## Society for Conservation Biology
## Ecological Footprint Committee

# 2012 Ecological Footprint Assessment

**Author:**
**Ronald Abrams, Dru Associates, Inc.**

**Contributors:**
**Lauren Krizel, Society for Conservation Biology**
**Stephen Handler, US Forest Service**
**Justin Kitzes, University of California-Berkeley**
**Jennifer Thornhill, National Science Foundation**

Submitted July 19, 2013

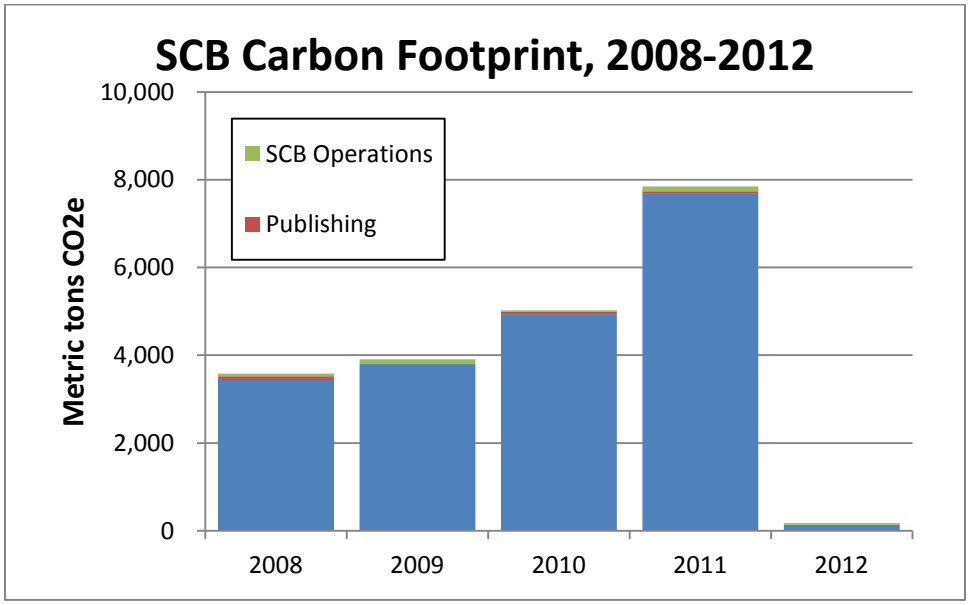
# Contents

Society for Conservation Biology

**2012 Ecological Footprint Assessment**

## Executive Summary

- This is the 5th year the Ecological Footprint Committee (EFC) of the Society for Conservation Biology (SCB) has estimated the annual ecological footprint of the organization's activities.
- The ecological footprint and carbon footprint of SCB have risen steadily from2008-2012, with a particularly dramatic decrease in 2012 (see figure). A disproportionately large increase in 2011, due to the air travel associated with the ICCB meeting in New Zealand, had already shown SCB the wisdom of changing to alternate year ICCB's.
- While there was no doubt amongst the BoG that air travel was our most costly carbon impact, the data from Operations (Scopes 1-3 Activities) show spikes for the years we visited China and New Zealand, with closer to home ICCB's limiting staff air travel.




- The EFC estimates that SCB's current carbon offset project, the Wild Rose Conservation Site (WRCS), can conservatively be expected to sequester 11,478 metric tons of $CO_2$ over the next 19 years. SCB entered into a contract with the project proponents with the understanding that this volume of carbon sequestration would be sufficient to mitigate the GHG emissions of SCB's operations for the years 2010-2013. In 2010 through 2012, SCB's combined greenhouse gas (GHG) footprint was 12,752 metric tons of $CO_2$. **Therefore, SCB has effectively "consumed" the 4-year allowance of carbon sequestration from this project after 3 years and 1,274 metric tons of $CO_2$ emissions from 2011 and 2012 remain unaccounted for.**
- The Board of Governors (BoG) in response to recommendations of the EFC is considering a proposal to develop a centralized carbon offset project selection process to deal with

this shortfall in the near-term, and prevent such outcomes in the future. The BoG has already responded to SCB's self assessment of carbon impacts (i.e., to change from an annual global congress to a bi-annual schedule), a move which has already born recognizable fruit. This 2012 Ecological Footprint Assessment is the first to reflect that change.

- The BoG will also need to take action to ensure that in coming years SCB is able to meet the organization's stated goal of mitigating its carbon footprint. More detailed recommendations are found at the conclusion of this assessment.

## Introduction

The Ecological Footprint Committee (EFC) of the Society of Conservation Biology (SCB) 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 2012 marks our 5th 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 2012 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

[1] Charge for the Ecological Footprint Committee, as stated in the SCB bylaws.
[2] See the SCB 2008, 2009, and 2010, 2011 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.

sea. Both concepts 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. The outcome of SCB's first policy change in response to these EFC reports (i.e., bi-annual global congresses) showed a striking reduction in our carbon impacts.

With five annual assessments already completed, SCB can track changes in the organization's environmental impacts over time. These reports will continue to reveal the outcomes of major operational or institutional changes at SCB and make it possible to weigh those choices against their ecological consequences. SCB is still very early in building this "time series" of information, and conclusions must bear this in mind. Participation of SCB Executive Office staff has improved the consistency of these assessments. Inconsistencies in data gathering and calculation methods continue to confound the results, particularly with respect to on-site meeting activities and publications. Therefore, the year-to-year differences highlighted by this assessment include some masking behavior on the part of SCB from improved or additional data collection, but these ambiguities are noted in the report.

Rather than absolute comparisons of GHG or Ecological Footprint values, these assessments are useful for comparing trends. For example, it is informative to compare the relative contributions of different activities to SCB's overall carbon footprint. Additionally, as the EFC improves its process for carbon offset project selection, and as more years accumulate, the trends analysis from these data will make a useful scientific record.

The 2012 Ecological Footprint Assessment will further 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 2008-2011 for comparison, along with conclusions and recommendations for the SCB Board of Governors. The complete raw data for the 2012 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 Ronald Abrams (ronwoolf07@gmail.com.).

Sincerely,

Ronald Abrams
Chair, Ecological Footprint Committee

## 2008-2012 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 2008-2012 are presented side-by-side for comparison. Values that were calculated using different methods have been noted, and complete data and calculations for 2012 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 2008-2011 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) | **2011 GHG Emissions** (metric tons CO2e) | **2011 Ecological footprint** (global ha-years) | **2012 GHG Emissions** (metric tons CO2e) | **2012 Ecological footprint** (global ha-years) |
|---|---|---|---|---|---|---|---|---|---|---|
| Scope 1 activities (owned or directly controlled by SCB) | | | | | | | | | | |
| | | | | | | | | | | |
| Physical area of the SCB office | 3,235 sq. ft | 0.04 [a] | 3,235 sq. ft | 0.04 [a] | 3,235 sq. ft | 0.03 [a,h] | 3,235 sq. ft | 0.03 [a] | 3,235 sq. ft | 0.03 [a] |
| | | | | | | | | | | |
| Scope 2 activities (purchased goods consumed by SCB) | | | | | | | | | | |
| | | | | | | | | | | |
| Electricity use at SCB EO | 8.21 [a] | | 8.80 [a] | | 1.95 [a] | | 7.12 [a] | | 9.39 | |
| Natural gas use at SCB EO | 9.17 [a] | | 5.50 [a] | | 4.45 [a] | | 4.44 [a] | | 1.69 | |
| SUB-TOTAL (Scope 1 and 2) | 17.38 | | 14.29 | | 6.40 | | 11.57 | | 11.08 | |
| | | | | | | | | | | |
| Scope 3 activities (indirect) | | | | | | | | | | |
| **SCB Executive Office** | | | | | | | | | | |
| Water use | 0.32 [a] | | 0.07 [a] | | 0.08 [a] | | 0.13 [a] | | 0.14 | |
| Paper use | 0.03 [a] | 0.1 [b] | 0.03 [a] | 0.11 [b] | 0.03 [f] | 0.13 [b,h] | 0.03 [f] | | 0.03 [f] | 0.13 [b,h] |
| Waste generated | 720 gal/year [g] | | 720 gal/year [f] | | 720 gal/year [f] | | 720 gal/year [f] | | 720 gal/year [f] | |
| Recycling generated | 720 gal/year [g] | | 720 gal/year [f] | | 720 gal/year [f] | | 720 gal/year [f] | | 720 gal/year [f] | |
| Air travel for SCB staff | 43.44 [b] | | 91.42 [b] | | 17.60 [b] | | 89.14 [b] | | 22.93 [b] | |
| Car travel for SCB staff | 0.38 [b] | | 0.87 [b] | | 0.14 [b] | | 0.39 [b] | | 0.44 [b] | |
| SCB website hosting and maintenance | Missing Data | | 2.18 [d] | | 2.18 [f] | | 2.18 [f] | | 2.18 [f] | |
| Employee commuting | 1.53 [b] | | 5.82 [b] | | 3.77 [b] | | 6.68 [b] | | 4.82 [b] | |
| Commercial printing, advertising, and newsletters | 16.62 [e] | 2.28 [b] | 10.89 [e] | 1.60 [b] | 11.17 [e] | 1.98 [b] | 10.61 [e] | 1.00 [b] | 4.03 [e] | |
| SUB-TOTAL (SCB Operations) | 62.31 | | 111.29 | | 34.97 | | 109.15 | | 34.57 | |

