GREENING THE OUTDOOR ADVENTURES PROGRAM

Sarah Adelson ▶ Rachel Keidan ▶ Kelly Muir ▶ Maura Niemisto

Project Sponsor: Lindsey MacDonald

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*Thank you Outdoor Adventures and Lindsey MacDonald, Dr. Shriberg, Laura Matson, and Carol Anderson for making this project possible*
The Outdoor Adventures Sustainability Team (OAST) worked towards making Outdoor Adventures (OA) a more sustainable program. The team focused on the trip component of the program, where there is the greatest opportunity for lessening environmental impact and promoting sustainable practices.

A set of recommendations were given to the trip program to promote greater sustainability. Outdoor Adventures Sustainability Team ran a pilot sustainability training session for the trip leaders, presenting action steps based on these recommendations. These recommendations were formed based on sustainable practices currently used by outdoor recreation programs at other colleges and universities. General research on the best sustainable practices for outdoor recreation was also considered in application to Outdoor Adventures’ program.

Recommendations:

- **Sustainability Education Development**: Permanently implement a version of the education pilot session for trip leaders focusing specifically on sustainability aspects of trips. This is to include the action steps for leaders in the following recommendations and ecological issues associated with outdoor recreation. Trip leaders also add specific site research to their pre-trip preparation checklist.

- **Reduction of carbon emissions through Transportation Alternatives**: Focus more trip destinations to closer locales and encourage University transportation services to offer fuel-efficient vehicles in order to reduce overall emissions. Provide an option for participants to purchase carbon offsets to reach carbon neutrality in transportation.

- **Gear re-use and purchasing options**: Promote the reuse, borrowing, and rental of gear and apparel to trip participants gathering equipment. Provide a buying guide for gear companies that use sustainable practices and/or promote environmental stewardship.

- **Food purchasing and consumption**: Implement a bulk food system for trip leaders to base meals from, reducing the pre-consumer packaging waste and promoting the purchase of local and organic food choices with resulting budget surplus. Encourage a vegetarian meal plan/buying guide for trip members to base their menus.

- **Measuring Success and Gathering Feedback**: Create a sustainability category in post trip surveys for participants and trip leaders to analyze the organization’s progress toward greater sustainability and provide incentives for trip leaders to follow through with proposed action steps.

Feedback was gathered through the pilot training session. Reactions from the trip leaders regarding the recommendations, including the bulk food proposal and the post-trip assessment changes, were largely positive and enthusiastic. The majority (approximately 94%) stated the lesson plan was helpful. Trip leaders stated they were likely to incorporate many of the recommendations including: buying local ingredients, bulk foods, vegetarian options, incorporating the education and products and gear action plan, planning more local trips, and purchasing carbon offsets.
Introduction and Status of Current Program

The University of Michigan Outdoor Adventures program, a sector of the University of Michigan Recreational Sports department, provides educational and recreational experiences for University of Michigan students, staff, and faculty as well as other Ann Arbor residents. As an outdoor education program, Outdoor Adventures strives to foster leadership development and environmental stewardship through their services and programs. However, many of the practices used in the services and programs provided by Outdoor Adventures have not reached their full potential in environmental stewardship and sustainability. Therefore, as students in Environ 391: Sustainability and the Campus, the Outdoor Adventures Sustainability Team took on the responsibility of assisting Outdoor Adventures reach their potential in sustainability.

Outdoor education programs such as Outdoor Adventures can promote sustainability by giving participants an insight into the causes and effects of environmental degradation. These programs may be the first place the participants are immersed in nature and see, close-up, the effects humans have on the environment. As environmental educators, programs such as Outdoor Adventures must be role models for their participants and practice sustainability so that the participants can learn environmental stewardship. If these programs do not take on the role of educating their participants on sustainability by practicing it on trips, and at home, an opportunity is lost. By providing recommendations and action steps, the team hopes to help the Outdoor Adventures program become a model for outdoor education programs on other college campuses.

Currently, the only standardized sustainable practice mandated by the Outdoor Adventures trip program is following the Leave No Trace principles while in the field. These principles include planning ahead, traveling and camping on durable surfaces, disposing of waste properly, leaving what travelers find, minimizing campfire impacts, respecting wildlife, and being considerate of other visitors.¹

- Planning Ahead: The steps of planning ahead include bringing a compass or map so that trails do not have to be marked, repackaging food to eliminate waste, knowing the special concerns for the area, and visiting in smaller groups to protect habitats. Trip leaders may buy in bulk to prepare the food for their trips.
- Traveling and Camping on Durable Surfaces: Travelers stay away from lakes and streams to protect riparian areas and use campsites and trails that are already there to avoid altering the pristine habitats.
- Disposing of Waste Properly: Visitors make sure every piece of trash has been removed, wash dishes away from lakes or streams and use biodegradable soaps, reuse items, and recycle.
- Leaving What Travelers Find: Travelers do not touch or take natural items such as plants, rocks, or artifacts, build structures, or introduce new species.
- Minimizing Campfire Impacts: Campers use only fallen wood, burn it completely, keep fires small, use established fire rings, and avoid making them when possible.
- Respecting Wildlife: All visitors observe all wildlife from a distance and do not feed animals.
- Being Considerate of Other Visitors: Travelers protect the quality of others’ experience by being sustainable and avoiding loud voices and other noises.

These are all general practices to be sustainable on the trail. However, the level of sustainability at Outdoor Adventures outside of these practices is based on the individual decisions made by trip leaders and staff. Currently, there is no overall systematized program pushing for sustainability in Outdoor Adventures.

The Outdoor Adventures program should use other programs as models so that the University can itself become a model for other universities. It is important for the University of Michigan to be at the forefront of sustainable practices to be considered the “Leaders and the Best.” If the University of Michigan can follow these principles of sustainability, other colleges may see how possible it is and will likely want to follow in the University’s footsteps so that they can be as competitive in sustainability.
Other Outdoor Programs

The Outdoor Adventures Sustainability Team researched several other schools in the United States to find the most sustainable outdoor educational programs that are similar to the trip program Outdoor Adventures provides. OAST found several sustainable programs throughout the country, but decided that Northland College, National Outdoor Leadership School, Sonoma State University, and Princeton University are among the best. Many of their sustainable practices became the baseline from which recommendations were created for Outdoor Adventures.

