# Society for Conservation Biology
# Ecological Footprint Committee

# 2011 Ecological Footprint Assessment

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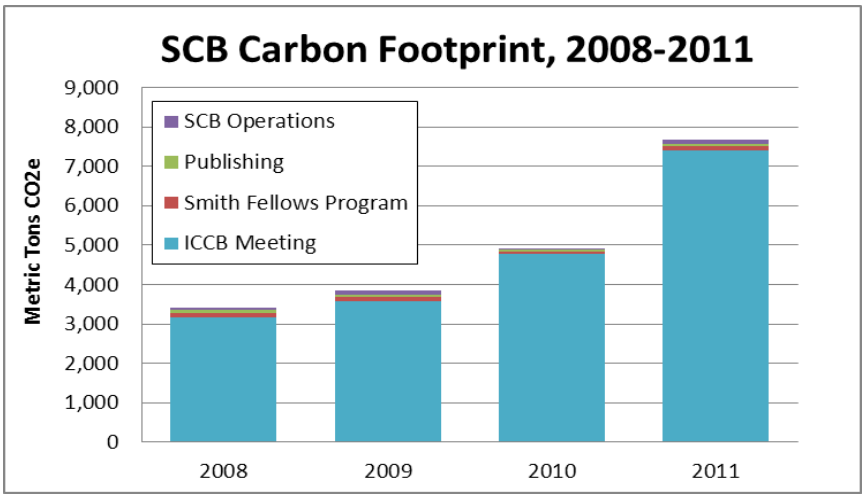
Society for Conservation Biology
**2011 Ecological Footprint Assessment**

## Executive Summary

- This is the 4th year the Ecological Footprint Committee (EFC) of the Society for Conservation Biology (SCB) has estimated our annual ecological footprint.
- The ecological footprint and carbon footprint of SCB have risen steadily from 2008-2011, with a particularly dramatic increase in 2011 (see figure). This 4-year trend is partially attributable to improved data-gathering practices. The large increase in 2011 is almost entirely due to the air travel associated with the ICCB meeting in Auckland, NZ.




- 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 SCB's operations for the years 2010-2013.
- In 2010 and 2011, SCB's combined greenhouse gas (GHG) footprint was 12,611 metric tons of $CO_2$. **Therefore, SCB has effectively "consumed" the 4-year allowance of carbon sequestration from this project after 2 years and 1,133 metric tons of $CO_2$ emissions from 2011 remain unaccounted for.**
- The Board of Governors will need to make several decisions to deal with this shortfall in the near-term. 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. SCB currently has $7,511.37 of unallocated funds in the carbon offset account. More detailed recommendations are found at the conclusion of this assessment (p. 15-17).

## 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 2011 marks our 4th 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 2011 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 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 four annual assessments already completed, SCB can track changes in the organization's 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 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. Nevertheless, inconsistencies in data gathering and calculation methods continue to confound the results, particularly with respect to on-site meeting activities and publications. Therefore, every year-to-year difference 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.

Rather than absolute comparisons of GHG or Ecological Footprint values, these assessments are useful for comparing trends. We do believe the assessments effectively capture broad trends and major

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

annual changes relevant to SCB activities and ecological impacts. For example, it is 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 4 years, more trends are apparent. For example, we now should be better able to predict the GHG emissions of an ICCB meeting based on reasonable estimates of the number of attendees and its geographic location.

The 2011 Ecological Footprint Assessment will further enhance SCB's understanding of the society'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 2011 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 (Stephen.handler@gmail.com). Ron Abrams is the newly-appointed Chair of the EFC and can be reached at ecofootprint@conbio.org.

Sincerely,

Stephen Handler
Outgoing Chair, Ecological Footprint Committee

## 2008-2011 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 2008-2011 are presented side-by-side for comparison. Values that were calculated using different methods have been noted, and complete data and calculations for 2011 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 2008-2010 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) |
|---|---|---|---|---|---|---|---|---|
| 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] |
| | | | | | | | | |
| 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] | |
| Natural gas use at SCB EO | 9.17 [a] | | 5.50 [a] | | 4.45 [a] | | 4.44 [a] | |
| SUB-TOTAL (Scope 1 and 2) | 17.38 | | 14.29 | | 6.40 | | 11.57 | |
| | | | | | | | | |
| Scope 3 activities (indirect) | | | | | | | | |
| **SCB Executive Office** | | | | | | | | |
| Water use | 0.32 [a] | | 0.07 [a] | | 0.08 [a] | | 0.13 [a] | |
| Paper use | 0.03 [a] | 0.1 [b] | 0.03 [a] | 0.11 [b] | 0.03 [f] | 0.13 [b,h] | 0.03 [f] | |
| Waste generated | 720 gal/year [g] | | 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] | |
| Air travel for SCB staff | 43.44 [b] | | 91.42 [b] | | 17.60 [b] | | 89.14 [b] | |
| Car travel for SCB staff | 0.38 [b] | | 0.87 [b] | | 0.14 [b] | | 0.39 [b] | |
| SCB website hosting and maintenance | Missing Data | | 2.18 [d] | | 2.18 [f] | | 2.18 [f] | |
| Employee commuting | 1.53 [b] | | 5.82 [b] | | 3.77 [b] | | 6.68 [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] |
| SUB-TOTAL (SCB Operations) | 62.31 | | 111.29 | | 34.97 | | 109.15 | |

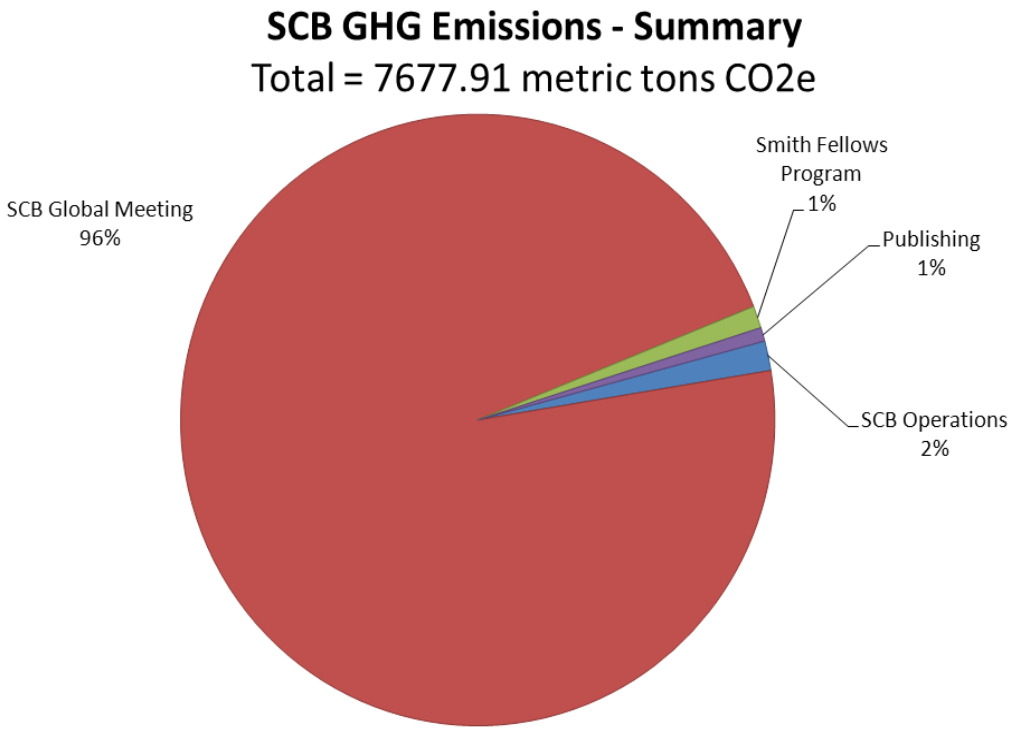
[5] Previous assessments are available at: http://www.conbio.org/Activities/Committees/EcologicalFootprint/CarbonOffset/ecologicalfootprint.cfm