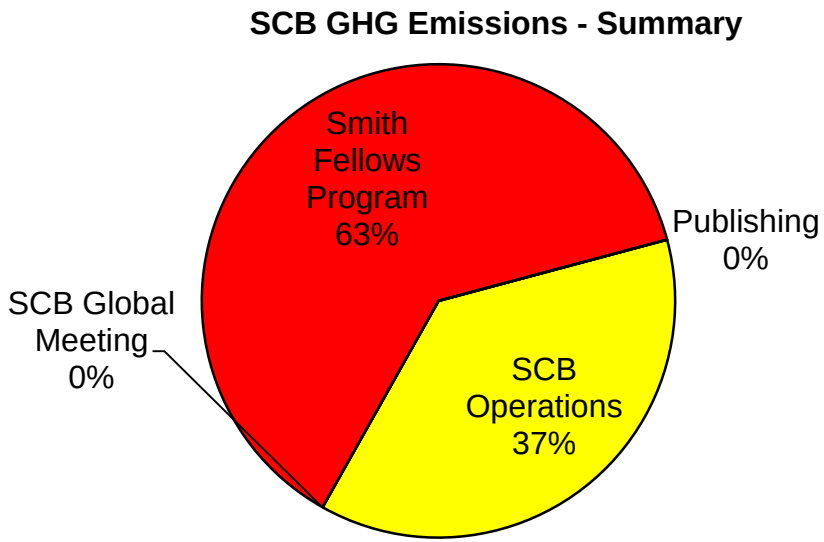
[5] Previous assessments can be downloaded at: http://www.conbio.org/Activities/Committees/EcologicalFootprint/CarbonOffset/ecologicalfootprint.cfm

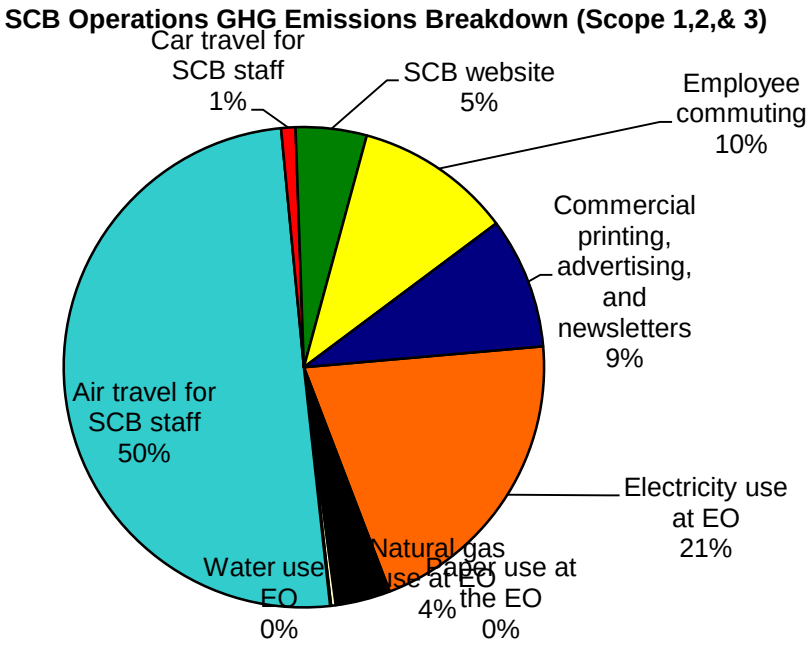
| Activity (by Scope) | 2008 GHG Emissions (metric tons CO2e) | 2008 Ecological footprint (global ha-years) | 2009 GHG Emissions (metric tons CO2e) | 2009 Ecological footprint (global ha-years) | 2010 GHG Emissions (metric tons CO2e) | 2010 Ecological footprint (global ha-years) | 2011 GHG Emissions (metric tons CO2e) | 2011 Ecological footprint (global ha-years) | 2012 GHG Emissions (metric tons CO2e) | 2012 Ecological footprint (global ha-years) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| **ICCB Meetings** | 2008 meeting in Chattanooga, TN | | 2009 meeting in Beijing, China | | 2010 meeting in Edmonton, Alberta | | 2011 meeting in Auckland, New Zealand | | | |
| Attendee air travel | 3026.63 [c] | | 3292.37 [c,h] | | 4484.79 [c,h] | | 7002.21 [c,h] | | | |
| Attendee car travel | 5.29 [c] | | 16.83 [c,h] | | 85.57 [c,h] | | 34.35 [c] | | | |
| Field trips and local tours | Missing Data | | 59.82 [c] | | 7.34 [c] | | 18.86 [c] | | | |
| Hotel and dorm room accommodations | Missing Data | | 121.75 [c] | | 59.95 [c,h] | | 129.78 [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] | 198.90 [c,e,g] | 10.55 [c] | | |
| Waste and recycling at conference | Missing Data | | Missing Data | | 0.24 | | Missing Data | | | |
| Electricity use at conference venue | 74.26 [c] | | 74.26 [f] | | 0.00 [c] (Shaw Conf. Center purchased renewable energy tags) | | 12.25 [a,h] | | | |
| Printing or advertising | 1.01 | | 1.01 [f] | | 1.01 [f] | | 15.81 [f] | | | |
| SUB-TOTAL (ICCB Meeting) | 3163.69 | | 3584.33 | | 4764.13 | | 7412.16 | | 0.00 | |
| | | | | | | | | | | |
| **Smith Fellows Program** | | | | | | | | | | |
| Participant air travel | 81.98 [b] | | 58.52 [b] | | 53.08 [b] | | 68.56 [b] | | 69.43 [b] | |
| Participant car travel | 3.39 [b] | | 4.36 [b] | | 3.61 [b] | | 0.46 [b] | | 1.17 [b] | |
| Hotel accommodations | 6.07 [b,g] | | 6.08 [b,g] | | 4.28 [b,g] | | 6.91 [b,g] | | 6.08 [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] | 13.96 [b,g,h] | 0.96 | 12.92 | 0.92 |
| Trips | Missing Data | | 2.48 [b] | | Missing Data | | Missing Data | | N/A | |
| SUB-TOTAL (Smith Fellows Program) | 101.31 | | 89.84 | | 74.85 | | 89.89 | | 89.60 | |
| | | | | | | | | | | |
| **Conservation Magazine** | | | | | | | | | | |
| Printing and design | 57.72 [e] | 16.86 [g] | 33.83 [e] | 10.89 [g] | 18.51 [e] | 13.52 [g] | 20.62 [e] | 13.52 [g,f] | 0.00 | |
| Shipping and distribution | 4.18 [e] | | 5.05 [e] | | 4.40 [e] | | 7.44 [e] | | 0.00 | |
| Other production tasks | Missing Data | | 20.92 [e] | | 23.41 [e] | | 20.56 [e] | | 0.00 | |
| | | | | | | | | | | |
| **Conservation Letters (online publication)** | | | | | | | | | | |
| Printing and design | Missing Data | | Missing Data | | Missing Data | | Missing Data | | Missing Data | |
| Shipping and distribution | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | |

