

## ENVIRONMENTAL IMPACT METRICS

### HIGHLIGHTS:

- **Wind energy:** The university has recently installed a 600kW wind turbine that will reduce energy consumption and emissions
- **Claire T. Carney library renovation project:** The recently completed library renovation project replaced old and outdated facilities with new more efficient equipment up to LEED Certification standards
- **IUCN Red List Species:** There are two species listed on the “species of concern list” located on the UMass Dartmouth campus, the *Plymouth Gentian* and the *New England Bluet*
- **Greenfile Database:** The Claire T. Carney library is subscribed to the Greenfile database giving users access to over 200 titles and 300,000 reports on environmental topics

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## ENVIRONMENTAL

The environmental dimension of sustainability, as outlined in this section, reflects the University of Massachusetts Dartmouth's impact on living and non-living natural systems. Environmental indicators as reported here include inputs and outputs, as well as the university's performance related to biodiversity, environmental compliance and other relevant information.

### **DISCLOSURE ON MANAGEMENT APPROACH GOALS AND PERFORMANCE ORGANIZATIONAL RESPONSIBILITY TRAINING AND AWARENESS MONITORING AND FOLLOW-UP**

The management approach taken at UMass Dartmouth follows policies established by the Chancellor's Office and the UMass Board of Trustees. Goals and Performance, Organizational Responsibility, Training and Awareness, and Monitoring and Follow-up are established by top-level administrators at the university and system levels in cooperation with departments and units throughout the university. More information about the approach can be found online at [www.umassd.edu/chancellor](http://www.umassd.edu/chancellor) or <http://www.massachusetts.edu/bot/>.

### **POLICY**

UMass Dartmouth policies defining the university's overall commitment related to Environmental Aspects are defined by the university-wide system as determined by the Board of Trustees. Policies can be found online at <http://www.massachusetts.edu/bot/>.

## ASPECT: MATERIALS

Akin to other academic and research institutions, UMass Dartmouth uses a sizeable amount of paper. In order to better understand paper usage and reduce the waste of paper, UMass Dartmouth's Purchasing Department conducted in 2009, a print audit resulting in a Print Less Campaign to drastically reduce the amount of paper utilized at the university. The outcomes are described and illustrated below.

### **EN1 MATERIAL USED BY WEIGHT OR VOLUME**

#### **Purchasing Amount:**

- From July 1, 2011 to June 30, 2012 (FY2012), UMass Dartmouth spent \$92,489.61 on purchasing 12,838,275 sheets of paper, and spent an additional \$3,690.03 on purchasing roll, photo and construction papers, amounting to 32,819 sheets.
- Each semester, the library and computer labs use approximately 1,250,000 sheets of paper, in other terms, the equivalent of 300 trees per academic year.

**YEAR-OVER-YEAR COMPARISON FOR PAPER PURCHASES**

|   | FY 2010                    | FY 2011                    | FY 2012                    |   |
|---|----------------------------|----------------------------|----------------------------|---|
|   | Total cut sheet paper only | Total cut sheet paper only | Total cut sheet paper only | Total paper usage (include cut sheet paper, photo paper, roll paper and construction paper) |
| <b>Total Paper Purchasing Expense (\$)</b>    | \$84,987.92                | \$93,764.95                | \$92,489.61                | \$96,179.64   |
| <b>Total Paper Purchasing Amount (Sheets)</b> | 12,563,050.00              | 13,341,200.00              | 12,838,275.00              | 12,871,094.00   |

**PAPER WASTE ANALYSIS FOR 2 MONTHS:**

100,000 pieces of paper (20 cartons, or ½ ton) were wasted in the library public printing areas, the equivalent to 12 trees (500 sheets use 6% of a tree on average). In financial terms, this equates to \$600. The average cost of 1 box of paper (5,000 sheets) is \$30.00.

**TOTAL CAMPUS ENVIRONMENTAL IMPACT OF PAPER CONSUMPTION:**

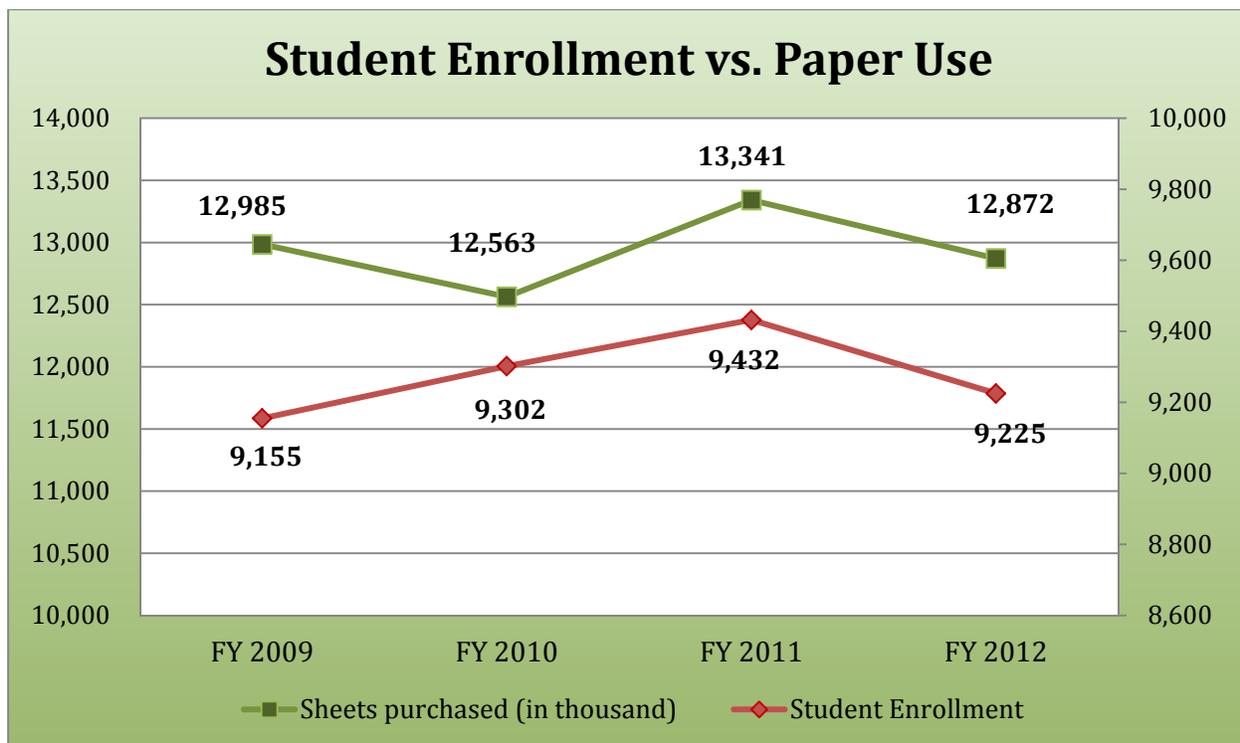
|   | FY 2010       | FY 2011       | FY 2012       |
|---|---------------|---------------|---------------|
| <b>Total Paper Purchasing Expense (\$)</b>    | \$84,987.92   | \$93,764.95   | \$96,179.64   |
| <b>Total Paper Purchasing Amount (Sheets)</b> | 12,563,050.00 | 13,341,200.00 | 12,871,094.00 |
| <b>Wood Use (tons)</b>                        | 220.00        |               | 172.00        |
| <b>Energy Use (MBTU)</b>                      | 1,851.00      |               | 1,933.00      |
| <b>GHG (tons CO2)</b>                         | 180.65        |               | 149.00        |
| <b>Water Use (gallons)</b>                    | 1,356,195.00  |               | 1,284,768.00  |
| <b>Solid waste (pounds)</b>                   | 117,501.00    |               | 111,845.00    |

**\*Improvement from 2008/ 2009 academic year (FY2009) to 2011/2012 academic year (FY2012):**

During the 2008/2009 academic year (FY2009), there were 9,155 enrolled students. Since then, the number of enrolled students has increased to 9,432 in FY2011, but as of FY2012, has decreased to 9,225. During this time, the total amount of paper used has followed this same trend, decreasing by 421,950 sheets from 2008 to 2010, but increasing by approximately 130,000 sheets from FY2010 to FY2011.

