FINAL DRAFT REPORT
ENVIRONMENTAL IMPACT AUDIT

BOWDOIN COLLEGE
BRUNSWICK, MAINE

DECEMBER 2000

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EXECUTIVE SUMMARY

Bowdoin College is in the process of evaluating the environmental impacts of its activities, how these activities are addressed, and what role the environment plays in Bowdoin’s decision-making. This evaluation is being conducted in part due to discussions between Bowdoin President Robert Edwards and the Bowdoin Evergreens, a student group that promotes environmental stewardship at Bowdoin. The Evergreens petitioned President Edwards to fully consider environmental issues when setting policy, establishing programs, and making significant decisions that affect the Bowdoin campus. President Edwards agreed that environmental impacts are a factor and should be considered as an element of decision-making at Bowdoin. He also expressed concern that Bowdoin’s overall environmental impact was not well defined. In response to the need to more fully understand Bowdoin’s environmental impact, President Edwards established the Committee for a Sustainable Bowdoin (Committee), working under the guidance of Treasurer Kent Chabotar, to investigate and report on Bowdoin’s environmental impacts.

The Committee hired Woodard & Curran Inc., of Portland, Maine to conduct an Environmental Impact Audit of all functional areas of the Bowdoin campus. The purpose of the audit was to detail the current environmental impact to air, water, and land from all of Bowdoin’s activities and operations. The field work for the Environmental Impact Audit was conducted from July through September 2000 and covered 43 functional areas of Bowdoin and included interviews with numerous students and more than 40 staff, faculty, and administrators. This Final Draft Report outlines Woodard & Curran’s findings.

This Environmental Impact Audit, and an Environmental Compliance Audit conducted by Woodard & Curran in 1999, indicate that Bowdoin manages its environmental performance well. The 1999 Environmental Compliance Audit identified minor regulatory compliance deficiencies that Bowdoin has since corrected. This Environmental Impact Audit identifies impacts on the environment (detailed in this report) of Bowdoin’s operations. This report also describes the on-going programs at Bowdoin that are minimizing and mitigating the consequences of the identified environmental impacts and provides recommendations to further improve Bowdoin’s environmental performance.

Many Bowdoin operations and activities (residential life, dining services, athletics, the Central Heating Plant) generate environmental impacts such as air emissions, solid and hazardous waste, and consume natural resources such as water, fossil fuel, and paper. The magnitude of these impacts is similar to those of other colleges and universities of comparable size, and is far less severe than impacts commonly associated with industry. While Bowdoin is in substantial compliance with environmental regulations (based on the 1999 Audit and actions taken by Bowdoin as a result of that Audit) and does not generate the magnitude of environmental impacts and pollution of industry, it does have opportunities to reduce both its impact on the environment as well as its environmentally related operating costs. Implementation of some of these opportunities would require capital expenses that would have to be justified either based on financial return or solely on environmental benefits. Recommendations to improve Bowdoin’s environmental performance are provided in this report along with a qualitative evaluation of the advantages and disadvantages associated with significant recommendations.

For example, converting the Central Heating Plant boilers to burn No. 2 rather than No. 6 fuel oil offers an opportunity to reduce environmental impact by lowering airborne emissions. However, Bowdoin has previously commissioned a fuel conversion study indicating this opportunity would require a significant capital expense and would result in higher on-going fuel prices that are not economically off-set by anticipated reduced boiler maintenance costs. In this case, Bowdoin must evaluate whether the environmental benefits justify the capital expense. Conversely, a successful electricity conservation program offers Bowdoin an opportunity to reduce operating costs without significant capital expenditure.
Bowdoin has made progress in energy conservation through energy-efficient building design and by procuring energy-efficient equipment. Future progress will be realized through no- or low-cost conservation efforts of the end-users of power.

Other significant opportunities for improvement lie in the areas of:

- Reducing the generation of solid waste;
- Increasing recycling of solid waste;
- Reducing paper use; and
- Implementing carpooling/ridesharing/mass transit systems.

To realize the benefits of the recommendations made in this report, students, staff, faculty, and administrators at Bowdoin College must do their part to reduce Bowdoin's impact on the environment. Achieving this "buy-in" by these groups can be achieved by implementing an environmental performance improvement program utilizing three strategies that are each reflected in the recommendations included in this report:

- Provide environmental awareness training;
- Continue upgrades to processes, systems, and physical features; and
- Communicate and reinforce program activity and success.

The Bowdoin community has a strong environmental conscience that is reflected in part by environmentally focused groups, organizations, and activities such as the Bowdoin Evergreens, the Committee for a Sustainable Bowdoin, the Environmental Studies Program, and the Kent Island and Coastal Studies facilities. Student-led initiatives concerning recycling, energy and water conservation, and other environmental issues routinely surface. In addition, members of the Bowdoin community participate in measures to conserve natural resources and reduce environmental impact. These initiatives and measures have historically been incrementally successful, and it appears that the single greatest obstacle to continuing success is the lack of a formal program designed to improve and sustain these efforts.

Bowdoin can further reduce its impact on the environment and associated operating costs by developing a system to effectively implement and sustain recommendations included in this report. Resources must be assigned by Bowdoin’s administration and the improvement effort must be managed similar to any other Bowdoin program. President Edwards has pledged his support and his leadership is necessary for the initial success of the program. To this end, Bowdoin should evaluate the potential benefits of implementing a formal Environmental Management System, possibly in accordance with the international standard ISO 14001. Actions by Bowdoin’s administration to adequately manage a campus-wide environmental program, such as filling the Environmental Coordinator position included in the 2000-2001 budget with a competent manager charged with:

- Developing a system to plan and implement improvement initiatives;
- Measuring results of actions taken;
- Communicating successes; and
- Continually reviewing and improving the program

would set the stage for sustainable improvement.
1. INTRODUCTION

Bowdoin College, an undergraduate liberal arts college located in Brunswick, Maine, hired Woodard & Curran to assess the environmental impacts of the college’s current activities. The need for an environmental impact audit was realized when the Bowdoin Evergreens, a student group, approached Facilities Management and President Robert Edwards with questions about how Bowdoin considered environmental impacts in decision making for projects and day-to-day services. As administration considered the issue posed by the Evergreens, it was determined that although most departments and services promote careful use of resources, recycling, and disposal of waste in accordance with applicable laws, Bowdoin does not have a process that evaluates the environmental impact of its decisions at the time its decisions are made. Moreover, Bowdoin lacks a comprehensive environmental management system and implements its environmental initiatives inconsistently. Based on these findings, President Edwards asked Treasurer Kent Chabotar to work with the Evergreens and other Bowdoin faculty and students to identify these issues and to propose solutions. As a result, the Committee for a Sustainable Bowdoin (Committee) was formed. The Committee is chaired by Treasurer Chabotar and brings together representatives of Administration and departments including Dining Services, Facilities Management, Security, and others as well as faculty, staff, and students.

1.1 CAMPUS OVERVIEW

Bowdoin’s current population consists of approximately 1,600 students and approximately 650 faculty and staff positions. The 200-acre campus has over 90 buildings that surround a central quadrangle. The college is located on the edge of a commercial area and is bordered mostly by residences. Bowdoin owns some of the residences adjoining the main campus. Bowdoin also owns several off-campus properties such as:

- Bowdoin Pines, on Bath Road at the edge of the campus;
- Coleman Farm in Brunswick;
- Coastal Studies Center on Orr’s Island;
- Breckinridge Conference Center in York;
- Bowdoin Scientific Station at Kent Island, Bay of Fundy, Canada; and
- A property at Bethel Point in Cundy’s Harbor which is now used by the sailing team.

This audit included the Breckinridge Conference Center and Coastal Studies Center, along with the main campus. Kent Island Scientific Station was also discussed with Bowdoin faculty during the audit. Breckinridge Conference Center is a twenty-three-acre estate bordering the tidal York River in York. The center has conference facilities, a dining and guest rooms, a saltwater swimming pool and a dock. Bowdoin’s Coastal Studies Center (CSC) is a 118-acre site comprised of forest, wetlands, and fields located eight miles from campus at Orr’s Island. CSC houses a sea water marine laboratory, a solar powered terrestrial laboratory, and a renovated farmhouse for classes and seminar meetings, and serves as a center for research in geology, ecology, marine biology, and ornithology.

Potable water for the main campus is supplied by the Town of Brunswick and wastewater is discharged to the Brunswick Sewer District’s wastewater treatment plant. Some of the remote locations, such as the Coastal Studies Center, pump water from individual wells and have their own septic systems. The main campus is heated by the Central Heating Plant, which has three No. 6 fuel oil-fired boilers. Some ancillary buildings, such as apartment houses and private residences, have their own propane or No. 2 fuel oil-fired boilers. Most of the remote locations are heated by small No. 2 fuel oil-fired boilers.
1.2 SUMMARY OF BOWDOIN'S PAST ENVIRONMENTAL CONSERVATION PROGRAMS

Student-led initiatives concerning recycling, energy and water conservation, and other environmental issues are implemented to varying degrees and with varying success each school year. These initiatives are usually supported by Bowdoin’s Facility Management Department to the extent practical considering available resources. Facilities Management has initiated numerous programs aimed at reducing the environmental impacts of Bowdoin’s activities and operations, such as the energy conservation projects discussed below. In addition, members of the Bowdoin community participate, with varying levels of commitment, in measures to conserve natural resources and reduce environmental impact, such as recycling and purchase of “environmentally friendly” products (chlorine-free paper). These initiatives and measures have historically been incrementally successful, and it appears that the single greatest obstacle to continuing success is the lack of a formal program to sustain the efforts. Specific initiatives implemented by Bowdoin are discussed in the following sections of this report.

The most prominent and successful programs undertaken by Bowdoin to conserve natural resources have been in the area energy conservation. From 1978 through 1984, the college received three federal grants from the United States Department of Energy for energy conservation measures. All major structures (approximately 63 buildings at that time) were thoroughly studied. Opportunities with a 5-year return on investment from energy cost savings were implemented. As a result of these measures, fuel oil consumption was reduced from 1.29 gallons per square foot of building area in 1972 to 0.55 gallons per square foot of building area in 1989. The projects undertaken included:

- Insulating walls, ceilings, roofs and piping;
- Installing storm windows and weather stripping;
- Installing new lighting fixtures, ballasts and timers;
- Implementing a campus-wide energy management system;
- Installing new controls at the Central Heating Plant; and
- Replacing worn and inefficient steam system components.

In 1991, Bowdoin undertook another major energy conservation initiative. This initiative was directed at conservation from lighting retrofits and controls, and resulted in annual electrical savings of 45,000 kilowatt-hours. Projects in this program, as well as other individual projects, undertaken by Bowdoin included:

- Replacing electrical heating systems with more efficient types;
- Upgrading lighting fixtures and replacing incandescent lights with fluorescent lights;
- Repairing and replacing old insulation;
- Installing voltage invertors on selected motors;
- Upgrading the energy management systems;
- Upgrading building heat control systems;
- Replacing worn and inefficient steam system components;
- Upgrading boiler controls; and,
- Installing a new boiler at the Central Heating Plant.

Since the successful energy use reduction programs of the 1970s and 1980s, designers of new buildings and building renovations at Bowdoin are charged with minimizing the use of fuels, electricity and campus steam. Requirements of the United States Department of Energy for energy conservation and equipment efficiency are used as minimum standards.
Architectural and mechanical energy conservation features that have been incorporated into new and renovated buildings by Bowdoin include:

- Insulated spandrel glass;
- Rigid insulation on foundations, in walls and roofs;
- Energy efficient window systems and wall systems;
- Heat recovery systems in return air loops;
- Building automation systems that constantly monitor comfort and peak performance; and
- High efficiency electric motors.
2. AUDIT APPROACH

The purpose of this audit was to establish a baseline of Bowdoin’s current environmental impact and to identify opportunities to help Bowdoin improve environmental sustainability and reduce environmentally related operating costs. To do this, it was necessary to identify activities at Bowdoin that impact or could potentially impact the environment and deplete natural resources. Woodard & Curran worked with Bowdoin to review existing available data and to identify locations of additional required data. In addition, Woodard & Curran and Bowdoin jointly identified the specific activities to be audited and personnel to be interviewed. Woodard & Curran then performed the baseline audit with the assurance that all areas of concern at the college, both on the Brunswick campus and at selected remote locations, were covered. This section describes Woodard & Curran’s approach in conducting this audit.

2.1 WOODARD & CURRAN AUDIT TEAM

The audit team consisted of Woodard & Curran staff who are familiar with the Bowdoin campus through previous work with the college and who have considerable experience in performing this type of work. The team included two 1999 Bowdoin graduates who provided insight into recent campus activities and aided in the integration of Bowdoin staff and students in the evaluation and implementation phases of this program. The audit team members included:

- Mike Curato;
- Tina Hunt;
- Charlotte Perry ('99); and
- Ben Burke ('99).