| **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) | **2011 GHG Emissions** (metric tons CO2e) | **2011 Ecological footprint** (global ha-years) | **2012 GHG Emissions** (metric tons CO2e) | **2012 Ecological footprint** (global ha-years) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Conservation Biology** | | | | | | | | | | |
| Printing | Missing Data | 41.95 [b,d] | Missing Data | 27.61 [g] | Missing Data | 12.70 [g] | Missing Data | 10.95 [b,d] | NA | 10 |
| Shipping and distribution | 25.00 [d] | | Missing Data | | 6.60 [d, h] | | 6.52 [d] | | 6.5 | |
| | | | | | | | | | | |
| SUB-TOTAL (Publishing) | 86.90 | | 59.80 | | 52.92 | | 55.13 | | 6.50 | |
| GRAND TOTAL ECOLOGICAL FOOTPRINT (EXCLUDING $CO_2e$) | | 63.04 | | 41.44 | | 34.21 | | 37.16 | | 11.06 |
| GRAND TOTAL CARBON FOOTPRINT | **3431.60** | 949 | **3859.56** | 1069.48 | **4933.26** | 1367.01 | **7677.91** | 2107.59 | **142.74** | 39.55 |
| GRAND TOTAL ECOLOGICAL FOOTPRINT | | **1012.04** | | **1110.92** | | **1401.22** | | **2164.70** | | **50.61** |

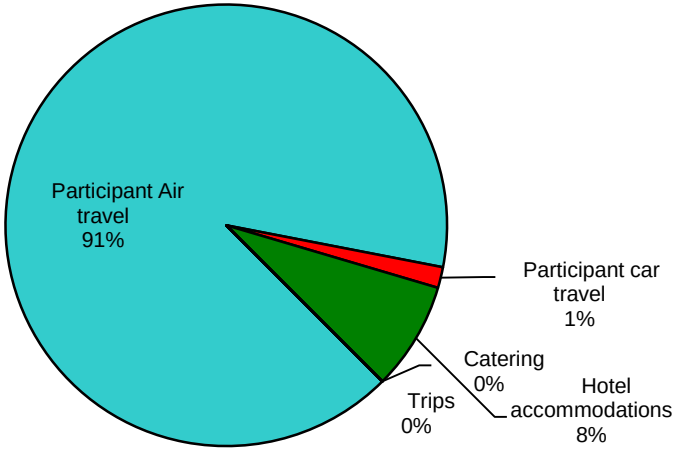
a = data gathered from bills and converted to consumption units
b = data gathered from staff notes and recollections
c = data gathered from conference registration records and converted based on reasonable assumptions
d = data provided from an external 3rd party (for example: Intermedia Web Hosting or Wiley-Blackwell 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)

**2012 Relative Contributions:** The following charts present the relative contributions of the various activities to SCB's GHG emissions and Ecological Footprint values.

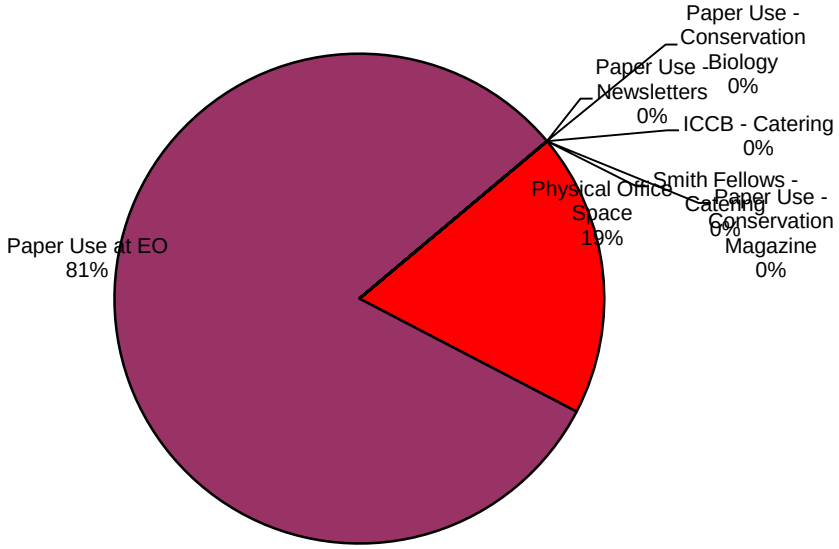


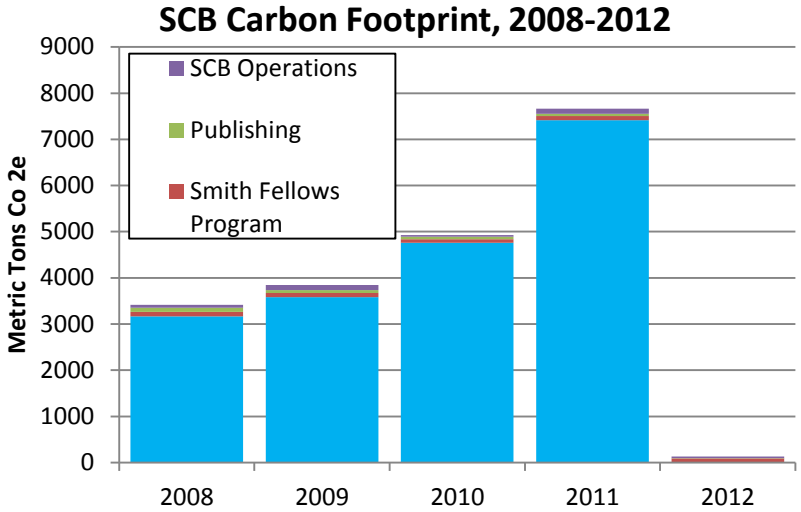
## 2012 Smith Fellows Program GHG Emissions Breakdown

