

Marina Design and Maintenance

Environmental Concerns

Land management decisions, operating procedures, and structural improvements may all contribute to—or detract from—the quality of the land and water surrounding your marina. Roads and parking areas may convey polluted stormwater directly into adjacent waterways. Dredging may resuspend toxic compounds such as heavy metals, hydrocarbons, and synthetic chemicals. Hazardous chemicals may be leached into the water from piers and other similar structures. Broken or degraded floats may release buoyant debris which birds and fish mistake for food. Finally, the location and installation of shoreside and in-water structures may lead to accelerated coastal erosion and sedimentation. Sedimentation is the rain of soil particles through the water column. It may bury bottom dwelling organisms, block sunlight, reduce the feeding efficiency of visual feeders, and clog fish gills.

Best Management Practices for Marina Facilities and Structures

Use Fixed or Floating Piers to Enhance Water Circulation. While being mindful of the need for pier/dock systems to provide access during routine operations and under emergency circumstances (e.g., evacuation preceding or during a storm), piers, and other structures should be placed to enhance, rather than to obstruct, water circulation.

- ❖ Select an open design for new or expanding marinas. Open marina designs have no fabricated or natural barriers to restrict the exchange of ambient water and water within the marina area.
- ✧ Install wave attenuators to reduce the force of incoming water, if protection is necessary. Wave attenuators do not restrict water exchange nor do they interfere with bottom ecology or aesthetic view. Furthermore, they are easily removed and do not significantly interfere with fish migration and shoreline processes.
- ✧ Design new or expanding marinas with as few segments as possible to promote circulation within the basin. The fewer the segments, the better the circulation.
- ✧ Use a de-ice bubbler system to aerate areas with poor circulation.

Use Environmentally Neutral Materials.

- ❖ For new pilings and other structures that are in or above the water, use materials that will not leach hazardous chemicals into the water and which will not degrade in less than ten years time, e.g., reinforced concrete, coated steel, recycled plastic, vinyl sheet piling.
- ❖ Be sure to contain shavings when field cutting plastic pilings and timbers.
- ✧ Avoid using wood treated with creosote for pilings and similar structures that

are in or above the water. Wood should be pressure treated to at least the minimum requirements recommended by the Southern Pine Council (<http://newstore.southernpine.com/images/ref322.pdf>). There is concern that these pressure treated timbers may also contribute to water pollution, however.

- ❖ Use naturally durable timbers conservatively. Black locust, cedar, chestnut, and white oak are naturally durable but expensive and may be hard to find.
- ❖ Avoid exotic timbers. Some tropical trees, such as greenheart and bongossi, are also naturally durable. Their harvest, however, is harmful to tropical forests.
- ❖ Purchase floatable foams that have been coated or encapsulated in plastic or wood. As these floats age, degraded foam is contained by the covering.

Limit Shaded Areas Over the Water.

- ❖ Near-shore bottom-dwelling organisms require sunlight. In order to provide them with as much sunlight as possible, limit the number of covered slips.

Minimize the Need for Dredging. New marinas must be located in areas where deep water access can be obtained with a minimum of excavation, filling, and dredging. Existing marinas that require maintenance dredging more frequently than once every four years should investigate practicable options to increase circulation or reduce sediment accumulation.

- ❖ Extend piers and docks into naturally deep waters.
- ❖ Locate slips for deep draft boats in naturally deep water.
- ❖ Dredge channels to follow the course of the natural channel.
- ❖ Provide dry storage for smaller boats.

Minimize the Impacts of Dredging.

- ◆ Do not dredge during critical migration or spawning periods of important species of finfish or shellfish (COMAR 26.24.02.06). Contact the Department of Natural Resources Environmental Review Unit to learn when these periods are.
- ◆ Avoid colonial waterbird nesting areas and historic waterfowl staging and concentration areas (COMAR 26.24.04.04).
- ◆ The State tidal regulations specifically prohibit:
 - mechanical dredging within 500 yards of shellfish areas December 16 to March 14 and June 1 to September 30;
 - hydraulic dredging within 500 yards of shellfish areas between June 1 and September 30; and
 - dredging between February 15 and June 15 in areas where yellow perch have been documented to spawn, and between March 1 and June 15 in areas where other important finfish species identified by DNR have been documented to spawn.
- ◆ Be certain that your dredging contractor selects an appropriate disposal site and containment design. The disposal site must have minimal impact on public safety, adjacent properties, and the environment. Dredge material must be disposed in accordance with the guidelines specified in COMAR 26.24.03.04-.05.
- ❖ Use dredging methods, like hydraulic dredging, that minimize environmental impacts.
- ❖ Use turbidity curtains to contain suspended sediments.



A Waterway Construction Permit and a Clean Water Act Section 404 Permit are required for all dredging projects.



Employ Nonstructural Shore Erosion Control Measures.