**PERCENTAGE CHANGE IN STUDENT ENROLLMENT AND PAPER USED**

|                                     | FY09 - FY10 | FY10 - FY11 | FY11 - FY12 |
|-------------------------------------|-------------|-------------|-------------|
| <b>Change in student enrollment</b> | 147.00      | 130.00      | -207.00     |
| <b>% Change</b>                     | 1.61%       | 1.40%       | -2.19%      |
| <b>Change in paper used</b>         | -421,950.00 | 130,000.00  | -469,260.00 |
| <b>% Change</b>                     | -3.25%      | 6.19%       | -3.52%      |

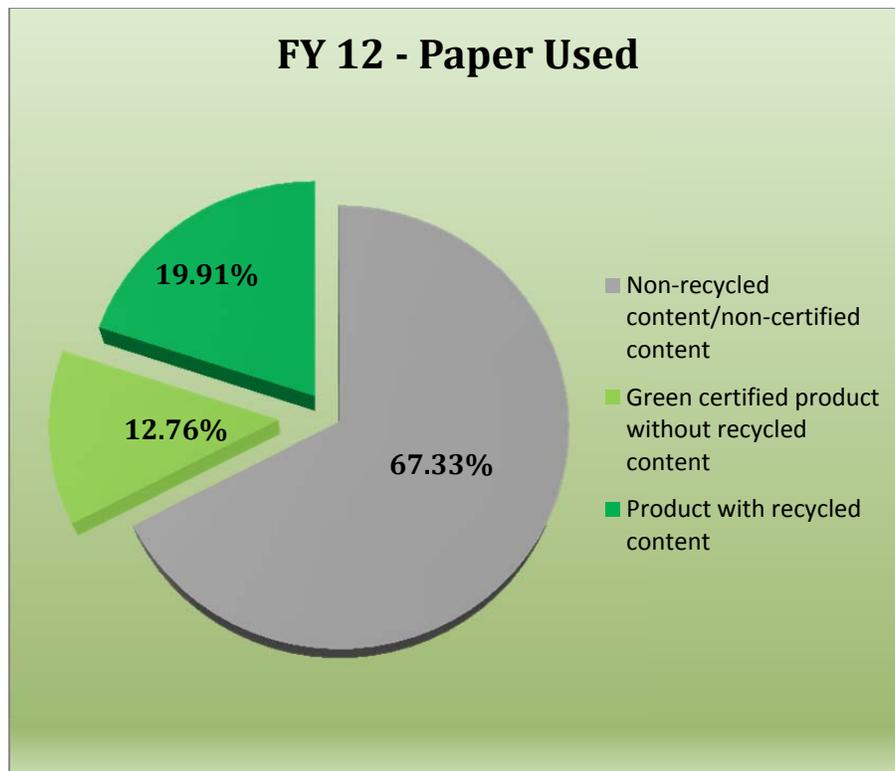
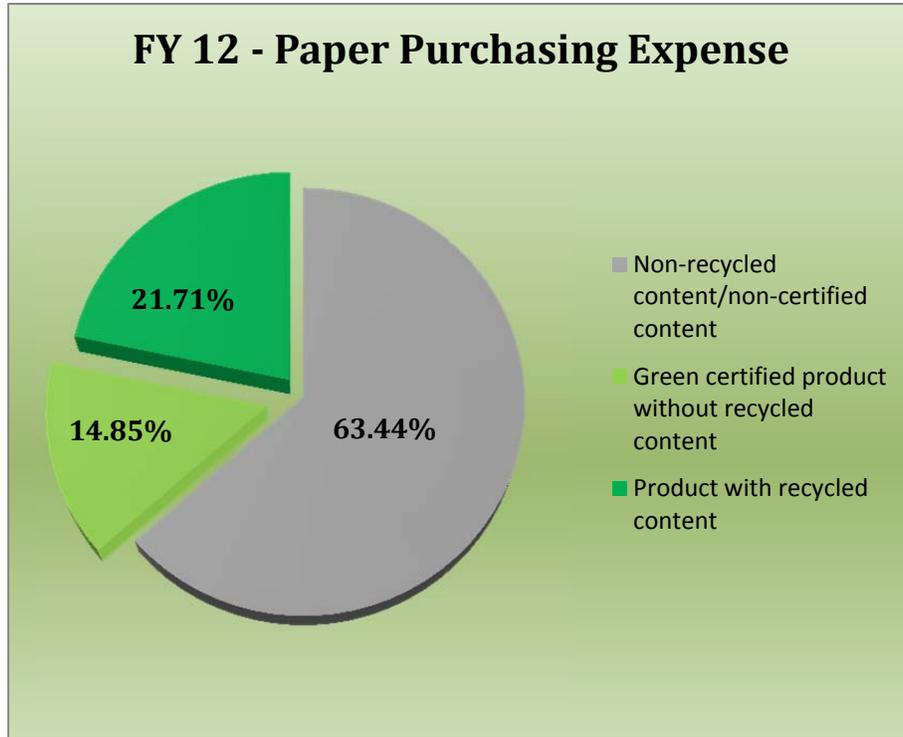


**EN2 PERCENTAGE OF MATERIALS USED THAT IS RECYCLED INPUT MATERIALS**

- In FY2008, nearly none of the paper being purchased contained any recycled content.
- In FY2011, the campus ordered 196 varieties of paper products:
  - 93 of these product varieties, or 47.45%, were green certified (20.92% of the total volume of paper used and 25.75% of the total cost of paper products).
  - 82 of the product varieties contained recycled content (defined as containing between 10% and 100% recycled content or used recycled content packaging).
  - Put another way, 41.84% of the total varieties of paper products purchased by the university were green certified AND contained recycled content, representing 19.91% of total volume of paper used and 21.71% of total cost(s).

| FY 2012                          | Green certified with recycled content |                  |                                       |  |                                    |
|----------------------------------|---------------------------------------|------------------|---------------------------------------|--|------------------------------------|
|                                  | Total                                 | Recycled content | Green certified with recycled content | Green certified without recycled content | Non-certified/non-recycled content |
| Variety of Paper Products        | 196                                   | 33               | 49                                    | 44                                       | 70                                 |
| Percent of Total Paper Products  | 100%                                  | 16.84%           | 25.00%                                | 22.45%                                   | 35.71%                             |
| Number of Paper Sheets           | 12,871,094.00                         | 1,512,236.00     | 1,050,000.00                          | 1,642,602.00                             | 8,666,256.00                       |
| Percent of Total Volume Used     | 100%                                  | 11.75%           | 8.16%                                 | 12.76%                                   | 67.33%                             |
| Dollar Amount Spent              | \$96,179.64                           | \$10,391.74      | \$10,490.51                           | \$14,279.52                              | \$61,017.87                        |
| Percent of total \$ Amount Spent | 100%                                  | 10.80%           | 10.91%                                | 14.85%                                   | 63.44%                             |