2.2 KICK-OFF MEETING

The project initiated with a kick-off meeting of Woodard & Curran representatives and the Committee for a Sustainable Bowdoin on May 12, 2000. The purpose of this meeting was to define the scope and objectives of the audit. The Committee detailed the areas and issues that were of most concern to them and requested that Woodard & Curran conduct the field work component of the audit in two phases; the first during the summer and the second during the fall semester. The purpose of the summer audit phase was to ensure summer activity at Bowdoin was observed and included in the project. The fall audit work focused on traditional activities that reflect the full student, staff, and faculty population and activities during school sessions. The following schedule was outlined for the audit:

- Summer audit activities: July 2000
- Fall audit activities: September 2000
- Draft report: November 2000
- Final report: December 2000

2.3 WORK PLANS

Woodard & Curran prepared work plans for the summer and fall audit activities that were reviewed, revised (as necessary) and approved by the Committee. The purpose of preparing and reviewing work plans prior to the audit activity was to ensure that the audit activities were conducted as thoroughly, efficiently and effectively as possible. Woodard & Curran, together with the Committee, identified the functional areas of Bowdoin to be visited during the audit and allocated time for each area. Committee
members identified the contacts at each area and scheduled meetings between the auditors and Bowdoin personnel. The work plans were dynamic documents that were adapted to accommodate the schedules of those involved as the audit progressed and to include functional areas that were identified during the audit that were not included in the original work plans. The fall work plan was reevaluated based on the results of the summer audit activity, revised by Woodard & Curran, and reviewed and approved by the Committee at the kick-off meeting before the fall audit activity. Copies of the two work plans are included in Appendix B.

2.4 AUDIT ACTIVITIES

The summer and fall audits started with meetings between Woodard & Curran and the Committee to identify any changes to the workplan, designate Bowdoin representatives to accompany Woodard & Curran auditors, and discuss specific concerns and issues.

Woodard & Curran auditors conducted the majority of their work in two-person teams and were accompanied by a Bowdoin representative nearly all of the time. The auditors interviewed faculty, staff and students and made visual observations at each functional area audited. A list of the people who were involved in the audit, either as committee members or as interviewees, as well as a list of the functional areas visited during the two audits are included below.

Audit Participants
Ann Barbay  Dave D'Angelo  Kent Chabotar  Rick Parkhurst
Ann Goodenow  Ed Lane  Kim Bibber  Robert Edwards
Ann Ostwald  Elsa Martz  Margaret Hazlett  Roland Levesque
Bill Carr  Jeff Ward  Mark Schmidt  Sara Bond
Bill Gardiner  Jeremy Apling  Mary Macul  Sara Lewis
Bob Graves  Jerry Boothby  Nat Wheelwright  Scott Steinburg
Brenda Rice  Jessica Brooks  Orman Hines  Sue Daignault
Bruce Boucher  Jim Kelly  Peter Russell  Ted Senior
Burgie Howard  Joe Bandy  Ray Dall  Tenley Meara
Charlotte Magnesson  John Wiley  Rebecca Clark  Tenley Wurgitz
Christine Cote  Kathleen Masterson  Rebecca F. Sandlin  Terra Wheeler
Craig Bradley  Keisha Payson  Rene Bernier  Tim Carr

TNR
Cliff Card  Karen McNaughton  Mike Cozad

Functional Areas Examined During the Audit
Accounting  Copy Center  Kent Island  Solid Waste
Admissions  Communications  Laboratories  Student Affairs
Art Construction  Dept. Coordinators  Library  Student Records
Athletics  Dining Services  Mail Room  Thalheimer
Biology  Dormitories  Moulton Union  Theater and Dance
Bookstore  Facilities Management  Parking  Transportation
Breckinridge  Geology  Registrar  Upward Bound
Central Heating Plant  Grounds  Residential Life  Utilities
Chemistry  Hazardous Waste  Security  Wentworth
CIS  Health Center  Smith Union
Classrooms  Information Fair  Social Houses
The audit involved a comprehensive and detailed analysis of each functional area. The aim of these analyses was to develop and organize data on how Bowdoin’s activities impact the environment and provide enough information so that Bowdoin can: 1) when appropriate, incorporate environmental aspects into the decision-making process; and 2) determine how best to direct resources to improve its environmental performance and reduce its environmentally related operating costs.

Woodard & Curran auditors asked several detailed questions, obtained records and data, and reviewed documents relevant to the environmental impact at each of the functional areas inspected. Most of the questions were specific to the kind of activities examined, but some of the general questions asked of Bowdoin staff included:

1. What is your name?
2. What are your responsibilities?
3. To whom do you report?
4. Please describe the activities that occur in this area.
5. What do you see as your environmental impacts?
6. What do you do to reduce the environmental impact of your operations?
7. Do you have any ideas for what else could be done?

Woodard & Curran auditors also interviewed students during four separate lunch time sessions. These discussions focused on the students’ current recycling habits and their thoughts on how they and Bowdoin could further reduce their impact on the environment. These discussion provided information regarding how much the students knew and cared about the environment, and what they thought Bowdoin could do to minimize environmental impact.

Woodard & Curran also supported the Committee by attending the Student Fair that was held on September 6, 2000 at Bowdoin campus and by preparing presentation materials, conducting a student survey, and answering questions to raise student awareness during the Fair. Appendix C provides the results of the student survey and the names of students who indicated their interest in participating in student environmental initiatives or joining the Committee.

The Committee and Woodard & Curran met to discuss audit findings after both the summer and fall fieldwork sessions. These meetings were also used as brainstorming sessions to develop ideas on how Bowdoin should proceed given the results of the audit. Past environmental sustainability successes and failures at Bowdoin were also discussed.

2.5 Audit Report

Woodard & Curran auditors compiled their notes upon completion of the summer and fall fieldwork. Documents and data obtained from Bowdoin were examined. When information given to Woodard & Curran in response to questions or requests was presented as factual, Woodard & Curran relied on that information being correct. When conflicting information was discovered, Woodard & Curran noted the issues during the audit and researched further before report preparation. The first draft of this report was presented to Bowdoin on November 8, 2000 and discussed in detail with Bowdoin representatives on November 28, 2000.
3. AUDIT RESULTS

The purpose of this section is to detail the baseline condition of environmental impact determined by the audit and information provided to Woodard & Curran by Bowdoin, and to present the opportunities for improvement identified during the audit. This section is organized into subsections by issue (solid waste, energy, water, etc.) and each issue is discussed on a Bowdoin-wide basis.

Benchmarking data are presented for each issue where benchmarking data were available and thought to be representative and applicable to Bowdoin. Woodard & Curran researched numerous sources to obtain quantitative information for benchmarking. In many instances, and for several issues, no data were found. In some cases where data were available, Woodard & Curran felt the information was either unreliable or not relative to Bowdoin and therefore is not presented.

Recommendations that would, if implemented, result in improved environmental performance and/or reduction of environmentally related operating costs are presented in each subsection of this report for Bowdoin to consider. Recommendations are presented without consideration of capital cost requirements, financial return on investment, or potential long-term cost, but solely on the basis of their likelihood to improve Bowdoin’s environmental performance. However, for the recommendations whose successful or timely implementation may be affected by unique circumstances, such as a high capital cost requirement, those circumstances are noted.

A list of recommendations organized by functional area is included in Appendix A in summary form to enable Bowdoin to engage function area personnel in an improvement program as efficiently as possible. Appendix A contains recommendations made in this Section of this report as well as other recommendations that do warrant detailed discussion because of their ease of implementation of relatively minor benefits. It is important to the success of this program that as Bowdoin evaluates and implements selected recommendations made in this report, it documents quantitative data to gauge the success of its programs, and to measure its performance over time and against other similar institutions.

3.1 RECYCLING/SOLID WASTE

Recycling is currently being done at Bowdoin. Several major recyclable solid waste generating areas on campus have recycling containers for metal cans, cardboard, plastic, and paper. Most all buildings that are populated by residents, students, and staff have access to four-bin sets for recycling high-grade office paper, cans and bottles, and newspaper. Most staff and faculty office areas have personal high-grade office paper recycling containers.

Recently, TNR, Bowdoin’s contracted waste hauler has set up a multi-compartment recycling center (“Silver Bullet”) in the parking lot at Farley Field house. Since this facility is new, Woodard & Curran does not have data to determine to what extent it is being used. Both TNR and Bowdoin Facilities Management staff share the responsibility for managing Bowdoin’s solid waste and recycled solid waste.

Staff- and student-initiated recycling efforts involving organic food waste, waste paper napkins from dining facilities, and competitions between residential life units have been implemented and have been successful in the past. However, these initiatives have not been sustained due to conflicting staff priorities and shifts in focus on the part of students. There is a history of students coming forward with ideas and energy for recycling projects at the beginning of each school year that, if started, have become less focused as the school year progresses.
Table 1 presents a comparison of waste recycled at Bowdoin with other colleges and universities.

**TABLE 1. WASTE RECYCLED AT BOWDOIN AND OTHER SCHOOLS**

<table>
<thead>
<tr>
<th>College/University</th>
<th>Percentage of Waste Recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowdoin College, Maine</td>
<td>14%</td>
</tr>
<tr>
<td>Bates College</td>
<td>66%</td>
</tr>
<tr>
<td>Middlebury College, Vermont</td>
<td>65%</td>
</tr>
<tr>
<td>University of Vermont</td>
<td>40%</td>
</tr>
<tr>
<td>University of South Carolina</td>
<td>25%</td>
</tr>
<tr>
<td>Medical University of South Carolina</td>
<td>14%</td>
</tr>
</tbody>
</table>

1 Bowdoin’s percentage is calculated as the total tons of recycled material reported in 1999 divided by the total tons of waste disposed of at the Brunswick landfill plus the recycled total.
2 The percentages presented for the other schools are from published data and the manner in which the percentages were calculated is not known.
3 Returnable bottles and cans are not included in Bowdoin’s calculations.

The data presented in Table 1 show Bowdoin’s rate of recycling its solid waste is relatively low compared to data found in literature from other colleges and universities. It is likely that only those colleges and universities that have implemented successful recycling programs publish data. Moreover, it is not known how the other schools included in Table 1 calculate their solid waste recycling rate, so direct comparison to Bowdoin may not be appropriate. Bowdoin’s recycling rate is also low compared to the now repealed solid waste recycling goals set in Maine law (to which Bowdoin was never subject) that formerly required Maine cities and towns to achieve incremental solid waste recycling rates of 35 percent and 50 percent.

Table 2 presents the data concerning solid waste disposal and solid waste recycling provided to Woodard & Curran by Bowdoin.

**TABLE 2. SOLID WASTE DISPOSAL AND RECYCLING AT BOWDOIN**

<table>
<thead>
<tr>
<th>Solid Waste Disposal and Recycling</th>
<th>7/99 – 6/00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tons Disposed</td>
<td>722.4</td>
</tr>
<tr>
<td>Tons Recycled</td>
<td>115.4</td>
</tr>
<tr>
<td>Percent Recycled</td>
<td>13.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Solid Waste Recycled, in Tons</th>
<th>1999</th>
<th>1998</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard</td>
<td>6.95</td>
<td>9.63</td>
<td>10.42</td>
</tr>
<tr>
<td>Newspaper</td>
<td>19.51</td>
<td>115.32</td>
<td>8.58</td>
</tr>
<tr>
<td>Hi-Grade Paper</td>
<td>7.77</td>
<td>9.23</td>
<td>8.7</td>
</tr>
<tr>
<td>Tin</td>
<td>1.30</td>
<td>0.138</td>
<td>0.14</td>
</tr>
<tr>
<td>Plastic Bags</td>
<td>0.008</td>
<td>0.016</td>
<td>0.020</td>
</tr>
<tr>
<td>Metal</td>
<td>13.37</td>
<td>5.36</td>
<td></td>
</tr>
<tr>
<td>Total Recycled Solid Waste</td>
<td>48.9</td>
<td>139.7</td>
<td>27.9</td>
</tr>
</tbody>
</table>

1 Newspaper combined with high-grade paper starting June 1999.
2 There was an unusually high amount of newspapers recycled from May-Dec 1998.
Solid waste from Bowdoin is disposed of at the Town of Brunswick’s landfill. Using the assumption that this landfill is compliant with applicable laws, the environmental impact of the solid waste stream from Bowdoin is relatively benign. Bowdoin’s solid waste is primarily paper-based and inert material that offers little opportunity to cause future environmental degradation. The consumption of available landfill volume by Bowdoin’s solid waste is an impact that is important for Bowdoin to consider because once the landfill is full, another disposal option will have to be developed with the potential associated costs and impact of consumption of natural resources.

Woodard & Curran can draw several general conclusions from its audit and observations regarding the apparent low solid waste recycling rate at Bowdoin and the amount of solid waste that is being disposed of at the Brunswick landfill.

1. There is not currently a mechanism to continuously deliver awareness training to the Bowdoin community concerning the importance of recycling solid waste and minimizing the generation of solid waste.

2. It is often more convenient for students, staff and faculty to dispose of recyclable solid waste in regular trash containers than in recycling bins, and they are choosing the more convenient disposal method.

3. There are limited opportunities for faculty and staff to recycle bulk items, such as catalogues.

There are numerous opportunities for Bowdoin to reduce the amount of solid waste it generates and to increase its solid waste recycling rate. The subjects of solid waste generation reduction and solid waste recycling rate improvement are not new to Bowdoin and there are many, isolated on-going efforts to achieve both. Campus-wide awareness training, data collection, closely managing TNR’s activities, and involving the entire Bowdoin Community are some of the actions that Bowdoin must take to ensure improved performance.