- ◆ Nonstructural measures, such as beach nourishment, marsh creation, and other methods that encourage the preservation of the natural environment are the preferred methods of shore erosion control (COMAR 26.24.01.01).
- ◇ If non-structural measures alone are not sufficient to control erosion, use revetments, breakwaters, or groins to stabilize and ensure the long-term viability of the non-structural controls.
- ◇ As a last resort, use structural controls in this order of preference: shoreline revetments, breakwaters, groins, and bulkheads.
- ◆ Minimize the adverse effects of erosion control projects on adjacent properties, navigation, threatened or endangered species, significant historic or archaeological resources, and oyster bars.

Conserve Water and Energy.

- ❖ Equip all freshwater hoses with automatic shutoff nozzles.
- ❖ Fix leaks and drips.
- ◇ Install “low-flow” faucets, toilets, and shower heads.
- ❖ Install CFL bulbs in all fixtures.
- ❖ Install motion sensors on lights in bathrooms and other rooms used intermittently.

Maintain Structures Using Clean Marina Practices.

- ❖ Scrape, sand, and paint in-water and land-side structures according to the same management principles as for vessels (refer to the Vessel Maintenance and Repair chapter).
- ◇ If feasible, move floating structures to shore for scraping, painting, and major repairs.

Best Management Practices for Protecting Sensitive Areas

Minimize Impervious Areas.

- ❖ Keep paved areas to an absolute minimum, e.g., just designated work areas and roadways for heavy equipment.

Use Upland and Inland Areas.

- ❖ Locate buildings, workshops, and waste storage facilities in upland areas, away from fragile shoreside ecosystems, to the greatest extent possible. Upland areas also provide a measure of protection against floods.
- ❖ Locate parking and vessel storage areas away from the water where feasible.
- ◇ Consider inland areas for boat repair activities and winter storage. Use hydraulic trailers to quickly and easily move boats to inland storage locations.

Expand Upward.

- ◇ Rather than adding wet slips, expand storage capacity by adding dry-stack storage. Boatels provide the following environmental benefits:
 - Dry-stacked boats do not accumulate marine growth. Consequently, toxic antifouling paints are not necessary and the associated need to wash, scrape, and paint is eliminated.

- Dry-stacked boats are less likely to accumulate water in their bilges. They are, therefore, less likely to discharge oily bilge water.
- ❖ Control stormwater runoff from dry-stack areas as well as from any expanded parking areas.
- ❖ Keep forklifts well-tuned to prevent grease or oil from dripping onto staging areas or into the water.
- ◆ Locate boatels outside of the 100-foot Critical Area buffer as they are not water-dependent facilities.

Conserve Sensitive Land.

- ❖ Provide a serene setting for your marina by placing adjacent, sensitive land in a conservation trust. Income, estate, and property tax benefits are available.
- ❖ Participate in Maryland Environmental Trust's Conservation Easement Program to preserve farmland, forestland, waterfront, wetlands, rare or unique areas, scenic areas, endangered species habitat, historic properties, and open space.
- ❖ Sell or donate the land (or the development rights to the land) to a local land trust or a non-profit organization such as The Nature Conservancy.

Practice Water-wise Landscaping. Save on water bills, reduce your maintenance activities, and protect water quality by minimizing your water use.

- ❖ Water only when plants indicate that they are thirsty: shrubs will wilt and grass will lie flat and show footprints. Water in the early morning or early evening as temperatures generally are cooler. Plants will not be shocked and water loss to evaporation will be minimized.
- ❖ Select plants that are suited to the existing conditions (i.e., soil, moisture, and sunlight) so that they will require little care in terms of water, fertilizer, and pesticides. Refer to Appendix III for a sampling of beneficial plants.
- ❖ Water deeply and infrequently rather than lightly and often. Deep watering promotes stronger root systems which enable plants to draw on subsurface water during hot spells and droughts.
- ❖ Select equipment that delivers water prudently. Sprinklers work well for lawns.¹ Soaker hoses or drip irrigation systems deliver water directly to the roots of shrubs, flowers, and vegetables with minimal loss to evaporation.
- ❖ Place mulch (wood chips, bark, grass clippings, nut shells, etc.) to a depth of 3-4" around plants to keep water in the soil, prevent weeds, and reduce the amount of sediment picked up by stormwater. Planting groundcover at the base of trees serves the same function.

¹ For best results, water grass to a depth of 1". Refer to Appendix III to learn how to calculate the time needed for proper water application



Landscape with native plants that require little care in terms of water, fertilizer, and pesticides.

- ❖ Group plants with similar water needs together. This practice will ease your maintenance burden, conserve water, and benefit the plants.
- ✧ Replace lawn areas with wildflowers, groundcover, shrubs, and trees.
- ✧ Recycle “gray water.” Gray water is water that has been used once—maybe for dishwashing or in a washing machine—but is not overly contaminated. It can be filtered and used to water landscaped areas. Because regulations vary, be sure to check local ordinances for permit requirements and written approval before pursuing this option.
- ✧ Collect rainwater by directing downspouts into covered containers. Use the collected water on your landscaped areas.