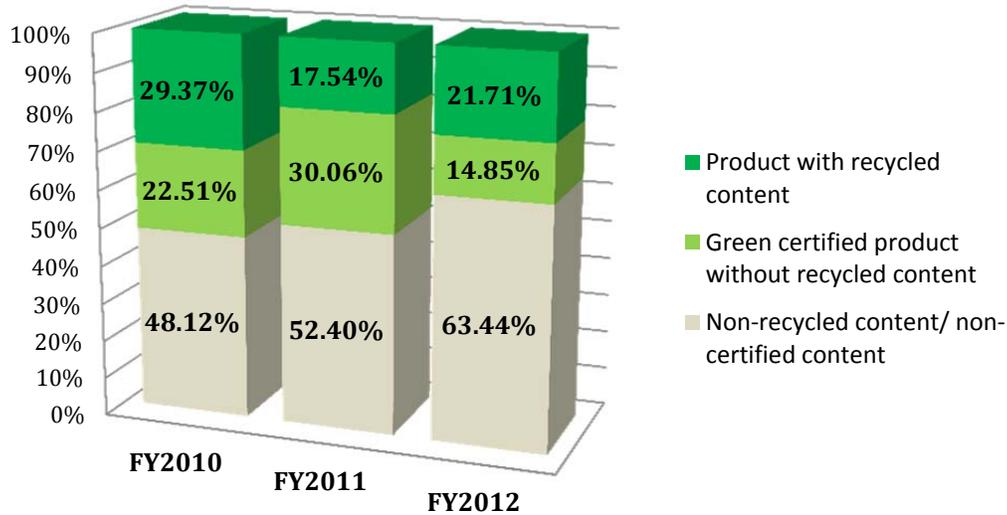
The data in the chart above is represented in the following pie charts:



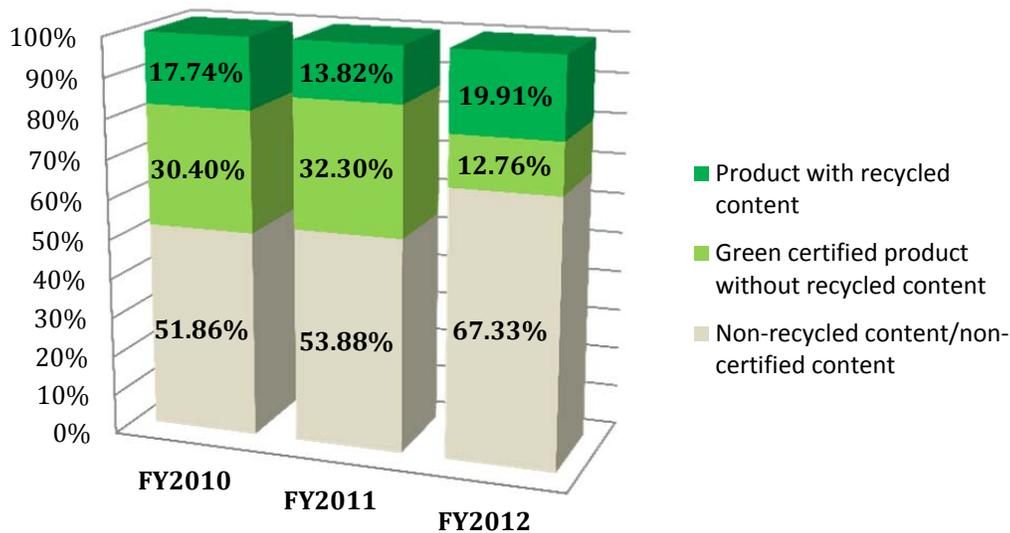
It is important to highlight that some products do not use recycled content, yet are certified as green products by several sustainable forestry programs such as Forest Stewardship Council (FSC), Green Seal, Sustainable Forestry Initiative® (SFI®), Green-e, and Programme for the Endorsement of Forest Certification (PEFC).

**YEAR-OVER-YEAR COMPARISON FOR PERCENTAGE OF RECYCLED INPUT MATERIALS**

**3yr Comparison - Paper Purchasing Expenses**



**3yr Comparison - Paper Used**



It is noted that the paper data used for Fiscal year 2010 and 2011 contained only cut-sheet paper. However, the data used for fiscal year 2012 contained not only cut-sheet paper, but also roll paper, photo paper and construction paper.

ASPECT: ENERGY

**EN3 DIRECT ENERGY CONSUMPTION BY PRIMARY SOURCE**

**EN4 INDIRECT ENERGY CONSUMPTION BY PRIMARY SOURCE**

Energy consumption is one of the major issues currently facing today’s world. New technological demands and increases in population only amplify this issue. These trends translate directly to universities in the form of technological needs and increasing enrollment. The University of Massachusetts Dartmouth has acknowledged the problem of energy consumption and is committed to addressing their energy needs in a sustainable and environmentally conscious manner. The following data reflects total eCO<sub>2</sub> emissions relative to variables such as community members, number of students, building space and some consumption items. The value for eCO<sub>2</sub> emissions was determined using an excel spreadsheet developed by Clean Air, Cool Planet, a company based out of Portsmouth, NH. Equivalent CO<sub>2</sub> is a measure of all greenhouse gases in terms of CO<sub>2</sub>, therefore a single metric can be used to quantify all greenhouse gases. For example, methane is 21 times as powerful as CO<sub>2</sub>, hence a ton of methane is equal to 21 tons of eCO<sub>2</sub>, while one ton of CO<sub>2</sub> is equal to one ton of eCO<sub>2</sub>. The following is data is under review and may be corrected by the Office of Campus and Community Sustainability. For the most up to date data, please contact Thomas Paine at [tpaine@umassd.edu](mailto:tpaine@umassd.edu).

|                       | Building Energy Use |                       |
|-----------------------|---------------------|-----------------------|
|                       | FY2012 Consumption  | Cost                  |
| Electricity From Grid | 28291861 kWh        | \$3,457,325.10        |
| Natural Gas           | 2190918 thermos     | \$2,112,441.60        |
| Diesel #2             | 200 gal             | \$569.80              |
| Fuel Oil #2           | 8500 gal            | \$28,179.20           |
|                       |                     | <b>\$5,598,515.70</b> |

|          | Vehicle Fuel Use   |                     |
|----------|--------------------|---------------------|
|          | FY2012 Consumption | Cost                |
| Gasoline | 47814.93 gal       | \$138,050.71        |
| Diesel   | 2408.38 gal        | \$7,436.71          |
|          |                    | <b>\$145,487.42</b> |

The total greenhouse gas (GHG) emissions by weight for the university in 2008 were 45,794.5 metric tons of eCO<sub>2</sub>. With 7,393 students enrolled in 2008, emissions were 6.19 metric tons per student. In 2011, 36,189.2 metric tons of eCO<sub>2</sub> were emitted, and with 9,432 students enrolled, resulted in emissions that were equal to 4.3 metric tons per student. Efforts at the University have led to the following results:

- Total reduction of GHG emissions: 21% between 2008 and 2010.
- Total reduction of GHG emissions per full-time student: 31% between 2008 and 2010.

An overall reduction in total eCO<sub>2</sub> emissions has been the result of the University Climate Action Plan. The University Climate Action Plan is a program that was developed to reduce the amount of eCO<sub>2</sub> emissions by implementing:

- Efficiency upgrades to all facilities on campus;
- Energy conservation by powering down machines and turning off lights.

With the Climate Action Plan in place, the university has set a goal of reducing greenhouse gases by 46% by 2020 and reaching climate neutrality by 2050.