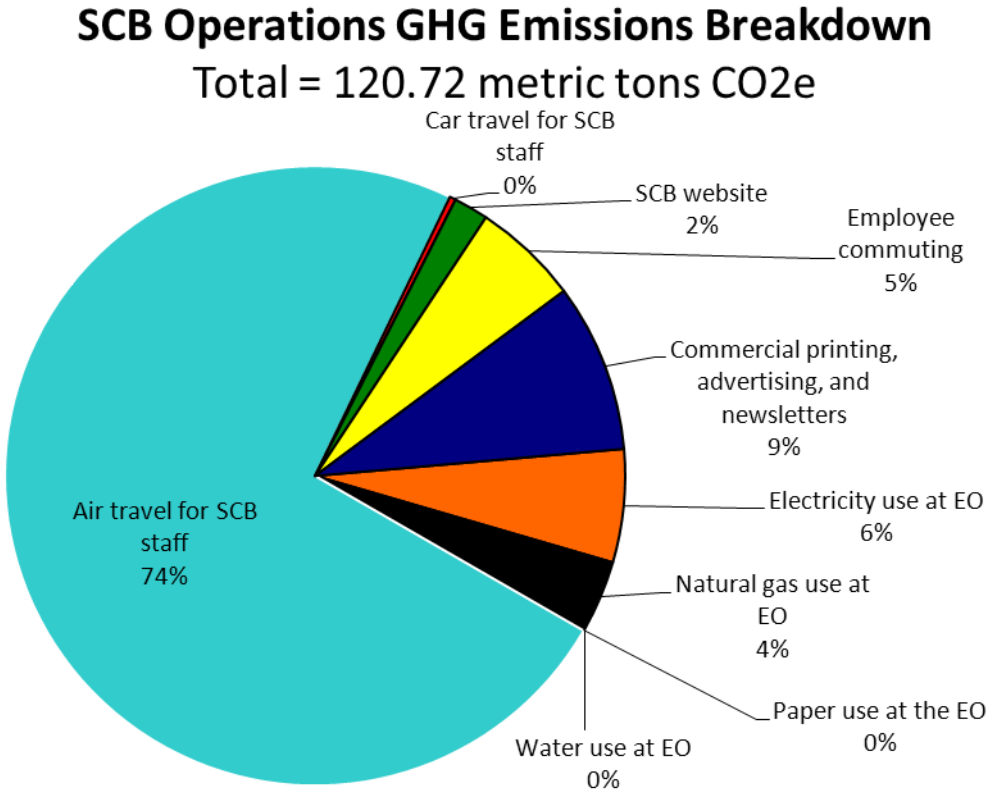
| Activity (by Scope) | 2008 GHG Emissions (metric tons CO2e) | 2008 Ecological footprint (global ha-years) | 2009 GHG Emissions (metric tons CO2e) | 2009 Ecological footprint (global ha-years) | 2010 GHG Emissions (metric tons CO2e) | 2010 Ecological footprint (global ha-years) | 2011 GHG Emissions (metric tons CO2e) | 2011 Ecological footprint (global ha-years) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **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 | |
| | | | | | | | | |
| **Smith Fellows Program** | | | | | | | | |
| Participant air travel | 81.98 [b] | | 58.52 [b] | | 53.08 [b] | | 68.56 [b] | |
| Participant car travel | 3.39 [b] | | 4.36 [b] | | 3.61 [b] | | 0.46 [b] | |
| Hotel accommodations | 6.07 [b,g] | | 6.08 [b,g] | | 4.28 [b,g] | | 6.91 [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 [g] |
| Trips | Missing Data | | 2.48 [b] | | Missing Data | | Missing Data | |
| SUB-TOTAL (Smith Fellows Program) | 101.31 | | 89.84 | | 74.85 | | 89.89 | |
| | | | | | | | | |
| **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] |
| Shipping and distribution | 4.18 [e] | | 5.05 [e] | | 4.40 [e] | | 7.44 [e] | |
| Other production tasks | Missing Data | | 20.92 [e] | | 23.41 [e] | | 20.56 [e] | |
| | | | | | | | | |
| **Conservation Letters (online publication)** | | | | | | | | |
| Printing and design | Missing Data | | Missing Data | | Missing Data | | Missing Data | |
| Shipping and distribution | 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) |
|---|---|---|---|---|---|---|---|---|
| **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] |
| Shipping and distribution | 25.00 [d] | | Missing Data | | 6.60 [d, h] | | 6.52 [d] | |
| | | | | | | | | |
| SUB-TOTAL (Publishing) | 86.90 | | 59.80 | | 52.92 | | 55.13 | |
| GRAND TOTAL ECOLOGICAL FOOTPRINT (EXCLUDING $CO_2e$) | | 63.04 | | 41.44 | | 34.21 | | 37.16 |
| GRAND TOTAL CARBON FOOTPRINT | **3431.60** | 949 | **3859.56** | 1069.48 | **4933.26** | 1367.01 | **7677.91** | 2107.59 |
| GRAND TOTAL ECOLOGICAL FOOTPRINT | | **1012.04** | | **1110.92** | | **1401.22** | | **2144.75** |

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)

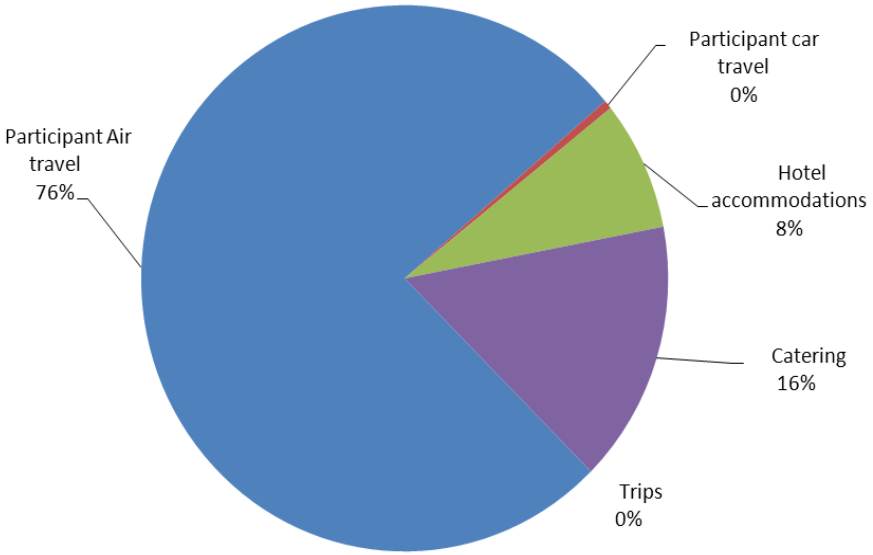
**2011 Relative Contributions:** The following charts present the relative contributions of the various activities to SCB's GHG emissions and Ecological Footprint values.