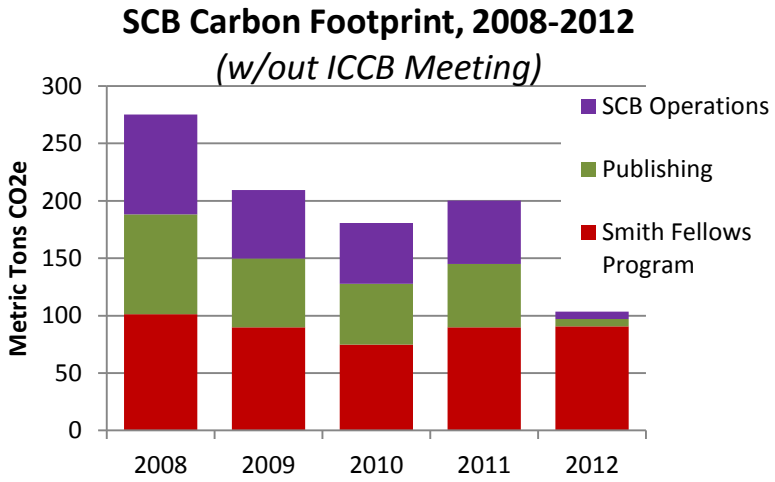


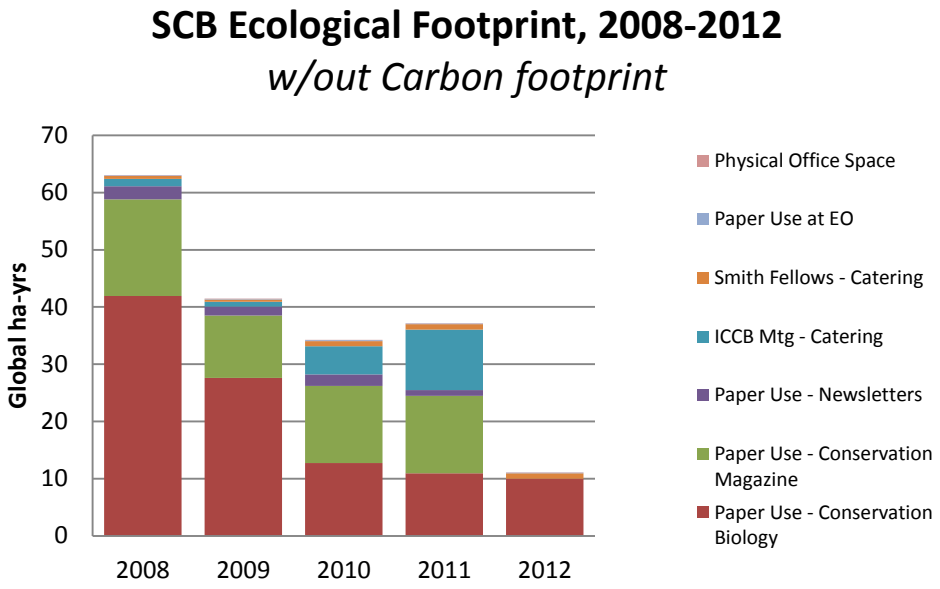

## 2012 SCB Ecological Footprint Summary
(excluding GHG emissions)



**5-Year Trends:** The following graphs present the trends of the various activities to SCB's GHG emissions and Ecological Footprint from 2008 to 2012.



## Results: GHG Emissions and Ecological Footprint

***Carbon Footprint - GHG Emissions***

SCB's total $CO_2e$ emissions of 7,677.91 metric tons of in 2011 dropped in 2012 to 143 metric tons, the lowest since we began tracking ourselves, with the obvious explanation coming from not holding an ICCB. This compares with roughly 3,400 metric tons in 2008, 3,800 metric tons in 2009, and 4,900 metric tons in 2010. To put this into perspective, 2011's carbon footprint was more than double the carbon footprint for 2009, the last year that SCB had an ICCB meeting outside of North America. The sharp decrease is due largely to the change to alternate years for ICCB meetings. The carbon footprint values for the Executive Office (EO), Smith Fellows Program, and Publishing all experienced decreases, reaching our overall lowest levels. Clearly the explanation of these differences is due largely to not holding an ICCB and eliminating print publishing, showing a promising trend over the past 5 years.

*International Congress for Conservation Biology*

There was no ICCB meeting held in 2012. Therefore, compared with the GHG emissions from the ICCB meetings in 2008-11 , SCB has significantly reduced our footprint.

The largest increase in our tracked carbon footprint history was from attendee air travel to New Zealand for the 2011 meeting (~2,500 metric tons more than in 2010). These GHG emissions were due to the combination of a large number of attendees (1,250 attendees at the 2011 meeting) and the long travel distances for the majority of attendees (similar comments apply to 2009's visit to China, but fewer attendees subdued those figures~650 attendees at Beijing). Since in previous years the largest number of ICCB attendees were from North America, it is evident that converting to a policy of bi-annual ICCB's appears on its way to successfully reducing SCB's carbon footprint, while maintaining a high level of participation, even though in 2011 the distribution of conference attendees was much more evenly spread across the globe (only 22% of ICCB participants traveled from North America). This forms a continuing dilemma for SCB.

In addition to the absolute carbon footprint figures, it's interesting to note the carbon footprint of the past 4 ICCB meetings in relative terms of *$CO_2e$ per attendee*:

| **Meeting** | **$CO_2e$ per attendee**[6] |
|---|---|
| 2012 – | None |
| 2011 – Auckland, NZ | 5.93 |
| 2010 - Edmonton, AB | 3.17 |
| 2009 - Beijing, China | 5.51 |
| 2008 - Chattanooga, TN | 2.63 |

[6] Attendee figures from conference registration records, ~1250 attendees at the 2011 ICCB.

Despite differences in the calculation methods between these four years, it is reasonable to assume that a large crowd and a meeting location that required multiple long-distance plane trips led to an immense carbon footprint. SCB will need to consider a balance between limiting the participation of any given geographic region based on air travel impacts with choices for a larger investment in carbon offsets, and certainly will need to feature the new strategy to encourage regional conferences reflects as an approach to reducing air travel impacts overall.

*SCB Operations*

After a decline in 2010, GHG emissions resulting from electricity use at the SCB Executive Office (EO) rebounded to 2009 levels this past year. In 2012, the electric consumption was up but natural gas use was down, leaving in-office utilities slightly lower in 2012 than 2011. It is unclear if the EO experienced a different pattern of use in 2012 that would account for these changes, and this will be queried. Staff air travel was minimal in 2012.

*Smith Fellows Program*

The carbon footprint of the Smith Fellows Program in 2012 was similar to 2011's program. Air travel continues to be the largest contributor to this program's carbon footprint (~75% of the total), while emissions due to car travel, hotel accommodations, and meals remain relatively constant.

*Publishing*

This area of SCB activities has remained relatively consistent in terms of GHG emissions for the past 5 years with respect to Conservation BIology. It is still unclear if Conservation Letters, the online publication, contributes any meaningful GHG emissions due to design or other tasks. The EFC has assumed no GHG emissions for this publication for the past 5 years but as we refine our understanding of inputs to our footprint, it may be worth considering in the future. SCB recently ended the formal relationship with Conservation Magazine, so this publication appears in this report for the last time with no contribution to the footprint, thus contributing to a small decrease in carbon footprint from reduction in paper and ink uses. 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, we could be more confident in their estimates and perhaps establish a reasonable estimate for printing-related GHG emissions.

*Overall*

Overall, core SCB operations (Scope 1, 2, and 3) accounted for only 2 % of the total carbon footprint in 2011, while publishing and the Smith Fellows Program each account for an additional 1% of the total. In 2012, a pattern of decline in SCB's footprint is evident, for obvious reasons. These measures will not again be available, so further reductions in our footprint will come from refining our data and looking for new measures of carbon offsets.

***Ecological Footprint***

SCB's Ecological Footprint is significantly reduced mainly by the absence of ICCB air travel in 2012. The 2012 footprint was 50.61 global hectare-years, down from 2144.75 global hectare-years in 2011. This translates to not using up 16 $km^2$ of land worldwide that we needed in 2011 to support or offset annual operations. Excluding GHG emissions, SCB's Ecological Footprint has remained relatively consistent from 2009-2011, with declines setting in for 2012. This can primarily be attributed to stable figures for paper use and printing among SCB's publications and newsletters. Subscriptions to Conservation Biology declined sharply after 2008, remain lower today and it remains to be seen whether print subscriptions will return to previous levels. Online subscriptions to the journal may reduce future printing impacts, even if circulation grows. As mentioned earlier, the publications sector still suffers from incomplete data so conclusions should bear this in mind. Between elimination of Conservation Magazine and newsletter carbon costs, the 2012 Assessment (which show a reduced paper use) is lower than any prior Assessment. Over the next year we may learn if the reduced exposure that may come from print matter makes a difference to SCB's attraction.

In any case, the EFC will focus on Adaptive Management as a priority, wherein we refine our ability to offset carbon footprint impacts. We should also refine our assessment to include issues not covered so far, and ask ourselves the question: Shall we include regional conferences in our assessments? One argument for that approach would be that SCB BoG uses a regional conference to hold its annual meetings in non-ICCB years. This and the concern for geographic representation in the face of long distance trips remain future philosophical challenges with real carbon footprint implications.

## 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:

1. 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 and Auckland meetings provided excellent information for this assessment. The next ICCB meeting will occur in 2013, so we have plenty of time to be in touch with the LOC and arrange for more complete information sharing.

2. For future ICCB meeting registration, it would assist the EFC greatly if we could add two questions to the registration process:
   a. Do you plan to drive or fly to the meeting?
   b. 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. We might also realize that more attendees are driving to meetings than is currently assumed, which would reduce the estimated carbon footprint for air travel.