**EN5 ENERGY SAVED DUE TO EFFORTS****EN6 INITIATIVES TO PROVIDE ENERGY EFFICIENCY OR RENEWABLE ENERGY****EN7 INITIATIVES TO REDUCE INDIRECT ENERGY CONSUMPTION**

The University of Massachusetts Dartmouth has taken strides in addressing the impact(s) of its energy consumption. The current \$48 million Energy Performance Contract, the largest such performance contract underway by the Massachusetts Division of Capital Asset Management, has resulted in a decrease in energy consumption per student as well as a decrease in energy spending. The university's energy conservation plan includes a newly-raised wind turbine, rooftop solar panels, a high-efficiency co-generation plant, the modernization of outdated utilities, powering down of idle machines and lights, and environmental research projects. From FY2008 to FY2011, the university has made progress in reducing its carbon footprint:

- Total eCO<sub>2</sub> emissions were reduced 21% from 2008 levels;
- Energy consumed for heating was reduced 10% from 2008;
- Carbon emissions were reduced 25% from 2008;
- Overall consumption of energy was reduced 13.5% from 2008 levels.

**Wind Energy**

The university has recently erected a 243 foot tall, 600 kW wind turbine. Once fully operational, the turbine will result in an estimated energy cost savings of \$125,000 a year. It will also eliminate emissions equivalent to 1,161 pounds of sulfur dioxide, 489 pounds of nitrous oxide, and 295 tons of carbon dioxide annually.

**Capital Plan**

UMass Dartmouth's capital plan involves expenditures of \$243 million from FY2012 through FY2016. The plan includes initiatives to rebuild the basic infrastructure with modern and energy efficient components, commits all new construction to LEED Silver Certification and commits the entire university system to an action plan to become carbon neutral.

**Library Renovations**

An extensive, \$31.5 million renovation of the Claire T. Carney Library was recently completed. In addition to bringing the outdated library up-to-date, the project brought the library up to LEED Certification standards.

**Solar Power**

A 269 kW solar photovoltaic system was recently installed on top of the Tripp Athletic Building. The system was financed with \$671,600 of American Recovery and Reinvestment Act funds.

**Green Parking Lots**

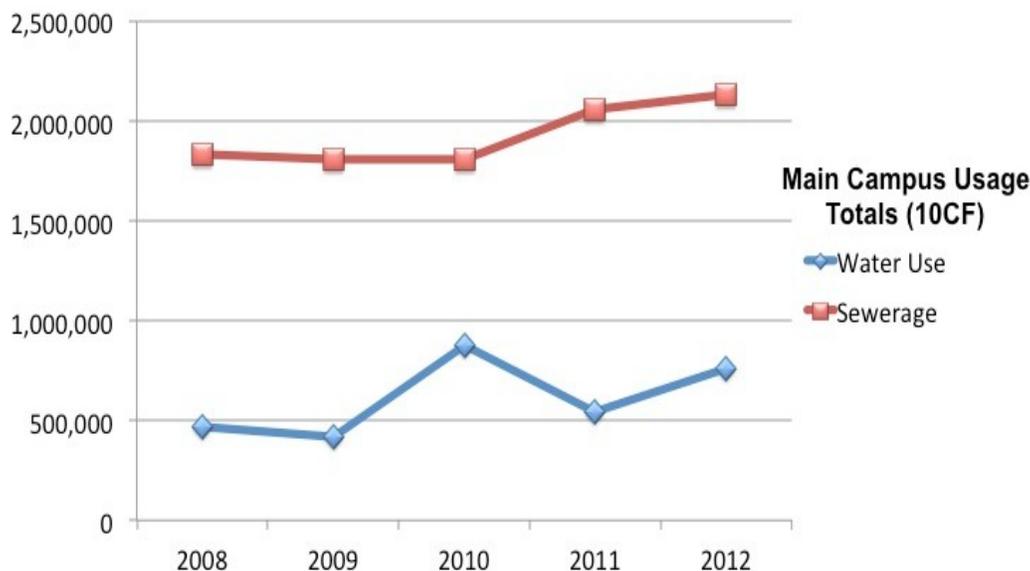
Many of the parking lots on campus can be defined as "green parking lots," meaning the surface of these parking lots is permeable so that water can pass through and be collected in the water table underneath. Many of these lots also employ photovoltaic lighting in order to harness solar energy to light the parking lots at night.

ASPECT: WATER

**EN8 TOTAL WATER WITHDRAWAL BY SOURCE**

The total dollar value of water consumed by the University was \$400,985.19 for the past fiscal year. Compared year-over-year, the total dollar value of water consumed has decreased by 22%. The university’s water usage and sewerage (according to the Town of Dartmouth) in 10s of cubic feet were:

|      | Water Usage | Sewerage  |
|------|-------------|-----------|
| 2012 | 756,700     | 2,132,530 |
| 2011 | 542,300     | 2,058,929 |
| 2010 | 873,700     | 1,804,756 |
| 2009 | 414,600     | 1,809,679 |
| 2008 | 469,859     | 1,835,579 |



The university has greatly increased and expanded, respectively, student enrollment and residential housing; as a result, water usage per student has declined. The graph above illustrates this data: Total water usage and sewerage in 10s of cubic feet over the last five (5) years.

**EN9 WATER SOURCES SIGNIFICANTLY AFFECTED BY WITHDRAWAL OF WASTE**

According to the Massachusetts Department of Environmental Protection (MassDEP), Dartmouth Water Division receives water from 12 wells and purchases water from the New Bedford Water Department. More information on water sources affected by the university can be found in the following Source Water Assessment Program (SWAP) document: <http://www.mass.gov/dep/water/drinking/4072000.pdf>

**EN10 PERCENTAGE & TOTAL VOLUME OF WATER RECYCLED AND REUSED**

UMass Dartmouth currently has no water recycling programs.

## ASPECT: BIODIVERSITY

### **EN11 LOCATION AND SIZE OF LAND OWNED, LEASED, MANAGED IN, OR ADJACENT TO, PROTECTED AREAS AND AREAS OF HIGH BIODIVERSITY VALUE OUTSIDE PROTECTED AREAS**

The UMass Dartmouth campus is home to one of the largest contiguous forests in the area. At over 705 acres, the campus provides a high value habitat, tremendous opportunity for land conservation,

and a large living classroom for educational endeavors. The forest is located in northeast Dartmouth, MA, approximately 1.5 miles west of the New Bedford town line. The forest is comprised of three main blocks: the North Block of 50.5 acres; the South Block of 307.4 acres; and the Cedar Dell Block of 40.2 acres. The university believes the area should be enhanced and maintained because of its value to wildlife, and to promote long-term goals in forest management.

### **EN12 DESCRIPTIONS OF SIGNIFICANT IMPACTS OF ACTIVITIES, PRODUCTS, AND SERVICES ON BIODIVERSITY IN PROTECTED AREAS AND AREAS OF HIGH BIODIVERSITY VALUE OUTSIDE PROTECTED AREAS**

#### **Forest management**

The forestry program will manage for old growth using a multi-purpose management and educational plan designed to foster the development of mature forest characteristics while maximizing educational potential. Felling trees is a key component of this forest stewardship plan. Clearing undesirable trees allows fruit- and nut-producing trees to flourish and provide food to local wildlife. Creating small gaps or forest openings generates groups of seedlings and saplings that provide an additional layer of cover, food, and perch sites, which together will enhance the existing habitat.

#### **Forest steward plan**

As part of the forestry program, the university will be removing trees from its forest. Although Cutting down trees can be controversial, the Dartmouth Conservation Commission and the Massachusetts Department of Wildlife have determined that the UMass Dartmouth proposal to restore the campus view of Cedar Dell pond makes ecological sense. Since approximately 300 acres of forest on the university's undeveloped southern side have not been maintained, unwanted trees have encroached up on a wetland that had been formerly used as an open space for local species of animals and plants.