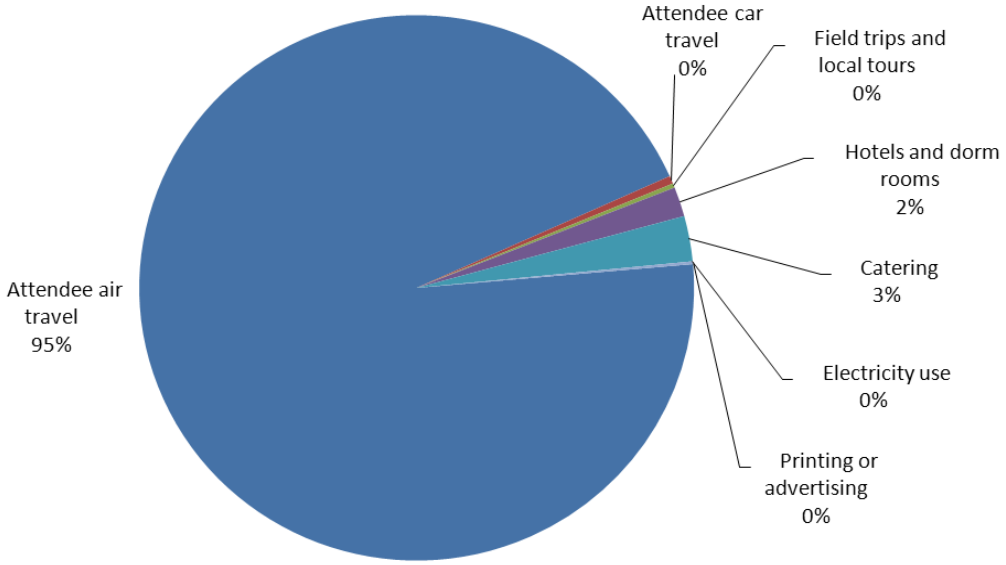
## Smith Fellows Program GHG Emissions

Total = 89.89 metric tons CO2e




## Auckland Global Meeting GHG Emissions

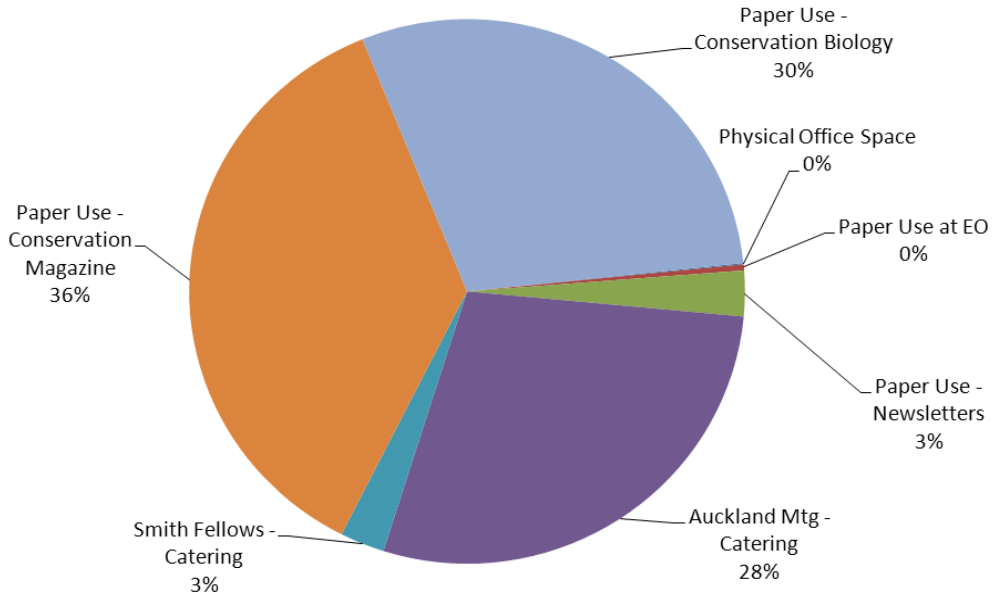
Total = 7412.16 metric tons CO2e



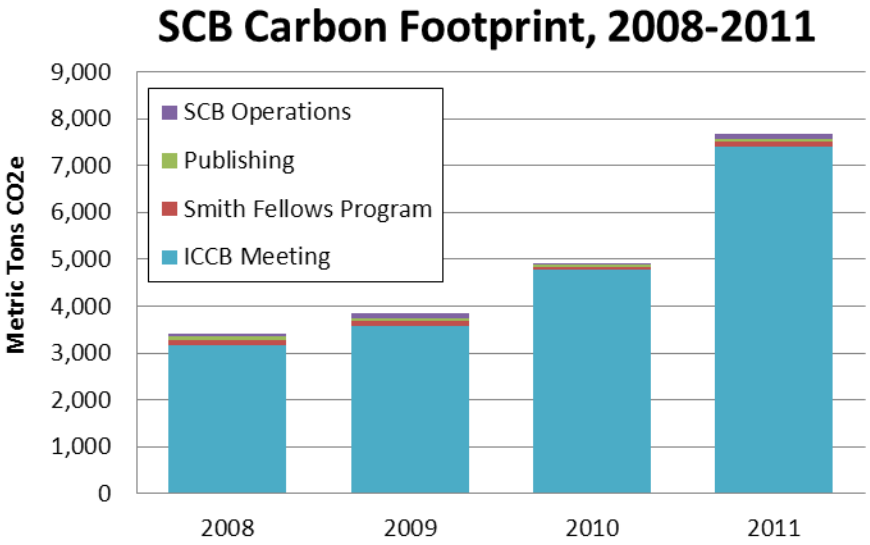

## Ecological Footprint Summary

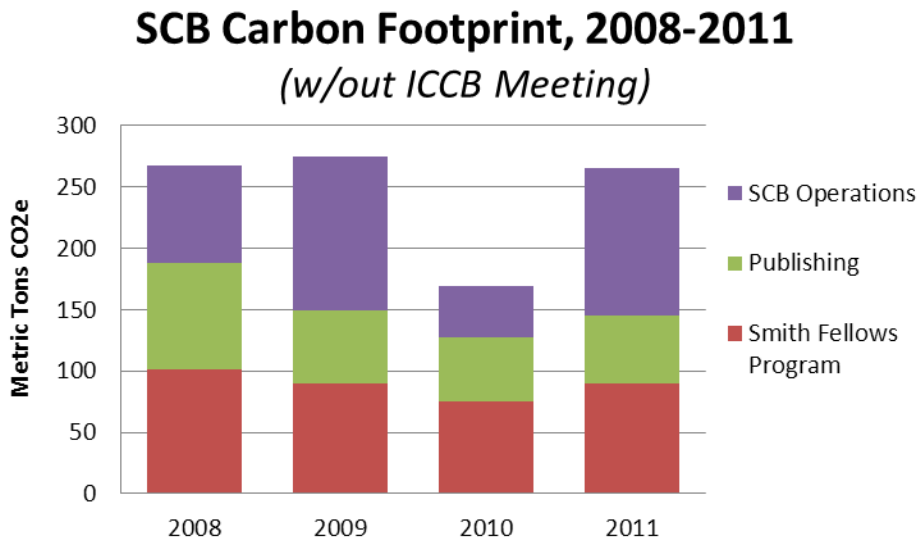
Total = 37.16 global ha-yrs

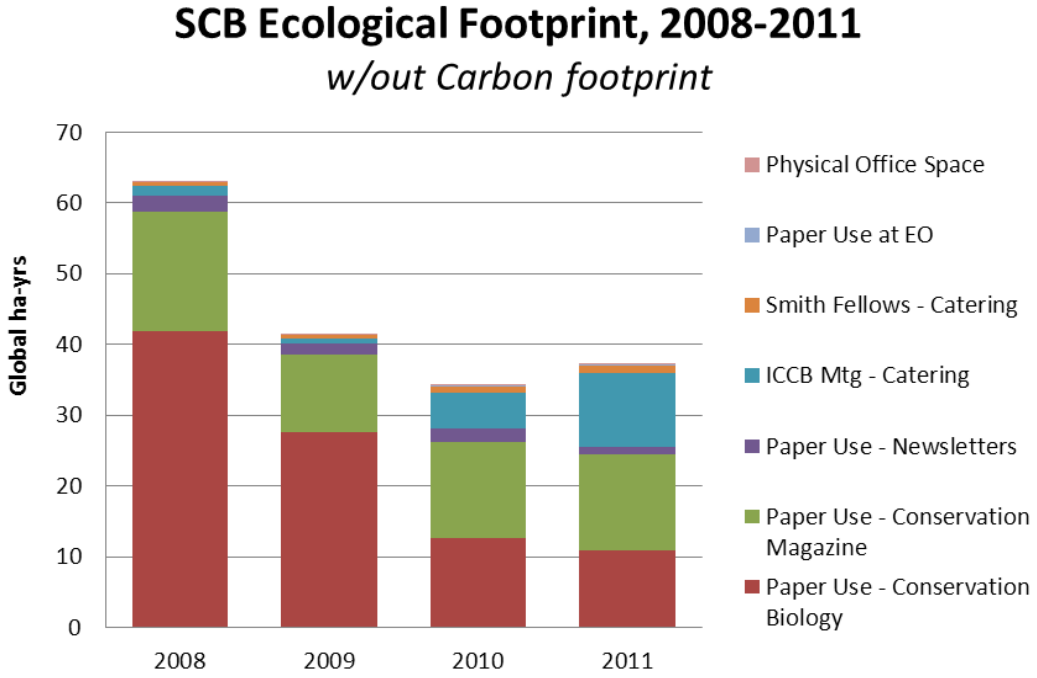
*(excluding GHG emissions)*



**4-Year Trends:** The following graphs present the trends of the various activities to SCB's GHG emissions and Ecological Footprint from 2008 to 2011.



## Results: GHG Emissions and Ecological Footprint

***Carbon Footprint - GHG Emissions***

SCB was responsible for a total of 7,677.91 metric tons of $CO_2e$ in 2011. 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 2008 and 2009 combined. This sharp increase is primarily due to participant air travel to the ICCB meeting in New Zealand. The carbon footprint values for the Executive Office (EO), Smith Fellows Program, and Publishing all experienced increases, returning to approximately 2009 levels after declining in 2010. Explanations of these differences are included below, along with some interesting trends over the past 4 years.