The solid waste generation and recycling data provided to Woodard & Curran by Bowdoin are not extensive enough to detect trends for either issue. The variability in the recycling data from 1997 to 1999 leaves room to question its accuracy and/or completeness. Interviews, observations and anecdotal information suggest that little recent progress has been made either reducing solid waste generation or recycling.

Recommendations

Conduct Awareness Training

This recommendation is being presented first because of its importance in improving the likelihood of success of a significant number of recommendations presented in this subsection and others. As Bowdoin engages in a formal environmental improvement program (see Section 4.1 of this report for recommendations for program development), training will evolve as the cornerstone of success. The most efficient means to a successful training program is to provide a competent staff person with appropriate resources to manage the effort. Creating a new staff position is a significant expense for Bowdoin, however the environmental and economic benefits will be seen in the improved chance of success for nearly all recommendations presented in this report.

Permanent Bowdoin faculty and staff will require initial training and a decreasing level of refresher training over time until true environmental awareness become part of their daily routine. Training will be more constant for students due to their continual four-year turnover. Creation of an environmental awareness web page on the Bowdoin Intranet would be a cost-effective method to provide continuous
refresher training. Including environmental awareness training in new student orientation would serve to get new students started in the right direction as soon as they arrive on campus.

Training regarding solid waste generation, management, and recycling should reflect the generally accepted pollution prevention hierarchy, promoted by the United States Environmental Protection Agency, shown below.

- REDUCE – don’t generate waste if at all avoidable.
- REUSE – if you do generate a waste, determine if it can be used again for the same or a different purpose.
- RECYCLE – if you can’t reuse the waste, determine if it is recyclable.
- PROPERLY DISPOSE – as a last resort, ensure the waste is disposed of properly.

Rather than repeat the reduce/reuse/recycle protocol for each recommendation below, the recommendations are presented assuming the protocol has been followed. In addition, the following recommendations assume that initial awareness training has been accomplished.

Provide Additional Recycling Containers

Bowdoin should evaluate the effectiveness of the existing recycling program including the type, size, number, and location of recycling containers on campus. Even after effective solid waste management training is provided to the Bowdoin community, there will still be solid waste streams containing recyclable material. Effective training should energize members of the Bowdoin community to seek recycling containers rather than placing recyclable material in the closest regular solid waste container. However, Bowdoin will still have to upgrade its current recycling program to improve its recycling rate. The resultant reduction in solid waste disposal transportation and tipping fees should be closely measured, and, if allowed by administration, used to further improve the program. Bowdoin should assess the following recommendations for implementation:

- Supply each office with a high-grade paper-recycling container, to be emptied by the office occupant in a centrally located container in each building that in turn is managed by either TNR or Facilities Management.
- Supply each resident space (dormitory room, apartment) with a high-grade paper-recycling container, to be emptied by the resident in a centrally located container in each building that in turn is managed by either TNR or Facilities Management.
- Supply additional, strategically located four-bin recycling sets, optimize the location of existing sets, and improve and clarify (in accordance with the current market for recyclable material) the labels and instructions on all sets.

Fully Utilize TNR

During the audit, TNR offered to present to Bowdoin a proposal to expand its services both for solid waste disposal and recycling. Bowdoin should request, receive and evaluate this proposal (and proposals from other waste management firms, if appropriate), as the cost for increased contract service may be justified by the cost saving from reduced Facilities Management staff labor and expenses performing the same tasks. It is possible that increased TRN involvement will result in lower unit solid waste management rates, improvements in the recycling program (TNR may be able to supply high-grade paper-recycling containers for dormitory rooms at no cost), and improved one-time event services for large and bulky item recycling and disposal.
According to data provided to W&C, it appears that TNR measures solid waste by cubic yards. No data were provided for actual tipping fees and actual weights. We believe that Bowdoin pays for 125 pounds per cubic yard of solid waste (65 pounds per cubic yard for cardboard), instead of paying for actual weight of waste and recyclables. Bowdoin should evaluate the difference in cost between TNR charging for removal and disposal of waste by actual weight instead of weight calculated based on volume.

Reduce Paper Use

Table 3 presents the amount of paper ordered by just the Bookstore for the 1999-2000 school year. No other paper use data were provided to Woodard & Curran.

<table>
<thead>
<tr>
<th>Paper Use</th>
<th>Sheets of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photocopiers</td>
<td>8,241,940</td>
</tr>
<tr>
<td>Printers and Facsimile Machine</td>
<td>1,873,060</td>
</tr>
<tr>
<td>Total Sheets</td>
<td>10,115,000</td>
</tr>
</tbody>
</table>

This category of recommendations is very broad and affects nearly all function areas of the Bowdoin campus. Implementation of the following specific recommendations can, for the most part, be easily implemented through awareness training and positive reinforcement. The benefits are multifaceted; the cost of paper purchase will decrease, some recommendations will result in lower energy costs (printer/copier use), solid waste disposal costs will decrease, and the environmental impacts due to paper production and transportation will be reduced.

- Promote use of electronic media whenever possible and discourage the practice of printing e-mail and indiscriminant printing of Internet material. It was reported that upgrades and improvements to certain user-intensive areas of the Bowdoin Intranet are required to enable more widespread use.
- Encourage shared reading material practices, including commercial newspapers and the Bowdoin Orient, as well as required course reading.
- Develop the use of two-side printer capability, encourage the practice of two-side copying and require two-side copying for Bowdoin business, including academics, where possible.
- Enact fees for the use of Copy Center services by students, student organizations, staff, and faculty as a means to manage the use of that resource. Also, continue the on-going effort to eliminate student use of network printers as a means to circumvent Copy Center fees for copying. These effort should reduce the flood of paper reported by numerous Bowdoin students and staff from mail box stuffing, campus-wide mailings, and organization billboard posting. Updating the campus mailing list would also reduce paper use for mailings that cannot be avoided.
- Admissions materials used for recruiting and admitting students (application packages), including material mailed to home once a student is on campus are a significant use of paper. This paper use should be assessed and changes to electronic media, lower grade paper, and less material per package that will not adversely impact Bowdoin’s ability to attract and enroll the caliber of students it desires should be implemented.
Reduce Waste Generated by Dining Services

Food service operations at similar institutions generate a significant amount of solid waste and offer opportunities to reduce solid waste generation by conservation and substitution methods and by recycling. The delivery of high-quality food to students is important to Bowdoin and some of the recommendations made in this report may affect how the students perceive this quality. This concern must be factored into Bowdoin's evaluation of the following recommendation prior to implementation.

The larger dining halls inspected during the audit are organized and operated to minimize both food and food service waste. A number of initiatives have been implemented and maintained, such as minimizing single-serving containers for cereal, increasing the size of beverage containers to minimize the number of containers each student uses per meal, placement of napkin dispensers on each table to minimize napkin use, and purchase of food stuffs and supplies in bulk containers. Each large dining hall has a four-compartment recycling box for metal cans, plastic containers, cardboard and paper.

Composting organic material such as non-meat food waste has several environmental benefits such as reduced solid waste volume and beneficial reuse of the compost as a soil amendment. In the past, Dining Services has collected organic food waste for transportation to Augusta for use as feed on a local pig farm. During the audit, it was determined that this practice has been discontinued. Ithaca College has an extensive composting program on-campus where significant amounts of organic waste are composted. This new facility that replaced an older composting facility, is reported to have cost $4.0 million and also occupies a significant amount of land. Middlebury College claims to compost 75 percent of its food waste in a program, combined with recycling, that funds itself.

Recommendations for Bowdoin to consider that would reduce solid waste from Dining Services are listed below.

- Evaluate the possibility of a small pilot composting facility, perhaps in conjunction with the Environmental Studies program. If successful in terms of economics, solid waste reduction and as a teaching aid, the facility could be scaled up. Awareness training for Dining Services staff would maximize the percent of food waste entering the composting stream.

- Reevaluate the benefits of the previous practice of sending food waste to the Augusta pig farm, if the composting initiative is not viable.

- Reintroduce a past practice of using canvas lunch bags for bag lunches. The combination of Bowdoin-supplied bags and awareness training may be enough to overcome the resistance and inconvenience of using canvas bags. Also, Bowdoin should research opportunities to reduce the amount of disposable waste items currently contained in the lunches.

- Evaluate the cost/benefit, considering aesthetics and public health, of eliminating or substituting paper-based products for the Styrofoam® and plastic food containers used in the smaller dining service areas such as the Café and bag lunch program. Table 4 provides additional information on food serving material alternatives.
TABLE 4. COMPARISON OF FOOD SERVING MATERIALS

<table>
<thead>
<tr>
<th>Material</th>
<th>Weight per Serving</th>
<th>Cost per Serving</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum foil</td>
<td>10-20 grams</td>
<td>Varies</td>
<td>Energy intensive to produce recycled</td>
</tr>
<tr>
<td>Waxed paper wrap</td>
<td>7 grams</td>
<td>$0.02</td>
<td>Waste reduction and cost savings Wax coating may not be recyclable</td>
</tr>
<tr>
<td>Polystyrene paper plate</td>
<td>12 grams</td>
<td>$0.04</td>
<td>Not readily recycled Energy intensive to produce</td>
</tr>
<tr>
<td>Picnic-weight paper plate</td>
<td>12 grams</td>
<td>$0.03</td>
<td>Not good for heavy and wet food Recyclable, if clean</td>
</tr>
<tr>
<td>Waxed paper plate</td>
<td>10-12 grams</td>
<td>$0.03-0.05</td>
<td>Better than plain paper for wet food Less recyclable than plain paper</td>
</tr>
<tr>
<td>Heavy molded or stamped paper plate</td>
<td>17 grams</td>
<td>$0.07</td>
<td>Recycled paper product Recyclable, with cardboard</td>
</tr>
</tbody>
</table>

Source: Greening the Ivory Tower, by Sarah Hammond Creighton, MIT Press, 1998

Additional Recommendations to Reduce Solid Waste

- Catalogues contribute to a significant portion of Bowdoin’s paper-based solid waste stream. Provisions should be made to ensure these wastes are recycled. Also, staff from a related functional area such as the Mail Room, Library, or Facilities Management should be assigned the task to minimize the number and type of catalogues (and junk mail) that come onto campus. The United States Post Office may be able to provide Bowdoin advice concerning control of this flow of mail.

- Bowdoin staff who are responsible for procurement of materials and supplies should be trained in techniques to reduce the amount of packing waste that comes onto campus. Major suppliers, such as Boise Cascade Office Products will arrange returnable packaging programs. Other suppliers will work with Bowdoin to substitute non-recyclable packing material with paper-based packing.

- Construction contracts should include language that requires Bowdoin's contractor to recycle construction waste to the extent possible. Bowdoin should work with its engineers and architects to incorporate appropriate language into all future contracts.

3.2 ENERGY

As discussed in Section 1 of this report, Bowdoin has previously undertaken several major energy conservation programs. In addition, Facilities Management continues to spend more than $100,000 annually on heating system upgrades and improvements. Bowdoin also implements a policy of meeting the United States Department of Energy's minimum standards for energy conservation for new building and renovation projects. The benefits to Bowdoin and the environment in terms of energy use reduction are summarized in Section 1 of this report and are detailed later in this Section.

Many buildings on the Bowdoin campus are old and were not well insulated when constructed. The aforementioned programs have provided improved levels of insulation in a large percentage of these
buildings, however, even the insulation upgrades do not make the older buildings on campus as energy efficient as newly constructed buildings and, therefore, present an energy conservation challenge.

To offset the low level of energy efficiency in the older buildings on campus, Bowdoin employs an energy management system that was installed 15 years ago and has been updated numerous times, including a $225,000 upgrade five years ago. Two separate systems monitor more than 3,600 points, perform electrical load shedding, and control various heating, ventilating, and air conditioning systems.

More than $100,000 per year is spent upgrading the Central Heating Plant and the steam distribution system that provides steam to heat most of the buildings on the main campus. These funds are spent to maintain and replace steam traps, replace condensate return pumps, refurbish and replace building temperature control valves, replace steam and hot water hand valves, and replace utility piping and insulation.

The results of the energy use reduction programs at Bowdoin are shown in the following figures.

**Figure 1. Annual Fuel Oil Consumption**

![Bar Chart](image)

The decrease in annual fuel oil consumption from 1972 through the late 1980s is attributed to the major energy conservation programs discussed above. The rise in fuel oil consumption during the 1990s shown in Figure 1 is at least partially discounted due to the increase in student population and building area, as shown in Figure 3 and Figure 4.
Electricity consumption at Bowdoin has experienced a steady rise as shown in Figure 2. As with fuel oil use, this rate is somewhat discounted in Figure 5 and Figure 6 due to increases in student population and building area. However, these increases do not offset the rise in electricity usage. The proliferation of electrical devices, such as those required by building codes for ventilation, fume hoods in labs, computer equipment, and those brought to campus by students explain some of the rising electricity usage rates.