Restoring the original landscape, established when the university was built in the late 1960s and early 1970s, will bring back a direct view of the pond that is now hidden by trees.

The forest management plan goes beyond restoring the Cedar Dell vista and the SITES initiative to clear old trails and establish new ones for recreation and education purposes. Rupert Grantham of Walden Forest Conservation in Westport said that several miles of trails are planned, some of them handicap-accessible, which will take people through old growth parts of the woods and wetlands.

*"It's a diverse, multi-aged forest with increasing amounts of old growth trees, gaps and openings with young stands of trees, and dead standing trees or downed trees decomposing woody material for nesting and soil renewal,"* Grantham described.

**UMass Dartmouth**

The university will use its forest to broaden the scope of the existing curriculum and to develop new coursework in order to utilize this educational resource.

**Community**

The forest will serve as a tool to foster a love for the natural environment and an understanding of sustainable forestry management practices. Educational walks and workshops for students, local residents of all ages, forest conservationists, and land management professionals will be offered.

**The School for Marine Science and Technology (SMAST)**

The School for Marine Science and Technology (SMAST) is the marine campus of UMass Dartmouth, located in the historic city of New Bedford, America's premier fishing port. Scientists at the SMAST have expertise in ocean modeling and monitoring, fisheries science and management, coastal systems science, ocean acoustics, biogeochemistry, remote sensing, and ocean engineering. Facilities include the school's two-story, 32,000-square-foot building and docking facilities on Clark's Cove, which provide access to Buzzards Bay.

**Additional facilities include:**

- A 90,000-gallon acousto-optic test tank designed for development and testing of underwater measurement concepts and devices. The tank is also a valuable resource for local academics, governments, industrial researchers and product developers.
- A seawater room of nearly 2,000 square feet with plentiful raw, filtered, heated or chilled seawater.
- A greenhouse for the growth and long-term maintenance of aquatic photosynthetic organisms under natural light.
- Three temperature-controlled rooms for long-term behavioral and physiological experiments and acclimation of marine organisms for culture and reproduction.
- Fifteen research laboratories.
- The R/V Lucky Lady, a 50-foot diesel-powered research boat.

SMAST focuses on interdisciplinary basic and applied marine sciences and development-related innovative technologies. In addition to scholarly marine science and technology research, SMAST also emphasizes interaction with regional industry, government, and non-governmental agencies on compelling regional marine-related issues and technological development(s).

**EN 13 HABITATS PROTECTED OR RESTORED****Forest management activities**

In March 2010, the Massachusetts Department of Conservation and Recreation (DCR) Private Lands Group Certification Program was certified as compliant with Forest Stewardship Council (FSC) forest management standards. In July 2010, the UMass Dartmouth Campus Forest was enrolled in the Private Lands Program.

## GOALS OF FOREST MANAGEMENT:

### Promote diversity and ecological integrity

The overarching management goal is to increase old-growth characteristics. This means assisting an even-aged forest, established on an abandoned pasture, in becoming a patchwork of multi-aged forest stands. Management includes the inventory and promotion of habitat structures such as standing dead trees and large-diameter downed woody material.

### Developing educational opportunities

The university wants to make the Campus Forest a hub for forest related education and educational activities. This includes developing infrastructure, coursework and community outreach.

### Promoting a “working-land ethic”

Working land is forest or farmland that is actively generating revenue or products. This product flow gives the land value to offset development pressures. Working land also creates local jobs and develops a land base that can sustain those jobs. Working land increases local self-sufficiency in food, fiber, fuel and other forest and farm products.

### Developing recreational resources

The Campus Forest is open to the public for passive recreation. UMass Dartmouth wants the public to experience and enjoy this amazing property and its role in environmental, social and economic sustainability practices.

## EN14 STRATEGIES, CURRENT ACTIONS, AND FUTURE PLANS FOR MANAGING IMPACTS ON BIODIVERSITY

### The School for Marine Science and Technology (SMAST) Fish Tagging Programs

- The Yellowtail Flounder Tagging Program: The cooperative yellowtail flounder-tagging study was initiated in the Fall of 2003, by NOAA Fisheries' Northeast Fisheries Science Center (NEFSC).
- The SMAST Cod Tagging Program: This program utilizes the knowledge and expertise of the local fishing industry to collect and tag cod during normal fishing operations in the Gulf of Maine, George's Bank, and Nantucket Shoals.
- The Northeast Regional Cod Tagging Program: In February 2003, NOAA's National Marine Fisheries Service funded the Northeast Regional Cod-Tagging Program through the Northeast Region Cooperative Research Partners Initiative (CRPI) to conduct a multi-agency tagging study of Atlantic Cod, movements in the Gulf of Maine and George's Bank region.

### The Massachusetts Marine Fisheries Institute (MFI)

The Massachusetts Marine Fisheries Institute (MFI) is a cooperative venture between the Massachusetts Executive Office of Energy and Environmental Affairs and the University of Massachusetts Dartmouth to promote sustainable fisheries through education and research. The Massachusetts Marine Fisheries Institute supports one of the most historic and valuable industries in Massachusetts and New England. The health of New England's commercial fishing industry is vital to the nation's economy, and the Massachusetts marine recreational fishery ranks among the

most valuable in the United States. The MFI, as a cooperative partnership, helps protect these vital marine ecosystems through groundbreaking research and innovative cooperative programs.

### **Buzzards Bay - Lobster Program**

The lobster fishery is among the most valuable fisheries in the Northeast. Although the lobster fishery is strong in some areas, Buzzards Bay has seen landings decline by nearly 50% since 1998. Possible explanations for this decline include over-fishing, oil spill effects, predation from recovering fish stocks (such as striped bass) and shell disease. Determining the reason for the decline is the focus of the Massachusetts Marine Fisheries Institute (MFI) Lobster Program.

### **Buzzards Bay - Whelk Study**

Working with local lobsterman, Jarret Drake, Professor Bradley Stevens and graduate student Bhae-Jin Peemoeller landed, marked, and released 4,000 whelks in Buzzards Bay in August, 2010. *“We’re asking fishermen to release any whelks they trap this season that are marked with numbers between 1 and 4,000; we’d rather not see them again until next year or the year after. That way, we can collect meaningful growth data.”* said Stevens. In 2009, as a Professor at the UMass Dartmouth School for Marine Science and Technology, Dr. Stevens was awarded \$220,000 in Saltonstall-Kennedy funding for a two-year study to improve the conservation of the New England channeled whelk, a large, edible sea snail, locally known as a “conch.” Now at the University of Maryland Eastern Shore, Stevens returned to SMAST to collect specimens and launch his study in the New England waters. *“There are currently 166 conch-pot permits in Massachusetts, but only about 40 of those are actively fished. If the remainder was to be fully utilized, landings could increase significantly, which could seriously deplete the whelk population,”* said Stevens.

## **EN15 NUMBER OF IUCN RED LIST SPECIES AND NATIONAL CONSERVATION LIST SPECIES WITH HABITATS IN AREAS AFFECTED BY OPERATIONS, BY LEVEL OF EXTINCTION**

There are at least two known species of concern listed on the IUCN Red List that are found in the Dartmouth, MA area: the Plymouth Gentian (a native flower), and the New England Bluet (a species of dragonfly or damselfly). These species are also listed as species of concern according to the Massachusetts Division of Fisheries and Wildlife.

### **Plymouth Gentian (Plant Summary)**



**Description:** Plymouth Gentian (*Sabatia kennedyana*) is a globally rare, showy perennial herb of the gentian family (Gentianaceae), with striking pink and yellow flowers and opposite lance-shaped leaves. It inhabits the sandy and peaty shorelines of coastal plain ponds.