*International Congress for Conservation Biology*

**The GHG emissions from the ICCB meeting in 2011 were about 2,700 metric tons greater than in 2010, and more than double 2009 and 2008 figures.** The main reason for this increase was attendee air travel to the 2011 meeting (~2,500 metric tons more than in 2010). The increase in GHG emissions due to air travel is 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. For comparison, there were only ~650 attendees at the 2009 ICCB in Beijing, and the air travel GHG emissions for this event were roughly half the 2011 total. In previous years the large majority of ICCB attendees were from North America, but in 2011 the distribution of conference attendees was much more evenly spread across the globe. Only 22% of conference participants hailed from North America. Typical flight itineraries for meeting attendees from Europe, Africa, and the Middle East were estimated to result in >10 metric tons $CO_2e$ per attendee.

Additionally, there was a substantial increase in GHG emissions estimated for ICCB catering (73 metric ton increase), hotel room accommodations (70 metric ton increase), electricity use (12 metric ton increase), and printing (15 metric ton increase). Conversely, attendee car travel represented a smaller carbon footprint according to 2011 estimates (50 metric ton decrease).

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] |
|---|---|
| 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.

Even from this normalized perspective, the 2011 ICCB meeting in Auckland clearly stands out as the highest emitter of GHGs. While there were differences in the calculation methods between these four years, it is reasonable to assume that this trend would still hold true. The combination of a large crowd and a meeting location that required multiple long-distance plane trips led to an immense carbon footprint.

*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. Natural gas use was practically unchanged from 2010 to 2011. It is unclear if the EO experienced a different pattern of use in 2011 that would account for these changes, or if 2010 was an aberration of some kind. Staff air travel also increased dramatically in 2011 due to several staff members traveling to New Zealand. Air travel emissions were comparable to 2009, when several staff members travelled to Beijing.

*Smith Fellows Program*

The carbon footprint of the Smith Fellows Program also repeated the pattern of increasing carbon emissions to 2009 levels. 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 3 years. 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 4 years and it may not be worth considering in the future. SCB recently ended the formal relationship with Conservation Magazine, so this publication will not appear in future assessments. 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. The ICCB meeting accounted for the other 96% of SCB's total carbon footprint in 2011. This pattern has been relatively consistent for the past 4 years, with ICCB meetings accounting for 92-96% of annual GHG emissions.

***Ecological Footprint***

SCB's Ecological Footprint is about 2144.75 global hectare-years, meaning that about 21 $km^2$ of land worldwide is needed to support or offset annual operations. The bulk of our Ecological Footprint (98%) is comprised of global hectare-years of forest land that would be required to sequester SCB's GHG emissions. This proportion of the overall ecological footprint has been increasing steadily as SCB's carbon footprint has grown, up from 93% in 2008. Excluding GHG emissions, SCB's Ecological Footprint has remained relatively consistent from 2009-2011. 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, 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. SCB discontinued printing newsletters in 2011, so future assessments will show a reduced paper use.

Ecological footprint values for food production were much higher in 2011 than previous years, particularly for the ICCB meeting. This can be attributed to a larger number of attendees, better record-keeping at the 2011 ICCB meeting, and more thorough methods of estimating ecological footprint values.

## 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 previous assessments. 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. EFC member Tuyeni Mwampamba (thmwampamba@gmail.com) can provide more details about the Africa Section meeting. 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

We recommend that the Board of Governors (BoG) consider the following two issues, and respond either by a formal Board vote, or communicating the sense of the BoG to the EFC and to the staff of the Executive Office. Information from the SCB Carbon Offset Account is also provided for reference.

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 SCB's operations for the years 2010-2013.

   For 2010 and 2011, SCB's combined estimated GHG footprint was 12,611 metric tons of $CO_2$.[7] **Therefore, SCB has effectively "consumed" the 4-year allowance of carbon sequestration from the WRCS project after 2 years and 1,133 metric tons of $CO_2$ emissions from 2011 remain unaccounted for.**

   The BoG will need to decide how to deal with this shortfall in the near-term. We present 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. As of June 27, 2012, SCB has a balance of $31,582.87 in the carbon offset account. Of this, $7,511.37 is currently unallocated and the remainder is still being held for the Baviaanskloof carbon project in South Africa.[8] So SCB has funds available to purchase offsets in the short term.

   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. Carbon offset fees for the 2011 ICCB were not high enough to cover the cost of mitigation (2c below).

   Option A has the advantage of being more straightforward and "balancing the account" in a matter of weeks or months, as opposed to years.

[7] 4933.26 metric tons in 2010 + 7677.91 metric tons in 2011.
[8] This information comes from the SCB accountant Phil Phan and Heather DeCaluwe.

2. 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 present several steps to ensure that SCB is able to maintain this commitment in the future:

    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 has already paid the second installment of $17,000 as required by the terms of the agreement. **SCB is bound to pay a final $16,000 to the project proponents after the 2013 ICCB meeting.** As of June 27, 2012, SCB has a balance of $31,582.87 in the carbon offset account. However, only $7,511.37 is unallocated, with the remainder being held for the Baviaanskloof project.

    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.** For reference, SCB raised $19,935.50 from the 2011 ICCB to cover an estimated footprint of 7,412 metric tons of $CO_2$ ($2.68 per metric ton of $CO_2$). It's unlikely that SCB could enter into a project to generate offsets so cheaply and also unlikely that SCB could purchase offsets so cheaply from the voluntary carbon market. So SCB underestimated the carbon offset fee for the 2011 meeting.

    d. SCB may wish to factor the ecological footprint implications into decisions regarding future ICCB locations. The New Zealand meeting completely negated the ecological benefit of holding meetings on a biannual basis.

## Annex 1

### 2011 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

**2011 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) |
| 12/31/2010 | 186.64 | 171.68 | 0.15 | 1130.40 | 1.09 | 1.072 | 0.60 |
| 01/31/2011 | 209.57 | 194.61 | 0.15 | 1281.37 | 1.09 | 1.072 | 0.68 |
| 03/23/2011 | 176.58 | 161.62 | 0.15 | 1064.16 | 1.09 | 1.072 | 0.56 |
| 04/20/2011 | 183.28 | 168.32 | 0.17 | 1019.10 | 1.09 | 1.072 | 0.54 |
| 05/18/2011 | 143.35 | 128.39 | 0.17 | 777.34 | 1.09 | 1.072 | 0.41 |
| 06/15/2011 | 179.38 | 164.42 | 0.17 | 995.48 | 1.09 | 1.072 | 0.53 |
| 07/20/2011 | 246.02 | 231.06 | 0.17 | 1398.96 | 1.09 | 1.072 | 0.74 |
| 08/17/2011 | 334.12 | 319.16 | 0.17 | 1932.36 | 1.09 | 1.072 | 1.02 |
| 09/22/2011 | 213.1 | 198.14 | 0.15 | 1304.62 | 1.09 | 1.072 | 0.69 |
| 10/19/2011 | 159.87 | 144.91 | 0.15 | 954.13 | 1.09 | 1.072 | 0.51 |
| 11/17/2011 | 129.66 | 114.70 | 0.15 | 755.22 | 1.09 | 1.072 | 0.40 |
| 12/14/2011 | 140.84 | 125.88 | 0.15 | 828.83 | 1.09 | 1.072 | 0.44 |
| **Total:** | 2302.41 | | | 13441.97 | | | **7.12** |

[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

**2011 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) |
| 02/02/2011 | 226.09 | 218.14 | 0.3592 | 607.29 | 5.914 | 4495 | 3235 | 2.58 |
| 03/01/2011 | 111.62 | 103.67 | 0.3592 | 288.61 | 5.914 | 4495 | 3235 | 1.23 |
| 03/30/2011 | 28.71 | 20.76 | 0.3592 | 57.80 | 5.914 | 4495 | 3235 | 0.25 |
| 04/27/2011 | 17.3 | 9.35 | 0.3592 | 26.03 | 5.914 | 4495 | 3235 | 0.11 |
| 05/31/2011 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 06/29/2011 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 07/27/2011 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 08/25/2011 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 09/28/2011 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 10/31/2011 | 7.95 | 0 | 0.3592 | 0.00 | 5.914 | 4495 | 3235 | 0.00 |
| 12/31/2011 | 13.73 | 5.78 | 0.3592 | 16.09 | 5.914 | 4495 | 3235 | 0.07 |
| 12/31/2011 | 25.37 | 17.42 | 0.3592 | 48.50 | 5.914 | 4495 | 3235 | 0.21 |
| | **Total: 470.52** | | | 1044.32 | | | | **4.44** |

[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 is subdivided to represent the proportion of the building occupied by SCB, because the building is metered as a whole.
[4] = 1000 kg equals 1 metric ton.