Several college campuses are developing sustainable outdoor trip programs. Northland College in Wisconsin was one of the first schools to develop a sustainable program for their outdoor educational program trips. Their model, “ASAP: As Sustainable as Possible” is one that other programs need to strive for. Northland students in the Sustainable Backcountry Travel class started the program in an attempt to make Northland’s outdoor trips more sustainable. The ASAP program weighs the impacts of travel, food, and gear to shrink their footprints on trips. The program wants to go beyond the simple mantra of “take nothing but pictures, leave nothing but footprints,” to have the lowest impact trips possible. Their goals are reducing waste, using equipment companies with good environmental records, and keeping travel distances low to prevent substantial greenhouse gas emissions. To reduce waste, they are opting for better packaging for their foods, such as reusable bags and containers, promoting recycling, and increasing composting. Their rental shops are buying equipment only from those companies who choose to be sustainable in their practices. Presently, these practices are being used on class trips and in Northland’s Outdoor Orientation.²

The National Outdoor Leadership School (NOLS) is an outdoor educational program, focused on outdoor trips, which college students can participate in for college credit. NOLS focuses on environmental stewardship because they have a commitment to the core values of wilderness and excellence. Their commitment to environmental stewardship started in February 2008 with a sustainability audit. The audit set target goals and timelines for operating all departments of the school sustainably and remains a baseline for continual improvement. One goal was to achieve reductions in their carbon footprint on trips. Another goal was to provide students and staff with tools to make sustainable choices. This meant developing a new curriculum to enable students to transfer backcountry sustainability to their travels and developing training tools for staff that demonstrate sustainability practices for travels. Presently, the program focuses on achieving sustainability in their use of natural resources and encouraging their students and partners to do the same. They are currently cultivating working partnerships with equipment and product suppliers who are willing to work toward greater sustainability in their supply chains. NOLS strives to protect the natural character of their outdoor classrooms in support of quality wilderness experiences for the students. Their students graduate with a strong foundation in Leave No Trace principles and the tools necessary to transfer these values to their everyday lives and all travels.³
Sonoma State University’s Outdoor Pursuits focus on being stewards of the earth. They continuously evolve their methods of practicing minimum impact, educating about sustainability, and working to facilitate safe and ecologically sound activities on all trips. Meals are also vegetarian and primarily organic. Trip leaders are proficient in Leave No Trace ethics and help educate on the proper ways to practice minimum impact.  

Princeton University also participates in an Outdoor Action Sustainability Program, where interns have been hired to determine what is necessary to make the program a model for sustainable outdoor educational programs. This program is currently researching options for trips that involve activities directly related to sustainability such as expanding their organic farming trips. They also sponsor outdoor trips during the academic year that focus on issues of climate change and sustainability. To promote education on trips, they are expanding the training of Outdoor Action Leaders of trips in Leave No Trace practices and are developing an integrated curriculum for trips. They are also bringing faculty members out on trips to educate them on sustainability. For more sustainable food options on these trips, they have been revising the menu to be based on local and/or sustainable products and are collecting data on where the food comes from to provide this information as part of the education curriculum on the trip. For more sustainable transportation to trip locations, they are looking into the use of alternative fuel or hybrid cars and buses and researching biodiesel vehicles as well as generating their own biodiesel fuel from Dining Services’ waste cooking oil. For more sustainable equipment for trips, they are identifying and purchasing alternative water purification methods that do not use toxic chemicals. They are purchasing alternative fuel cooking stoves (potentially bio-diesel) and obtaining this fuel from Dining Services’ waste cooking oil. They are also developing a green purchasing plan for equipment (backpacks, sleeping bags) including using purchasing power to encourage manufacturers to develop environmentally sustainable products. To reduce waste on trips, they are decreasing the use of packaging through bulk food purchasing and enhancing recycling of trip waste through the use of biodegradable plastics.
Outdoor Adventures is a fairly small program within the University. One permanent and one part-time employee make up their entire staff. Outdoor Adventures is a non-profit organization, meaning their entire revenue goes into their programs and payment for staff. As a result of their size and the fact that they are a non-profit organization, they have a very limited budget. At the beginning of the project, this was one of the largest obstacles the Outdoor Adventure’s Sustainability Team encountered. The process of “greening” a program can be a very expensive one. The Outdoor Adventures Team had to create recommendations that stayed within their budget and also created a more sustainable environment for the program. The team seized the opportunity to use education, which is a free tool, to be the base of the recommendations. The Outdoor Adventures Team used education to make the trip leaders more aware of sustainability issues on trips. The trip leaders were strongly encouraged to relay the sustainable information and practices onto their trip participants. This meant that the recommendations had to appeal to the trip leaders and be easy to pass on to the trip participants. The basic education recommendations may seem simple but they represent many overall ideas for the Outdoor Adventures trip program. Education can be a gateway to more tangible methods of sustainability in the future.
Methodology

The Outdoor Adventures sustainability team was faced with a very broad task: improving the overall sustainability of the Outdoor Adventures program. To find success in this endeavor, a great deal of creativity, innovation, and focus was required. Eventually the team reached a practical set of recommendations that will positively impact Outdoor Adventures if implemented. The team began the process by deciding upon three main leverage points for improvement: augmenting the education of trip leaders with sustainability knowledge and tactics to refer this knowledge to trip participants, supplementing the pre- and post-trip assessment tools, and proposing a bulk food system for the trip program.

The decision to focus on these areas was instructed by the understanding of the program the team gained, primarily through discussions with the sponsor and independent research of the program through Outdoor Adventure’s website. The recommendations made were instructed by research conducted by the team on sustainable practices in other outdoor programs as well as shopping trips to By the Pound in Ann Arbor to investigate the local options for bulk food purchasing.

On November 18, the team taught a pilot sustainability lesson at the Outdoor Adventures headquarters. This lesson was geared towards current trip leaders and OA administration and covered topics such as education, transportation, food and packaging, gear, recycling, and Leave No Trace principles (see appendix for complete lesson plan). During this lesson, the team also proposed the bulk food system in hopes of gaining the support and feedback of trip leaders. After the lesson, a survey was distributed questioning those who attended on the effectiveness and content of the lecture. This feedback served as a guiding tool in assessing the feasibility of the recommendations.
Recommendations

I. Sustainability Education Development: Permanently implement a version of the education pilot session for trip leaders focusing specifically on sustainability aspects of trips. This is to include the action steps for leaders in the following recommendations and ecological issues associated with outdoor recreation. Trip leaders also add specific site research to their pre-trip preparation checklist.

Encourage trip leaders to comprehensively research ecological aspects of an area prior to visiting to identify known threats of recreation.
Trip leaders are accustomed to systemized preparation before each trip. They complete checklists prior to departure to manage equipment, food and other plans. The Outdoor Adventures Sustainability Team recommends that trip leaders comprehensively research an area’s condition to identify known threats caused by recreation. This type of background knowledge can be very beneficial to the trip leader, participants, and most notably the health of the ecosystem. It is recommended to research such things as climate, site durability, and any ecological threats including invasive species. The Outdoor Adventures Sustainability Team provided examples of invasive species, such as zebra mussels and spotted knapweed, which have had detrimental effects on some of the lake ecosystems within the Great Lakes. This information was provided in a training session that took place at the Outdoor Adventures headquarters.