Figure 3 and Figure 4 show that while total fuel oil consumption has risen steadily in the 1990s (Figure 1), the rates of consumption considering student population and building area are flat.
Figure 4. Fuel Oil Use Per Building Area

Figure 5. Electricity Use Per Student
Energy use at Bowdoin is costly and has the potential to offer significant cost reduction opportunities. Since major building rehabilitations have already occurred, the largest remaining opportunities lie with energy waste by students, faculty, and staff that can be curbed by increasing awareness and implementing energy-saving educational programs. Bowdoin should continue evaluating the cost-effectiveness of additional building upgrades as capital expense resources allow.

Bowdoin can reduce its impact on the environment by changing the fuel oil it uses. Table 5 below summarizes the airborne pollutants emitted from Bowdoin's Central Heating Plant for different fuels. Bowdoin has commissioned a fuel conversion study that estimates the capital cost to convert the boilers to burn other fuels. Woodard & Curran was not able to review this study prior to writing this report. No. 6 fuel oil, currently used by Bowdoin, is less expensive to purchase, so a conversion to No. 2 fuel oil or natural gas would result in higher operating costs. One cost benefit to conversion is that No. 2 fuel oil or natural gas would enable the boilers to operate with less scheduled and unscheduled maintenance.

\textbf{Table 5. Annual Pollutant Emissions for Different Fuels}\textsuperscript{1}

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Sulfur Dioxide (SO\textsubscript{2}) (tons/year)</th>
<th>Sulfur Trioxide (SO\textsubscript{3}) (tons/year)</th>
<th>Nitrogen Oxides (NO\textsubscript{x}) (tons/year)</th>
<th>Filterable Particulate Matter (tons/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 6 Fuel Oil\textsuperscript{2}</td>
<td>23.6</td>
<td>0.3</td>
<td>16.5</td>
<td>3.0</td>
</tr>
<tr>
<td>No. 2 Fuel Oil\textsuperscript{3}</td>
<td>12.8</td>
<td>0.18</td>
<td>6.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>0.027</td>
<td>-</td>
<td>0.098</td>
<td>0.085</td>
</tr>
</tbody>
</table>

\textsuperscript{1} Numbers are based on the 1999-2000 No. 6 fuel oil consumption of approximately 19,000 barrels.
\textsuperscript{2} Assuming 0.5\% Sulfur No. 6 fuel oil.
\textsuperscript{3} Assuming 0.3\% Sulfur No. 2 fuel oil.
The following recommendations address both energy conservation and energy efficiency.

- Implement a gradual program to install additional water, steam, and electrical meters at strategic locations around campus. This will require funding through the annual budgeting process, but will provide Bowdoin with important data upon which it can base future decisions for its energy conservation program. Electric meters range in cost from $500 to $2,000 each, depending on the meter specifications; water meters are less expensive. Both require wiring or piping modifications during installation.

- Evaluate purchasing a hand-held ultrasonic probe with graph recorder to measure the steam use in lieu of installed meters. The cost for one meter and probe is approximately $9,000 and piping modification would be required at each building service. While Bowdoin does have some detailed information on specific building utility-use, more comprehensive data would be helpful.

- Continue to upgrade boiler, energy management system, and steam distribution system components.

- Many students complain that rooms overheat. A detailed evaluation is warranted to determine the cause of this situation. Simple and effective awareness training will help resolve this problem. It is not currently cost effective to install individual control valves in some buildings due to the extent of piping system modification that would be required. However, as older buildings are renovated, Bowdoin should consider a steam distribution system that would allow individual room control.

- The hockey rink is a significant energy user. The building is old and not well insulated. While Facilities Management keeps the building as cold as possible considering the needs of skaters and hockey fans, heating the building is not efficient. In addition, the ice making equipment uses a significant amount of electricity, especially when it is run for summer skating programs. If Bowdoin decides to construct a new ice rink, it should consider all available energy conservation measures.

- Continue to upgrade, improve, and expand the energy management system to eventually provide computerize climate control throughout campus. For those building that are not currently monitored and controlled by the energy management system, provide environmental awareness and energy conservation training to Facilities Management, Housekeeping, and building occupants concerning thermostat settings. It may be helpful for Bowdoin's administration to issue guidelines for minimum and maximum temperature settings for heating and air conditioning systems.

- Ensure domestic hot water systems are set to temperatures between 120 to 130°F where appropriate.

- Evaluate the benefits of low-flow water fixture installation for those older buildings that have outdated fixtures and continue to equip new and renovated buildings with water-efficient fixtures. There are drawbacks to some fixtures that must be evaluated by Bowdoin, including potential increased maintenance of low-flow toilets due to frequent clogging and potential complaints from residents due to lower than desired shower head flow.

- Evaluate the practicality of installing zone-heating systems at the Thalheimer farmhouse and in the Breckinridge Conference Center.
• Energy use awareness training for all students and staff should include encouragement to ensure all lights are turned off in rooms that are not being used at night and closing windows at night in the winter. Housekeeping staff and building residents and tenants should be encouraged to report to Facilities Management if they observe lights on or high temperatures in rooms or other spaces that are not being used or are used infrequently. Facilities Management should perform periodic checks to ensure its energy management system is properly programmed for current space use.

• Install occupancy sensors in common areas such as bathrooms and classrooms. The energy cost savings could pay back for the sensors within Bowdoin’s guidelines. The Rochester Institute of Technology (RIT) installed 600 sensors and reduced annual electricity use by 326,000 kilowatt-hours for annual savings of $25,000.

• Complete the on-going program to replace incandescent bulbs on campus with more energy efficient fluorescent lights and ballasts. RIT saved $27,000 a year by replacing 800 incandescent bulbs, with an average payback of three months. In addition, RIT realized annual energy cost savings of $36,000 by replacing 40-watt incandescent exits signs with 5-watt light emitting electrodes in 25 buildings, and $23,000 by replacing older T-12 fluorescent lamps and magnetic ballasts with T-8 lamps and electronic ballasts in four buildings. Awareness training should include a message to students, staff, and faculty that the energy saving by these relamping programs is necessary despite perceived aesthetic concerns associated with fluorescent light.

• Conduct a lighting survey with a lamp meter and consider delamping (eliminating lights) where existing light exceeds the guidelines below, or other guidelines Bowdoin wishes to follow. Delamping programs can be a source of complaints and Bowdoin should prepare the students, staff and faculty during energy use awareness training prior to starting a delamping program. Many schools have successfully implemented delamping programs. For example, SUNY Buffalo found that they could disconnect 50 percent of the lights in their corridors and still have adequate illumination. Recommended illumination levels for colleges are given below (based on Illuminating Engineering Society of North America Recommendations):

<table>
<thead>
<tr>
<th>Area</th>
<th>Foot-Candles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms</td>
<td>50-75</td>
</tr>
<tr>
<td>Offices</td>
<td>50-75</td>
</tr>
<tr>
<td>Libraries</td>
<td>30-75</td>
</tr>
<tr>
<td>Hallways/Stairways</td>
<td>20</td>
</tr>
<tr>
<td>Restrooms</td>
<td>20</td>
</tr>
<tr>
<td>Auditoriums</td>
<td>20</td>
</tr>
<tr>
<td>Gymnasiums</td>
<td>50-70</td>
</tr>
<tr>
<td>Kitchen Areas</td>
<td>75</td>
</tr>
<tr>
<td>Dining Areas</td>
<td>150</td>
</tr>
</tbody>
</table>
• Lighting levels can decrease by 50 percent in five years in a clean environment and in six months in a dirty environment due to lamp fouling. Clean lamps and fixtures annually in clean environments (classrooms) and every six months in dirty environments (shops) to improve their effectiveness and efficiency.

• Typically, the light output of a lamp decreases most during the last 30 percent of the manufacturers' rated life. Replacing lamps after 70 percent of the rated life will result in higher lamp efficiency. Group relamping, or replacing all lamps in a given area before they burn out, can help in achieving the maximum efficiency from the lamps. The cost of lamps is small compared to the loss in energy efficiency and productivity.

• Purchase energy efficient equipment, including computers, monitors, printers, fax machines, copiers, washers, dryers, and ovens. All computer products should meet the United States Environmental Protection Agency's "Energy Star" requirements for energy efficiency. These requirements state that computer equipment must be able to enter and recover from low power stand-by mode, defined as less that 30 watts, when not in use. Most major equipment manufacturers have equipment that meet these standards and label such equipment accordingly. Table 7 below presents potential annual savings from using "Energy Star" equipment. Also, notebook computers with liquid crystal display (LCD) screens use less than one-quarter the energy of "Energy Star" computers and cathode ray tube (CRT) monitors.

• Inform new and returning students about Bowdoin's energy conservation program, and to the extent practical, require "Energy Star" approved equipment. Urge students to only bring to campus the minimum number of electrical devices they require and to ensure those devices are energy efficient.

• Encourage all users to turn off their monitors during short breaks, and both monitors and computers during longer breaks. Educate people that turning computers off does not reduce the computer's life expectancy. Turning computers off at night can result in substantial annual savings as shown in Table 7.

**Table 7. Potential Savings "Energy Star" Standards**

<table>
<thead>
<tr>
<th>System</th>
<th>Annual Operational Cost</th>
<th>Annual Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional System (150 W) - always on</td>
<td>$105</td>
<td></td>
</tr>
<tr>
<td>Conventional System - off at night</td>
<td>$79</td>
<td>$26</td>
</tr>
<tr>
<td>Energy Star System (67 W) - always on</td>
<td>$47</td>
<td>$58</td>
</tr>
<tr>
<td>Energy Star System - off at night</td>
<td>$35</td>
<td>$70</td>
</tr>
</tbody>
</table>

Note: Adapted from Greening the Ivory Tower, by Sarah Hammond Creighton, MIT Press, 1998. Computer system includes computer, monitor and laser printer. Costs are based on $0.08 per kWh and turning computers off for eight hours at night.

• Encourage or require, when appropriate, double sided copying that conserves approximately 20 watt-hours per sheet (consumed during the paper manufacturing process) and reduces paper use and waste. Some functional areas may be able to implement a paper reuse program by saving for reuse paper that has only been used on one side. This would be appropriate for internal drafts of papers and reports. However, care must be taken in these circumstances to prevent accidental distribution of sensitive or confidential information from the side of the sheet of paper that was
previously used. Also, constructing “scratch pads” or “note pads” can reuse paper that has been used only on one side, as long as the warning cited above is heeded.

- Use ink jet printers instead of laser printers where possible. Their quality is usually comparable and a 4 page-per-minute ink jet printer uses approximately 13 watts per page whereas a laser printer uses between 60-80 watts per page. It is also easier to feed paper that has been used on one side to ink-jet printers than to laser printers.

- Evaluate the possibility of providing smaller pumps for seawater in marine lab at Thalheimer or provide variable frequency drives on the existing pumps.

- According to Bowdoin staff, hot water is used to clean the laboratory floor at Thalheimer. A cold water supply should be provided for this use.

- Continue the current practice of performing regular maintenance for electric motors to keep them operating efficiently.

3.3 WATER

Historically, water has been relatively inexpensive and there has been a seemingly endless supply. Consequently, water conservation opportunities have been ignored. Recently, Woodard & Curran was involved in a water reduction effort solely through public awareness driven by drought conditions that resulted in a 40 percent water use reduction. This is a subject area, similar to recycling, that can quickly take form through simple awareness training and communication. Voluntary participation aided by awareness can affect significant change. Financial and environmental benefits can be easily achieved. Publicity about early success, such as water use reductions, often acts as momentum for future, more difficult initiatives.

The largest use of water on campus is believed to be from personal use by students in housing. Functional areas that are believed to be large water users include Grounds Maintenance for irrigation, Dining Services for food preparation and dishwashing and the Central Heating Plant for steam generation.

All water uses have associated costs of water purchase and wastewater disposal, and the related environmental impact of the use of a natural resource. Personal water use can best be reduced through awareness training and low-flow fixtures. Grounds Maintenance reports that they perform the minimum required irrigation and use water saving methods such as soaker hoses and early morning and evening irrigation to conserve water. Some of the irrigation occurring at Bowdoin is done using a water meter so that the Brunswick Sanitary District does not count water used for irrigation as wastewater. However, this cost savings method is not always applied.

Awareness training, low-flow fixtures, and water-efficient dishwashers are ways Dining Services can reduce water use. The water consumed by the Central Heating Plant as make-up water for steam generation can be reduced by the previously outlined energy conservation methods as well as upgrades to boilers and related equipment. Water lost in the generation of steam should not be considered in the wastewater flow.

Recommendations for water conservation initiatives are listed below.
• In conjunction with water conservation awareness training, continue to gradually equip all water-using fixtures with low-flow devices. As previously mentioned, effective awareness training will be needed to prepare students, staff and faculty with the resultant loss of water volume from showers. Also, the poorer designed low-flow toilets on the market have a history of clogging problems that produce a maintenance problem as well as a potential health risk. SUNY Buffalo installed 200 non-aerated, low-flow showerheads in seven residence halls and saved $28,000 annually. Brown University retrofitted 750 showerheads with low-flow fixtures and recovered its costs in less than six months, saving $26,000 annually.

