ReCORK CARBON FOOTPRINT REPORT
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BONNEVILLE ENVIRONMENTAL FOUNDATION

RECORK™

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BACKGROUND & GOALS

Edge Marketing Group (EMG) has undertaken an initiative called ReCORK where used wine corks are collected throughout North America, diverted from landfills, and repurposed as raw materials for new products such as footwear, yoga blocks, flooring tiles and etc.

ReCORK has engaged Bonneville Environmental Foundation (BEF) in order to develop an initial report on ReCORK's projected GHG footprint, develop a tool to track true impacts going forward, and to consider the GHG value and messaging related to its cork oak tree planting activities.

The purpose of this carbon footprint project is to build on ReCORK's commitment to environmental sustainability through reuse of natural cork by examining the impacts of its process from raw material collection through delivery of finished goods to their points of wholesale distribution.

The project measures the greenhouse gas (GHG) impacts of collecting used cork and converting it into a raw material as the basis for other products, in addition to those impacts specifically associated with ReCORK's SOLE footwear products. This includes transportation of raw materials, product manufacturing, and delivery of the finished goods to its distribution network.

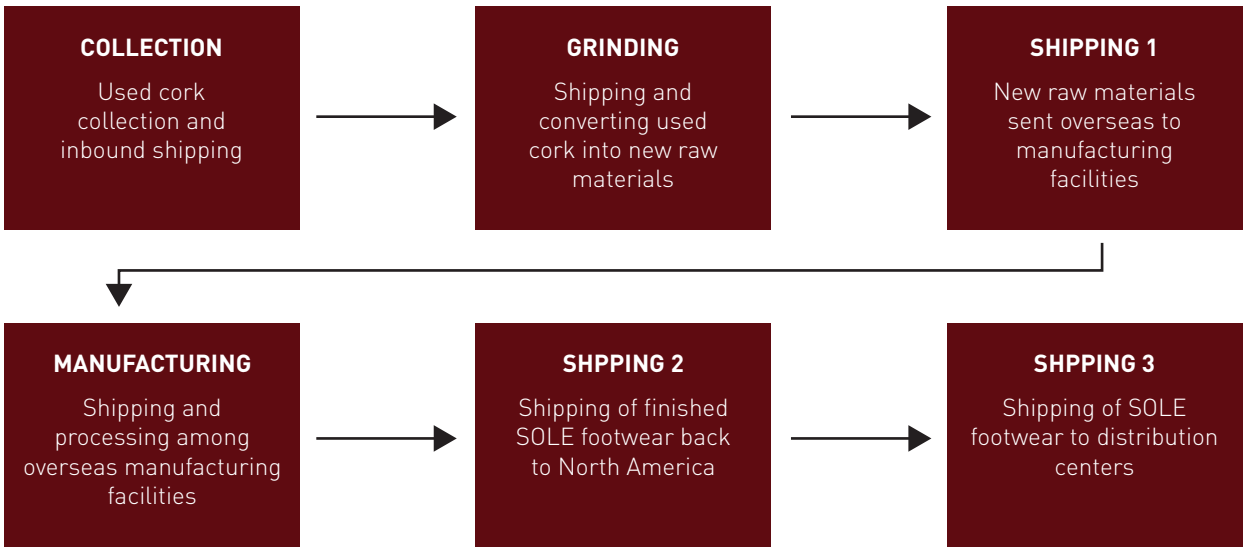
In addition to operational and process impacts, this project also establishes estimates for the carbon value and positive impacts of new cork oak forests ReCORK has been supporting through funding tree plantings in Portugal.

The following report is provided by BEF and details its initial assessment of ReCORK's activities. Impacts are based on estimated production for 2014 provided by ReCORK and should be compared with actual production data tracked throughout the year with refinements added as needed along the way. GHG measurement should be approached as an ongoing process rather than a one-time event.

Based on a projected assessment for ReCORK's initial footwear production campaign, GHG impacts are estimated to be approximately 0.74 tonnes of emissions. ReCORK is offsetting these initial impacts through its support for plantings of new cork oak trees – with a starting commitment of planting 8,000 trees. Less than 1 of these trees will match the 0.74 tonnes of emissions from the initial production campaign.