Permanently implement a version of the education pilot session for trip leaders focusing specifically on sustainability aspects of trips.
To promote continuing sustainability education within the Outdoor Adventures program, the team created a lesson plan to present to trip leaders. It is an informational session on sustainable practices that can easily be done on every trip. It covers topics of concern, paralleling OAST’s recommendations: food, products and gear, transportation, and the overall methods of education. The Outdoor Adventures Sustainability Team emphasizes the importance of communicating these sustainable practices to trip participants. It is crucial that the trip leaders remind their participants of the most sustainable practices on and off the trail. If the trip leaders do this, their participants will be more likely to remember the practices, use them on trips in the future, and also pass them on to others. By implementing a permanent version of this training session, all trip leaders will remain up-to-date on the best and most current sustainable practices and will be able to effectively incorporate these practices into their trips so that participants will be educated on sustainability in theory and practice.

II. Reduction of carbon emissions through Transportation Alternatives: Focus more trip destinations on closer locales and encourage University transportation services to offer fuel-efficient vehicles in order to reduce overall emissions. Provide a channel for participants to purchase carbon offsets to reach neutrality.
With the limitations on transportation changes to the program such as budget and university requirements within the Department of Recreational Sports, the Outdoor Adventures Sustainability Team has devised some recommendations that are feasible for the Outdoor Adventures program.

Maximize the amount of trips closer to home
The first of these recommendations is to increase the amount of trips in local areas. Reducing the amount of traveling done on trips will reduce the overall greenhouse gas emissions due to transportation for the Outdoor Adventures trip program. There are several locations close to Ann Arbor that have great recreational activities such as backpacking, kayaking, and hiking. For example, the Waterloo-Pinckney trail is less than an hour drive from Ann Arbor and features a 36 mile, 3 day backpacking trail. The Huron River is another great place to kayak and canoe, which is right in Ann Arbor. Beyond southeastern Michigan, northern Michigan holds some of the most majestic trails, parks, and lakes. Sleeping Bear Dunes, the University of Michigan Biostation, John Bryan State Park in Ohio, and the Upper Peninsula are already locations visited by Outdoor Adventures.

Increasing in-state or local trips would decrease the greenhouse gas emissions substantially. A trip to Sleeping Bear Dunes will produce approximately 0.12 tons of carbon dioxide per van whereas a trip to Mammoth Caves in Kentucky will produce almost double that amount with 0.21 tons of carbon dioxide per van and a trip to Newport Harbor, Rhode Island would triple that amount of carbon dioxide at 0.36 tons of carbon dioxide per van. Figure 2.1 shows the carbon dioxide emissions per person (assuming Outdoor Adventures uses a van with 4 people inside) on several of the locations OA visit.

<table>
<thead>
<tr>
<th>Trip</th>
<th>CO₂ (tons/person)</th>
<th>Miles (Round-Trip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleeping Bear Dunes, MI</td>
<td>0.0605</td>
<td>495.4</td>
</tr>
<tr>
<td>Costa Rica (flight)</td>
<td>1.8</td>
<td>4499.5</td>
</tr>
<tr>
<td>Gauley River, WV</td>
<td>0.09</td>
<td>734.28</td>
</tr>
<tr>
<td>Mammoth Caves, KY</td>
<td>0.105</td>
<td>860.34</td>
</tr>
<tr>
<td>Everglades, FL (flight)</td>
<td>0.914</td>
<td>2286.19</td>
</tr>
<tr>
<td>Grand Canyon, AZ (flight)</td>
<td>1.304</td>
<td>3260.29</td>
</tr>
<tr>
<td>Newport Harbor, RI</td>
<td>0.18</td>
<td>1471.158</td>
</tr>
<tr>
<td>Joshua Tree, CA (flight)</td>
<td>1.477</td>
<td>3692.6</td>
</tr>
<tr>
<td>Bahamas (flight)</td>
<td>0.997</td>
<td>2,491.46</td>
</tr>
</tbody>
</table>
Furthermore, studies have shown that the more time people spend in local recreational areas, the more they develop a sense of environmental consciousness. A study conducted in Ann Arbor, Michigan by Robert Ryan “explored the relationship between place attachment and both environmental experience and environmental attributes.” This study researched individuals who spent time in Ann Arbor’s outdoor areas (which included two areas within the park system and the arboretum). Researchers of this survey determined that individuals who used the parks and areas often had significantly more of an attachment towards the areas than others. They even found that the individuals who spent only leisure time in these areas were more likely to have a greater attachment than individuals who worked in the areas. This proves that individuals who spend time outdoors voluntarily (rather than because of an obligation to an occupation) are going to gain the most benefits and have the highest appreciation for the areas. Therefore, by spending more time in locations near Ann Arbor, Outdoor Adventures’ trip participants may learn to value their local environment. This way, trip participants may feel responsible to practice sustainability in all aspects of their lives at home.  

Encourage the use of lower impact transportation options and encourage the university to make these resources available.

The second recommendation for the transportation sector of the Outdoor Adventures trip program is to urge the trip leaders to use less-impact transportation options such as hybrid vehicles for their trips. For trip transportation, Outdoor Adventures is required to use vehicles provided by University of Michigan Parking & Transportation Services since it is considered a program offered by the University of Michigan Recreational Sports Department. However, Parking & Transportation Services does not have hybrid vehicles large enough to transport all trip participants. Currently, Transportation Services has 29 hybrid sedans available for student, staff, and faculty rental. These sedans fit up to five people, whereas vans fit up to eight. Therefore, trip leaders should begin encouraging Parking & Transportation Services to make larger hybrid vehicles available for student, staff, and faculty rental.

Include an optional fee for carbon offset purchases by trip participants

The final recommendation for the transportation sector of the Outdoor Adventures trip program is to include an optional fee in the trip price to purchase a carbon offsets appropriate for the expected carbon dioxide emissions resulting from transportation to and from the trip location. Carbon offsets allow a reduction in net carbon dioxide emissions. In order to balance out OA’s carbon footprint, offsets can be purchased to support renewable energy or environmentally beneficial projects such as reforestation. The transportation for trips will lead to inevitable emissions of greenhouse gases, however, by purchasing carbon offsets much of this environmental cost can be compensated for. On the Outdoor Adventures Costa Rica Cultural Immersion/Multi-sport trip, the overall emissions from flying are 3.6 tons of carbon dioxide per person. This would cost $56.00 in carbon offsets. In relation to the overall trip price, $950.00 for early registration and $1050.00 for late registration, this carbon offset can be very inexpensive. The team recommends that there be another price listed on the Outdoor Adventures trip program handouts, which would include the cost of a carbon offset. This
cost can be found on different carbon offset websites, but the team used Native Energy’s services at www.nativeenergy.com. Each trip’s total carbon emissions and offset price can be easily calculated by going to the travel calculator, entering the starting point and the destination, and then checking out.\footnote{7}

III. Gear re-use and purchasing options: Promote the reuse, borrowing, and rental of gear and outdoor apparel to trip participants gathering equipment. Provide a buying guide listing gear companies that use sustainable practices and/or promote environmental stewardship.