Adopt Integrated Pest Management Practices. Because of your proximity to the water, it is important to avoid toxic lawn and garden chemicals to the greatest extent possible. Instead, deter unwanted plants or animals with Integrated Pest Management practices. Integrated Pest Management employs preventive, cultural, biological, and chemical methods to control pests while minimizing impacts to non-target species, wildlife, and water quality.

- ❖ Select plants that are disease and insect resistant, that will out-compete common weeds, and that can thrive on your property. Refer to the BayScapes list of native plants (Appendix III) and consider the degree of sun exposure, slope, drainage, amount of shade, wind, volume of foot traffic, soil type, temperature variations, and other environmental factors.
- ❖ Mow lawn areas properly to suppress weeds. Varieties of grass that grow better in cooler weather should be mowed to no less than 2.5 inches in height. Grasses that grow better in warm weather should be mowed to no less than 1.5 inches.
- ❖ Pull weeds by hand to reduce reliance on herbicides.
- ❖ Boost your own tolerance for weeds and other pests. If it is not actually harming anything, leave it alone.
- ❖ Foster natural predators such as spiders, praying mantis, dragonflies, lacewings, soldier beetles, birds, bats, frogs, lizards, and certain snakes and toads.
- ❖ Use natural agents such as milky spore disease for grubs and Japanese beetles, *Bacillus thuringiensis* (BT) to control mosquito and small moth larvae, and sabadilla for chinch bugs.
- ❖ Use pesticides only after all other options have been exhausted. Use organic alternatives to chemical pesticides. Also, rather than broadcasting pesticides, apply them directly to problem areas.
- ❖ Treat only serious or threatening intolerable pest infestations.
- ❖ Purchase the least toxic chemical in the smallest amount practical.
- ❖ Do not use pesticides just before a rainfall or on a windy day.
- ❖ Apply insecticides during the evening when honeybees and other beneficial insects are less active.
- ❖ Do not apply pesticides near water, e.g., shore, wells, streams, ponds, bird baths, swimming pools, etc.

Best Management Practices for Creating Habitat Areas

Maintain and/or Develop Vegetated Areas. Vegetation filters and slows the flow of surface water runoff, stabilizes shorelines, and provides wildlife habitat, flood protection, and visual diversity.

- ❖ Maintain vegetated buffers (grassy or wooded) between all impervious areas (e.g., parking lots, boat storage areas) and the water.
- ❖ Plant vegetated areas with “beneficial” plants: those plants that require minimal care in terms of trimming, watering, and applications of fertilizer and pesticides. Native, or indigenous, plants demand little care since they are adapted to the local climate and soil types. Also, many horticultural varieties and imported plants may be considered beneficial if they have few maintenance requirements and if they do not displace naturally occurring vegetation (that is, if they are not invasive). Refer to Appendix III.
- ❖ Select perennial plants instead of annuals. Perennial plants need only be planted once, tend to shade out most weeds, and few require additional water or maintenance.
- ❖ Choose plants that bear flowers, fruit, nuts, and seeds to attract birds, small mammals, and other wildlife.
- ❖ Maintain proper soil pH and fertility levels. Fertility describes the presence of nutrients and minerals in the soil. Acidity and alkalinity levels are indicated by pH. These two measures together tell you which plants your soil can support. Soil pH may be adjusted by adding lime (base) or gypsum (acid). Add organic matter such as compost, leaf mold, manure, grass clippings, bark, or peat moss to improve fertility.
- ❖ Annually, submit a soil sample to the University of Maryland’s Cooperative Extension Service to determine fertility, pH, and application rates for soil amendments.
- ❖ Foster beneficial critters. For example, earthworms move through the soil feeding on microorganisms. In the process, they aerate the soil, improving the flow of water and air to plant roots.
- ❖ Compost leaves, branches, grass trimmings, and other organic matter. Use the mature compost to nourish your soil. Alternatively, chip branches and leaves and use as mulch to discourage weeds and to conserve moisture. More complete information on composting is available from the University of Maryland’s Cooperative Extension Service.

Participate in Oyster Restoration Programs. Oyster reefs provide food and habitat for hundreds of animals. The oysters themselves improve water quality by filter-feeding on microscopic algae. A single 3-inch oyster can filter up to 50 gallons of water a day. Benefits accrue to marinas as well. Jonathan Jones of Haven Harbour Marina in Rock Hall noticed that his tenants became more cautious about waste disposal once he began participating in an oyster restoration program.

- ❖ Become an oyster “gardener.” Work with the Chesapeake Bay Foundation to build and install a float system for growing oysters. You will tend to seed oysters for 12 to 14 months, after which time the oysters will be transplanted to non-harvested oyster bars. Do not eat oysters grown in marinas! They will likely contain heavy metals from bottom paints and possibly bacteria from sewage discharges.

Information Sources

Appendix I

Alliance for the Chesapeake Bay

Chesapeake Bay Foundation

Cooperative Extension Service

Maryland Department of Natural Resources

- Environmental Review
- Fisheries Service

Maryland Department of the Environment

- Water Management Administration

Maryland Environmental Trust

The Nature Conservancy

U.S. Fish and Wildlife Service

Appendix III

BayScapes Program