**Aids to identification:** Plymouth Gentian reaches 12 to 28 inches (30-70 cm) in height, with opposite branches bearing narrowly lanceolate leaves. The leaves are 0.8 to 5 inches (2-12.5 cm) in length, entire, and sessile. The flowers, which form atop long pedicels, are pink with a yellow center bordered by red; they have 9 to 11 petals, each of which is 0.6 to 1.1 inches (1.5-3 cm) in length. Plymouth Gentian blooms between early July and mid-September, depending on when the water level of the site decreases enough to expose adequate shoreline. The fruit is a capsule with two valves.

**Threats:** Plymouth Gentian is threatened by any activity that changes the hydrologic regime, water, quality, or soil integrity of the coastal plain pond it inhabits. Region-wide, coastal plain ponds are imperiled due to shoreline development, water table drawdown (from wells), eutrophication (resulting from fertilizers and septic systems), and soil disturbance from heavy recreational use (ORV, horse, and foot traffic; camping; boat-launching; raking and digging).

**Management Recommendations:** Management of Plymouth Gentian requires protection of the hydrology, water quality, and soil integrity of its habitat. Like many other coastal plain pond plant species, Plymouth Gentian requires pronounced water-level fluctuations, acidic, nutrient-poor water and substrate, and an open, exposed shoreline, free from major soil disturbance. The hydrologic regime is particularly important; coastal plain pond species often require low water years for reproduction, but their persistence at a site depends on high water years to keep dense woody vegetation from taking over the shoreline. Protection of Plymouth Gentian habitat may require exclusion of new wells and septic systems, prohibitions on fertilizer use, and restrictions on recreational use of the site.

#### New England Bluet (Insect Summary)



**Description:** The New England Bluet is one of the damselflies in the genus *Enallagma* found in New England. The New England Bluet has also been called the Lateral Bluet as its specific name; lateral, referring to the black mark on the side of the 8th abdominal segment.

**Aids to Identification:** The New England Bluet is one of a large number of species of small (typically 1-1.5 inches) damselflies in the genus *Enallagma*, collectively referred to as the bluets, and most of which are predominantly black and sky blue in coloration and quite similar to one another in overall appearance. Bluets have large, widely separated eyes with colored “eyespot” (or postocular spots) on the top of the head next to the eyes, black stripes on the thorax, and a pattern of black with blue

(usually), red, orange, or yellow on the abdomen, and clear (untinted) wings. At 1-1.1 inches (2.5-2.8 cm) in length, the New England Bluet is one of the smaller members of the genus (Lam).

**Threats:** Any activities degrading the sensitive hydrology or water quality of the ponds where it occurs could threaten populations of these damselflies. Examples include: ditching, filling, eutrophication and changes in dissolved oxygen content, direct effects of pesticides (e.g. for mosquito control or from agricultural runoff), and other chemical contamination from runoff or discharge of agricultural, industrial, or urban effluent(s).

**Management recommendations:** The major threat to the New England Bluet is most likely due to the destruction of its breeding habitat. Because New England Bluets, like many species of damselflies, spend a period of several days or more away from the water maturing, it is important to maintain natural upland habitats.

## ASPECT: EMISSIONS, EFFLUENTS AND WASTE

### EN16 TOTAL DIRECT AND INDIRECT GREENHOUSE GAS EMISSIONS BY WEIGHT

The following data is under review and may be corrected by the Office of Campus and Community Sustainability. For the most up-to-date data, please contact Thomas Paine at [tpaine@umassd.edu](mailto:tpaine@umassd.edu).

The total greenhouse gas emissions by weight for the University is:

- Total CO<sub>2</sub> Emissions (metric tons) was 36,643 in 2010 compared to 45,794 in 2008.
- Total CO<sub>2</sub> per FTE Student (metric tons) was 4.3 in 2010 compared to 6.19 in 2008.

(These metrics are related to indicators EN3-7 and associated explanations.)

#### Efforts at the university have led to successful decreases including:

- Total reduction of GHG (in metric tons of eCO<sub>2</sub>): 21%
- Total reduction of GHG (in metric tons of eCO<sub>2</sub>): per Full-Time Equivalent student: 31%

The location of the university between the regional urban centers of Fall River and New Bedford naturally lends itself to commuting lifestyles and therefore, more eCO<sub>2</sub> from transportation activities. To truly reduce eCO<sub>2</sub>, the university must seek out and be cognizant of advances in fields such as mass transit, telecommuting, and distance learning.

### EN17 OTHER RELEVANT INDIRECT GREENHOUSE GAS EMISSIONS BY WEIGHT

When computing the Greenhouse Gas Inventory (GHGI), the carbon equivalency of all measured gases is calculated so that one number (eCO<sub>2</sub>) can be reported, therefore the total weight of the separate gases, when added up, does not equal the total weight for eCO<sub>2</sub>. As stated above, total greenhouse gas emissions by weight for the university is 36,189.2 tons of eCO<sub>2</sub>. Total CH<sub>4</sub> (methane) emissions were 21,307.6 kg in 2008 and 12,297.2 kg in 2010. N<sub>2</sub>O (nitrous oxide) emissions were 1,139.2 kg in 2008 and 870.5 kg in 2010.

### EN19 EMISSIONS OF OZONE-DEPLETING SUBSTANCES BY WEIGHT

The university does not currently have activities that produce ozone-depleting substances.

### EN20 NO, SO AND OTHER SIGNIFICANT AIR EMISSIONS BY TYPE AND WEIGHT

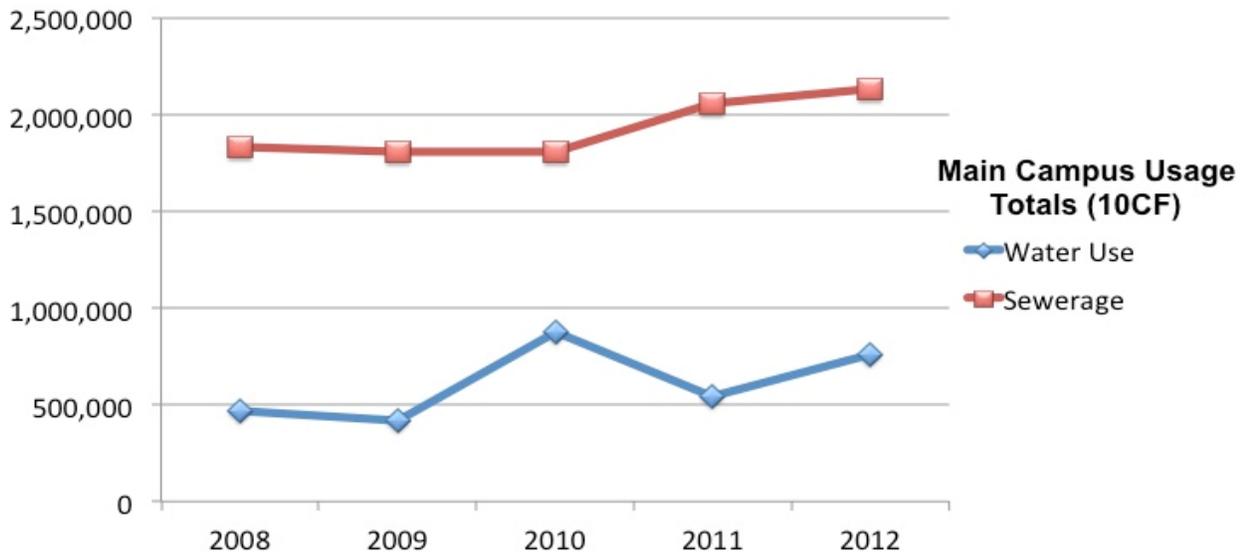
The university does not currently have activities that produce these emissions.