3. Lauren Krizel in the EO has been a great asset in terms of gathering information for the 2010 and 2011 assessments. When possible, she may be able to spearhead additional efforts to record raw figures of resources used, staff commuting, and staff travel. Tracking waste and recycling from the EO would also be a substantial improvement.

4. 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 meals 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. The EO should work with Shonda Foster to make this an easy protocol.

5. Wiley-Blackwell has provided useful information for the past two Ecological Footprint Assessments. SCB should appreciate this information sharing and encourage greater transparency on the way W-B estimates GHG emissions for Conservation Biology.

## Decisions to be made by SCB Board of Governors

The EFC recommended in our last report that the Board of Governors (BoG) consider the following issues, and in the interim the EFC has discussed these matters and provided a proposal to create a comprehensive protocol for tracking the Carbon Offset program that would set policy that guides such decisions. The 2013 LOC was involved in discussions of the needs addressed below, and BoG reaction will be solicited at the ICCB BoG meetings:

1. The EFC estimates that SCB's current carbon offset project, the Wild Rose Conservation Site (WRCS), can conservatively be expected to sequester 11,478 metric tons of $CO_2$ over the next 20 years. SCB entered into a contract with the project proponents with the understanding that this volume of carbon sequestration would be sufficient to mitigate the GHG emissions of both travel to ICCB's and SCB's EO operations for the years 2010-2013.

   For 2010 through 2012, SCB's combined estimated GHG footprint was 12,752 metric tons of $CO_2$.[7] **Therefore, SCB has effectively "consumed" the 4-year allowance of carbon sequestration from the WRCS project after 3 years and 1,274 metric tons of $CO_2$ emissions from 2011 and 2012 remain unaccounted for.**

   The BoG will need to decide how to deal with this shortfall in the near-term. In 2012 the EFC described two options:
   a. Purchase 1,133 certified carbon offsets from the voluntary carbon offset market to compensate for the shortfall. This could cost between $5,000 and $10,000, depending on the desired project type and carbon offset certification standard.

   b. Actively solicit new carbon offset project proposals from the SCB membership, establish a contract agreement with the new project, and be sure to account for this extra 1,133 metric tons of $CO_2$ in estimating SCB's desired output from the project. SCB would need to ensure that sufficient funds are generated from future meeting carbon fees to compensate for these extra tons.

   The implications of this choice go to the heart of the EFC proposal to establish guidance based on our experiences to date.

2. The SCB offset project in Baviaanskloof experienced unanticipated logistical constraints, coupled with unanticipated impacts from drought and herbivory, resulting in the likelihood that the project as conceived requires expansion (for which provision was made in the original contract), meaning that other lands in the Baviaanskloof or Addo National Park will be needed to achieve SCB's target of carbon sequestration. Through two visits by SCB to the site, and continuing negotiations with the South African parties,

[7] 4933.26 metric tons in 2010 + 7677.91 metric tons in 2011.

an agreement is nearly completed to add such lands to the contract. SCB owes dedicated funds of about $16,000 once the contract revision is completed.

3. The BoG will also need to take action to ensure that in coming years SCB is able to meet the organization's stated goal of mitigating its carbon footprint. We presented the following ideas in 2012 and have further developed the needs represented below into the proposal brought to the BoG in July 2013:

    a. Re-visit the contract with the WRCS project to make sure that SCB will be able to generate sufficient carbon funds to fulfill the terms of that agreement. **SCB is required to pay $17,000 within 6 months of the 2011 ICCB meeting by the terms of the agreement.** SCB is bound to pay a final $16,000 to the project proponents after the 2013 ICCB meeting.

    b. Establish a plan for offsetting GHG emissions in calendar year 2012 and beyond. This will require SCB to either establish a contract with a new carbon offset project quickly, or determine a process for vetting and directly purchasing certified carbon offsets.

    c. Attendee carbon offset fees for future ICCB meetings should accurately reflect the anticipated cost of mitigation. Estimates of average GHG emissions per attendee should be completed well in advance of each meeting, in order to establish a conservative carbon offset fee before registration opens. If future meetings are held in remote locations, it is likely that SCB will need to increase the carbon offset fee for each attendee.

    d. SCB may wish to factor the ecological footprint implications into decisions regarding future ICCB locations. The New Zealand meeting showed a potential for excessive travel to negate the ecological benefit of holding meetings on a biannual basis, but defining 'excessive travel' for a global organization will be difficult without introducing some geographic bias to the networking of the Society.

## Annex 1

**2012 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 or other parties |
| | Standard conversion factor |
| | Calculated figure |
| | Greenhouse Gas (GHG) figure |

SCB Operations

**2012 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) |
| 01/25/2012 | 275.5 | 260.54 | 0.15 | 1715.48 | 1.09 | 1.072 | 0.91 |
| 02/15/2012 | 205.11 | 190.15 | 0.15 | 1252.01 | 1.09 | 1.072 | 0.66 |
| 03/27/2012 | 214.22 | 199.26 | 0.15 | 1311.99 | 1.09 | 1.072 | 0.70 |
| 04/18/2012 | 156.67 | 141.71 | 0.17 | 857.99 | 1.09 | 1.072 | 0.45 |
| 05/17/2012 | 172.33 | 157.37 | 0.17 | 952.80 | 1.09 | 1.072 | 0.50 |
| 06/13/2012 | 256.18 | 241.22 | 0.17 | 1460.47 | 1.09 | 1.072 | 0.77 |
| 07/18/2012 | 391.43 | 376.47 | 0.17 | 2279.34 | 1.09 | 1.072 | 1.21 |
| 08/15/2012 | 312.58 | 297.62 | 0.17 | 1801.94 | 1.09 | 1.072 | 0.95 |
| 09/20/2012 | 320.53 | 305.57 | 0.15 | 2011.97 | 1.09 | 1.072 | 1.07 |
| 10/16/2012 | 231.1 | 216.14 | 0.15 | 1423.13 | 1.09 | 1.072 | 0.75 |
| 11/15/2012 | 191.51 | 176.55 | 0.15 | 1162.46 | 1.09 | 1.072 | 0.62 |
| 12/20/2012 | 241.32 | 226.36 | 0.15 | 1490.43 | 1.09 | 1.072 | 0.79 |
| **Total:** | 2968.48 | | | 17720.01 | | | **9.39** |

[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

**2012 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) |
| 01/31/2012 | 62.34 | 54.39 | 0.3592 | 151.42 | 5.914 | 4495 | 3235 | 0.64 |
| 02/29/2012 | 48.64 | 40.69 | 0.3592 | 113.28 | 5.914 | 4495 | 3235 | 0.48 |
| 03/27/2012 | 21.14 | 13.19 | 0.3592 | 36.72 | 5.914 | 4495 | 3235 | 0.16 |
| 04/30/2012 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 05/31/2012 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 06/30/2012 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 07/31/2012 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 08/30/2012 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 09/26/2012 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 10/31/2012 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 12/28/2012 | 42.15 | 34.2 | 0.3592 | 95.21 | 5.914 | 4495 | 3235 | 0.41 |
| | **Total: 470.52** | | | 396.63 | | | | **1.69** |

[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.

| 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) |
| 01/18/2012 | 60.91 | 56.91 | 5.77 | 9.86 | 7378.10 | 3.09 | 22.80 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 02/21/2012 | 45.23 | 41.23 | 5.77 | 7.15 | 5345.27 | 3.09 | 16.52 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 03/31/2012 | 92.87 | 88.87 | 5.77 | 15.40 | 11521.56 | 3.09 | 35.60 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 04/24/2012 | 137.5 | 133.5 | 5.77 | 23.14 | 17307.62 | 3.09 | 53.48 | 1.072 | 1.09 | 4495 | 3235 | 0.02 |
| 06/20/2012 | 60.91 | 56.91 | 5.77 | 9.86 | 7378.10 | 3.09 | 22.80 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 07/18/2012 | 100.11 | 96.11 | 5.77 | 16.66 | 12460.19 | 3.09 | 38.50 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 08/22/2012 | 107.95 | 103.95 | 5.77 | 18.02 | 13476.60 | 3.09 | 41.64 | 1.072 | 1.09 | 4495 | 3235 | 0.02 |
| 09/20/2012 | 139.31 | 135.31 | 5.77 | 23.45 | 17542.27 | 3.09 | 54.21 | 1.072 | 1.09 | 4495 | 3235 | 0.02 |
| 10/16/2012 | 63.84 | 59.84 | 5.77 | 10.37 | 7757.96 | 3.09 | 23.97 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 11/20/2012 | 91.14 | 87.14 | 5.77 | 15.10 | 11297.27 | 3.09 | 34.91 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 12/20/2012 | 66.36 | 62.36 | 5.77 | 10.81 | 8084.67 | 3.09 | 24.98 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| Total | 902.51 | 898.51 | | | | | | | | | | **0.14** |