FOOTPRINT: MEASUREMENT OF IMPACTS & SCOPE

Measurement of ReCORK's GHG impacts traces the following basic productions process:



The following narrative details specific impacts measured and addressed for each key step throughout ReCORK's production process. In addition, a spreadsheet tool has been developed for ReCORK following this process to track and calculate actual impacts as they occur over time

COLLECTION

ReCORK recycles used wine corks from businesses and individuals across the U.S. and Canada.

For individuals, they support over 1,700 collection points located at business sites (such as retail grocers or wine shops) across the U.S. and Canada. Consumers can turn used cork in at these points where it is collected to a minimum volume of 30 lbs, and then ReCORK has it shipped to a centralized storage facility in Napa, California hosted by Amorim Cork North America.

Inbound shipping of the used cork from collection points or individuals to the Napa storage facility is managed by ReCORK, including expenses, via United Parcel Service (UPS). Shipments are made using the UPS Carbon Neutral Option[1].

Using the weight, size, and distance traveled of an individual package, UPS determines the volume of fuel consumed for the specific package and calculates the resulting GHG emissions. UPS then purchases certified carbon (CO2) offsets from The CarbonNeutral Company to balance out the emissions produced by transporting these shipments. UPS offsets have been sourced from projects that include reforestation, landfill gas destruction, wastewater treatment, and methane destruction. Their system for tracking and calculating the impacts and offsets is third-party verified by Société Générale de Surveillance (SGS). As a policy, ReCORK utilizes the UPS Carbon Neutral Option for all of its inbound shipping from individuals.

[1] UPS Carbon Neutral Option Web page:
http://www.ups.com/content/us/en/resources/ship/carbonneutral/shipping.html?WT.srch=1&WT.mc_id=iPros_mkwid|sOIGVaph2_dc|pcrid|28985186424|pkw|carbon%20offset|pmt|b|&gclid=CO3a4PzQoLoCFSEV7AodoHQAZA

ReCORK business partners, such as wineries, restaurants, or commercial airlines, also collect and ship used wine cork in bulk to ReCORK's storage facility in Napa, California. Some shipments are prearranged and managed by ReCORK in which ReCORK assumes responsibility for shipping costs as well as the GHG impacts for the shipments. Other shipments of used cork simply arrive unsolicited to the ReCORK storage facility – for these deliveries, the cost of shipping and any related GHG impacts are assumed to be upstream and are the responsibility of the entity providing the used cork to ReCORK. Once used cork is stored with ReCORK, it assumes all responsibilities related to GHG impacts going forward.

Shipments from business partners managed by ReCORK do not occur based on a regular schedule and may include various commercial freight providers. These shipments also lack the tracking automation built into systems such as those offered by UPS. ReCORK is currently developing a strategy to manually track and manage the GHG impacts from these commercial-scale deliveries.

GRINDING

Once the used cork has been collected to the storage facility in Napa, the next stage is shipping to an industrial grinding facility located in Oakland, California. Shipping to the grinder utilizes a diesel tractor-trailer traveling a distance of approximately 42 miles[2]. Fuel consumption is assumed at 8 miles per gallon[3] and multiplied by a GHG emissions factor of 0.01015 metric tonnes of CO2 per gallon[4] to arrive at the total emissions per shipment. As example, one shipment creates 0.053 tonnes of GHG.

At the grinding facility, the used wine cork is ground for use as a raw material in other products (such as footwear). Processing the cork represents a small portion of production for the grinding facility and it is estimated to require less electricity than a typical U.S. household consumes in one month – 1,000 kilowatt-hours[5] (kWh or 1 megawatt-hour MWh). Electricity use is then multiplied by the GHG factor for the WECC Regional California Grid[6], 658.68 lbs of GHG emissions per MWh, to attain the emissions number.

Note: For this report, data on the actual electricity consumed on behalf of ReCORK by the grinding facility was not available. In order to conservatively account for these impacts, we assume 1MWh worth of electricity attributable to ReCORK per month for grinding services, or 0.299 tonnes of GHG emissions per month.

Once processed, ground cork is then loaded into a standard forty-foot cargo-shipping container, referred to as an FEU[7] in the shipping industry. The container holds 15,000 lbs of ground cork and is delivered via tractor-trailer to the departure port in Oakland – a distance of approximately 3 miles[8] and equal to 0.004 tonnes of GHG emissions per shipment.