• Evaluate the water conservation rating of Dining Services’ dishwashing equipment and, if justified, replace the equipment. Otherwise, as is the practice by Bowdoin for new building and renovation projects, when the equipment is replaced, ensure it is replaced with water saving equipment.

• Along with comprehensive water conservation awareness training, the installation of strategically located water meters will assist Bowdoin in a campus-wide water reduction effort. An accurate water balance will permit both strategic and tactical improvements in Bowdoin’s water use rate.

• Bowdoin’s sewer bill is based on how much water is used by the campus. Bowdoin currently uses a portable meter for most irrigation activity allowing it to subtract out that water from the sewer bill. This practice should be done for all irrigation. This may require the purchase of additional water meters. Other water that does not need to be disposed of to the sanitary sewer should be identified, metered, and subtracted from the sewer bill.

3.4 HAZARDOUS WASTE

Bowdoin has minimized the use and storage of hazardous material on campus. For example, Bowdoin’s approach to develop and use micro-scale techniques in laboratories has reduced the amount of chemicals used and stored, and wastes generated in Drukenmiller Hall. Facilities Management has also made a conscious effort to replace hazardous chemicals with safer substitutes.

• Bowdoin should continue its efforts of minimizing the use of hazardous chemicals and generation of hazardous waste by material substitution and, when substitution is not possible, minimization.

The University of Illinois at Urbana-Champaign conducted a study to find safer substitutes for commonly used lab chemicals. Table 8 presents some of the substitutes recommended by the study. It should be noted that some of these substitutions may not work as well, and some substitutes, though less dangerous are still unsafe.
TABLE 8. SUBSTITUTES FOR COMMON LABORATORY CHEMICALS

<table>
<thead>
<tr>
<th>Hazardous Chemical</th>
<th>Substitute</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetamide</td>
<td>Stearic Acid</td>
<td>Freezing point depression</td>
</tr>
<tr>
<td>Benzene</td>
<td>Xylene or Hexane</td>
<td>Many solvent uses</td>
</tr>
<tr>
<td>Benzoyl Peroxide</td>
<td>Lauryl Peroxide</td>
<td>Some polymer catalysts</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>Cyclohexane</td>
<td>Qualitative test for halides</td>
</tr>
<tr>
<td>Formaldehyde (Formalin)</td>
<td>Ethanol</td>
<td>Specimen storage</td>
</tr>
<tr>
<td>Halogenated Solvents</td>
<td>Non-halogenated Solvents</td>
<td>Some extractions and other solvent uses</td>
</tr>
<tr>
<td>Sodium Dichromate</td>
<td>Sodium Hypochloride</td>
<td>Some oxidation reactions</td>
</tr>
<tr>
<td>Toluene-based Scintillation Cocktail</td>
<td>Non-ignitable Scintillation Cocktail</td>
<td>Studies using radioactive materials</td>
</tr>
</tbody>
</table>


The laboratories in Druckenmiller and the Health Center use mercury thermometers and manometers. Breakage of mercury-containing equipment results in the need to appropriately handle, manage, and dispose of hazardous waste. The materials used to wipe up mercury spills, along with any other absorbent materials that liquid mercury touches, also become hazardous.

- Bowdoin should consider using alcohol thermometers, thermocouples, and other substitutes to mercury-containing equipment.

3.5 TRANSPORTATION/PARKING

Bowdoin has a pedestrian and bike friendly campus with several auto-free zones. Parking on campus is scarce, with 1,400 to 1,500 parking passes issued last year for 1,100 to 1,200 spaces. Prospective parkers spend time and burn fuel circling the campus in search of a parking spot. Attempts have been made in the past to organize vanpools with little success. Security is responsible for campus parking issues and is currently evaluating measures to relieve the parking pressures.

Woodard & Curran surveyed several Bowdoin staff and faculty members and students to determine their commuting habits and the distance they commuted. The results of the survey are presented in Table 9. Based on the survey results, Woodard & Curran estimated that Bowdoin's 650 faculty and staff members commute approximately 72,800 miles per week and students drive only a fraction of those miles. Bowdoin also operates 49 of its own vehicles that were driven approximately 312,700 miles in 1999.

TABLE 9. TRANSPORTATION SURVEY RESULTS

<table>
<thead>
<tr>
<th>Employees</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Interviewed</td>
<td>28</td>
</tr>
<tr>
<td>5-Day per Week Commuters</td>
<td>25</td>
</tr>
<tr>
<td>Number That Carpool</td>
<td>0</td>
</tr>
<tr>
<td>Commuter Miles(^1)</td>
<td>72,800 miles/week</td>
</tr>
</tbody>
</table>

\(^1\) continued on next page
TABLE 9. TRANSPORTATION SURVEY RESULTS (CONTINUED)

<table>
<thead>
<tr>
<th>Students</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Interviewed</td>
<td>33</td>
</tr>
<tr>
<td>Car Owners</td>
<td>20</td>
</tr>
<tr>
<td>Commuter Miles¹</td>
<td>3,000 miles/week</td>
</tr>
</tbody>
</table>

¹An extrapolation of the average number of miles driven by those interviewed to the total number of employees and students.

Each staff, faculty, student and Bowdoin vehicle emits pollutants to the atmosphere. Table 10 provides an approximation of the amount of pollutants emitted per year from these vehicles, based on 1990 United States Environmental Protection Agency emission standards for vehicles.

TABLE 10. ESTIMATED VEHICLE AND CENTRAL HEATING PLANT EMISSIONS (TONS/YEAR)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Student Vehicles</th>
<th>Staff/Faculty Vehicles</th>
<th>Bowdoin Vehicles</th>
<th>Total Vehicles</th>
<th>Central Heating Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-methane Hydrocarbons</td>
<td>0.04</td>
<td>1.04</td>
<td>0.09</td>
<td>1.17</td>
<td>NA</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>0.58</td>
<td>14.18</td>
<td>1.17</td>
<td>15.93</td>
<td>NA</td>
</tr>
<tr>
<td>Nitrogen oxides</td>
<td>0.07</td>
<td>1.67</td>
<td>0.14</td>
<td>1.87</td>
<td>16.5</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>23.6</td>
</tr>
<tr>
<td>Sulfur trioxide</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.3</td>
</tr>
<tr>
<td>Particulate matter</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>3</td>
</tr>
</tbody>
</table>

NA = Not Available

Students, staff and faculty traveling to off-campus locations and Bowdoin-sponsored events are reported to typically drive in separate cars, even when groups are leaving from the Bowdoin campus. Bowdoin does operate several vans for such purposes but are normally busy and used heavily by student organizations and athletics. Environmental awareness training should include this subject, however it is difficult to break the bond of driver and car.

Another source of airborne emissions from Bowdoin's activities is small machinery such as garden tractors, leaf blowers, and lawn mowers used by Facilities Management that operate on diesel fuel or gasoline. While it is typically the belief that electric (alternating current or direct current) equipment of this type delivers inferior service, Bowdoin should consider beginning to incorporate plug-in or rechargeable battery-powered small equipment.

To minimize the environmental impact of airborne emission from internal combustion engines operating on diesel fuel or gasoline from Bowdoin-operated vehicles, Bowdoin should consider implementing an alternative fuel vehicles program. Three common alternative fuels for service vehicles include compressed natural gas (CNG), liquefied natural gas (LNG), and rechargeable batteries. CNG and LNG reduce carbon monoxide emissions 65-90 percent and particulates are nearly eliminated compared to gasoline-powered vehicles. The ozone reactivity of CNG and LNG is 80-90 percent better than gasoline emissions. There are no emissions from electric vehicles.
CNG vehicles are gaining popularity for use as light-duty vehicles and pickup trucks, medium duty trucks, and in transit and school buses. CNG’s main drawback is the range of 120-180 miles for the average vehicle with three cylinders. However, newer designs are expected to provide a range of 300 miles or more. The cost to equip a light-duty vehicle to run on compressed natural gas can range from $2,000-$6,000 per vehicle. Other drawbacks of alternative fuel vehicles concern the availability of CNG/LNG filling stations, the power generation of the engines (snow plowing capability may not be available), and the range of the vehicles.

In addition to evaluating alternative fuels for Bowdoin vehicles and small machinery, Bowdoin should consider the following recommendations.

- Replace selected aging pickup trucks that are used only on campus with electric carts manufactured by traditional golf cart companies especially for light-duty maintenance service, while maintaining an adequate fleet of full size trucks.

- Investigate whether Bowdoin sponsorship of vanpools from destinations with adequate ridership would result in success. Relief from a portion of the campus parking situation and reduced airborne emissions would be benefits if vanpools were sustained.

- Off-campus parking for Bowdoin staff that use Bowdoin vehicles during the day would make additional parking spaces available. Similarly, additional off-campus parking lots along major commuter routes and remote from the campus with shuttle service would reduce campus traffic congestion and commuter miles.

- Many colleges and universities do not issue parking permits to first-year students. Bowdoin should weigh the benefits of this practice.

- Bowdoin should evaluate use of its vans by organizations and athletics to determine if the purchase of additional vehicles would reduce vehicle miles from individuals driving alone to Bowdoin-sponsored events.

3.6 CONSTRUCTION

New building and building renovation projects at Bowdoin follow, at a minimum, the United States Department of Energy’s standards for energy efficiency. Bowdoin normally assesses the reuse potential for any material from demolition and renovation projects prior to disposal. In addition, building committees are diligent in requiring project architects and engineers to minimize future energy consumption by utilizing high efficiency electric motors and minimum and high efficiency lighting. One example of this practice is that building committees are minimizing large and small space air conditioning. Ventilation is considered and applied in lieu of large space air conditioning when appropriate and small spaces such as individual office space are not being furnished with air conditioning units. These energy conservation efforts are often negated once new building space is occupied, and the occupants request and receive additional electric devices for their comfort.

The next level of environmental sustainability practices building committees can implement is consideration of Design For Environment (DFE) and Life Cycle Assessment (LCA) principles. Building committees should include a person with knowledge of these principles and contracts with architects and engineers should include a clause that these principles will be applied to future designs. Design fees would only be slightly impacted, but should be financially recovered from improved energy efficiency
and reduced environmental impact. DFE and LCA principles involve consideration of the environmental impact of all proposed building materials, products, equipment, and furnishings regarding:

- Raw material acquisition;
- Manufacturing;
- Transportation to the building site;
- Installation;
- Operation during their useful life; and
- Ultimate disposal.

According to conversations with Bowdoin personnel, building committees responsible for planning projects have historically not considered environmental sustainability as a high priority, although sound environmental decisions are made during design and construction as previously discussed. Decisions are weighed most heavily on program (or function), aesthetics, and appearance rather than on the environment. More heavily weighing environmental sustainability into the planning of new projects is an essential step in building Bowdoin’s environmental program.

The following recommendations are made for Bowdoin’s consideration concerning the environmental impact of new construction or remodeling.

- Building committees should have at least one representative familiar with DFE and LCA principles and who represents Bowdoin’s environmental sustainability program.
- Require engineers/architects to perform, to an appropriate degree, Life Cycle Assessment (LCA) and Design for the Environment (DFE) analyses on electrical and mechanical systems and all building materials.
- Require engineers/architects to propose material, product and equipment options, weighing environmental impact and using DFE and LCA principles.

3.7 LANDSCAPING

Landscaping at Bowdoin has been designed to ensure the campus is not excessively landscaped. A large percentage of the landscaping is comprised of native plants and trees that require minimal attention. The landscaping program being implemented by Grounds Maintenance staff has been design to be environmentally conscious and is minimizing environmental impact. For example, pesticides are used only when problems are identified, except for athletic fields. Preventative pesticide application on athletic field is justified due to the cost that would be incurred to replant these large areas. Other environmentally sound practices used by Grounds Maintenance include:

- Irrigating mostly in the morning hours to reduce water loss to evaporation;
- Using soaker hoses for shrub and tree watering to minimize water use; and
- Exchanging grass clippings and leaves for mulch with a contractor.

The following recommendations are made for Bowdoin to consider for improving the environmental performance of the Grounds Maintenance activity.

- Implement a “wood program” for wood waste too small for the brush-for-mulch exchange to ensure beneficial reuse of this waste. This can include wood waste from tree trimming and
removal, wood from packing, and wooden pallets. An employee at a manufacturing plant in Muncie, IN makes furniture from oak pallets that the facility previously sent to the local landfill.

- Continue to select landscaping shrubs, trees and plants that are most native and natural and require the least amount of water, fertilizer, and pesticides/herbicides.

- Maximize the use of portable water meters so that water not directed to the sanitary sewer is not included on Bowdoin’s sewer bill.

- Urea is being used in small amounts for ice melting on campus. Bowdoin should find a substitute for urea and discontinue its use due to its nutrient-loading characteristic on water bodies as stormwater carries it away.

- At the time of Woodard & Curran’s environmental compliance audit, Bowdoin was found substantially in compliance with applicable environmental regulation concerning chemical use. Still, Bowdoin should periodically review chemical purchase practices and use to ensure the minimum required amount of chemical are being stored, chemicals with the least environmental impact are being used, and chemicals in use are used properly and in minimum amounts.