[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

**2012 Staff Air Travel**

| Employee | Origin | Layover [1] | Layover | Destination | Round-trip? | Number of Trips | Leg 1 [2] | Leg 2 | Leg 3 | Leg 1 [3] | Leg 2 | Leg 3 | GHG Emissions [4] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1=no, 2=yes | | Miles | Miles | Miles | metric tons CO2e | metric tons CO2e | metric tons CO2e | metric tons CO2e |
| Anne Hummer | Washington, DC | | | Bozeman, MT | 2 | 2 | 1787.9 | | | 0.99 | 0.00 | 0.00 | 3.94 |
| Anne Hummer | Washington, DC | | | Oakland, CA | 2 | 1 | 2429.5 | | | 1.34 | 0.00 | 0.00 | 2.68 |
| Brett Hartl | Washington, DC | | | Panama | 2 | 1 | 2112.7 | | | 1.16 | 0.00 | 0.00 | 2.33 |
| Brett Hartl | Washington, DC | | | Bangor, Maine | 2 | 1 | 589.3 | | | 0.32 | 0.00 | 0.00 | 0.65 |
| Brett Hartl | Washington, DC | | | Bozeman, MT | 2 | 1 | 1787.9 | | | 0.99 | 0.00 | 0.00 | 1.97 |
| Heather DeCaluwe | Washington, DC | | | Bangor, Maine | 2 | 1 | 589.3 | | | 0.32 | 0.00 | 0.00 | 0.65 |
| John Fitzgerald | Washington, DC | | | Oakland, CA | 2 | 1 | 2429.5 | | | 1.34 | 0.00 | 0.00 | 2.68 |
| Nate Spillman | Washington, DC | | | Oakland, CA | 2 | 1 | 2429.5 | | | 1.34 | 0.00 | 0.00 | 2.68 |
| Lauren Krizel | Washington, DC | | | Oakland, CA | 2 | 1 | 2429.5 | | | 1.34 | 0.00 | 0.00 | 2.68 |
| Shonda Foster | Washington, DC | | | Oakland, CA | 2 | 1 | 2429.5 | | | 1.34 | 0.00 | 0.00 | 2.68 |
| **Totals** | | | | | | | | | | | | | **22.93** |

[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/). 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.

**2012 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 | 1 | 158 | 23 | 6.87 | 0.08 |
| Autumn-Lynn Harrison | Santa Cruz to Oakland | 4 | 560 | 23 | 24.35 | 0.27 |
| Heather DeCaluwe | Airlie, VA | 1 | 94 | 23 | 4.09 | 0.05 |
| Nate Spillman/Shonda Foster | Airlie, VA | 1 | 94 | 23 | 4.09 | 0.05 |
| | | | | 23 | 0.00 | 0.00 |
| | | | | 23 | 0.00 | 0.00 |
| **Totals** | | | | | | **0.44** |

**2012 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) |
| Anne Hummer | 180 | 26.5 | 4770 | 2004 Chevrolet MalibuMaxx | 23 | 207.39 | 2.32 |
| Brett Hartl | 50 | 5 | 250 | Metro train | 0.30 lb CO2/pass-mile | N/A | 0.03 |
| Cathy McIntosh | 5 | 80.4 | 402 | 2011 Toyota Sienna Minivan | 23 | 17.48 | 0.20 |
| Heather DeCaluwe | 97 | 14.8 | 1435.6 | Acura Integra | 23 | 62.42 | 0.70 |
| John Fitzgerald | 195 | 14 | 2730 | Metro train | 0.30 lb CO2/pass-mile | N/A | 0.37 |
| Nate Spillman | 5 | 16 | 80 | Honda Civic | 23 | 3.48 | 0.04 |
| Nate Spillman | 240 | 16 | 3840 | Metro train/bus | 0.30 lb CO2/pass-mile | N/A | 0.52 |
| Shonda Foster | 126 | 20 | 2520 | Metro train | 0.30 lb CO2/pass-mile | N/A | 0.34 |
| Shonda Foster | 10 | 20 | 200 | Toyota Sienna | 23 | 8.70 | 0.10 |
| Lauren Krizel | 240 | 6 | 1440 | Metro bus | 0.30 lb CO2/pass-mile | N/A | 0.20 |
| | | | 0 | | 23 | 0.00 | 0.00 |
| **Totals** | | | **17667.6** | | | | **4.82** |

**2012 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] = on a dedicated server by Intermedia. We The SCB website is hosted 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

**2012 Newsletter**

| Newsletter | 2012 Dollars | 1997 Dollars [1] | Emission Factor [2] | GHG Emissions [3] | EIO-LCA Sector |
|---|---|---|---|---|---|
| | | | kg C02e/$ | metric tons CO2e | |
| Printing and Reproduction | | 0.00 | 0.477 | 0.00 | Commercial printing |
| Postage and Shipping | | | 0.257 | 0.00 | |
| **Total:** | **$0.00** | | | **0.00** | |

[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 right hand column.

| Activity | 2012 Dollars | 1997 Dollars [1] | Emission Factor [2] | GHG Emissions [3] |
|---|---|---|---|---|
| | | | kg C02e/$ (1997) | metric tons CO2e |
| Advertising and Marketing | 10,013.30 | 7,362.72 | 0.55 | **4.03** |

[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 2011 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.

**Conservation Magazine**

| | 2012 Dollars | 1997 Dollars [1] | Emission Factor [2] | GHG Emissions [3] | EIO-LCA Sector |
|---|---|---|---|---|---|
| | | | kg C02e/$ | metric tons CO2e | |
| Printing and Reproduction | | 0.00 | 0.477 | 0.00 | Commercial printing |
| Postage and Shipping | | | 0.257 | 0.00 | |
| Accounting, Legal, Editorial services | | 0.00 | 0.326 | 0.00 | Accounting and bookkeeping |
| Office supplies | | | 0.355 | 0.00 | |
| Computers and hardware | | | 0.282 | 0.00 | |
| Telecommunications and internet | | 0.00 | 0.476 | 0.00 | Telecommunications |
| Illustrations | | 0.00 | 0.398 | 0.00 | Independent artists and writers |
| Building expenses | | 0.00 | 0.400 | 0.00 | Sevices to buildings and dwellings |
| Books and publications | | | 1.100 | 0.00 | |
| Travel | | 0.00 | 1.330 | 0.00 | Air travel |
| Advertising and marketing | | 0.00 | 0.548 | 0.00 | Advertising and marketing |
| Misc | | 0.00 | 0.315 | 0.00 | Misc professional and technical services |
| **Total:** | | | | **0.00** | |

[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.