**EN21 TOTAL WATER DISCHARGED BY DESTINATION**

- The total dollar value of water consumed by the university was \$400,985.19 for the past fiscal year.
- The total dollar value spent on sewage for the year was \$960,245.04.

The graph below illustrates the data above: water and sewerage in 10s of cubic feet over 5 years

|      | Water Usage | Sewerage  |
|------|-------------|-----------|
| 2012 | 756,700     | 2,132,530 |
| 2011 | 542,300     | 2,058,929 |
| 2010 | 873,700     | 1,804,756 |
| 2009 | 414,600     | 1,809,679 |
| 2008 | 469,859     | 1,835,579 |



The university has greatly expanded in terms of student enrollment and residential housing; therefore, water usage per student has declined.

**EN22 TOTAL WEIGHT OF WASTE BY TYPE AND DISPOSAL METHOD**

Total waste generated by UMass Dartmouth in FY2011 was 1,477 tons. The recycled volume of waste was 177 tons, or 12% of total waste. The remaining 88% was municipal solid waste. These 1,300 tons of waste are sent to Crapo Hill Land Fill in New Bedford, MA. Methane gases created by decomposition within the landfill are collected through a system of perforated pipes installed throughout the landfill. The gas is piped to the electric plant operated by Commonwealth New Bedford Energy, LLC where it is burned in Caterpillar engines to generate 3.4 megawatts of electricity. The power is sold to NSTAR.

**EN 23 TOTAL NUMBER AND VOLUME OF SIGNIFICANT SPILLS**

There were no significant spills in the past fiscal year.

**EN 24 WEIGHT OF TRANSPORTED, IMPORTED, EXPORTED OR TREATED WASTE DEEMED HAZARDOUS**

There was no transported, imported, exported, or treated waste deemed hazardous in the last fiscal year.

**EN 25 IDENTITY, SIZE, PROTECTED STATUS, AND BIODIVERSITY VALUE OF WATER BODIES AND RELATED HABITATS SIGNIFICANTLY AFFECTED BY THE REPORTING ORGANIZATION'S DISCHARGES OF WATER AND RUNOFF**

There are no water bodies or related habitats affected by UMass Dartmouth's discharge of water and runoff.

**ASPECT: PRODUCTS AND SERVICES****EN 26 INITIATIVES TO MITIGATE ENVIRONMENTAL IMPACTS OF PRODUCTS AND SERVICES AND EXTENT OF IMPACT MITIGATION****Textbook Initiatives**

Textbooks play a significant role in the education of students. To reduce its environmental footprint, UMass Dartmouth applies several textbook initiatives involving used books, E-books, and their Greenfile Database.

**Used book & Book Buyback event**

The university's Campus Store, in accordance with the Higher Education Opportunity Act, discloses required textbook information at the time of course registration. The Campus Store reminds and encourages faculty to report their textbook adoptions on time each semester. In addition, the Campus Store holds a Book Buyback event at the end of each semester for a period of two weeks. During Buyback, students can recycle their textbooks by selling them back to the Campus Store. This reduces the total cost of textbooks for students who purchase the books used and for students who sell the books at buyback.

**E-books**

Due to advances in technology, E-Books (online versions of texts) have become increasingly popular. Usually the price of E-Books could be 60-80% of a new hardcopy price and the "assist functions" (such as directly highlighting and ability to record notes) in the E-Books improve the E-Book experience for students. Consequently, E-Books are an option that can reduce overall paper and printing use.

**Used books in the Claire T. Carney Library**

Libraries routinely remove books with outdated content from their collections so they can have more space for updating their collections. The Claire T. Carney Library at UMass Dartmouth cooperates with a discards-and-donations program that has been initiated by Better World Books library (BWB). The library undertakes subject area reviews resulting in the withdrawal of approximately 5,000 volumes from the collection every year. These withdrawn books are shipped free-of-charge to the BWB warehouse in Indiana where they are sorted with books from 350 other

academic and community libraries nationwide so that BWB can resell a small portion of books. Returned profits are 15% to the libraries and 5% are sent to a worldwide literacy-focused charity. The Claire T. Carney Library received a return of approximately \$1,035.00 from BWB with an additional \$200.00 sent to a world literacy effort in the first year. Although the value realized for the books is small, BWB offers an alternative to disposal in landfills.

### **Sustainability Academic Activity/Greenfile Database in Claire T. Carney Library**

Claire T. Carney Library has been subscribed to the Greenfile database with more than 200 titles and 300,000 records. This database is a free bibliographic database of information about environmental topics ranging from global warming to recycling to alternate fuel sources. It also focuses on the relationship between human beings and the environment.

### **Highlight from the library:**

#### **Claire T. Carney Library renovation project**

An extensive, \$31.5 million renovation of the Claire T. Carney Library was recently completed. In addition to bringing the outdated library up to date, the project brought the library up to LEED Certification standards. Items replaced with more efficient options during the renovation included light fixtures/bulbs, exterior glass, the HVAC system, toilets and sinks. The book stacks were also arranged to make best use of the natural light.

### **Sustainability Studies**

As an education institution, the university understands the importance of sustainability awareness and offers sustainability courses and programs to help familiarize students and other stakeholders with this and related topic(s). Specifically, UMass Dartmouth offers the Undergraduate Sustainability Studies Minor Program, Undergraduate Certificate in Sustainability Studies, Graduate Certificate in Sustainable Development, and MBA concentration in Sustainable Development. In addition to that, students in different colleges and programs (such as Mechanical Engineering, Business, Education, and Public Policy) can easily take sustainability related courses (i.e. Cross-List Sustainability Courses). It is also noted that there are three additional programs currently under development including Master of Science - Sustainable Development, a full undergraduate major course of study, and Ph.D. in Sustainable Development.

### **ALL CURRENT AND PAST SUSTAINABILITY & CROSS-LISTED SUSTAINABILITY COURSES**

- **ANT 420** - Senior Seminar: Dealing with Disaster
- **BIO 103** - Topics in Biology: Ecology
- **BIO 143** - Ecology and Environmental Issues
- **CEN 304** - Intro Environmental Engineering
- **CHM 130** - Chemistry and the Environment
- **DES 300** - Designing for Environment
- **ENL 101** - Critical Writing and Reading I
- **IST 444** - Sustainable Living
- **MAR 110** - Natural Hazards and the Ocean
- **MAR 545** - Stock Assessment of Fishery Resources

- **MAR 690** - Green Business: Principles and Practice of Sustainable Business
- **MGT 312** - Legal Framework Business
- **MGT 690** - Innovation and Creativity in Sustainable Management
- **MTX 110** - Environmental Science and Business
- **MTH 120** - Quantitative Reasoning
- **PSC/SUS 347** - Environmental Law
- **PHY 162** - Science, Tech & Soc.: Environment II
- **PHY 171** - Earth Science I
- **PHY 172** - Planet Earth II
- **PHY 183** - Intro Global Climate Change
- **PSC/SUS 235** - Environmental Policy
- **PSC 251** - World Political Issues and Ideas: Politics of Everyday Things
- **PSC/SUS 348** - Ocean Policy and Law (Staff)
- **PSC 400** - Seminar in American Politics & Ideas
- **PST 650** - Sustainability Education and Public Policy: Connecting for Change
- **SOC 381** - Social Impact of Science and Technology
- **SUS 201** - Topics in Sustainability (*Perception, Representation, and the World; Food; Consumption; Water; Coastal Zones*)
- **SUS 211** - Principles of Sustainability
- **SUS 250** - Readings in Sustainability
- **SUS296/396/495/496** - Independent/Directed Study
- **WMS 210**: Topics in Women's Studies: Women's Health and the Environment

For detailed description of the above courses, please follow this link:

<http://www.umassd.edu/sustainability/sustainabilitystudies/minorprogram/allcourses/>  
<http://www.umassd.edu/charlton/programs/graduate/mba/curriculum/>

### Office of Campus and Community Sustainability at UMass Dartmouth

The Sustainability Office is the sustainability resource center on campus. This office links together most on- and off-campus stakeholders, such as students, staffs, suppliers, neighbors, and communities. It works on developing sustainability assessments, planning for changes consistent with the UMass Dartmouth Climate Commitment, coordinating campus greening projects, holding Farmer's Market events, providing campus sustainability information and other sustainability-related programs including, but not limited to, Sustainability Film Series, and campaigns to improve sustainable practices and awareness in areas such as recycling, energy conservation, composting, and waste reduction. Further information can be found online at:

<http://www.umassd.edu/sustainability>.