Outdoor Adventures attracts seasoned outdoor enthusiasts as well beginners to the field. Participants come to the program and are aided by the Rental Center and trip leaders in becoming appropriately outfitted for their adventures. The Outdoor Adventures Sustainability Team saw an opportunity in the role of trip leaders to promote more sustainable gear re-use and purchasing options during regularly scheduled pre-trip meetings. The team made recommendations to trip leaders to guide participants with the following action steps:

*Promote the reuse, rental or recycling of gear and apparel*

The most sustainable option for gear is to eliminate the need to purchase new items requiring the harvest of new materials, and the energy cost of production and shipment of products. For Outdoor Adventures trip participants, the OA Rental Center is available as a fairly sustainable option for renting used gear. The Outdoor Adventures Sustainability Team encourages the thorough use of this program. The team also suggests that trip leaders encourage participants to seek out family and friends for gear availability before resorting to making a new purchase.

*When purchasing is necessary, provide recommendations of eco-friendly brands*

The team recognized the impracticality of strictly using borrowed or used gear. Therefore, research was conducted to discover outdoor apparel and equipment companies that have relatively sustainable practices. Much of this research was conducted by reviewing information available on retailers’ websites in addition to the Ethical Consumer’s Buying Guide for outdoor gear.\footnote{11} It is recommend that trip leaders present these options to trip participants when considering a new purchase.

Two schools found through research, Princeton University and Northland College, use their purchasing power to encourage companies to become more sustainable. These two colleges also use only equipment from companies that practice sustainability.\footnote{5,2} The team suggested that Outdoor Adventures trip leaders consider purchasing from Patagonia in support of their exemplary commitment to wildlife restoration and environmental education. Patagonia participants in the “1% for the Planet” program, which means that they donate one percent of their profits towards projects that benefit ecosystems and sustainable systems across the nation. Patagonia independently funds their own environmental stewardship programs such as their wildlands protection program called “Freedom to Roam” and the protection of their very own “Patagonia State Park.”\footnote{12} It was also discussed with trip leaders the efforts that REI, the outdoor clothing and gear outfitter that is very popular and accessible locally. REI has an “eco-sensitive line” that uses recycled materials such as recycled fleece and recycled plastics in their clothing
items. REI also has an environmental stewardship program that takes a grass-roots approach to environmental protection and advocacy. The team suggested a few other companies such as Nau, Vegetarian Shoes, Ethical Wares, Marmot, Sierra Designs and Royal Robbin for their use of more sustainable materials as well. One such material, which was given as an example used by many of these companies is cocona. This material is made from the husks of coconuts which are usually disposed as waste by the coconut food industry. It is a wonderfully soft and versatile fabric with moisture-wicking and thermal retention properties. The use of cocona by popular outdoor apparel companies exemplifies how convenient it can be to be more sustainable on and off the trail.

IV. Food purchasing and consumption: Implement a bulk food system to be used on all trips, reducing the pre-consumer packaging waste and promoting the purchase of local and organic food choices with resulting budget surplus. Encourage a vegetarian meal plan/buying guide for trip leaders to base their menus.

Currently the system of food purchasing is very decentralized. Trip leaders are in charge of going out to purchase the food from a grocery store on site or before their trip. They are given a general outline of the number of individual food categories they need to include, and often times a mock menu to help them organize, but other than that it is at the trip leader’s discretion to choose the food items for the trip meals. The trip leaders are given a budget of $7.00 per person per day for meals, with $1.50 of this allotted to breakfast, $1.50 for lunch, $1.00 for snacks, and $3.00 for dinner. Food is generally purchased at a regular grocery store, such as Kroger. The food purchased must be repackaged from the original packaging into flexible plastic bags to be brought on the trips. The plastic bags must be single use to be in accordance with health codes. Any food leftover from the trip may not be used on future trips and is usually disposed of.

The Outdoor Adventures Sustainability Team recognizes many problems in sustainability within this system that can be addressed without putting significant pressure on the Outdoor Adventures budget. First off, the trip leaders are not given guidance on what foods are sustainable, and are not given adequate pressure to purchase these items. In line with this, the budget is tight for providing a full menu, which makes it more difficult to purchase these sustainable items that are typically more expensive. Also, the amount of packaging used in this system is excessive because trip leaders buy from grocery stores that use individual packaging for their items and they must then repackage the items into the single use plastic bags, which are, at this time, unavoidable in this system. Finally, there is the problem of food waste created from the trips, due to the fact that at the grocery store where food is pre-packaged, trip leaders have less flexibility in portioning out only the amount of food that is necessary for the trip.

Implement a bulk dry food system into the Outdoor Adventures rental center

Firstly, the Outdoor Adventures Sustainability Team recognizes that some trip leaders do take initiative to go to a separate shopping area to purchase bulk food for their trips. However, if a bulk food system was implemented within the structure of the OA program, everyone would be able to participate, thus centralizing the responsibility to make sustainable choices, saving food and packaging waste, and giving the food budget more flexibility. A bulk food system would work off of a stock of dry food goods
maintained and kept at the OA Rental Center in a dry, shaded, cool area. Before purchasing from a grocery store the trip leaders would go to the center to collect their dry food purchases. The cost of the items would be “purchased” through the Rental Center, by deducting the price from the trip leaders’ food budget. A bulk dry food system would address many of the above problems including budget restriction, food waste, and packaging waste.

Because in a grocery store the trip leaders buy their food in pre-consumer containers, which come with prescribed amounts of the food items, they do not have as much control over specific amounts purchased. Thus, in many accounts they are buying excess amounts of those food items in order to feed everyone on the trip. Creating a bulk food system for the dry goods in which the trip leaders could determine the amount needed for their trip and only purchase what the required amount could reduce the amount of waste accumulated from uneaten food. In addition, this solution would address the packaging problems, because instead of creating waste from the unneeded pre-consumer container that the food item is coupled with in the grocery store, the trip leaders would cut out the middle man by having the food items go directly from the bulk bin to the plastic bag for the trip.