**2011 Water Use at the EO**

| Date | Bill | Bill 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) |
| 01/19/2011 | 63.32 | 59.32 | 5.77 | 10.28 | 7690.54 | 3.09 | 23.76 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 02/16/2011 | 48.28 | 44.28 | 5.77 | 7.67 | 5740.68 | 3.09 | 17.74 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 03/23/2011 | 108.44 | 104.44 | 5.77 | 18.10 | 13540.13 | 3.09 | 41.84 | 1.072 | 1.09 | 4495 | 3235 | 0.02 |
| 04/20/2011 | 70.84 | 66.84 | 5.77 | 11.58 | 8665.48 | 3.09 | 26.78 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 05/11/2011 | 63.32 | 59.32 | 5.77 | 10.28 | 7690.54 | 3.09 | 23.76 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 06/22/2011 | 115.96 | 111.96 | 5.77 | 19.40 | 14515.06 | 3.09 | 44.85 | 1.072 | 1.09 | 4495 | 3235 | 0.02 |
| 07/20/2011 | 63.32 | 59.32 | 5.77 | 10.28 | 7690.54 | 3.09 | 23.76 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 07/31/2011 | 78.36 | 74.36 | 5.77 | 12.89 | 9640.41 | 3.09 | 29.79 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 09/22/2011 | 77.93 | 73.93 | 5.77 | 12.81 | 9584.66 | 3.09 | 29.62 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 10/19/2011 | 59.74 | 55.74 | 5.77 | 9.66 | 7226.42 | 3.09 | 22.33 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 11/17/2011 | 68.75 | 64.75 | 5.77 | 11.22 | 8394.52 | 3.09 | 25.94 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| 12/31/2011 | 84.25 | 80.25 | 5.77 | 13.91 | 10404.02 | 3.09 | 32.15 | 1.072 | 1.09 | 4495 | 3235 | 0.01 |
| Total | 902.51 | 898.51 | | | | | | | | | | **0.13** |

[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

**2011 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 |
| Heather DeCaluwe | DC | Los Angeles | | Auckland | 2 | 1 | 2296.8 | 6529.4 | | 1.27 | 3.12 | 0.00 | 8.77 |
| John Fitzgerald | DC | Los Angeles | | Auckland | 2 | 1 | 2296.8 | 6529.4 | | 1.27 | 3.12 | 0.00 | 8.77 |
| Ellen Main | Fort Myers | Dallas | Los Angeles | Auckland | 2 | 1 | 990 | 1240.4 | 6529.4 | 0.55 | 0.68 | 3.12 | 8.69 |
| Nate Spillman | DC | Chicago | Los Angeles | Auckland | 2 | 1 | 595 | 1743 | 6529.4 | 0.33 | 0.96 | 3.12 | 8.81 |
| Margaret Flagg | Gainsville | Los Angeles | | Auckland | 2 | 1 | 2121 | 6529.4 | | 1.17 | 3.12 | 0.00 | 8.57 |
| Lauren Krizel | DC | Houston | Los Angeles | Auckland | 2 | 1 | 1220 | 1371.8 | 6529.4 | 0.67 | 0.66 | 3.12 | 8.89 |
| Anne Hummer | Baltimore | | | Seattle | 2 | 1 | 2330.8 | | | 1.28 | 0.00 | 0.00 | 2.57 |
| Anne Hummer | New York | | | San Francisco | 2 | 1 | 2568.5 | | | 1.42 | 0.00 | 0.00 | 2.83 |
| Anne Hummer | DC | | | Vancouver | 2 | 1 | 2359.6 | | | 1.30 | 0.00 | 0.00 | 2.60 |
| Anne Hummer | San Francisco | | | Auckland | 2 | 1 | 6536 | | | 3.60 | 0.00 | 0.00 | 7.20 |
| Anne Hummer | Baltimore | | | Corning, NY | 1 | 1 | 198 | | | 0.16 | 0.00 | 0.00 | 0.16 |
| Anne Hummer | DC | | | Boston | 2 | 1 | 394.5 | | | 0.22 | 0.00 | 0.00 | 0.43 |
| Autumn-Lynn Harrison | Los Angeles | | | Auckland | 2 | 1 | 6529.4 | | | 3.60 | 0.00 | 0.00 | 7.20 |
| Shonda Foster | Baltimore | | | Austin | 2 | 1 | 1348.3 | | | 0.74 | 0.00 | 0.00 | 1.49 |
| Shonda Foster | Baltimore | | | San Jose, CA | 2 | 1 | 2435.5 | | | 1.34 | 0.00 | 0.00 | 2.68 |
| Shonda Foster | Baltimore | | | Milwaukee | 2 | 1 | 642 | | | 0.35 | 0.00 | 0.00 | 0.71 |
| Shonda Foster | Baltimore | Los Angeles | | Auckland | 2 | 1 | 2296 | 6529.4 | | 1.27 | 3.12 | 0.00 | 8.77 |
| **Totals** | | | | | | | | | | | | | **89.14** |

[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.

**2011 Staff Car Travel**

| Employee | Destination | Number of Trips | Miles | Estimated MPG [1] | Gallons of Gasoline | GHG Emissions [2] |
|---|---|---|---|---|---|---|
| | | | | | | (metric tons CO2e) |
| Heather DeCaluwe | McLean, VA | 6 | 132 | 23 | 5.74 | 0.06 |
| Heather DeCaluwe | Front Royal, VA | 1 | 158 | 23 | 6.87 | 0.08 |
| Cathy McIntosh | McLean, VA | 3 | 87 | 23 | 3.78 | 0.04 |
| Anne Hummer | Corning NY to NYC | 1 | 186 | 23 | 8.09 | 0.09 |
| Anne Hummer | Front Royal, VA | 1 | 158 | 23 | 6.87 | 0.08 |
| Anne Hummer | Baltimore | 1 | 71 | 23 | 3.09 | 0.03 |
| **Totals** | | | | | | **0.39** |

**2011 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 | 15 | 80.4 | 1206 | 2011 Toyota Sienna Minivan | 23 | 52.43 | 0.59 |
| Heather DeCaluwe | 253 | 14.8 | 3744.4 | Acura Integra | 23 | 162.80 | 1.82 |
| John Fitzgerald | 208 | 14 | 2912 | Metro train | 0.30 lb CO2/pass-mile | NA | 0.40 |
| Nate Spillman | 4 | 16 | 64 | Honda Civic | 23 | 2.78 | 0.03 |
| Nate Spillman | 81 | 16 | 1296 | Metro train | 0.30 lb CO2/pass-mile | NA | 0.40 |
| Lauren Krizel | 85 | 6 | 510 | Metro bus | 0.30 lb CO2/pass-mile | NA | 0.40 |
| Anne Hummer | 185 | 26.5 | 4902.5 | 2004 Chevrolet MalibuMaxx | 23 | 213.15 | 2.39 |
| Shonda Foster | 68 | 20 | 1360 | Toyota Sienna | 23 | 59.13 | 0.66 |
| **Totals** | | | **15994.9** | | | | **6.68** |

[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 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 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

**2011 Newsletter**

| | 2011 Dollars | 1997 Dollars [1] | Emission Factor [2] | GHG Emissions [3] | EIO-LCA Sector |
|---|---|---|---|---|---|
| | | | kg C02e/$ | metric tons CO2e | |
| Printing and Reproduction | 9,111.60 | 6,508.29 | 0.477 | 3.10 | Commercial printing |
| Postage and Shipping | 2,161.34 | | 0.257 | 0.56 | |
| **Total:** | **$11,272.94** | | | **3.66** | |

[1] = When possible, we made use of the Cascadia Climate Partnership Tool, which uses an input in 2011 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 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. 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.