3.8 Purchasing

The purchasing function is typically overlooked and undervalued in pollution prevention programs. Purchasing is the front line for pollution prevention. For example, if waste packing does not come off campus, it does not need to be recycled or disposed of. Purchasing’s influence is not limited to packing waste; they can be effective in identifying product substitutions and ensuring materials that have a shelf life do not expire in stock. Purchasing can also influence the use of products made from recycled materials. For example, identifying, buying and using textbooks made from post-consumer recycled fiber would reduce the impact on the environment by reducing the amount of new paper that has to be manufactured.

Purchasing is decentralized at Bowdoin allowing individual departments to purchase their own supplies. Therefore, Bowdoin’s success in identifying environmentally sustainable product substitutes, as well as better pricing, is dependant upon each department's efforts. Bowdoin should consider, as a starting point, requiring centralized purchasing of all hazardous and non-hazardous chemicals to ensure they are being properly managed and disposed.

Recommendations

- All Bowdoin staff who purchase materials for their departments should receive environmental awareness training, including information concerning how their purchases affect Bowdoin’s environmental performance.

- Bowdoin should evaluate a centralized purchasing system, looking at chemical purchases first.

- Train staff who purchase goods to work with suppliers and vendors to minimize waste resulting from purchased goods.

- Bowdoin should consider coordinating purchase of appropriate supplies with other similar institutions (Bates and Colby) to take advantage of their work to identify environmentally sustainable product substitutes and to receive lower, bulk rate prices.

- Boise Cascade Office Supplies (BCOS) is Bowdoin’s preferred vendor for office supplies and will use returnable packing rather than cardboard boxes. However, it was reported that only 35
percent of Bowdoin's office supplies come from BCOS. The majority of office supplies are purchase from Staples and a small amount form a local supply store. Staff interviewed reported that BCOS's service does not meet their needs. The number of individual trips made by Bowdoin staff to Staples and the other local supply store creates vehicle air emissions and consumes staff time. Bowdoin should meet with BCOS to resolve the problems that exists or pursue a permanent relationship with Staples.

**TABLE 11. PURCHASING ACTIONS TO REDUCE ENVIRONMENTAL IMPACT**

<table>
<thead>
<tr>
<th>Area</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste reduction and</td>
<td>Require returnable packaging.</td>
</tr>
<tr>
<td>recycling</td>
<td>Work with vendors to reduce packing waste.</td>
</tr>
<tr>
<td></td>
<td>Require all packing to be made of recyclable materials.</td>
</tr>
<tr>
<td></td>
<td>Ship packing materials back to vendor.</td>
</tr>
<tr>
<td>Recycled products</td>
<td>Buy paper products made with high post-consumer content.</td>
</tr>
<tr>
<td></td>
<td>Buy plastic products made from recycled plastic.</td>
</tr>
<tr>
<td>Local products</td>
<td>Reduce the impact of transportation of goods to campus by supporting</td>
</tr>
<tr>
<td></td>
<td>local manufacturers and suppliers.</td>
</tr>
</tbody>
</table>

4. RECOMMENDED APPROACH

In Section 3 of this report, Woodard & Curran presents numerous opportunities for minimizing ecological and environmental impact and reducing associated operating costs associated with Bowdoin’s operations and activities. This section presents recommendations selected by Woodard & Curran that, if implemented by Bowdoin, could have the most beneficial impact on the environment. These recommendations are listed below (in no particular order):

1. Increase the environmental awareness of Bowdoin students, staff, and faculty through effective and continuous training and communication.

2. Facilitate additional vanpooling, carpooling, and ridesharing.

3. Prioritize future remodeling plans at least partially based on the energy inefficiency of the older building on campus.

4. Centralize purchasing, starting with chemicals.

5. Increase lighting delamping, relamping, and fixture maintenance and cleaning efforts.

6. Encourage, and require where possible, use of e-mail and other electronic media to reduce paper use on campus.

7. Train staff who purchase goods to work with vendors to reduce the environmental impact of goods brought onto campus.

8. Convert the Central Heating Plant boilers to burn natural gas or No. 2 fuel oil.

9. Use a combination of awareness training and improved recycling infrastructure to increase the percentage of Bowdoin’s solid waste that is recycled.

10. Ensure that Bowdoin buys and students bring to campus only the most energy efficient computers, printers, copiers, faxes and other equipment.

11. Buy environmentally sustainable products such as chlorine free paper and products made from recycled paper and plastic.

12. Expand the extent of the current energy management system.

13. Continue expanding the extent of the use of low-flow plumbing fixtures.

14. Develop a policy for assessing environmental impact and using alternative materials in construction projects.

15. Establish a process to ensure beneficial reuse of dining service food and other organic waste.

16. Enact an alternative fuel use program for Bowdoin vehicles.
Woodard & Curran presents a qualitative evaluation the above recommendations in Table 12 considering the following criteria:

- Reduction of ecological impact;
- Reduction of environmental impact;
- Reduction of waste;
- Reduction of operational cost;
- Cost of implementation;
- Ease of implementation; and
- Likelihood of success.

Each evaluation criterion was weighed according to its relative importance based on discussions between Bowdoin and Woodard & Curran. Each recommendation was scored for each of the criterion and the overall weighted score was used for ranking the recommendations.

4.1 THE NEXT STEP

The purpose of this audit was to establish a baseline of the ecological and environmental impact of Bowdoin’s activities. Based on audit findings and research following the audit, Woodard & Curran has made numerous recommendations to Bowdoin in this report. Woodard & Curran’s comparative evaluation of the key recommendations is presented in Table 12. The next step for Bowdoin is to select opportunities listed in Table 12 that it believes will provide sustainability benefits and develop a plan of action for implementation. Some of the opportunities, like providing recycling containers, are very straightforward; others such as converting the Central Heating Plant to an alternative fuel will require detailed cost and alternatives analysis.

Bowdoin should consider implementing a formal environmental management system (EMS) to ensure its environmental goals and objectives are efficiently achieved. Whether to implement an EMS that conforms to the international standard ISO 14001 is one of the first decisions Bowdoin should make. ISO 14001 is a voluntary standard and Bowdoin is subject to no legal or regulatory requirement to conform to it. However, ISO 14001 does provide a useful and flexible process that Bowdoin could use to develop its EMS. Certifying to the ISO 14001 standard would provide Bowdoin external recognition and a certain degree of prestige that may be beneficial in student and faculty recruiting, and perhaps an advantage over other institutions in securing grants and funding for environmentally-related projects.

This report contains recommendations and a qualitative evaluation of the more significant recommendations to reduce the environmental impact of Bowdoin’s activities. Numerous initiatives including major energy conservation programs in the 1970s and 1980s and student-led projects aimed at conserving energy and increasing recycling have been implemented in the past with varying degrees of success. These initiatives have produced benefits to Bowdoin and some projects have been less than successful because of the lack of institutional support and insufficient resources. Bowdoin will likely continue to achieve less than optimal progress reducing its environmental impact without a formal process to further evaluate and enact improvements based on the recommendations in this report.
### Table 12. Qualitative Evaluation of Identified Opportunities

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Criteria</th>
<th>Weight</th>
<th>Ecological Impact</th>
<th>Environmental Impact</th>
<th>Waste Reduction</th>
<th>Financial Benefit</th>
<th>Cost to Implement</th>
<th>Ease to Implement</th>
<th>Chance of Success</th>
<th>Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpooling/vanpooling</td>
<td></td>
<td>30</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>5</td>
<td>5</td>
<td>255</td>
<td>1</td>
</tr>
<tr>
<td>Awareness training</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>225</td>
<td>1</td>
</tr>
<tr>
<td>Upgrade oldest buildings</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>195</td>
<td>3</td>
</tr>
<tr>
<td>Centralize purchasing</td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>185</td>
<td>4</td>
</tr>
<tr>
<td>Delamping, relamping</td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>180</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Use e-mail</td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>180</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Environmental purchasing training</td>
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<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>180</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Switch to No. 2 fuel oil</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
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<td>0</td>
<td>1</td>
<td>180</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Make recycling convenient</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>175</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Buy energy efficient equipment</td>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>170</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Buy sustainable products</td>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>170</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Expand energy management system</td>
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<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>155</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Install low-flow plumbing fixtures</td>
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<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>145</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Use DFE/LCA for building projects</td>
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<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
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<td>2</td>
<td>2</td>
<td>135</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Composting</td>
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<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>130</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Alternative fuel vehicles</td>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>95</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>Adverse</th>
<th>Increase</th>
<th>Major</th>
<th>Major</th>
<th>Major</th>
<th>Major</th>
<th>Major</th>
<th>No Cost</th>
<th>Easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
<td>$1-10,000</td>
<td>Hard</td>
</tr>
<tr>
<td>2</td>
<td>Beneficial</td>
<td>Beneficial</td>
<td>Reduction</td>
<td>Beneficial</td>
<td>$&lt;1,000</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
<td>No Cost</td>
<td>Easy</td>
</tr>
</tbody>
</table>

Woodard & Curran
O:205151.01\Bowdoin Environmental Impact Audit Final Draft Report 31 12/5/00
It is critical to the implementation of a successful impact reduction program that a competent manager be assigned and given an appropriate level of authority to execute the program. One way Bowdoin can do this is by filling the full-time Environmental Coordinator position which is included in the 2000-2001 budget. In order to demonstrate to the entire Bowdoin community that the administration is committed to the program, the Environmental Coordinator should be given:

- A position at a high level in the administration;
- Adequate resources to execute the program; and
- Delegated authority from President Edwards.

Once a person is assigned to carry out the environmental impact reduction program, the following steps should be taken in the order presented to ensure Bowdoin is proceeding in the most cost-effective and efficient manner.

1. **Establish Environmental Objectives and Targets.** Objectives are similar to goals, and can be broad and qualitative. Each Objective must have one or more Targets that are specific and can be numerically set and measured. Objectives and Targets should be developed and agreed upon by a representative of all stakeholder groups (students, staff, faculty, administration). Agreed upon Objectives and Targets provide goals to be achieved and a measurement feature, without which programs can become unfocussed.

2. **Develop an Environmental Policy.** This simple step is important and should not be underestimated. The Policy should also be developed by all stakeholders and should be signed by President Edwards. An effective Policy can be very brief and succinct. Should Bowdoin decide to ultimately seek ISO 14001 certification, there are a few, simple requirements that concern the establishment of Objectives and Targets and an Environmental Policy.

3. **Prioritize Initiatives.** Upon establishment of Objectives and Targets and an Environmental Policy, the recommendations for opportunities to reduce environmental impact at Bowdoin contained in this report can be prioritized for implementation. Without the formalization of Objectives and Targets, it would be difficult to select from the long list of recommendations included in this report because the desired result of the program is not clearly defined.

4. **Implementation, Measurement, and Communication.** Before, during, and after implementation, measurements must be taken to assess progress and effectiveness. Communication of results for implementation of any program is required by the administration so that they may continue to make informed decisions. Also, communication of positive results to those responsible for the day-to-day control of environmental impact at Bowdoin, the entire Bowdoin population, serves as momentum to continue progress and as catalyst for new ideas.

5. **Periodic Program Review and Improvement.** The program must be reviewed periodically for its effectiveness in achieving the stated Objectives. Opportunities to improve the program will come from these reviews.
APPENDIX A. RECOMMENDATIONS BY FUNCTIONAL AREA
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12/4/00
1. UTILITIES

Interviewed: Richard Parkhurst, Assistant Director for Properties and Budget Administration; Don Brown, Plumbing.

Ongoing Efforts

- Bowdoin is reducing energy use in new building construction and modifications. New buildings are heated by hot water and have zone heating. The new dormitories have energy efficient water heaters. New buildings are using fluorescent fixtures, and motion-sensored lights are used wherever practical.
- Old lighting has been phased out from most areas of campus. New buildings are equipped with new fluorescent fixtures, and motion-sensored lights are used wherever practical.
- New water-saving showerheads, automated toilets, and motion-sensored faucets are used in newly constructed and newly renovated buildings on campus.
- The energy management system is being continually upgraded, as is the steam generation and distribution system.

Opportunities to Improve Environmental Performance

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Lead the effort to include energy conservation aspects in environmental awareness training.
- Convert the boilers in the Central Heating Plant to burn No. 2 fuel oil and/or natural gas.
- Continue the program of upgrading the energy efficiency of the oldest buildings.
- Upgrade building steam distribution system as building renovations occur.
- Continue annual upgrades of the steam distribution system components.
- Continue upgrades to the energy management system and increase surveillance and management of building temperature and hot water temperature.
- Continue installing occupancy sensors where practical.
- Install low-flow water fixtures wherever practical.
- Develop a strategy to counter the practice of students opening windows in dormitory rooms during the winter.
- Implement a program of measuring all utilities at strategic locations around campus, including purchase of a steam probe and other utility meters, in order to provide sufficient information on water, electricity, and steam use to form the basis of future utility use reduction efforts.
• Ensure all water that is not discharged to the sanitary sewer is excluded from the Brunswick Sewer District’s wastewater bill to Bowdoin by identifying the sources of non-sanitary discharges and utilizing portable (or installed) water meters.