Smith Fellows Program

**2012 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 |
| Mike Dombeck | Stevens Point, WI | | Dulles, VA | 2 | 1 | 733.7 | | 0.40 | 0.00 | 0.81 |
| Louis Provencher | Reno, NV | | Dulles, VA | 2 | 1 | 2248.5 | | 1.07 | 0.00 | 2.15 |
| Janis Bush | San Antonio, TX | | Dulles, VA | 2 | 1 | 1367.9 | | 0.65 | 0.00 | 1.31 |
| Tom Sisk | Flagstaff, AZ | | Dulles, VA | 2 | 1 | 1894 | | 0.90 | 0.00 | 1.81 |
| Erica Fleishman | Sacramento, CA | | Dulles, VA | 2 | 1 | 2351.8 | | 1.12 | 0.00 | 2.25 |
| Barry Noon | Denver, CO | | Dulles, VA | 2 | 1 | 1468 | | 0.70 | 0.00 | 1.40 |
| Viorel Popescu | Vancouver | | Dulles, VA | 2 | 1 | 2338.7 | | 1.12 | 0.00 | 2.23 |
| Tabitha Graves | Flagstaff, AZ | | Dulles, VA | 2 | 1 | 1894 | | 0.90 | 0.00 | 1.81 |
| Brooke Bateman | New York City | | Dulles, VA | 2 | 1 | 219 | | 0.17 | 0.00 | 0.34 |
| Rebecca McCaffery | Bozeman, MT | | Dulles, VA | 2 | 1 | 1766.1 | | 0.84 | 0.00 | 1.69 |
| Tim Bonebrake | Los Angeles, CA | | Dulles, VA | 2 | 1 | 2274.3 | | 1.09 | 0.00 | 2.17 |
| David Hayman | Denver, CO | | Dulles, VA | 2 | 1 | 1468 | | 0.70 | 0.00 | 1.40 |
| Sara Souther | Madison, WI | | Dulles, VA | 2 | 1 | 684.9 | | 0.38 | 0.00 | 0.75 |
| Mo Ryan | Seattle, WA | | Dulles, VA | 2 | 1 | 2303.3 | | 1.10 | 0.00 | 2.20 |
| Clare Aslan | Hilo, HI | | Dulles, VA | 2 | 1 | 4727.8 | | 2.26 | 0.00 | 4.52 |
| Shonda Foster | Washington, DC | | Bangor, ME | 2 | 1 | 589.3 | | 0.32 | 0.00 | 0.65 |
| Heather DeCaluwe | Washington, DC | | Bangor, ME | 2 | 1 | 589.3 | | 0.32 | 0.00 | 0.65 |
| Brett Hartl | Washington, DC | | Bangor, ME | 2 | 1 | 589.3 | | 0.32 | 0.00 | 0.65 |
| Morgan Tinley | NYC | | Bangor, ME | 2 | 1 | 387.7 | | 0.21 | 0.00 | 0.43 |
| David Hayman | Denver, CO | | Bangor, ME | 2 | 1 | 1869.9 | | 0.89 | 0.00 | 1.79 |
| Viorel Popescu | Vancouver | | Bangor, ME | 2 | 1 | 2525.6 | | 1.21 | 0.00 | 2.41 |
| Tabitha Graves | Denver, CO | | Bangor, ME | 2 | 1 | 1869.9 | | 0.89 | 0.00 | 1.79 |
| Mo Ryan | Seattle, WA | | Bangor, ME | 2 | 1 | 2519.8 | | 1.20 | 0.00 | 2.41 |
| Sara Souther | Madison, WI | | Bangor, ME | 2 | 1 | 1031.4 | | 0.49 | 0.00 | 0.99 |
| Kim Terrell | Washington, DC | | Bangor, ME | 2 | 1 | 589.3 | | 0.32 | 0.00 | 0.65 |
| Malin Pinsky | NYC | | Bangor, ME | 2 | 1 | 387.7 | | 0.21 | 0.00 | 0.43 |
| Wendy Palen | Vancouver | | Bangor, ME | 2 | 1 | 2525.6 | | 1.21 | 0.00 | 2.41 |
| Mevin Hooten | Denver, CO | | Bangor, ME | 2 | 1 | 1869.9 | | 0.89 | 0.00 | 1.79 |
| Gordon Stenhouse | Edmonton, AB | | Bangor, ME | 2 | 1 | 2072.4 | | 0.99 | 0.00 | 1.98 |
| Colleen Webb | Denver, CO | | Bangor, ME | 2 | 1 | 1869.9 | | 0.89 | 0.00 | 1.79 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Paul Cryan | Denver, CO | | Bangor, ME | 2 | 1 | 1869.9 | | 0.89 | 0.00 | 1.79 |
| Oliver Pergams | Chicago, IL | | Bangor, ME | 2 | 1 | 969 | | 0.53 | 0.00 | 1.07 |
| Shonda Foster | Baltimore, MD | | Seattle, WA | 2 | 1 | 2330.8 | | 1.11 | 0.00 | 2.23 |
| Mike Dombeck | Stevens Point, WI | | Seattle, WA | 2 | 1 | 1574.6 | | 0.75 | 0.00 | 1.50 |
| Morgan Tinley | NYC | | Seattle, WA | 2 | 1 | 2404.6 | | 1.15 | 0.00 | 2.30 |
| David Hayman | Denver, CO | | Seattle, WA | 2 | 1 | 1020.9 | | 0.49 | 0.00 | 0.98 |
| Viorel Popescu | Vancouver | | Seattle, WA | 2 | 1 | 120 | | 0.09 | 0.00 | 0.19 |
| Tabitha Graves | Denver, CO | | Seattle, WA | 2 | 1 | 1020.9 | | 0.49 | 0.00 | 0.98 |
| Sara Souther | Madison, WI | | Seattle, WA | 2 | 1 | 1618.7 | | 0.77 | 0.00 | 1.55 |
| Kim Terrell | DC | | Seattle, WA | 2 | 1 | 2324.4 | | 1.11 | 0.00 | 2.22 |
| Malin Pinsky | NYC | | Seattle, WA | 2 | 1 | 2404.6 | | 1.15 | 0.00 | 2.30 |
| John Hall | DC | | Seattle, WA | 2 | 1 | 2324.4 | | 1.11 | 0.00 | 2.22 |
| Clare Aslan | Tucson, AZ | | Seattle, WA | 2 | 1 | 1221.2 | | 0.58 | 0.00 | 1.17 |
| Jim Manolis | Minneapolis | | Seattle, WA | 2 | 1 | 1392.8 | | 0.67 | 0.00 | 1.33 |
| | | | | 2 | 1 | | | 0.00 | 0.00 | 0.00 |
| | | | | 2 | 1 | | | 0.00 | 0.00 | 0.00 |
| | | | | 2 | 1 | | | 0.00 | 0.00 | 0.00 |
| **Totals** | | | | | | | | | | **69.43** |

[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/). (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) |
| Group of Smith fellows/staff/mentors | Warrenton, VA | Washington, DC | 48 | 23 | 2.09 | 0.02 |
| Group of Smith fellows/staff/mentors | Warrenton, VA | Washington, DC | 48 | 23 | 2.09 | 0.02 |
| Group of Smith fellows/staff/mentors | Warrenton, VA | Washington, DC | 48 | 23 | 2.09 | 0.02 |
| Group of Smith fellows/staff/mentors | Warrenton, VA | Washington, DC | 48 | 23 | 2.09 | 0.02 |
| Mike Dombeck | Stevens Point, WI | Bangor, ME | 1462 | 23 | 63.57 | 0.71 |
| Curtis Ogen | Boston, MA | Bangor, ME | 235 | 23 | 10.22 | 0.11 |
| Group of Smith fellows/staff/mentors | Bangor, ME | Schoodic Point, ME | 57 | 23 | 2.48 | 0.03 |
| Group of Smith fellows/staff/mentors | Bangor, ME | Schoodic Point, ME | 57 | 23 | 2.48 | 0.03 |
| Group of Smith fellows/staff/mentors | Bangor, ME | Schoodic Point, ME | 57 | 23 | 2.48 | 0.03 |
| Group of Smith fellows/staff/mentors | Bangor, ME | Schoodic Point, ME | 57 | 23 | 2.48 | 0.03 |
| Group of Smith fellows/staff/mentors | Seattle, WA | North Cascades, WA | 72 | 23 | 3.13 | 0.04 |
| Group of Smith fellows/staff/mentors | Seattle, WA | North Cascades, WA | 72 | 23 | 3.13 | 0.04 |
| Group of Smith fellows/staff/mentors | Seattle, WA | North Cascades, WA | 72 | 23 | 3.13 | 0.04 |
| Group of Smith fellows/staff/mentors | Seattle, WA | North Cascades, WA | 72 | 23 | 3.13 | 0.04 |
| **Totals** | | | **2405** | | | **1.17** |

[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)). 2205 lbs equals 1 metric ton.