### EN27 PERCENTAGE OF PRODUCTS SOLD AND THEIR PACKAGING MATERIALS THAT ARE RECLAIMED BY CATEGORY

UMass Dartmouth exists primarily to create and provide an environment for learning, service, and research rather than to sell or package products. However, inasmuch as UMass Dartmouth is involved in the purchase and sale of goods, it has a green purchasing policy. The university is a major purchaser of goods and services, and therefore has a responsibility to promote sustainable practices and has a green purchasing policy, known as the Environmentally Preferable Purchasing (EPP) Policy. The purpose of the EPP is to minimize the university's environmental impact through conserving natural resources, encouraging conservation, reducing utility usage and the

amount of materials that are land-filled, minimizing pollution, and supporting recycling while also promoting responsible and sustainable budget practices. To reach these goals, the university’s purchasing involves life cycle analysis and having specific guidelines for purchasing in different areas such as construction and building supplies, general and office supplies, janitorial supplies, and technology.

**ASPECT: COMPLIANCE**

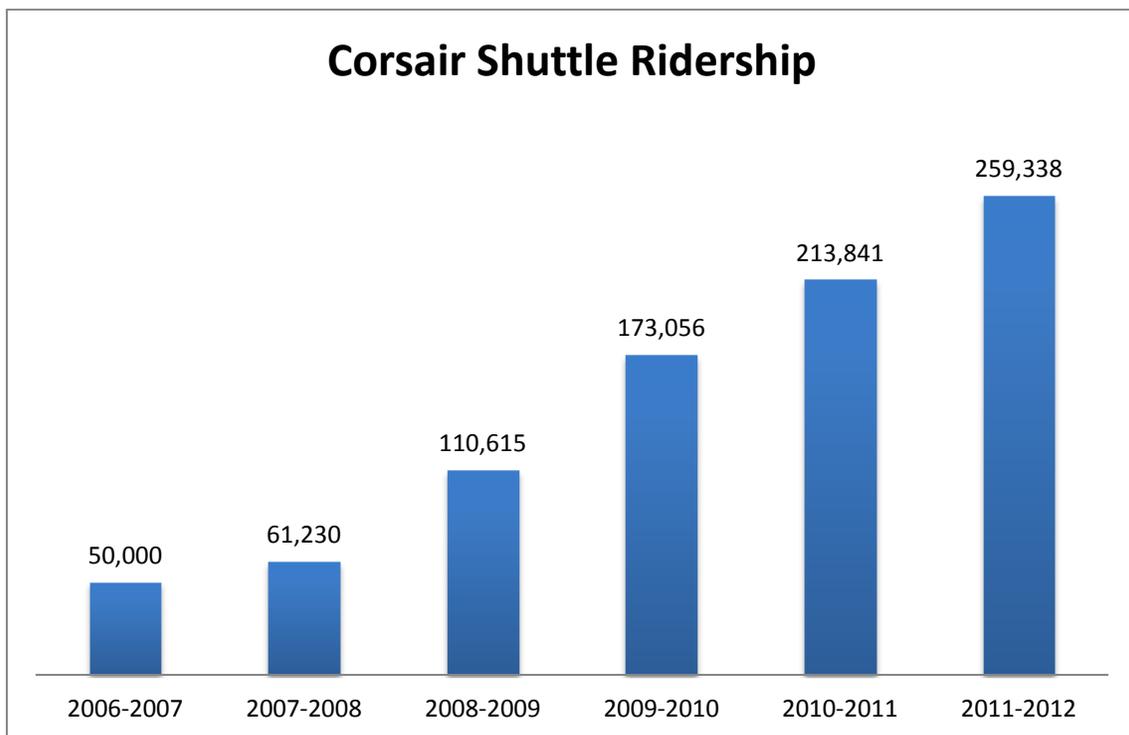
**EN28 MONETARY VALUE OF SIGNIFICANT FINES AND TOTAL NUMBER OF NON-MONETARY SANCTIONS FOR NON-COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS**

UMass Dartmouth has not been fined for environmental non-compliance during the last fiscal year.

**ASPECT: TRANSPORT**

**EN29 SIGNIFICANT ENVIRONMENTAL IMPACTS OF TRANSPORTING PRODUCTS AND OTHER GOODS AND MATERIALS USED FOR THE ORGANIZATION’S OPERATIONS, AND TRANSPORTING MEMEBERS OF THE WORKFORCE**

Transportation to and from, as well as around, the UMass Dartmouth campuses is a major contributor to the university’s environmental footprint. The university however, has several programs to combat this issue. The Corsair Shuttle is a shuttle van service that transports students around the main campus and to local shopping and retail locations. Shuttle ridership has steadily increased thanks to improved service, and the addition of covered waiting areas.



The university also operates a bus service, known as The Loop, which transports students from the Dartmouth campus to the Star Store campus in downtown New Bedford. A low cost bus pass (\$50 per month) gives students access to the following additional routes.

- UMass Dartmouth to New Bedford Terminal
- UMass Dartmouth to Fall River Terminal
- UMass Dartmouth to ATMC
- Fall River Terminal to Bristol Community College
- New Bedford Terminal to SMAST

In addition to the bus and shuttle services, the university also operates car-sharing and carpool programs. UMass Dartmouth is home to a branch of Zipcar, the world's largest car-sharing provider which allows users to reserve a car by-hour or by-day. This eliminates the need for resident students to bring their car on-campus. There are also carpooling programs which allow commuting students, who pledge to commute together, to purchase carpool-parking passes and split the parking costs.

## ASPECT: OVERALL

### EN30 TOTAL ENVIRONMENTAL PROTECTION EXPENDITURES AND INVESTMENTS BY TYPE

#### Campus Energy

The University of Massachusetts Dartmouth has made a conscious effort to minimize the energy used on campus. These efforts include the use of renewable energy in the form of solar panels and a wind turbine, updating old facilities with newer and more efficient ones, such as the Claire T. Carney Library renovation, and policy changes aimed at reducing energy use. The university's Energy Performance Contract is the largest such contract in the state at \$48 million. These efforts have led to decreased energy spending and decreased per-student energy consumption. Efforts will continue in coming years with projects such as a future cogeneration plant, with the ultimate goal of carbon neutrality.

#### Environmental

Many of the academic programs at the university have positive effects on biodiversity and the local environment. The university's proximity to the ocean makes it an important factor in the local marine environment. The School for Marine Science and Technology (SMAST) and the Massachusetts Marine Fisheries Institute (MFI) have research and education programs throughout the area.

#### Education

The university contributes to environmental protection by providing courses to educate their students on sustainability and related topics.