• Incorporate best available technology heating systems, water and energy conservation devices, and energy efficient building materials on all new building and building renovation projects.

• Once metering device are in place, evaluate a program to charge departments based on actual energy use rather than current accounting method to encourage conservation.

• Continue relamping and delamping efforts.

• Consider program to relamp at 70 percent bulb life.

• Continue replacing less efficient forms of lighting and implement lamp and fixture cleaning program.

• Work with other departments to promote use of high efficiency electrical equipment such as “Energy Star” approved computer equipment.
2. HEATING PLANT

Interviewed: John Hersey, Heating Plant Manager.

On-going Efforts

- Steam generation for building heat is initiated as late in the heating season as possible.
- Upgrades to the boiler and ancillary features are performed on a continuous basis as funding allows.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Provide recycling containers for the Central Heating Plant.
- Convert the boilers in the Central Heating Plant to burn No. 2 fuel oil and/or natural gas.
- Accurately track water use/loss from steam production to subtract from the Brunswick Sanitary District wastewater bill.
- Begin the process of strategically locating steam meters outside each building to facilitate future energy conservation decisions.
- Once utility meters are installed at each building, consider tracking and charging to departments, where feasible, for actual utility use.
- Continue boiler and energy management system upgrades.
- Continue replacing motors and other energy-using device with higher efficiency products.
- Continue upgrading steam distribution systems during renovation projects, especially in older buildings.
3. SOLID WASTE/RECYCLING

Interviewed: TNR, Tim Carr, Grounds Coordinator.

On-going Efforts

- Housekeeping collects trash and recyclables (tin cans, cardboard, plastic and paper) in buildings and puts it in dumpsters outside the buildings. TNR only picks up trash in dumpsters. Facilities personnel collect recyclables and trash from individual dormitories and take them to the silver bullet and the landfill, respectively.

- TNR is the only company in Maine that collects pre-consumer vegetables and takes them to a pig farmer. TNR picks food waste in dumpsters behind Wentworth Hall once a week. Approximately 5 to 5 ½ tons of food waste is taken to the pig farm per year. (According to Wentworth, this is not being done any more.)

- Bowdoin has several corrugated cardboard dumpsters on campus. A new cardboard compacter will be located behind Wentworth Hall this fall. Cardboard is taken to Carter Recycling facility in West Bath.

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- Ensure all students, staff, and faculty receive environmental awareness training.

- Ensure training focuses on reducing and reusing resources before recycling them as waste.

- Promote use of electronic media in lieu of paper use.

- Promote sharing of reading materials such as newspapers (including the Bowdoin Orient) and class work.

- Increase cost to students and organization for printing and copying to eliminate indiscriminant use of paper and to encourage alternative non-paper based communication.

- Work with Admissions to see if paper use can be reduced and if recycled paper use can be increased.

- The end-of-the-year move-out activity should be assessed to provide reuse and recycling in addition to the roll-off dumpsters are now provided.

- The wooden recycling receptacles located at several buildings should be better labeled. Additional receptacles located at other building would increase recycling.

- Request, receive and evaluate a proposal from TNR (and other waste management firm, if appropriate) to increase contracted services.

- Evaluate TNR’s billing method to ensure best price and accurate solid waste disposal and recycling measurements.

- Clarify which solid waste items can currently be recycled.

- Re-label the existing recycling four-bin set to improve the ease of recycling.
• Relocate existing recycling containers to optimal locations, and add containers at strategic locations.
• Ensure all offices and classrooms have a high-grade office paper recycling container.
• Evaluate, or pilot test, placing high-grade paper recycling containers in dormitory rooms.
• Implement a strategy to ensure all high-grade paper containers are routinely collected.
• Develop a method to measure amount of recycled material collected at the “Silver Bullet” and quantity of returnable bottles and cans and account for them when calculating the rate of solid waste recycling.
• Provide a once-a-semester recycling service for faculty and staff for bulky items, such as catalogues, scrap wood, and big drawing pads.
• Develop a program to allow the Brunswick community to reuse furniture, books, beddings and other materials that would otherwise be discarded.
• Develop a recycling rate (and include in contracts) for building contractors for new building and renovation projects.
• Evaluate the benefits of one or more cardboard compactors.
• Find an outlet for glass that is currently not part of the recycling program.
• Evaluate intra-Bowdoin use of paper, such as the monthly financial statement that requires 7 reams of paper, to identify opportunities for savings.
4. HAZARDOUS WASTE

Interviewed: Sue Daignault, Director of Environmental Health & Safety.

Ongoing Efforts

- Use of micro-scale chemicals in labs has greatly reduced hazardous waste use, storage, and generation.
- Staff are formally managing the procurement, storage, and use or hazardous materials and the disposal of hazardous waste at Bowdoin.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Continue efforts to minimize the use of hazardous chemicals and generation of hazardous waste by material substitution and, when substitution is not possible, minimization.
- Continue development of the micro-scale laboratory techniques.
- Consider mandated centralized purchasing of all chemicals.
5. TRANSPORTATION

Interviewed: Bruce Boucher, Director of Security; and Ray Dall, Lead Mechanic, motor pool.

Ongoing Efforts
- Bowdoin has a pedestrian and bike friendly campus with several auto-free zones.
- Security provides a shuttle escort service around campus.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Consider Bowdoin support for carpools/vanpools.
- Evaluate the need for additional vans to reduce the vehicle miles driven to Bowdoin-sponsored events.
- Consider special parking spots for commuters that carpool or vanpool.
- Evaluate if shuttle service (or other mass-transit method) are justified for Bowdoin’s off-campus and Brunswick area staff and faculty.
- Reduce vehicle miles driven by staff traveling to Staples and other supply stores by improving BCOS service or changing to another office supply vendor.
- Begin an alternative fuel vehicle program, starting with considering CNG light duty pick-up trucks and maintenance carts.
- Provide off-site parking for Bowdoin staff who use Bowdoin vehicles during the day.
- Develop additional remote parking with shuttle service.
- Make more vans available for off-campus events.
- Evaluate the benefits of not issuing parking passes to first-year students.
6. GROUNDS MAINTENANCE

Interviewed: Tim Carr, Grounds Coordinator.

On-going Efforts

- Grounds Maintenance picks up recyclables (cardboard, office paper, newsprint, magazines, cans) from all buildings.
- Metals recycling through Grimmels in Topsham produces $400 to $500 per year.
- Glass clippings, leaves, and other organic material are traded with a contractor for mulch used on campus.
- Sand sweepings from winter road maintenance are given away as fill.
- The original landscape was designed so that the property is not extensively landscaped and most of it is in its natural state.
- Pesticide is used on as-needed basis.
- Irrigation is done in the early morning and evening hours, soaker hoses are used for trees.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Continue to reduce the need for pesticide, fertilizer, and water by using natural and native landscaping.
- Transition to wet application of chemicals when appropriate to eliminate waste associated with dry chemicals.
- Evaluate methods, such as installed irrigation, to reduce water use in athletic field watering.
- Increase portable water meter use for irrigation and other water uses that are not directed to the sanitary sewer to reduce the Brunswick Sanitary District bill.
- Evaluate alternative fuels for small engines.
- Direct money earned from this program into additional investments.
- Discontinue the use of urea.
- Stockpile sand sweepings and reuse for sanding.
- Buy a chipper for brush and use for landscaping.
- Develop a wood give-away program.
- Periodically review chemical use to ensure minimum required is being used and evaluate less toxic substitutes.
7. WAREHOUSE

Interviewed: Bill Carr – Warehouse.

Ongoing Efforts

- Keep a minimum quantity of supplies on hand.
- Take in furniture and other materials, and try to reuse and have yards sales prior to disposal options.
- Recycle Styrofoam® packing peanuts, paper, and cardboard.
- Work with suppliers to send wooden pallets back.
- Work with vendors on relamping and delamping opportunities and have implemented some projects.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Work with suppliers to reduce packaging and eliminate Styrofoam®.
- Increase bulk buying.
- Work with vendors to minimize packaging and to use returnable packaging.
- Continue relamping and delamping efforts.
- Install a 4-bin set for recycling, and evaluate the benefits of a cardboard compactor.
8. CONSTRUCTION

Interviewed: Dave D’Angelo, Assistant Director for Planning and Construction.

Ongoing Efforts

- Reuse and recycle as much as possible during renovations.
- Incorporate energy efficiency into the design of all new construction and renovations.
- Use florescent lights when appropriate.
- Use motion sensors for lighting.
- Most new water systems have low-flow fixtures.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Include environmental representation on building committees.
- Committees responsible for making decisions on new or renovated building architecture, furniture, design, and materials should consider Design for the Environment (DFE) / Life Cycle Assessment (LCA) principles.
- Require engineers/architects to perform LCA and DFE analyses on electrical and mechanical systems and all building materials.
- Require engineers/architects to do research on environmentally friendly material substitutes.
- Develop and implement specific policies regarding disposal of construction and demolition waste.
9. COMPUTER AND INFORMATION SYSTEMS

Interviewed: Peter Russell.

Ongoing Efforts

- Attempt to reuse old equipment or recycle.
- Increasing number of two-sided printers.
- Manages rechargeable two-way radios and provides NiCd battery recycling.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Lead the effort to provide equipment use energy conservation training.
- Determine best way to ensure all toner is used before replacing the cartridges.
- Standardize on energy efficient hardware.
- Continue to research returnable toner cartridge issue.
- Evaluate which equipment delivers the most service per waste generated (i.e. most number of copies per toner cartridge).
- Use only “Energy Star” certified equipment.
- Ensure all equipment comes with “sleep” mode.
- Affix “Turn Off When Not In Use” stickers on equipment.
- Maximize use of printers with double-sided capability.
- Centralize toner purchase.
- Develop a policy for rechargeable battery use.
- Work with suppliers to develop returnable packaging and reduce packing waste.
- Develop system procedure and policy to curtail the indiscriminant use of “free” network printers.
- Reduce number of individual printers by networking, especially in dormitories.
10. BOOKSTORE

Interviewed: Mark Schmitz, Director of Bookstore and Campus Services.

On-going Efforts
- Reusing cardboard boxes and packing.
- Rarely dispose of textbooks, have found users.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Work with vendors to reduce or eliminate packing waste.
- Lead the training effort of reducing paper use by transitioning to electronic media and by changing personal printing and copying habits.
- Evaluate requiring all office supply purchases, including paper, to be performed by the Bookstore or some other central authority.
- Weigh the environmental benefits of chlorine free paper against its higher price. Evaluate Bowdoin subsidies to encourage departments to use it.
- Seek opportunities to collaborate with similar institutions (Bates and Colby) for better prices on environmentally friendly products.
- Add chlorine free paper to the Bookstore order form.
- Discontinue use of non-recyclable Tyvek envelopes used for shipping.
11. MAIL ROOM

Interviewed: Mark Schmitz, Director of Bookstore and Campus Services.

On-going Efforts

- Have worked with some vendors not to send individual catalogues, but to provide a few to be placed on circulation shelf near the mailroom.
- There is a policy against staff and faculty receiving personal mail on campus.
- Reuse Styrofoam® peanuts to students.
- Re-use manila envelops for inter-office correspondence.
- Are sending vendors and suppliers who mail catalogues revised mailing lists.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Continue efforts to reduce junk mail by enforcing policy against personal mail being sent to campus, working with vendors to eliminate or at least minimize catalogues, and enacting a program to request some sources of junk mail be stopped.
- Provide several areas around campus for catalogue sharing, possibly in conjunction with the library.
- Work with students and departments to minimize mail box stuffing by encouraging non-paper based communication and by increasing fees for printing and copying.
- Update and keep current campus mailing list and provide to both internal and external users.
- Discourage indiscriminate mailings in campus mail by charging senders for distribution.
- Ensure undeliverable mail is recycled.
- Minimize the use of mailing labels that may make paper non-recyclable.
- Minimize the use of colored paper.
12. COPY CENTER

Interviewed: Mark Schmitz, Director of Bookstore and Campus Services.

On-going Efforts

- Buy new copiers and printers that have two-sided capability.
- A Printer Committee is starting to log print copies to track printer use.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Lead the effort to provide paper use reduction training through eliminating unnecessary use and minimization strategies such as electronic communication, two-sided paper use, and paper reuse.
- While conducting evaluations into which equipment delivers the best value in terms of parameters such as number of copies per toner cartridge, factor in other environmental issues such as power consumption, turn-down and turn-off modes and work with vendors and Bowdoin departments to provide the most environmentally friendly equipment.
- Investigate toner-recycling options and look for equipment that effectively uses recycled toner cartridges.
- Maximize and promote the use of chlorine free paper.
- Minimize the use of colored paper.
- Increase the price of coping and printing.
13. LIBRARY

Interviewed: Mary Macul, Technical Services; Guy, Interlibrary Loan; Ted Coulombe, Circulation; Diane Hurd, Facilities.