[2] Distance calculated from the facility in Napa, CA to the facility in Oakland, CA using Google Maps.

[3] U.S. Department of Transportation, National Highway Safety Administration, Report "Factors and Considerations for Establishing a Fuel Efficiency Regulatory Program for Commercial Medium and Heavy-Duty Vehicles" - Table II.A.1 - NAS Report Table 2-1: Comparing Light Duty Vehicles with Medium and Heavy Duty Vehicles, Section 7 – Assuming top end of performance due to low weight payload and newer vehicle use:
http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/NHTSA_Study_Trucks.pdf

[4] U.S. Energy Information Administration - Voluntary Reporting of Greenhouse Gases Program - Carbon Dioxide Emission Factors for Transportation Fuels - http://www.eia.gov/oiaf/1605/coefficients.html#tbl2

[5] From U.S. Energy Information Administration of 940 kWh per month avg. rounded up to the nearest MWh - http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3

[6] U.S. Environmental Protection Agency eGrid Data
http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2012V1_0_year09_GHGOutputrates.pdf

[7] Forty Foot Equivalent Unit - http://en.wikipedia.org/wiki/Twenty-foot_equivalent_unit#Forty-foot_equivalent_unit

[8] Distance is calculated from Oakland Facility to departure port in Oakland using Google Maps.

SHIPPING 1

From the departure port in Oakland, containers of ground cork are sent via deep-sea container vessel (ship) to a receiving port in China for a distance of 5,789.2 nautical miles[9].

GHG impacts of water transport are calculated based on methodologies developed by World Resources Institute's Greenhouse Gas Protocol[10] and their tool developed to measure GHG emissions from transport or mobile sources[11].

The Tonnes shipped number is multiplied by distance to arrive at the GHG emissions per tonne/mile traveled. As example 1 container of ground cork equals 6.805 tonnes and travels 5,789 nautical miles to China (6.805 x 5,789) equals 39,398.82 tonne miles and emits 0.023 tonnes of GHG emissions[12].

Also included in the category Shipping 1, is ground transportation of the FEU container from the receiving port in China to the initial footwear manufacturing facility located for a distance of approximately 39.4 miles[13].

MANUFACTURING

Conversion of the used wine cork into SOLE footwear occurs over multiple manufacturing facilities and locations, and combined shipping throughout this process equals approximately 318.57 miles[14].

Manufacturing of SOLE footwear represents only a portion of the production performed at these facilities. The local electricity powering these facilities comes from a mix of large-scale hydropower, nuclear and some renewable energy. While not necessarily environmentally-preferred sources of energy, we do not assume hydropower or nuclear to create any direct GHG emissions and therefore do not attribute any emissions from manufacturing to our assessment.

[9] Distance is estimated using the Transit Time/Distance calculator from Sea-Rates.com http://www.searates.com/reference/portdistance/

[10] WRI's Greenhouse Has Protocol - http://www.ghgprotocol.org/

[11] WRI's Greenhouse Gas Protocol: "GHG emissions from transport or mobile sources" tool - http://www.ghgprotocol.org/calculation-tools/all-tools

[12] Based on a tonne/mile emissions factor of 5.838229e-07 used in the "GHG emissions from transport or mobile sources" tool.

[13] Distance is calculated from receiving port in China to manufacturing facility #1 using Google Maps. Shipping mpg assumes 8 mpg as used in earlier U.S. land transport calculations.

[14] Distance between manufacturing facilities is calculated using Google Maps. Shipping mpg assumes 8 mpg as used in earlier U.S. land transport calculations.

SHIPPING 2

From manufacturing, finished product is shipped to a departure port for ocean transit back to the West Coast of the U.S.

From manufacturing facility #2 to the departure port is a distance of approximately 65 miles[15]. Finished product equals approximately 4,300 pairs of shoes per FEU container[16], with each pair weighing approximately 1.045 kg[17].

Containers transit from this departure port back to the West Coast of the U.S. for a distance of 5,734.8 nautical miles[18] and produce 0.015 tonnes of GHG emissions per container[19]. Of the original 15,000 pounds of ground used cork approximately 42,524 pairs of shoes[20] are produced and would fill just under 10 FEU containers with finished product.