**2011 Advertising and Marketing**

| | 2011 Dollars | 1997 Dollars [1] | Emission Factor [2] | GHG Emissions [3] |
|---|---|---|---|---|
| | | | kg C02e/$ (1997) | metric tons CO2e |
| Advertising and Marketing | 17,749.23 | 12,678.02 | 0.55 | **6.95** |

[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**

| | 2011 Dollars | 1997 Dollars [1] | Emission Factor [2] | GHG Emissions [3] | EIO-LCA Sector |
|---|---|---|---|---|---|
| | | | kg C02e/$ | metric tons CO2e | |
| Printing and Reproduction | 55,985.96 | 39,989.97 | 0.477 | 19.08 | Commercial printing |
| Postage and Shipping | 28,947.14 | | 0.257 | 7.44 | |
| Accounting, Legal, Editorial services | 6,625.26 | 4,732.33 | 0.326 | 1.54 | Accounting and bookkeeping |
| Office supplies | 389.69 | | 0.355 | 0.14 | |
| Computers and hardware | 158.44 | | 0.282 | 0.04 | |
| Telecommunications and internet | 513.47 | 366.76 | 0.476 | 0.17 | Telecommunications |
| Illustrations | 10,994.20 | 7,853.00 | 0.398 | 3.13 | Independent artists and writers |
| Building expenses | 35,000.00 | 25,000.00 | 0.400 | 10.00 | Sevices to buildings and dwellings |
| Books and publications | 72.58 | | 1.100 | 0.08 | |
| Travel | 1,977.51 | 1,412.51 | 1.330 | 1.88 | Air travel |
| Advertising and marketing | 13,065.63 | 9,332.59 | 0.548 | 5.11 | Advertising and marketing |
| Misc | | | 0.315 | 0.00 | Misc professional and technical services |
| **Total:** | | | | **48.61** | |

[1] = When possible, we made use of the Cascadia Climate Partnership Tool, which uses an input in 2011 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 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. 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.

2011 SCB Global Congress in Auckland, New Zealand

**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 2011 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. Mileage was calculated for each leg of the flight path using the Webflyer tool: http://www.webflyer.com/travel/mileage_calculator/. 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. The longest flight possible in most travel itineraries is ~ 8,000 miles, so we use this as an upper limit. We assumed the following flight distances and GHG emissions for each flight category in our calculations:

| **Single-leg distance (miles)** | **0 - 280** | **281 - 994** | **995 - 2500** | **2501 - 5000** | **5001 - 10000** |
|---|---|---|---|---|---|
| Miles assumed | 200 | 638 | 1747 | 3750 | 6500 |
| RFI | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 |
| Emissions factor (kg CO2e/mile) | 0.2897 | 0.2028 | 0.177 | 0.177 | 0.177 |
| GHG emissons (round-trip x 2, metric tons CO2e) | 0.312876 | 0.698687 | 1.669783 | 3.58425 | 6.2127 |

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 < 50 miles one way decided to drive daily to the meeting . We also decided to add 30 miles to all arrivals to Auckland international airport for car distance to the conference center (15 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) |
| 3275 (single occupancy) | 29.53 | 96.71 |
| 2240 (double occupancy) | 14.765 | 33.07 |
| | | **129.78** |

[1] = Hotel nights estimated from conference registration figures - attendees to the full meeting assumed for 4 nights, one-day registrants assumed for 1 night. Additional hotel-nights assumed from ICCB workshops and short courses. Half of attendees assumed to stay in double rooms or hostels.
[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). Dormitory rooms or double rooms are estimated to produce half of the GHG emissions as a regular hotel room.
[3] = 1000 kg equals 1 metric ton.

**Catering**

| Buffet Lunches/ Dinners [1] | Boxed Lunches [1] | Snacks [1] | % Vegetarian [2] | Estimated Cost [3] | Emission Factor [4] | GHG Emissions [5] |
|---|---|---|---|---|---|---|
| | | | | | kg CO2/$ | (metric tons CO2e) |
| 1,540 | 3,518 | 18,165 | 50 | $210,636.00 | 1.1953 | **198.90** |

[1] = Number of snacks and boxed lunches for pre-conference workshops and short courses provided by Sue burk. of Burk Inc. Meals provided at the main ICCB conference and other associated events estimated from the catering bill. Catering costs for main ICCB meeting provided by Sue Burk of Burk Inc. (USD $167,310.20)
[2] = Estimated.
[3] = Assumed $15 for each buffet lunch, $12 for each boxed lunch, and $8 for each snack.
[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

**Travel during the 2011 ICCB**

| Trip | Vehicles | Driving Distance [1] | Estimated MPG [2] | Gallons of Gasoline | Number of Flights | Average Flight Dist. [3] | Emissions factor [4] | Hotel Nights | Emission Factor [5] | GHG Emissions [6] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (miles) | | | | (miles) | kg CO2e/mile | | kg CO2/room-night | (metric tons CO2e) |
| Goat Islad | 2 | 100 | 5 | 20.00 | | | | | 29.53 | 0.45 |
| Waitakere Ranges & Muriwai Parks | 2 | 62 | 5 | 12.40 | | | | | 29.53 | 0.28 |
| Tawharanui Park | 1 | 98 | 5 | 19.60 | | | | | 29.53 | 0.22 |
| Poor Knights Islands | 1 | 234 | 15 | 15.60 | | | | 7.00 | 29.53 | 0.38 |
| Island Conservation | 1 | 252 | 15 | 16.80 | | | | 33.00 | 14.765 | 0.68 |
| Volcanic Ecosystems | 2 | 478 | 15 | 31.87 | | | | 48.00 | 14.765 | 2.13 |
| Kaikoura Marine Conservation | 1 | 248 | 15 | 16.53 | 5.00 | 478.00 | 0.20 | 3.00 | 29.53 | 1.24 |
| Clarence River Rafting | 1 | 270 | 12 | 22.50 | 6.00 | 478.00 | 0.20 | 12.00 | 29.53 | 1.19 |
| Rangitoto Island | 1 | | 600 gal/hr | 300.00 | | | | | 29.53 | 3.36 |
| Tiritiri Matangi Island | 1 | | 600 gal/hr | 798.00 | | | | | 29.53 | 8.94 |
| **Totals** | | | | | | | | | | **18.86** |

[1] = Driving distance estimated from www.distance.to.
[2] = MPG estimated to be 5 MPG on average for a tour bus, 15 MPG for a 12-passenger van, and 12 MPG for a 20-passenger van. Fuel economy for a ferry is assumed from http://www.epa.gov/ttnchie1/conference/ei13/poster/agyei.pdf, and it is assumed that SCB tours to Rangitoto Island (30 min trip) and Tiritiri Matangi Island (80 min trip) comprised about 50% of the total passengers on board.
[3] = Flight distances estimated from www.distance.to.
[4] = 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). We include a Radiative Forcing Index of 2.7 (IPCC 2007).
[5] = 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). We assumes that attendees stayed in average hotel rooms, unless it was noted that participants stayed in hostels. The GHG emission rate for hostels was assumed to be 50% of a typical hotel room.

[6] = 1000 kg equals 1 metric ton.

**Electricity use at the conference venue**

| Date [1] | Electricity Use (total) | Electricity Use (base) | Electricity Use (ICCB) | Emissions Factor [2] | Line loss factor [3] | GHG Emissions [4] |
|---|---|---|---|---|---|---|
| | (kWh) | (kWh) | (kWh) | (kg CO2e/kWh) | | (metric tons CO2e) |
| 12/04/2011 | 20,115.0 | 17975.34 | 2139.70 | 0.698 | 1.072 | 1.60 |
| 12/05/2011 | 20,857.0 | 17975.34 | 2881.62 | 0.698 | 1.072 | 2.16 |
| 12/06/2011 | 21,517.8 | 17975.34 | 3542.42 | 0.698 | 1.072 | 2.65 |
| 12/07/2011 | 19,801.6 | 17975.34 | 1826.26 | 0.698 | 1.072 | 1.37 |
| 12/08/2011 | 20,245.8 | 17975.34 | 2270.42 | 0.698 | 1.072 | 1.70 |
| 12/09/2011 | 21,687.0 | 17975.34 | 3711.70 | 0.698 | 1.072 | 2.78 |
| **Total:** | 124224.16 | | 16372.12 | | | **12.25** |

