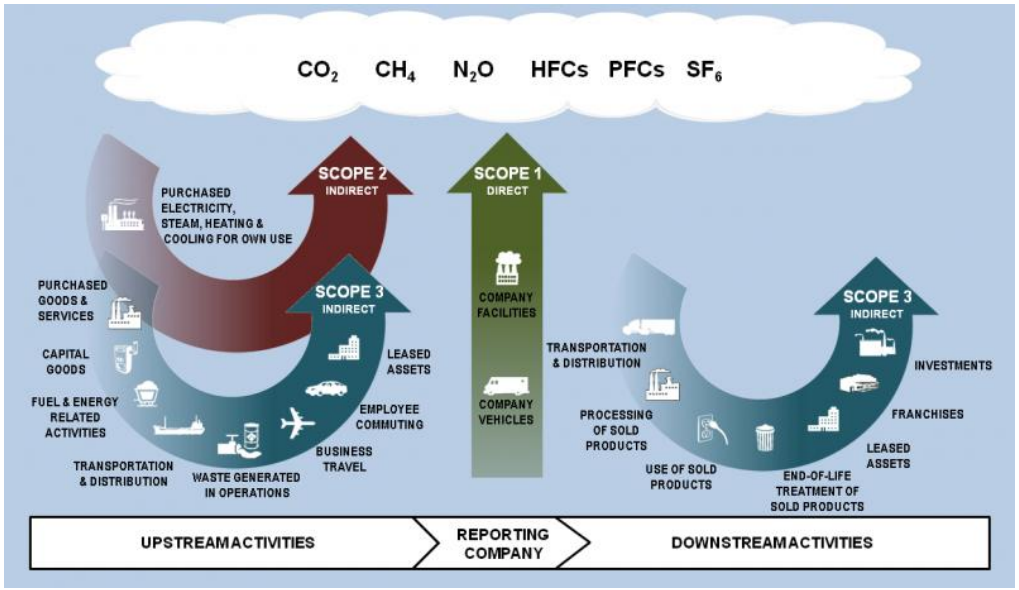
Forest for carbon sequestration

4,933	tonne fossil CO2 emitted from SCB operations
0.218	ha-yr world-average forest / t CO2 (absorption)
1,075	ha-yr world-average forest for carbon absorption
1.26	EQF forest land
1,354	global ha-yr for carbon absorption
0.2745	global ha-yr per tonne fossil CO2 emitted

Annex 2: Assessment Process

Assessment Boundary: included activities

SCB carries out many activities, some of which are not directly controlled by SCB. Thus, there is some grey area in terms of what should be included in an environmental assessment of SCB's operations. A useful way to organize an organization's functions is presented in the figure below.[9]



As this figure shows, it is sometimes useful to divide an organization's operations into "upstream" and "downstream" activities – those that occur as necessary precursors to doing business, and those that occur as a result of doing business. Greenhouse Gas Assessments sometimes include only Scope 1 and Scope 2 activities, while Scope 3 (indirect) emissions are often included based on the desires of the organization. The Environmental Footprint Committee decided to take an ambitious approach and include as many Scope 3 activities as possible.

The boundary for the 2010 evaluation is essentially the same as previous years, for the sake of consistency. The list of activities for this

[9] Modified from the World Resources Institute Greenhouse Gas Protocol – www.ghgprotocol.org.

assessment includes:

Scope 1 activities (owned or directly controlled by SCB)

Physical area of SCB offices (for the Ecological Footprint Assessment)

Scope 2 activities (purchased energy)

Electricity use at SCB Executive Office (EO)
Natural gas use at SCB EO

Scope 3 activities (indirect impacts)

SCB Operations

Water use at the SCB EO
Paper use at the SCB EO
Waste disposal from EO
Air travel and car travel for SCB staff members
Hosting of the SCB website
Employee commuting
Commercial printing, advertising and newsletters

ICCB Meeting

Air travel to and from the event for attendees
Car travel to and from the event for attendees
Field trips and local tours
Hotel accommodations
Catering (food and beverages)
Waste and recycling at the conference
Electricity use at the conference venue
Printing and advertising

Smith Fellows Program

Air travel to and from meetings for participants
Car travel to and from meetings for participants
Hotel accommodations
Catering (food and beverages)
Field trips

Conservation Biology
- Printing
- Shipping and distribution

Conservation Magazine
- Printing
- Shipping and distribution
- Other production and operations activities

Conservation Letters
- Printing
- Shipping and distribution

This list covers most of SCB's direct and indirect environmental impacts. We excluded an activity from the list if it was too difficult to measure or determined to be outside of SCB's potential influence. We encourage readers to advise the Committee of any significant activity we inadvertently overlooked. This assessment boundary can be revised in future years.