**Smith Fellows Hotel Stays**

| Trip | Hotel-Nights | Emission Factor [1] | GHG Emissions [2] |
|---|---|---|---|
| | | kg CO2/room-night | (metric tons CO2e) |
| Warrenton/DC retreat | 96 | 29.53 | 2.83 |
| Maine Retreat | 66 | 29.53 | 1.95 |
| WA Retreat | 44 | 29.53 | 1.30 |
| **Totals** | **206.00** | | **6.08** |

[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
[2] = 1000 kg equals 1 metric ton.

**Smith Fellows Meals**

| Trip | Meals [1] | Snacks | % Vegetarian [2] | Estimated $ Spent [3] | Emission Factor [4] | GHG Emissions [5] |
|---|---|---|---|---|---|---|
| | | | | | kg CO2/$ | (metric tons CO2e) |
| | | | | 0 | 1.1953 | 0.00 |
| | | | | 0 | 1.1953 | 0.00 |
| | | | | 0 | 1.1953 | 0.00 |
| **Totals** | **0.00** | **0.00** | | | | **0.00** |

[1] = Estimated from meal menus and attendee lists for the various trips, or assumed where this information was unavailable.
[2] = Estimated from meal menus and attendee lists for the various trips, or assumed where this information was unavailable.
[3] = Assumed $25 for each meal, and $5 for each snack. Shonda Foster advised that $60/day is a rough estimate for food expenses.
[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

**Smith Fellows Trips**

| Trip | Destination | Number of Vehicles | Trip Distance [1] | Vehicle | Total Distance | Estimated MPG [2] | Gallons of Gasoline | GHG Emissions [3] |
|---|---|---|---|---|---|---|---|---|
| | | | (miles) | | (miles/hrs) | | | (metric tons CO2e) |
| | | | | | 0 | 18 | 0.00 | 0.00 |
| | | | | | 0 | 18 | 0.00 | 0.00 |
| | | | | | 0 | | | 0.00 |
| **Totals** | | | | | | | | **0.00** |

[1] = Driving distance estimated from Google.com, boat trip length estimated from Ventura tour company.
[2] = MPG estimated to be 23 MPG on average, and boat gasoline consumption is estimated from experience.
[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)). 2205 lbs equals 1 metric ton.

**2011 Printing for Conservation Biology**

| | # of issues printed [1] |
|---|---|
| Volume 25 #1 | 2080 |
| Volume 25 #2 | 1930 |
| Volume 25 #3 | 1970 |
| Volume 25 #4 | 1650 |
| Volume 25 #5 | 1320 |
| Volume 25 #6 | 1400 |
| | **10350** |

[1] = Information provided by Marjorie Spencer, at Wiley-Blackwell Publishing

**2012 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 |
| | |

**Cropland for meals**

| | |
|---|---|
| 690 | meals Smith Fellows |
| 420 | snacks Smith Fellows |
| 40% | percent vegetarian |
| | |
| | meals ICCB meeting |
| | snacks ICCB meeting |
| | percent vegetarian |

Meal compositions assumed below

| | | meal non-veg | meal veg | snack |
|---|---|---|---|---|
| 414 | total meals non-veg | | | |
| 276 | total meals veg | chicken | 0.1 | | |
| 420 | total snacks | turkey | 0.2 | | 0.1 |
| | | bread | 0.4 | 0.4 | 0.5 |
| 0.75 | kg food / meal non-veg | wheat | 0.2 | 0.2 | |
| 0.75 | kg food / meal veg | apple | | 0.2 | 0.4 |
| 0.2 | kg food / snack | lettuce | 0.1 | 0.2 | |

| | | ha / kg | gha / t |
|---|---|---|---|
| 0.0005 | ha / kg of meal | | | |
| 0.0002 | ha / kg of meal veg | chicken | 0.0010 | 2.64 |
| 0.0003 | ha / kg of boxed lunch | turkey | 0.0010 | 2.64 |
| | | bread | 0.0003 | 0.81 |
| | | wheat | 0.0004 | 0.93 |
| 2.64 | EQF cropland | apple | 0.0001 | 0.21 |
| | | lettuce | 0.0000 | 0.12 |

| EQF crop |
|---|
| 2.64 |

| | |
|---|---|
| 0.1545 | ha world avg cropland for all meals non-veg |
| 0.0452 | ha world avg cropland for all meals veg |
| 0.0240 | ha world avg cropland for all snacks |
| | |
| 0.4080 | global ha for all meals non-veg |
| 0.1192 | global ha for all meals veg |
| 0.0633 | global ha for all snacks |

**Food and Beverage**

| | | | | | |
|---|---|---|---|---|---|
| 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 | | | | |
| | | | | | |
| 25,000 | copies of Conservation Biology printed | | | | |
| 0.7 | kg/copy (estimated) | | | | |
| 17,500 | kg paper Cons Bio | | | | |
| | | | | | |
| 25,480 | total kg paper all sources | | | | |
| 0.004 | m3 roundwood / kg paper | | | | |
| 2.3600 | world avg forest yield (m3 roundwood / ha) | | | | |
| 43.19 | ha world average forest | | | | |
| | | | | | |
| 1.33 | EQF forest land | | | | |
| | | | 0.27% | % SCB office | |
| 57.44 | global ha, of which --> | | 3.97% | % SCB newsletter | |
| | | | 27.08% | % Cons Magazine | |
| | | | 68.68% | % Cons Bio | |
| | | | | | |
| **30%** | % recycled | | | | |
| 30.23 | ha world avg forest with recycling credit | | | | |
| 40.21 | global ha with recycling credit | | | | |

Carbon Sequestration

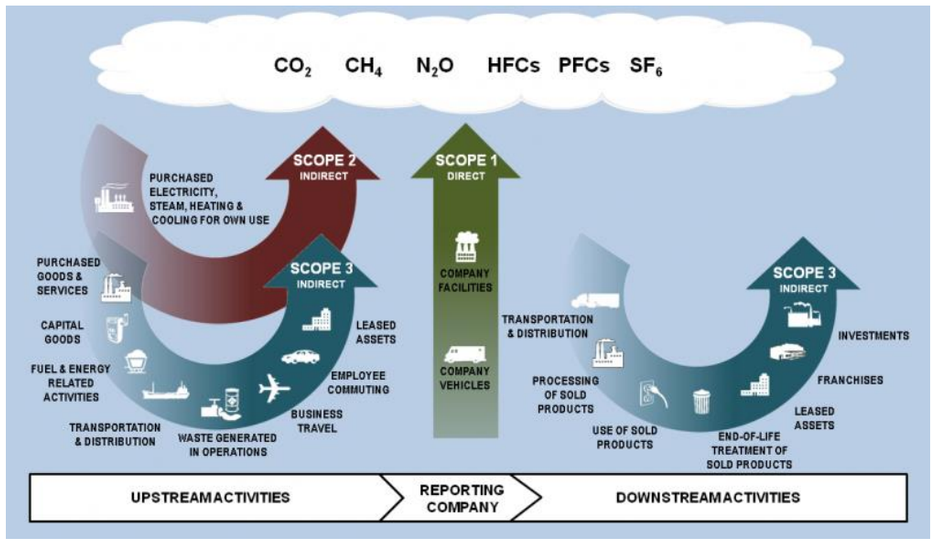
**Forest for carbon sequestration**

| | |
|---|---|
| **143** | tonne fossil CO2 emitted from SCB operations |
| 3.59 | world-average forest absorption (tonnes CO2 / ha) |
| 25.20% | % of emitted fossil carbon sunk by surface ocean |
| 28 | ha world-average forest for carbon absorption |
| | |
| 1.33 | EQF forest land |
| | |
| 40 | global ha for carbon absorption |
| | |
| 0.2771 | global ha 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.[8]




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 2011 evaluation is essentially the same as previous years, for the sake of consistency. The list of activities for this assessment includes:

Scope 1 activities (owned or directly controlled by SCB)

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

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.[9] 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.

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

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

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.[10] 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.

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