[1] = Baseline electricity use at the convention center calculated by Jonathan Woodbridge, as well as daily electricity use for the ICCB.
[2] = New Zealand average kWh emission factor is 0.698 lbs/kWh (NZ Crown Authority).
[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 = 1000 kg

**ICCB Printing and advertising**

| | 2011 Dollars | 1997 Dollars [1] | Emission Factor [2] | GHG Emissions [3] | EIO-LCA Sector |
|---|---|---|---|---|---|
| | | | kg C02e/$ | metric tons CO2e | |
| Printing shirts, water bottles, flash drives, kakapo etc. | 44,037.00 | 31,455.00 | 0.477 | 15.00 | Commercial printing |
| Postage and Shipping | 315.00 | | 0.257 | 0.08 | |
| Office supplies | 2,034.00 | | 0.355 | 0.72 | ID sleeves and folders and lanyards |
| **Total:** | | | | **15.81** | |

[1] = When possible, we made use of the Cascadia Climate Partnership Tool, which uses an input in 2011 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 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. 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

**2011 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 | Baltimore, MD | | Austin, TX | 2 | 1 | 1348 | | 0.64 | 0.00 | 1.29 |
| Mike Dombeck | Stevens Pt, WI | | Austin, TX | 2 | 1 | 1082 | | 0.52 | 0.00 | 1.03 |
| Anne Hummer | Baltimore, MD | | Austin, TX | 2 | 1 | 1348 | | 0.64 | 0.00 | 1.29 |
| Provencher, Louis | Reno, NV | | Austin, TX | 2 | 2 | 1401 | | 0.67 | 0.00 | 2.68 |
| Erica Fleishman | Santa Barbara, CA | | Austin, TX | 2 | 1 | 1312 | | 0.63 | 0.00 | 1.25 |
| Guy Mcpherson | Tucson, AZ | | Austin, TX | 2 | 1 | 790 | | 0.44 | 0.00 | 0.87 |
| Doria Gordon | Gainsville, FL | Atlanta, GA | Austin, TX | 2 | 1 | 308 | 818 | 0.17 | 0.45 | 1.24 |
| Tim Ward | Washington, DC | | Austin, TX | 2 | 2 | 1317 | | 0.63 | 0.00 | 2.52 |
| Keryn Gedan | Washington, DC | | Austin, TX | 2 | 1 | 1317 | | 0.63 | 0.00 | 1.26 |
| Liana Joseph | New York, NY | | Austin, TX | 2 | 1 | 1512 | | 0.72 | 0.00 | 1.44 |
| Clare Aslan | Sacramento, CA | Flagstaff, AZ | Austin, TX | 2 | 1 | 592 | 876 | 0.33 | 0.48 | 1.62 |
| Kiki Jenkins | Seattle, WA | | Austin, TX | 2 | 1 | 1771 | | 0.85 | 0.00 | 1.69 |
| Sarah Reed | Denver, CO | | Austin, TX | 2 | 1 | 772 | | 0.43 | 0.00 | 0.85 |
| Raina Plowright | Bozeman, MT | | Austin, TX | 2 | 1 | 1285 | | 0.61 | 0.00 | 1.23 |
| Sarah Jacobi | Chicago, IL | | Austin, TX | 2 | 1 | 978 | | 0.54 | 0.00 | 1.08 |
| Alycia Crall | Charlottesville, VA | | Austin, TX | 2 | 1 | 1223 | | 0.58 | 0.00 | 1.17 |
| Sarah Souther | WV | | Austin, TX | 2 | 1 | 1139 | | 0.54 | 0.00 | 1.09 |
| Malin Pinsky | San Jose, CA | | Austin, TX | 2 | 1 | 1466 | | 0.70 | 0.00 | 1.40 |
| Kimberly Terrell | Washington, DC | | Austin, TX | 2 | 1 | 1317 | | 0.63 | 0.00 | 1.26 |
| Holly Jones | San Jose, CA | | Austin, TX | 2 | 1 | 1466 | | 0.70 | 0.00 | 1.40 |
| Jennifer Balch | Scranton, PA | | Austin, TX | 2 | 1 | 1451 | | 0.69 | 0.00 | 1.39 |
| Timothy Bonebrake | Los Angeles, CA | | Austin, TX | 2 | 1 | 1226 | | 0.59 | 0.00 | 1.17 |
| Maureen Ryan | Seattle, WA | | Austin, TX | 2 | 1 | 1771 | | 0.85 | 0.00 | 1.69 |
| Shonda Foster | Philadelphia | | San Jose, CA | 2 | 1 | 2502 | | 1.19 | 0.00 | 2.39 |
| Mike Dombeck | Stevens Pt, WI | | San Jose, CA | 2 | 1 | 1747 | | 0.83 | 0.00 | 1.67 |
| Anne Hummer | Baltimore, MD | | San Jose, CA | 2 | 1 | 2435 | | 1.16 | 0.00 | 2.33 |
| Ben Sikes | Austin, TX | | San Jose, CA | 2 | 1 | 1466 | | 0.70 | 0.00 | 1.40 |
| Keryn Gedan | Washington, DC | | San Jose, CA | 2 | 1 | 2418 | | 1.15 | 0.00 | 2.31 |
| Liana Joseph | New York, NY | | San Jose, CA | 2 | 1 | 2552 | | 1.22 | 0.00 | 2.44 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Maureen Ryan | Seattle, WA | | San Jose, CA | 2 | 1 | 710 | | 0.39 | 0.00 | 0.78 |
| Sarah Souther | WV | | San Jose, CA | 2 | 1 | 2242 | | 1.07 | 0.00 | 2.14 |
| Kimberly Terrell | Washington, DC | | San Jose, CA | 2 | 1 | 2418 | | 1.15 | 0.00 | 2.31 |
| Wendy Palen | Vancouver | | San Jose, CA | 2 | 1 | 827 | | 0.46 | 0.00 | 0.91 |
| Don Waller | Madison, WI | | San Jose, CA | 2 | 1 | 1750 | | 0.84 | 0.00 | 1.67 |
| Patricia Ford | Madison, WI | | San Jose, CA | 2 | 1 | 1750 | | 0.84 | 0.00 | 1.67 |
| JD Kleopfer | Washington, DC | | San Jose, CA | 2 | 1 | 2418 | | 1.15 | 0.00 | 2.31 |
| Brian Gratwicke | Washington, DC | | San Jose, CA | 2 | 1 | 2418 | | 1.15 | 0.00 | 2.31 |
| Juliann Aukema | Seattle, WA | | San Jose, CA | 2 | 1 | 710 | | 0.39 | 0.00 | 0.78 |
| Jim Manolis | Minneapolis | | San Jose, CA | 2 | 1 | 1572 | | 0.75 | 0.00 | 1.50 |
| Brett Dickson | Flagstaff, AZ | | San Jose, CA | 2 | 1 | 590 | | 0.33 | 0.00 | 0.65 |
| Ann Salomon | Vancouver | | Baraboo, WI | 2 | 1 | 1629 | | 0.78 | 0.00 | 0.78 |
| Olaf Jensen | Newark, NJ | | Baraboo, WI | 2 | 1 | 819 | | 0.45 | 0.00 | 0.45 |
| Keryn Gedan | Washington, DC | | Baraboo, WI | 2 | 1 | 732 | | 0.40 | 0.00 | 0.40 |
| Liana Joseph | New York, NY | | Baraboo, WI | 2 | 1 | 828 | | 0.46 | 0.00 | 0.46 |
| Clare Aslan | Hilo, Hawaii | | Baraboo, WI | 2 | 1 | 4144 | | 1.98 | 0.00 | 1.98 |
| Ben Sikes | Austin, TX | | Baraboo, WI | 2 | 1 | 1013 | | 0.48 | 0.00 | 0.48 |
| Maureen Ryan | Seattle, WA | | Baraboo, WI | 2 | 1 | 1592 | | 0.76 | 0.00 | 0.76 |
| Kimberly Terrell | Washington, DC | | Baraboo, WI | 2 | 1 | 732 | | 0.40 | 0.00 | 0.40 |
| Malin Pinsky | Newark, NJ | | Baraboo, WI | 2 | 1 | 819 | | 0.45 | 0.00 | 0.45 |
| Francis Pandolfi | Warwick, RI | | Baraboo, WI | 2 | 1 | 939 | | 0.52 | 0.00 | 0.52 |
| Shonda Foster | Baltimore, MD | | Baraboo, WI | 2 | 1 | 739 | | 0.41 | | 0.41 |
| | | | | | | | | 0.00 | 0.00 | 0.00 |
| **Totals** | | | | | | | | | | **68.56** |

[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.