Data Gathering

Data for this assessment come from a variety of sources, and in a variety of formats. Several people contributed information for this assessment, going above and beyond their regular job duties to ferret out trip itineraries at the ICCB Global Congress, or natural gas bills for the SCB office. Because this was an all-volunteer effort among people with other jobs, we had to balance precision and practicality. We made reasonable attempts to obtain hard data from primary sources, but in some cases we had to rely on "best guess" assumptions and memory. When we were unsure about an assumption or calculation, we chose values that tended to over-estimate, rather than under-estimate an impact.

Furthermore, some of the difficulties identified in last year's Ecological Footprint Assessment still exist. For example, travel and commuting information for SCB staff was still recalled from memory and presented in different formats, rather than recorded consistently at the time of the actual trip. Also, flight itineraries were not available for Smith Fellows participants, and the production offices of SCB publications were unprepared to deliver necessary information. These obstacles impact the accuracy and consistency of the Ecological Footprint Assessments, and at the end of this report we present a few suggestions for improving the data-gathering process.

Calculation Methods

Calculation of GHG emissions

Producing an estimate of GHG emissions from a particular activity can proceed in one of three ways, depending on the quality of the available data. An overview of each method and the circumstances under which it was used is below and ordered from most to least precise:

- Given a known quantity of fuel, energy, or raw material, we multiplied this by an emissions factor, which is a rate of tons or pounds (lbs) of CO_2e emitted per quantity of the material consumed (for example, 24.692 lbs CO_2e/ gallon of gasoline).

- When the quantity of raw material was not known, or SCB's share of the total cannot be known, we used emissions factors based on secondary units of consumption, such as passenger air-miles flown (0.64 lbs CO_2e/passenger air-mile flown), or hotel room-nights (29.53 kg CO_2e/ hotel night). These emissions factors are based on published data and tools that have been scientifically vetted and produced for public use – for example, the World Resources Institute Greenhouse Gas Protocol. These emissions factors will be updated from time to time as new data become available.

- In cases where consumption data weren't available, we converted dollars spent on the activity into CO_2e emissions, using a Life Cycle Assessment tool. Two models that we used in this assessment were the Economic Input-Output Life Cycle Assessment (EIO-LCA) tool built by the Carnegie Mellon Green Design Institute and the Cascadia Seattle Climate Partnership tool. An EIO-LCA breaks an economic activity into its main component activities, estimates average CO_2e per dollar for the entire sector of the economy related to each activity, and sums the greenhouse gas emissions of each component activity.[10] For example, a dollar spent on "commercial printing" emits greenhouse gasses from several component sectors, including pulpwood harvesting, paper manufacturing, transportation, energy use, ink manufacturing, etc. Although EIO-LCAs are powerful tools, they rely on many assumptions and give outputs that represent an aggregated national perspective rather than a particular, localized activity. EIO-LCAs are becoming increasingly sophisticated; for instance some models discriminate between printing on recycled versus virgin paper.

Calculation of Ecological Footprint

The Ecological Footprint of an organization is a measure of the amount of biologically productive areas required to support the consumption activities of that organization. SCB's Ecological Footprint, for example, includes the forest needed to grow the trees that become the paper distributed in SCB journals and magazines, the cropland needed to provide the meals served at SCB meetings, the area needed to absorb the fossil carbon dioxide emitted from electricity use in the SCB office, and many other activities.

[10] Please see http://www.eiolca.net/cgi-bin/dft/use.pl for complete information on this particular tool and LCAs in general.

In simplest terms, the Ecological Footprint of a material (e.g., 1 kg of paper) is calculated by first translating that material back into its primary product equivalent (e.g., 1 kg of paper requires 2 kg of raw wood to be harvested), which is then divided by the yield, in metric tons per hectare each year, of the land from which the material was harvested. This provides an Ecological Footprint in units of hectare-years, representing the area required to produce that material over the course of a year. Most Ecological Footprint analyses normalize these hectares into *global hectare-years*, or hectares with world average biological productivity, for the purposes of adding areas together and comparing results across land types.[11] We follow this convention.

The Ecological Footprint of fossil carbon dioxide emissions generally forms a substantial part of the total Ecological Footprint of an organization. The Footprint of an organization's carbon dioxide emissions is calculated as the productive area of world-average forest required to absorb that amount of carbon dioxide. This method is designed to produce conservative values, as using carbon dioxide absorption yields for non-forest land types would yield higher Ecological Footprint estimates. We used an estimate of 0.2771 ha/ metric ton fossil CO_2e emitted. The full calculations for Ecological Footprint figures are presented in **Annex 1** of this assessment.

[11] Please see the papers listed at http://www.footprintnetwork.org/en/index.php/GFN/page/methodology/ for more details on Ecological Footprint accounting methodology.