Ongoing Efforts

- Each library staff member has a recycling receptacle.
- Books are shipped wrapped in newspaper, which is recycled.
- Back issues of newspapers are also recycled.
- Interlibrary loan (ILL) reuses all packing materials except bubble wrap padded envelopes.
- Other departments in the library send packing materials to ILL for reuse (Styrofoam® peanuts, cellophane, soft corrugated cardboard).
- Cardboard is broken down and placed in dumpster, which is picked up by facilities once a week.
- All outdated government documents are recycled.
- Old journals are sent to the United States Book Exchange.
- Paperbacks are recycled as mixed office paper.
- Audiotapes are given to students when lower than acceptable library quality and reused.
- CDs are recycled.
- Toner cartridges in HP laser printers are sent out for refilling.
- Most lights in the library have timers.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Remove trash bins from study carrels and locate regular trash containers strategically near recycling bins.
- Develop a system that ensures hard cover books are recycled rather than placed in regular trash because of the covers and bindings.
- Lead the effort to educate students and faculty of the cost of indiscriminant printing, especially from the Internet.
- Use only “Energy Star” approved computer equipment and employee two-sided technology.
- Evaluate climate control for Microfiche storage to extend life.
- Install a four-bin set of recycling containers at library entrance.
- Promote sharing of reading materials such as newspapers (including The Bowdoin Orient) and class material.
- Promote use of the Internet for newspaper and class material reading.
- Discontinue use of bubble wrap envelopes and other non-recyclable packing material.
14. ATHLETICS

Interviewed: Jeff Ward, Athletics Director.

Ongoing Efforts

- Ice rink paint on the floor, not the ice, so scrapings can be disposed without being concerned about chemicals.
- Have found organization to take used tennis balls and other equipment.
- Always use vans or buses for events.
- Do laundry only when washers are full and new dryers automatically stop when clothes are dry.
- All laundry chemical addition is computerized and they don’t use detergents with phosphates.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Install high-grade office paper bins in all offices, and several four-bin sets in larger facilities.
- Monitor heating requirements for hockey rink to minimize steam use.
- Evaluate upgrades to ice refrigeration system.
- Investigate heating of older buildings, and evaluate if zone heating can better balance the temperatures. Work with Facilities Management to ensure absolute minimum energy use.
- Incorporate energy efficiency into plans for potential new hockey rink.
- Work with Grounds Maintenance to ensure absolute minimum irrigation and chemical use.
15. RESIDENCE LIFE

Interviewed: Bob Graves, Director of Residential Life; Ted Senior, summer intern; Kirk Haynes, Housekeeping; and Students: Jill Shirley, Dan Burke, Dave Frank, Meghan Faughnan.

On-going Efforts

- Recycling containers are in the basement of each dormitory.
- Students are asked not to bring halogen lamps to campus due to energy use and fire hazard.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Ensure students all receive environmental awareness training concerning energy and water use.
- Reinforce limiting energy-using devices in dormitory rooms and turning lights and other electricity-using devices off when not in use.
- Place high-grade paper recycling bins in rooms and require students to use and empty them into centralized recycling containers.
- Add recycling containers at strategic locations at Brunswick Apartments.
- Limit and minimize paper use for newsletter – use electronic communication if possible.
- Assign responsibility for turning off common area lights at night.
- Work with Facilities Management to address the issues of students opening and leaving open windows during the winter.
- Use opportunities during orientation and periodic meeting to address environmental issues.
- Provide student incentives to encourage energy conservation and recycling by implementing contests between dormitories.
- Students should be encouraged take the following actions to reduce environmental impact:
  - Turn off lights and equipment when not being used;
  - Take short showers;
  - Wash full loads of laundry;
  - Use phosphate-free detergent;
  - Reuse scrap paper;
  - Share reading of materials such as newspapers and magazines;
  - Work with mail room to get junk mail stopped;
  - Recycle used paper, cans, bottles etc.; and,
  - Give away unwanted materials when leaving campus.
16. DINING SERVICE

Interviewed: Orman Hines, Purchasing Manager; Mark Tenley Meara; Ken Cardon.

Ongoing Efforts:
- Decreased the use of paper towels by over 40% by placing dispensers on tables.
- Using unbleached napkins and made from post consumer, recycled materials.
- Utensils are offered in the food service area on an as-needed basis (e.g. soup spoons near the soup) to prevent students from taking utensils they don’t need.
- Some food is self-service, presented in bulk reducing food waste.
- Using larger plastic glasses resulting in fewer being used.
- Chillers and freezers and being converted from Freon.
- A “pulper” is used for post-consumer food goes into the pulper which has reduced food waste from 50-60 gallons per meal to 5-15 gallons per meal.
- Food is bought in bulk, up to 40 pounds (lifting considerations).
- A cardboard compactor will be installed behind Wentworth/Thorne Hall.
- Use locally grown food products when possible.
- Plastic separators and air curtains are used as heat transfer barriers.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receives environmental purchasing training.
- Ensure all staff receive energy conservation training specific to food preparation and dishwashing.
- Centralize purchasing among all Dining Services operations as much as possible and evaluate potential to bulk buy in conjunction with other similar institution (Bates and Colby). Evaluate a central, large dry and refrigerated storage space to facilitate more bulk buying.
- Cooperate with effort to centralize chemical purchasing.
- Revisit organic waste composting for food waste and paper napkins. Assist with development of an on-campus composting program, perhaps in conjunction with the Environmental Studies program.
- Reevaluate contents of bag lunches to eliminate plastic and Styrofoam® and to reduce other waste that is currently not recyclable.
- Retry a reusable canvas bags program for bag lunches.
- Eliminate the Styrofoam® containers that are used in the Express Meal Area and at Jack Magee’s Grill.
- Investigate pizza delivery to reduce the amount of pizza box waste.
- Work with all vendors to reduce packing waste by buying more in bulk and requiring returnable packing where feasible.
- Evaluate a better can crushing method to increase recycling of this waste. When possible, buy in larger, collapsible plastic packing.
- Substitute cleaning chemicals that contain chlorides and phosphates.
- Eliminate individually wrapped candies and toothpicks.
- Provide four-compartment recycle boxes in dining halls.
- Evaluate energy and water use efficiency of dishwashing equipment.
- Identify food banks for reuse of large quantities of unwanted food.
17. ACADEMIC BUILDINGS

Interviewed: Rene Bernier, Science Laboratory Manager and Jeremy Arling, student and tour guide.

On-Going Efforts

- Recycling four-bin sets are available, normally on each floor.
- New building and renovation projects are incorporating energy and electricity conservation measures.

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- Ensure all faculty and staff receives environmental awareness training.
- Ensure all faculty and staff who purchase goods and services receives environmental purchasing training.
- Work with students, faculty, staff, and Facilities Management personnel to look for lights that can be turned off when space is not in use.
- Work with suppliers to reduce the number of catalogues received, and with faculty to share. Develop a catalogue-recycling plan for those that do come onto campus. Phone books should be included in this effort.
- Reduce the availability of regular trash receptacles in common area so that the four-bin sets of recycling containers become higher profile.
- Supply each classroom and laboratory with a high-grade paper recycling container and develop a management program for emptying them.
- Encourage faculty to use electronic communication rather than paper-based methods.
- Discontinue use of mercury thermometers.
- Continue to monitor space temperature setting and adjust energy management system accordingly.
- Monitor lighting of unoccupied classrooms and laboratories and install timers and motion sensors as appropriate.
- Continue to identify most energy and lighting inefficient buildings and upgrade.
- Redesign the e-mail digest to make it more user-friendly and more widely used.
18. ART DEPARTMENT

Interviewed: Bob Colburn, Art Department Technical Intern.

On-going Efforts

- Painting studios have switched to water based paints and are not generating solvent wastes.

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- Ensure all staff receive environmental awareness training;
- Ensure all staff who purchase goods and services receive environmental purchasing training;
- Provided high-grade paper recycling bins in each office and space and provide a four-bin recycling set in McCellan Hall.
- Identify possible substitutes for paper towels use in the art studios.
- Develop an end-of-semester clean up to recycle or give away bulky material such as paper pads, drawing pads, and newsprint.
- Participate in the development of a wood program for scraps from the wood shop and advanced art studio.
- Ensure all cardboard is sent to proper recycling area.
- Identify outlet for abandoned art supplies, such as local schools.
19. WISH/PICKARD THEATER AND MEMORIAL HALL

On-going Efforts

- Newly renovated space incorporated some energy efficient and water conservation design features such as new lighting and automatic faucets and flush toilets.

Opportunities to Improve Environmental Performance

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Supply four-bin recycling set, properly labeled and remove regular trash containers in the foyer to improve recycling rate.
- Ensure playbills are produced using recycled paper and two-sided coping when possible.
- Aggressively monitor heating, ventilating, and cooling in the building for a combination of employee/theatergoer comfort and energy efficiency.
20. ADMISSIONS

Interviewed: Scott Steinburg.

On-going Efforts

- Approximately 25-50% of potential students are being contacted only via e-mail.
- Paper based information packets are sent only to the students who express interest in knowing more about Bowdoin.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Continue to reduce the number of full, paper-based information packets sent.
- Ensure only prospective student who want additional mailings continue receive additional information after the first introductory packet has been sent.
- Identify ways to increase the post-consumer recycled fiber content of paper, and the use of uncoated paper that is more readily recycled.
- Direct prospective students to Bowdoin's web page to maximize electronic communication and reduce paper use.
- Incorporate information on Bowdoin's environmental sustainability program in information packets. Work with other departments to ensure new student orientation material includes similar information.
21. OFFICE OF COMMUNICATIONS

Interviewed: Lucie Teegarden, Director.

On-going Efforts

- Most printers use water-based and soy inks for print jobs unless the print job is of a special nature for high-impact results.
- Many printers use recycled paper except when the college needs specialty paper for glossy covers or inserts.
- The office carefully targets the exact number of publications needed in a print run so that there is not much overstock, but there is enough so that reprints are not necessary.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Work with printing vendors to maximize the use of post-consumer fiber in paper and the use of paper that is readily recycled.
- Continually increase electronic communication to replace paper-based methods.
- Work with vendors to reduce packing waste such as cardboard boxes by using returnable containers.
22. PURCHASING

On-going Efforts

• A large amount of chemicals is received by the warehouse and, therefore can be monitored and managed.
• Facilities Management uses purchase orders to track and manage purchases.
• Warehouse staff recycles packing materials.

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• Evaluate a centralized purchasing system, starting with chemicals.
• Ensure all staff who purchase goods and services receive environmental purchasing training.
• Training should include working with vendors and suppliers to reduce packing materials and use returnable packaging.
• Investigate product substitutions for more environmentally friendly products.
• Promote departments collaborating to gain bulk-purchasing advantages.
• Work out issues with Boise Cascade Office Products to improve services so that more staff use them for office supplies.
• Investigate bulk-buying opportunities working with other similar institutions (Bates and Colby).
23. THALHEIMER

Interviewed: Dean McCurdy, Caretaker.

Ongoing Efforts

- Solar energy is used in the Terrestrial lab.
- Some outside lights are on motion sensors.
- Students normally travel to site in vans.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Evaluate improving heating system in farmhouse that currently has only one zone.
- Evaluate other energy conservation possibilities such as new windows, doors, and insulation.
- Monitor hot water heater temperature to ensure it is set at optimum level.
- Discontinue use of hot water to hose down floors by supplying a cold-water faucet in the marine lab.
- Evaluate the apparent over-sized seawater pumps that result in large amounts of by-pass to see if smaller pumps or variable frequency drives would be cost-effective and still meet the needs of the lab.
24. BRECKINRIDGE PUBLIC AFFAIRS CENTER

Interviewed: Gail Berneike and Don Bernier, Coordinators.

Ongoing Efforts

- Coordinators are very careful about conserving resources to meet their budget for utilities.
- Compost grass clippings and leaves.
- Recycle or return everything they can (mandatory in York) by sorting guests’ trash and recycling scrap metal.
- Printer toner cartridges are recycled.
- Have replaced eight toilets with low-flow fixtures.
- Irrigate only the croquet lawn regularly and use manual sprinklers only during the mornings.
- Plumbing is maintained regularly to reduce leaks and water waste.
- Have replaced some incandescent lights with fluorescent.
- Photosensitive lights are used in parking lots.
- The dishwasher and clothes washer and dryer are used only when full and only for as long as needed.
- Air conditioner is very rarely used.
- Hot water tanks are maintained at 130°.
- They try to turn off lights whenever no one is in the room.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receives environmental purchasing training.
- Ensure all guests are subtly informed of Bowdoin’s environmental sustainability program and encouraged to participate in recycling and energy and water conservation.
- Evaluate an improved composting program to replace what is currently being done to improve use.
- Replace remaining standard toilets with low-flow fixtures and install low-flow showerheads.
- Replace the remaining incandescent lights with more energy efficient lighting where appropriate.
- Evaluate installing zone heating controls.
25. KENT STATION

Interviewed: Nat Wheelwright

On-going Efforts

- Due to difficult access, have to haul supplies in and trash out, which makes students more conscious of what they use and waste.

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- Ensure all staff receive environmental awareness training.
- Ensure all staff who purchase goods and services receive environmental purchasing training.
- Use the facility as a case study for recycling, waste reduction, and energy conservation.
- Work to increase the number of students exposed to Kent Island through on-site participation or on-campus lectures.