The biggest benefit of the bulk food program is that it saves a considerable amount of money. This is shown in figure 4.1, taken from the complete bulk food proposal. When several bulk food items are used, trip leaders can save a lot of money on their trips, freeing up money in their food budget and giving them more flexibility on the purchasing choices they make for the food that they do purchase in the grocery store.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Bulk per pound</th>
<th>Packaged per pound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instant Oatmeal</td>
<td>$0.79</td>
<td>$8.23 (Quaker Oats Instant Packs)</td>
</tr>
<tr>
<td>Macaroni</td>
<td>$1.10</td>
<td>$1.79 (Mueller Macaroni)</td>
</tr>
<tr>
<td>Brown Rice</td>
<td>$0.89</td>
<td>$2.00 (Uncle Ben)</td>
</tr>
<tr>
<td>Brown Sugar</td>
<td>$1.19</td>
<td>$1.23 (Domino)</td>
</tr>
<tr>
<td>Granola</td>
<td>$2.99</td>
<td>$3.39 (Kashi)</td>
</tr>
<tr>
<td>Raisins</td>
<td>$2.49</td>
<td>$5.33 (Sun Maiden)</td>
</tr>
<tr>
<td>Trail Mix</td>
<td>$3.99</td>
<td>$11.20 (Bear Naked)</td>
</tr>
</tbody>
</table>

For a complete view of the Food Proposal, see Appendix I.

*Maximize the amount of vegetarian meals on trips*
The purchasing of meat for trips comes with a lot of hidden costs to the environment. OAST finds that OA can be more sustainable in their food consumption by including most or only vegetarian meals while in the field. The US food production system uses about 50% of the total US land area, 80% of the fresh water, and 17% of the fossil energy used in the country and those percentages are significantly shifted toward the production of livestock and meat based food products. On average the vegetarian diet consumes a considerably less amount of energy than a meat-based diet as seen in Figure 4.2 that depicts the compared kilocalories to the amount of energy input used to produce that unit of meat, based on the amount of volume produced in the United States. In contrast to the inefficiency of eating meat, the ratio of energy input to nutrient output in plants is virtually 1:1.\(^{16}\)

*Figure 4.2*

**Animal production in the United States and the fossil fuel energy required to produce 1 kcal of animal protein.**

<table>
<thead>
<tr>
<th>Animal Product</th>
<th>Production Volume (x106)</th>
<th>Ratio of energy input to protein output (kcal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>74</td>
<td>40:1</td>
</tr>
<tr>
<td>Eggs</td>
<td>77000</td>
<td>39:1</td>
</tr>
<tr>
<td>Dairy (milk)</td>
<td>13</td>
<td>14:1</td>
</tr>
<tr>
<td>Chickens</td>
<td>8000</td>
<td>4:1</td>
</tr>
</tbody>
</table>

Outdoor Adventures can reduce its energy footprint by eating more energy efficient food. This would not include meat based products which are the most energy intensive. Figure 4.3 depicts a graph showing how eating lower on the food chain maximizes the amount of energy return as a function of input. By switching to a vegetarian based meal plan, OA would be a more sustainable program.
Focusing on local and/or organic food items
By increasing the amount of local food purchases, Outdoor Adventures could save on the amount of energy used in transportation for the food they purchase. Because of the high energy inputs to cultivate crops in conventional farming as well as transporting food far distances from mass food plots in site-specific areas. Orange juice from Florida, coffee from South America, and bacon from the South West all contribute to the energy costs, as all food items are shipped all the way to the local grocery store to be purchased. OA should encourage the purchase of local food items to lessen their influence on this energy intensive system.

Organic food items can also influence the amount of energy used, and reduce chemical impacts and nutrient loss in the ecosystem. Organic agriculture techniques foster soil formation, resulting in better water and nutrient retention as well as reducing soil erosion. Contrastingly, conventional farming tends to use mono-cropping techniques resulting in a depletion of the soil’s nutrient content and results in a more intensive use of fertilizers and pesticides, polluting the air and water around the site. This also requires a excessive water and energy to harvest and process the crops. By choosing organic food
items, OA will, again, reduce their dependence on agriculture processes that waste energy and natural resources.

Figure 4.4 shows how the amount of energy input to the American food system has drastically increased between 1940 and 1970, but food consumed has only slightly. Due to increased energy used to cultivate mass conventional plots of crops and then transport them across the country and world, the hidden energy costs behind the food our society eats is disconcerting. OA can reduce the gap between energy consumed through procurement of food and energy brought into the human body by buying food locally and organically. Thus, OA will be more sustainable in terms of the food consumed.

Figure 4.4

A challenge regarding the purchase of Organic and local food items is that they are typically more expensive in the grocery store and the trip leaders are made to adhere to a strict budget of $7 per person per day. The purchasing of these food options would be more economically feasible if there was more room in the budget which could be made possible through the implementation of the bulk food program mentioned above.

V. Measuring Success and Gathering Feedback: Create a sustainability category in post trip surveys for participants and trip leaders to track the progress toward higher sustainability and provide incentive for trip leaders to follow action steps.

Outdoor Adventures currently utilizes post-trip evaluations to assess the strengths and weaknesses of their program. The Outdoor Adventures Sustainability Team believes it is necessary to adjust these questionnaires to include questions that measure the sustainability on trips. This is a useful way for Outdoor Adventures to gauge the success of sustainability in the program and to analyze what changes need to be made to the program.

*Incorporate a sustainability question for the post-trip evaluation*
• Did you learn anything new about how you can be sustainable while on a trip? If so, what was it and do you consider this education to be a valuable part of the trip? If not, were you ever curious if there was a more sustainable method for actions taken on the trip?
• Did you feel as though Outdoor Adventures has a sustainable mindset while on trips? If so, how do we do this? If not, where do you suggest we incorporate more sustainable practices?
• Did your trip leader seem motivated about being sustainable on the trail? If yes, how so?

The team believes that adding any these questions will serve as a tool that can be used to evaluate how sustainable the Outdoor Adventures program is. Implementing these additional questions will create many more opportunities for feedback on how the program can become more sustainable. Surveys will also serve as a way to ensure the trip leaders are implementing all of the sustainable recommendations and as reminders to both focus on and continue the greening of the Outdoor Adventures program. With these assessment questions, many more individuals will have the opportunity to provide sustainable ideas that Outdoor Adventures could implement in the future, creating opportunities for collaboration, enthusiasm and growth of the program. They show that Outdoor Adventures is always conscious of being sustainable recognizes that becoming sustainable is an ongoing processes. It is the OAST’s hope that the surveys will always be taken into consideration and used as yet another tool to make the program green and also serve as a model for similar institutions.
Desired Outcomes

If implemented, the culmination of these recommendations would create an overall improvement of the sustainability of the Outdoor Adventures program in regards to their trip program. The Outdoor Adventures Sustainability Team would like for trip leaders to now take on the OAST role in implementing these recommendations so that Outdoor Adventures can eventually become a model in sustainability for other similar outdoor educational programs.