Shipping 3
The final shipping stage accounts for land-transit delivery of the finished product from the receiving port in the U.S. to a series of wholesale distribution warehouses located from approximately 140 – 675 miles away[21]. Calculations are based the number of shipments made to each of these locations using either rail or truck transport.

Shipping from the ReCORK/SOLE wholesale[22] location to retailers is arranged and managed by the retailer. ReCORK is not responsible for this stage of shipping and therefore assumes the impacts to also belong to the entity controlling the shipping.

FOOTPRINT: RESULTS

ReCORK's first GHG assessment is a forward-looking estimate based on the projected number of footwear units to be produced through its initial Online sales and development campaign. The current projection results in approximately 0.74 tonnes of GHG emissions from this first campaign.

[15] Distance from manufacturing facility #2 to the departure port is calculated using Google Maps. Shipping mpg assumes 8 mpg as used in earlier U.S. land transport calculations.

[16] Reported from ReCORK

[17] Reported from ReCORK – Finished shoes are shipped in master cartons containing 6 pairs with a weight of 6.27 kg per carton – divide by 6 to get weight per pair.

[18] Distance is estimated using the Transit Time/Distance calculator from Sea-Rates.com http://www.searates.com/reference/portdistance/

[19] Based on a tonne/mile emissions factor of 5.838229e-07 used in the WRI "GHG emissions from transport or mobile sources" tool.

[20] Reported from ReCORK – Each pair of shoes utilizes 160g of cork.

[21] Distance estimates from Google Maps.

[22] Based on a tonne/mile emissions factor of 2.812920904e-05 for rail used in the WRI "GHG emissions from transport or mobile sources" tool. Rail distances based on Google Maps.

FOOTPRINT: ONGOING MEASUREMENT & REFINEMENTS

As referenced earlier in this document, production totals are based on projections for a relatively new product and process. Regular use of the accompanying spreadsheet tool tracking true performance over time will provide further insight into the key areas driving impacts. It will also show whether the initial projected GHG footprint values need to be adjusted up or down.

In terms of other refinements, determining electricity use for the grinding facility in Oakland and two manufacturing facilities in China should be completed. These are likely minor sources of impacts but should be accounted for in greater detail in the future.

ReCORK should also consider impacts associated with any components that also go into manufacturing the final product such as the textiles used and etc. While not directly related to the reuse of wine cork, it is reasonable to account for these other elements that comprise the SOLE shoes and will further reinforce the products sustainability.

Finally, any changes to the process outlined here and in the spreadsheet tool should be accounted for and updated over time in order to maintain consistency and accuracy.

GHG EMISSIONS MITIGATION

In order to help mitigate the impacts of its business operations and to further the environmental benefits of cork, ReCORK has supported plantings of over 8,000 new cork oak trees in Portugal – the worlds leading producer of natural cork.

Plantings are managed through The Creating Forests Project partnership with Quercus – A.N.C.N.[23] Specifically ReCORK supported reestablishment of arboreal cover in two locations of the Sines Forest.

In terms of ongoing support for new plantings, ReCORK's policy is to plant new cork oak trees equal or greater (in terms of the tree projected GHG sequestration value) than the volume of measured GHG impacts from its business operations. Understanding that it takes time for the trees to mature and the urgency of reducing GHG emissions, ReCORK made an up-front commitment and supported planting over 8,000 cork oak trees in advance of its anticipated business impacts.

GHG SEQUESTRATION VALUE

A cork oak tree is distinct from other types of trees in that its bark may be removed and hand-harvested without harming the tree. The cork bark regenerates within approximately 9-12 years[23] and may be harvested and regenerated around 12 times[23] during the tree's expected life of 150-250 years[24] .

The leading and commonly used verification standards for development of carbon credits include Climate Action Reserve (CAR), Verified Carbon Standard (VCS), American Carbon Registry (ACR), and Gold Standard. Currently none of these standards offers a protocol or methodology in order to calculate the GHG (or carbon) specific to the value of cork oak trees.

Without a specific carbon methodology to determine valuation, BEF solicited the opinion of an outside forestry carbon expert, Gordon Smith of Ecofor, LLC. Gordon suggested taking a conservative approach to carbon valuation by utilizing known valuations of similar species of trees (oak) in similar growing conditions (temperate and dry, Mediterranean). Using this approach, the cork oak plantings are assumed to sequester approximately 300 tonnes GHG emissions per hectare, assuming 30% canopy cover with 40-80 trees per hectare, over an assumed 100-year life[25] of the tree.