**2011 Smith Fellows Car Travel**

| Name | Departure | Arrival | Distance [1] | Estimated MPG [2] | Gallons of Gasoline | GHG Emissions [3] |
|---|---|---|---|---|---|---|
| | | | (miles) | | | (metric tons CO2e) |
| Janis Bush | San Antonio, TX | Austin, TX | 76 | 23 | 3.30 | 0.04 |
| Clare Aslan | Sacramento, CA | San Jose, CA | 88 | 23 | 3.83 | 0.04 |
| Malin Pinsky | Palo Alto, CA | San Jose, CA | 15 | 23 | 0.65 | 0.01 |
| Peter Kareiva | Palo Alto, CA | San Jose, CA | 15 | 23 | 0.65 | 0.01 |
| Holly Gibbs | Palo Alto, CA | San Jose, CA | 15 | 23 | 0.65 | 0.01 |
| Louis Provencher | Reno, NV | San Jose, CA | 188 | 23 | 8.17 | 0.09 |
| Jim Manolis | Minneapolis | Baraboo, WI | 203 | 23 | 8.83 | 0.10 |
| Pete McIntyre | Madison, WI | Baraboo, WI | 32 | 23 | 1.39 | 0.02 |
| Holly Gibbs | Madison, WI | Baraboo, WI | 32 | 23 | 1.39 | 0.02 |
| Sarah Jacobi | Chicago | Baraboo, WI | 154 | 23 | 6.70 | 0.07 |
| Sarah Souther | Madison, WI | Baraboo, WI | 32 | 23 | 1.39 | 0.02 |
| Don Waller | Madison, WI | Baraboo, WI | 32 | 23 | 1.39 | 0.02 |
| Mike Dombeck | Steven's Point, WI | Baraboo, WI | 73 | 23 | 3.17 | 0.04 |
| | | | | 23 | 0.00 | 0.00 |
| **Totals** | | | **955** | | | **0.46** |

[1] = Driving distance estimated from Google.com.
[2] = MPG estimated to be 23 MPG on average.
[3] = Emissions factor for gasoline is 24.692 lbs CO2e/gallon, including 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) |
| January Retreat | 77 | 29.53 | 2.27 |
| March Retreat | 81 | 29.53 | 2.39 |
| October Retreat | 76 | 29.53 | 2.24 |
| **Totals** | **234.00** | | **6.91** |

[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.

**2011 Smith Fellows Meals**

| Trip | Meals [1] | Snacks | % Vegetarian [2] | Estimated $ Spent [3] | Emission Factor [4] | GHG Emissions [5] |
|---|---|---|---|---|---|---|
| | | | | | kg CO2/$ | (metric tons CO2e) |
| January Retreat | | | 40 | 4620 | 1.1953 | 4.59 |
| March Retreat | | | 40 | 4860 | 1.1953 | 4.83 |
| October Retreat | | | 40 | 4560 | 1.1953 | 4.53 |
| **Totals** | **0.00** | **0.00** | | | | **13.96** |

[1] = This information was unavailable.
[2] = Estimated because 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

**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

**2011 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 |
| | |
| 1.12 | US YF cropland |
| 2.51 | EQF cropland |
| | |
| 0.0282 | global ha for office space |
| | |

Food and Beverage

**Cropland for meals**

| | |
|---|---|
| 702 | meals Smith Fellows |
| 468 | snacks Smith Fellows |
| 40% | percent vegetarian |
| | |
| 5058 | meals Auckland meeting |
| 18165 | snacks Auckland meeting |
| 50% | percent vegetarian |
| | |
| 0.0010 | ha-yr / kg of meal Smith |
| 0.0013 | ha-yr / kg of meal Auckland |
| 0.0013 | ha-yr / kg of snack |
| | |
| 0.5 | kg food / meal |
| 0.04 | kg food / snack |
| | |
| 2.51 | EQF cropland |
| | |
| 0.3837 | ha-yr world avg cropland for meals + snacks Smith |
| 4.2040 | ha-yr world avg cropland for meals + snacks Auckland |
| | |
| 0.9631 | global ha-yr for meals + snacks Smith |
| 10.5521 | global ha-yr for meals + snacks Auckland |
| 11.5152 | 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 | | | |
| | | | | |
| **11,135** | sheets of 25"x30" paper for SCB newsletter | | | |
| 10.16 | 8.5"x11" sheets in one sheet 25"x30" paper | | | |
| 113,132 | equivalent number 8.5"x11" sheets of paper for SCB newsletter | | | |
| 500 | sheets in a ream | | | |
| 226 | equivalent number reams paper for SCB newsletter | | | |
| 2.265 | kg / ream | | | |
| 512 | kg paper SCB newsletter | | | |
| | | | | |
| 30,000 | copies of Conservation Magazine printed | | | |
| 0.23 | kg/copy (estimated) | | | |
| 6,900 | kg paper Conservation Magazine | | | |
| | | | | |
| 10,350 | copies of Conservation Biology printed | | | |
| 0.54 | kg/copy (estimated) | | | |
| 5,589 | kg paper Cons Bio | | | |
| | | | | |
| 13,069 | total kg paper all sources | | | |
| 0.002 | ha-yr world average forest / kg printing paper | | | |
| 29.04 | ha-yr world average forest | | | |
| | | | | |
| | | | | |
| 1.26 | EQF forest land | | | |
| | | 0.52% | | % SCB office |
| 36.59 | global ha-yr, of which --> | 3.92% | | % SCB newsletter |
| | | 52.79% | | % Cons Magazine |
| | | 42.76% | | % Cons Bio |
| **30%** | % recycled | | | |
| 20.33 | ha-yr world avg forest with recycling credit | | | |
| 25.62 | global ha-yr with recycling credit | | | |

Carbon Sequestration

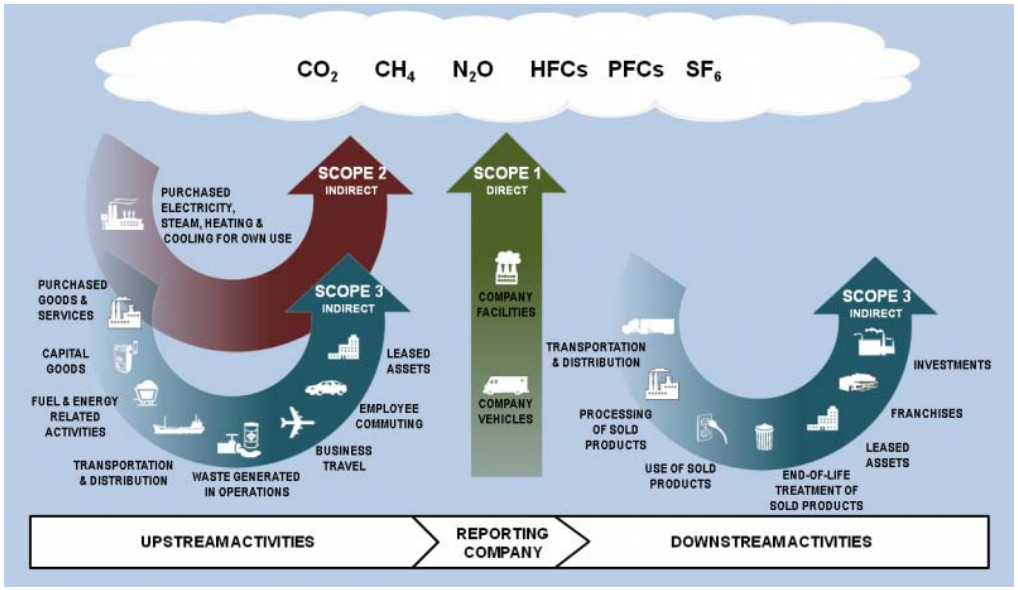
**Forest for carbon sequestration**

| | |
|---|---|
| **7678** | tonne fossil CO2 emitted from SCB operations |
| 0.218 | ha-yr world-average forest / t CO2 (absorption) |
| 1673 | ha-yr world-average forest for carbon absorption |
| | |
| 1.26 | EQF forest land |
| | |
| 2108 | 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.

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

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)
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 $CO_2$e 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.