When setting out on a trip, the trip leaders will know the environmental threats and level of resistance of the environment they are recreating in. They will be able to pass along information about the invasive species and the stability of the ecosystem of the area. Trip participants will then be able to prevent recreational damage on an ecological level to this particular environment.

OA will promote adventures closer to home to reduce the amount of energy used and the amount of green house gases that are emitted while traveling to and from the trip destination. OA will also promote and provide an accessible way for participants to purchase carbon offsets to lessen their ecological footprint in order to strive for carbon neutrality.

After expressing the need for more fuel efficient and hybrid vehicles, transportation services will hopefully expand their variety of vehicles. Once this happens, Outdoor Adventures will have the opportunity to take advantage of these new options and be more sustainable while traveling to destinations.

When trip leaders are grocery shopping for meals on the trips, they will purchase their dry goods from the OA rental center in order to reduce packaging and waste material. With the surplus left in their budgets they will expand the amount of local and organic food options.

In assessing the experiences of trip leaders and participants, OA will place stress on the sustainability practices taught and implemented in order to promote environmental stewardship and sustainable lifestyles.

These steps will ultimately foster a sustainability consciousness among the program and participants. This will inspire future advances in the overall sustainability of the program.
Analysis and Feedback

The Outdoor Adventures Sustainability Team combined their previous environmental knowledge and information received through researching other schools to complete the list of sustainable recommendations. OAST created feasible and beneficial recommendations that are considered practical to implement into the program. The team focused on the trip portion because this is the area in which the most impact can be made. Also, a sense of sustainable consciousness sparked in the trip program can ripple into other areas of Outdoor Adventures. The feedback that the Outdoor Adventures Sustainability Team received from the entire program was very positive. They were satisfied and excited about the ideas presented.

The Outdoor Adventures Sustainability team passed out a survey directly after the presentation.

Question 1: Which of these sustainable practices are you most likely to implement on your next trip? Common Responses:
- buying local food for trips
- vegetarian meals
- local and organic ingredients
- food and packaging action plan
- education action plan
- bulk food and biodegradable bags
- Leave No Trace
- making sure to educate participants on sustainable practices
- participating in carbon offset programs
- reusing and renting gear
- taking more trips closer to home
- creating a bulk food storage program for Outdoor Adventures
- educating participants on the food
- visiting more local spots

Question 2: Was there anything we did not mention that you feel would be a beneficial sustainable practice to incorporate into the trips?
Common responses:
- using less paper in the recreation center
- having a composting bin at the center
- having a pre-trip requirement for trip participants to volunteer for an environmental cause
- having a lesson for the trip leaders on how carbon offsets relate to trip programs directly
- incorporating an invasive plant species removal day-hike trip
- look further into other university’s outdoor programs

Questions 3-6: The team polled the trip leaders asking them if they thought they would be likely to use each specific action plan. For each area (education, transportation, products and gear, and food and packaging), the majority of the trip leaders decided that they were likely to use the
recommendations. It was concluded on survey by asking if the presentation as a whole was beneficial for them (please see Appendix graphs #1-4 to observe the actual data).

*Sustainability Education Development*

![Bar chart showing how likely trip leaders are to implement education action steps.]

Analysis: The trip leaders’ likelihood to implement the education action steps was high. This is most likely due to the fact that it is simple and free to inform trip participants of sustainable practices and other sustainable facts. Educating participants is a crucial base for the Outdoor Adventures program becoming a sustainable institution and trip leaders realize this.

*Reduction of Carbon Emissions through Transportation Alternatives*

![Bar chart showing how likely trip leaders are to implement transportation action steps.]

Analysis: The trip leaders’ likelihood to implement the transportation action plan was not as high as some of the other recommendations. This is most likely due to the fact that many elements of the transportation plan either limit the variety of opportunities to visit sites outside of Michigan, involve work outside of the job description, or have additional monetary costs. A lot of the people that participate in the Outdoor Adventures trip program sign up for these trips in order to experience a location they have never been to previously. The most popular trip of the year is the Costa Rica trip. This proves that trip participants enjoy taking trips to exotic locations. Another portion of the team’s transportation recommendation was to encourage the University Parking & Transportation services to buy larger hybrid vehicles. This would require the trip leaders to contact the department, which is outside their job description. The final portion of the team’s recommendations is to purchase carbon offsets, which increases the overall price of the trip.

**Gear Reuse and Purchasing Options**

![Bar Chart](image)

Analysis: The trip leaders’ likelihood to implement the products and gear action plan was fairly high. This recommendation is relatively simple to implement, and can have a significant reduction in environmental degradation. Outdoor Adventures would only have to edit the pre-trip checklist to suggest that trip participants borrow or rent gear or purchase gear from a sustainable company if a new item is necessary. This portion of the checklist would also include a buying guide that provided a list of sustainable companies, and the Outdoor Adventure Sustainability Team has already created this. A faculty member would have to include the information on products and gear on the pre-trip checklist and then this recommendation would be implemented. This is most likely why this recommendation had such positive results.
Food Purchasing and Consumption

Analysis: The results involving the likelihood of trip leaders to implement the Food and Purchasing action plan is very positive. This is most likely because the action steps are not only easy and financially efficient, but they also give the trip leaders more freedom when they have to purchase the food for the trip. It allows the trip leader to purchase more local and organic foods because of the savings involving bulk foods.

Question 7: Was this program educational for you? (Responses were yes or no)
Overall, 94% (17/18) of the trip leaders thought that the presentation was beneficial.
Conclusion

Outdoor Adventures is a unique University of Michigan program that allows participants to interact with their environment in a dynamic and educational way. Therefore, there are significant opportunities to increase awareness and compassion for environmental issues through this program. Improving the overall sustainability of Outdoor Adventures trip program is paramount in ensuring that OA’s environmental harm is minimized on a local and global scale and that the program both creates and attracts environmental stewards. If this can be achieved, Outdoor Adventures will be on its way to becoming a model for outdoor recreation programs at other institutions, exemplary in sustainability.

In hopes of assisting Outdoor Adventures reach their potential in sustainability, the Outdoor Adventures Sustainability Team has researched and proposed a collection of recommendations. It is the team’s hope that these recommendations enable Outdoor Adventures to adjust and augment their current practices in education, transportation, gear use, and food purchasing and consumption. The team recognizes that these changes will be largely fueled by the growing enthusiasm of trip leaders, and therefore simplified the desired outcomes into practical action steps to ensure this vision is manageable.
Appendix

Appendix 1. Bulk Food Proposal

Statement of Problem:
As it stands today the Outdoor Adventures trip program does not supply individual trips with food beforehand. The menu of the participants is at the discretion of the trip leaders who are charged with the responsibility of providing food with an allotment of approximately $1.50 for Breakfast, $1.50 for lunch, $3.00 for dinner, and $1.00 for snacks per person per day. Each of these are bought from a grocery store in their respective packaging and then re-packaged into flexible plastic bags for the trips. Leftover food from the trips is later often thrown out, as it cannot be re-used on the trail.