[23] The Creating Forests Project: http://www.yoursole.com/media/live/downloads/recork-tree-planting-2011.pdf

[24] Cork Oak wiki: http://en.wikipedia.org/wiki/Quercus_suber

[25] Ecofor LLC assumes 100 years as the period to estimate sequestration because UNFCCC's default period for accounting for warming effects and emissions is 100 years. Also, in 100 years, one would expect that the oak stands would have gained much of the carbon that they will eventually gain, and that after 100 or 140 years the annual increase in carbon stock will be small.

Determining the GHG sequestration value from tree plantings also requires accounting for the mortality rate of the newly-planted trees – often as high as 80% in general for forestry. Without specific data on cork oak regarding the longevity of new plantings we will assume a conservative estimate that 20% of new plantings are successful in achieving full maturity.

Without a specific approach to account for the unique characteristics of cork oak, namely the harvest and regeneration of the cork bark and any emissions the bark may sequester, we do not recommend attempting to include a value for the bark.

Other considerations that inform our opinion regarding the carbon value of the cork bark are: 1) that it is not very dense material and therefore contains much less biomass than the tree itself. The real carbon gain is the tree versus the cork production. The extra gain from harvesting bark would likely equal a rounding error compared to the total carbon value of the tree. And 2) the bark would have decomposed naturally, so harvesting and using it in products delays that from happening so there's a carbon gain. However any portion of the bark not used likely gets mulched and therefore speeds up the natural decomposition - a carbon loss. For accuracy we'd need to determine the percentage of waste between harvest and production over the tree's life.

Even if there's no production waste, we would need to consider the field work as well - as example the first harvest from a tree isn't very good quality, if this isn't used for cork production and mulched instead it's a loss of carbon.

Utilizing this approach and assumed mortality-rate for new tree plantings, we would project approximately 6,000 tonnes of GHG sequestered as a result of the initial cork oak plantings.

Alternatively, the World Wildlife Fund reports[26] that cork oak trees store CO2 in order to regenerate, and therefore a harvested cork oak tree absorbs 3 to 5 times more than one which is not harvested, therefore increasing its carbon benefits over typical oak trees.

Also, The Portuguese Cork Association – APCOR reports[27] studies carried out in Portugal, measuring from 2003-2006, have shown on average that the annual retention of carbon from a cork oak forest with approximately 30% tree coverage, was 88 g C per m2 or 3.2 tonnes of CO2 per hectare and per year. Taking into account that the average includes a very dry year (2005), one may consider that the normal annual retention does not differ much from a same type forest (example Quercus douglassi with 40% tree coverage) in California, this is, 156 g C per m2/year or 5.72 t CO2 per hectare/year, or from Maritime Pine stands, in Alcácer do Sal, 150 g C per m2/year or 5.5 t CO2 per hectare/year.

Using assumptions from the APCOR report, one could conclude a carbon value ranging from between 320 – 572 tonnes of CO2 per hectare over the expected 100-year life of the trees.

BEF's recommendation is to use the approach outlined by Ecofor, LLC as it is more conservative of the two sets of assumptions. With that said, it is ultimately the decision of ReCORK regarding which approach to follow. Without a formal carbon methodology or protocol in place, transparency regarding sources for the factors used is key in order to support any public messaging around the value of the cork oak plantings.

[26] World Wildlife Fund: Cork Screwed? Environmental Impacts of the cork stoppers market
http://www.wwf.org.uk/filelibrary/pdf/corkscrewed.pdf

[27] APCOR: From the Cork Oak to Cork:
http://apcor.pt/userfiles/File/Publicacoes/From%20the%20Cork%20Oak%20to%20Cork%20a%20sustainable%20system.pdf

TIMING OF GHG SEQUESTRATION & MESSAGING

Standard methodologies for calculating forest carbon sequestration to produce voluntary or compliance carbon credits measure the stock before planting, and then re-measure the stock every few years. Sequestration value is the amount of carbon increase since the last measurement. To calculate the amount of credits to be issued, if the measurement does not meet a specified precision level there is an uncertainty deduction. And a fraction of credits are withheld to cover reversals, with the fraction calculated using methods issues by the program under which the credits are being issued.