This model brings forth many problems in terms of sustainability. Buying food in pre-packaged amounts gives less variability in the portions of the individual products, resulting in too little or excess food. It is likely that the trip leaders will opt for the latter in order to make sure that all participants are fed, resulting in food waste at the end of the trip.

The packaging use is also of concern. Individually packaged food items produce excessive packaging waste, as each food item comes in its own packaging and then must be re-packaged into one-use plastic bags for the trips.

Another problem is the inflexibility trip leaders find in their budgets. There is a very small allotment to cover food costs. Therefore, the shoppers have a decreased range of choices for their menus and the ability to purchase more sustainable food items, namely, local or organic food items that are generally more expensive. As a result trip leaders purchase the cheaper, greater subsidized and unsustainable food choices that acquire much higher hidden environmental costs in production, preservation, transportation and distribution.

Solutions:
A bulk food system implemented and maintained by Outdoor Adventures would solve many of these issues. This system would work off of a core stock of dry goods at the OA rental center with many basic dry food items stored in air-tight storage bins. Trip leaders would then be encouraged or required to purchase their dry goods at the center before going on trips, and then package the amount needed into plastic bags. This plan would find solutions to the above problems in the following ways:

- This plan will reduce the amount of food waste coming out of the trips, because trip leaders will pack only the amount of food they need to sustain their trip participants instead of carting extra food that comes pre-packaged in varying amounts. Therefore, there will be a minimal amount of leftover foods and the trip will produce less waste.
- This plan will reduce the overall packaging by eliminating the pre-consumer packaging. The trip leaders will be able to measure out the amount of the particular food item from a large stock and therefore will be able to eliminate the smaller scale packaging in which they would purchase these items from a conventional grocery store. Though the use of one-use plastic bags on the trail is at this time necessary, a significant amount of material consumption will be reduced if re-useable containers are used when acquiring the bulk dry food products for the OA stock.
Because buying food in bulk cuts down on food costs (see figure 1), the overall costs of buying these staple food items by trip leaders will reduce the amount of money spent while maintaining the same amount of food purchased. OA can choose to reduce the budget for food and reduce the overall costs of the trips, and/or they can encourage that the surplus money in the budget be used toward purchasing local and/or organic food items to promote a more sustainable menu.

**Costs:**

Because the trip leaders will be purchasing their dry goods from this system, the revenue can be used to sustain the system itself. Trip leaders will have the ability to purchase the exact amount needed for their trips, the money saved that would have been lost in the extra food waste can be used to further support the bulk food system, expanding the variety of stock offered, and maintaining the equipment necessary.

OA will have to invest some initial capital in purchasing a dry food stock as well as the necessary bins, scoops, and re-useable bags to purchase and transport the food items. This initial investment will be based on the food items that OA decides to purchase to pilot this program, the amount of each food item, and the bins and scoops to distribute the food items (see food storage). However, the payback on these items can be relatively very short, with the discretion of OA on pricing of the individual food items. Figure 1 shows a chart with a sampling comparing the prices of dry food goods in bulk per pound to the prices of leading brands of the same food items pre-packaged per pound. It is recommended that the prices that OA charges the trip leaders be slightly more than the wholesale costs in order to generate a small revenue to pay back capital investment, as well as have a cash base for future upgrades, maintenance and modifications to the system.

### Figure 1

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Bulk per pound</th>
<th>Packaged per pound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instant Oatmeal</td>
<td>$0.79</td>
<td>$8.23 (Quaker Oats Instant Packs)</td>
</tr>
<tr>
<td>Macaroni</td>
<td>$1.10</td>
<td>$1.79 (Mueller Macaroni)</td>
</tr>
<tr>
<td>Brown Rice</td>
<td>$0.89</td>
<td>$2.00 (Uncle Ben)</td>
</tr>
<tr>
<td>Brown Sugar</td>
<td>$1.19</td>
<td>$1.23 (Domino)</td>
</tr>
<tr>
<td>Granola</td>
<td>$2.99</td>
<td>$3.39 (Kashi)</td>
</tr>
<tr>
<td>Raisins</td>
<td>$2.49</td>
<td>$5.33 (Sun Maiden)</td>
</tr>
<tr>
<td>Trail Mix</td>
<td>$3.99</td>
<td>$11.20 (Bear Naked)</td>
</tr>
</tbody>
</table>

Although all trips include different menus and brands of items certain staples are common. On a trip to the Sleeping Bear Dunes for two days, including 12 participants, a typical menu can include oatmeal, raisins and trail mix which are items can be purchased in bulk. Figure 2 shows how much the trip leaders could free up in their budget if they were able to participate in a bulk
food system. The table shows the amount saved per person, since there are 12 participants on the trip and this number will typically vary. It also shows the amount saved per person per day to give perspective on how this fits into the typical shopping budget.

*Chart only includes menu items that are easily and commonly purchased in bulk.*

The overall savings of this hypothetical trip instance is almost $50, and $2/person/day. That frees up a lot of room in the budget to purchase local and/or organic options to substitute the produce and dairy purchased on the trip for local and organic food items. These items tend to be more expensive, but they would be more economically feasible with more flexibility in the food budget.

![Figure 2](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>Bulk:</th>
<th>Pre-packets:</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 cups of oatmeal (3 lbs)</td>
<td>$2.37</td>
<td>$24.69</td>
</tr>
<tr>
<td>1 lb of raisins</td>
<td>$2.49</td>
<td>$5.33</td>
</tr>
<tr>
<td>3 lbs Trail Mix</td>
<td>$11.97</td>
<td>$33.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$16.83</strong></td>
<td><strong>$63.62</strong></td>
</tr>
<tr>
<td><strong>/person</strong></td>
<td><strong>$1.40</strong></td>
<td><strong>$5.30</strong></td>
</tr>
<tr>
<td><strong>person/day</strong></td>
<td><strong>$.70</strong></td>
<td><strong>$2.65</strong></td>
</tr>
</tbody>
</table>

**Total Savings: $46.79**

**Savings per Person: $3.90**

**Savings per Person/Day: $1.95**
Figure 3 shows the savings when implementing the proposed bulk food system on a trip to the Upper Peninsula’s Pictured Rocks for five days with four participants.

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Bulk Cost</th>
<th>Pre-packaged Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 cups of oatmeal (2 lbs)</td>
<td>$1.58</td>
<td>$16.44</td>
</tr>
<tr>
<td>1/2 cup raisins (.18 lbs)</td>
<td>$0.45</td>
<td>$0.96</td>
</tr>
<tr>
<td>16 cups trail mix (4 lbs)</td>
<td>$15.96</td>
<td>$44.80</td>
</tr>
<tr>
<td>2 cups rice (.8 lbs)</td>
<td>$0.71</td>
<td>$1.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$18.70</strong></td>
<td><strong>$63.80</strong></td>
</tr>
</tbody>
</table>

Savings per Person: $11.28
Savings per Person/Day: $2.25

In this model, the trip would save a total of $45, but when split up for only 4 participants, this number is very significant. The participants can save $2.25/person/day to spend on local and organic food items, which can supplement their dry food meal. This kind of budget can make huge improvements on the overall sustainability of the meal aspects. Out of the $7/person/day over $2 will be available in the budget to put toward the extra expenses of more sustainable food options.

In addition, OA rental center would have to allot time in a pre-existing staff position to maintain and replenish the food stocks, as well as to determine the dry goods available, the amount, and the prices to be deducted from the food budgets in order to minimize the amount of food waste in the system.

**Food Storage:**

Currently the Outdoor Adventures rental center has a viable space in order to house the bulk food program. They are planning to install a plastic shelving system with a locked door for security in food storage.

Occupational Safety and Health Administration standards require that dry foods be stored at temperatures below 85°F, humidity below 60%, without direct lighting. The containers should be air tight and made of food grade plastic. The shelf life of each food item needs to be adhered to by OA. Figure 4 gives a guide to the shelf life of dry food goods that are applicable to the OA program under optimal storage conditions.19
In order to retain freshness, when replenishing the containers, OA staff should be sure to rotate the stock so that the oldest goods are at the top and the newest at the bottom. In order to reduce contamination, OA can wait until a bin is completely empty to be cleaned and replenished.

**Figure 4**

<table>
<thead>
<tr>
<th>Item</th>
<th>Shelf Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oatmeal</td>
<td>6 months</td>
</tr>
<tr>
<td>Macaroni</td>
<td>2 years</td>
</tr>
<tr>
<td>Brown Rice</td>
<td>6 months</td>
</tr>
<tr>
<td>Brown Sugar</td>
<td>4 months</td>
</tr>
<tr>
<td>Granola</td>
<td>2-3 months</td>
</tr>
<tr>
<td>Dried Fruit</td>
<td>6 months</td>
</tr>
<tr>
<td>Trail Mix</td>
<td>4 months (due to unshelled nuts)</td>
</tr>
</tbody>
</table>

In order to store and distribute the food, Outdoor Adventures will need to purchase food storage bins and scoops. Air-tight, opaque FDA approved food storage bins can be purchased from Safetycentral.com for $14.99. These bins can store up to 5 gallons, come in a variety of colors and are BPA free. Remeer.com offers metal food scoops in cup and half-cup sizes for $11.95 and $7.95, respectively.

**Evaluation:**
In order to evaluate the effectiveness of this endeavor, Outdoor Adventures can chart the overall costs saved as well as track if the amount of sustainable food items purchased by trip leaders for the trip menus increases. OA can use its experience and understanding of trip menus to determine the types of food goods purchased for the program and can measure the overturn of these items. After the system is in place for a sustained period of time, Outdoor Adventures can assess whether or not the project has provided an appropriate response to the problems stated above and adjust the system on this basis.

**Appendix 2. Lesson Plan Outline**

I. Goal of Presentation
   - Train leaders in sustainable practices outside of LNT principles
   - Motivate leaders to practice sustainability on trips
   - Help leaders educate participants

II. Definition of Sustainability

III. Why It’s important
   - Environmental concerns and issues
- Sustainability help prevents these issues

IV. Recommendations

1. Education
   - Why education is important in regards to sustainability
   - Part of the role of a trip leader is to educate participants: we want to make it easy for you to educate your trip members in an efficient and practical way
   - Know and use the LNT principles
   - Understand how recreational impact affects natural areas

   Education Action Plan:
   1. Research your trip area to know the habitat threats
   2. Use your knowledge as power to educate your trip participants and help reduce your impact as a group (teach them LNT)

2. Transportation
   - Including the purchase of carbon offsets in trip price
   - Promote visiting locations that are more local (show carbon calculator chart Figure 2.1)
   - Start to demand hybrid or biodiesel fuel vehicles rental from the university
   - Princeton University incorporates carbon offset prices into their trip prices and uses hybrid vehicles

   Transportation Action Plan:
   1. Create a demand for more sustainable vehicle options from University Transportation
   2. Purchase carbon off-sets, encourage participants to do so as well
   3. Go on more local trips, minimizing the need for transportation

3. Products and Gear
   - Passing on information to trip participants about sustainable companies, reusing, renting equipment and gear.
   - Encourage the purchase of equipment from more sustainable companies
     - Companies to know (buying guide):
       b. REI: “Eco-sensitive” products, Environmental Stewardship program
       c. Nau (Portland-based clothing company): Partners for Change
       d. Vegetarian Shoes
       e. Ethical Wares
       f. More sustainable, natural fabrics: Cocona made from food industry waste (coconut husks): Marmot, Sierra Designs, Royal Robbins
       g. See what can be found used at second hand stores
       h. Use example models: Princeton University, Northland College who use their purchasing power to encourage sustainability

   Products and Gear Action Plan:
   1. Encourage participants to borrow, rent, reuse
2. Look at buying new products from sustainable companies

4. Food and Packaging
   - The goals of packaging sustainability: reduce, reuse, recycle
   - The plastic bag dilemma: Reuse them! Consider them as reusable containers, not single-use, disposable bags
     - Princeton University uses only biodegradable plastic bags
   - Bulk Food Proposal (Include Figure 4.1)
     - Princeton University is using bulk food
   - Using leftover money to purchase more local and/or organic foods
     - Princeton University is using only local foods
     - Local/Organic Food--considering the energy and transportation costs involved in the food purchased
   - Keeping most meals vegetarian
     - Sonoma State University has completely vegetarian meals on trips

Food and Packaging Action Plan
   1. Discuss the meal with participants (where food comes from)
   2. Look at bulk food stores as source of trip food
   3. Try to purchase local and/or organic items
   4. Plan vegetarian meals

5. Recycling
   - Being mindful of your out-packing
   - Single Stream!
   - Reduce, Reuse, Recycle...

V. Conclusion
   - Be a model for similar programs
   - Remember the pre and post-trip checklist items to analyze how the process goes on the trail
Endnotes