No standard methodology provides credits for sequestration before the trees grow. The trees will remain quite small during the first decade, and will have sequestered little carbon. As a very rough ballpark estimate, by year 3 or 4 the trees should sequester a cumulative total of 1-2 ton CO2e/hectare and by year 5 the plantings should have cumulative sequestration of 2-10

tCO2e/hectare. During the years of fast growth, approximately stand age 30 to 80, the 3.2 tCO2e/ha per year is quite plausible.

In terms of messaging, it would be acceptable for the marketing purposes for a company to say "We have planted trees to offset our emissions. If these trees grow as expected, by age 100 each hectare will have removed approximately 300 tons CO2 from the atmosphere and stored the carbon in wood, cork, and soil."

With this delay in the timing of sequestration, it would not be appropriate to imply that emissions have already been offset, or will be offset in the near future through these plantings. For example we would not recommend ReCORK stating that it has offset GHG impacts made today with a cork oak tree planted today. Rather it's important to clarify that it is accounting for impacts today by planting trees that will sequester and equal or greater amount of GHG impacts during the life of the tree.

At the same time, in our opinion it is appropriate to include that the trees are also providing additional environmental benefits such as avoided desertification, wildlife habitat, jobs that support the natural cork industry and etc. while the tree matures and provides sequestration.

RECOMMENDATIONS

ReCORK's commitment to this GHG assessment, its mission to further reuse of natural cork, and supporting the expansion of natural cork oak forests represent a significant demonstration of environmental leadership. ReCORK has taken the approach to consider environmental sustainability as a cornerstone of its business. BEF commends ReCORK for having made these significant steps – these are not common for a young business and should serve as a model for others.

In the spirit of continuous improvement of the assessment, going forward BEF recommends the following:

- Tracking actual GHG impacts over time through use of the spreadsheet tool in order to establish true impacts based on business performance versus projections. Also taking the time to fill in any blanks in its data collection process.
- Conducting an annual assessment of the total impacts and publically reporting actual performance year-over-year through an annual sustainability report.
- Expanding scope of the impacts measured to include other components of the SOLE ReCORK footwear and other products produced using the reused cork (such as yoga blocks or floor tiles).
- Expanding scope to include other operational impacts such as office energy use, travel and etc. related to the business.

Regarding messaging, BEF is happy to review and help refine any messaging regarding the assessment of impacts or valuation of the carbon from cork oak tree plantings. We recommend utilizing the approaches we have described in this report in terms of what to claim, and above all advocate for transparency regarding sources or methods used.

ABOUT BEF

For more than a decade, BEF has been a trusted, full-service provider of corporate energy, carbon and water footprinting services, helping our partners take practical steps to minimize their reputational, financial, and regulatory risks; meet impact reduction goals; and demonstrate innovative industry leadership.

BEF has partnered with a wide range of organizations—from product manufacturers to retailers to universities—in order to measure environmental impacts and assess risk. Its expert team routinely provides the following activities in support of corporate sustainability: baseline assessments, industry-specific impact assessments, product and supply-chain assessment to uncover hidden risks and embedded impacts, customized impact research, greenhouse gas footprinting, energy footprinting and water footprinting.

Once the impact is quantified, BEF offers guidance on risk mitigation and performance improvement strategies and stands ready to provide a full suite of energy, carbon and water solutions to meet the unique goals of the partner organization. Visit www.B-E-F,org for more information.

PATRICK NYE, SENIOR CONSULTANT

Patrick has eleven years experience in renewable energy and greenhouse gas measurement & reduction with Bonneville Environmental Foundation - serving clients ranging from organic food producers and film productions, to major league sports and a Fortune 50 automobile manufacturer. Patrick is a LEED® Accredited Professional with the U.S. Green Building Council. He has also worked as a public relations/advertising account manager for KnollGROUP, and as the engineering/environmental compliance manager for Portland Brewing Company. Service on the Coast Guard Cutter Planetree and Ice Breaker Polar Star gave him his first environmental work as a first responder to the Exxon Valdez oil spill and as a participant in climate research conducted at the Arctic Sea near the North Pole.