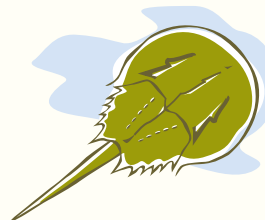


PROTECTING THE INLAND BAYS

A Waterfront Property
Owner's Guide



DELAWARE CENTER FOR THE
INLAND BAYS
Research. Educate. Restore.

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The Inland Bays

This Is Home

Source: J&J Photography

For those who are lucky enough to call the Delaware Inland Bays home, we get to experience the unique charm and the natural beauty of their shorelines each day. The waters of the Rehoboth, Indian River, and Little Assawoman Bays are a naturally dynamic and changing environment, but human activity and climate change are driving unexpected shifts.

Our home is a shared one. This sense of pride and ownership extends from one backyard to the next, creating an extraordinary network of

full-time and seasonal residents with a common bond. The Bays and their tributaries drain a landmass—called a “watershed”—of about 320 square miles. It is essential that all members of this community take action to help manage and protect our shorelines and the greater watershed, ensuring that the Inland Bays remain a special home for generations to come. This guidebook and the information and strategies inside are essential tools for preserving and enhancing the Inland Bays.

A unique and dynamic ecosystem

The Delaware Inland Bays are three shallow, interconnected coastal lagoons separated from the Atlantic Ocean by a narrow barrier island. As a result, these estuaries contain a mixture of freshwater—which enters the Bays through groundwater, stormwater runoff, and tributaries—and saltwater, which reaches the Bays through inlets carved into the barrier islands.

Congress designated Delaware’s Inland Bays an “estuary of national significance” in 1988.

“The environment is where we all meet; where all have a mutual interest; it is the one thing all of us share.”

Lady Bird Johnson



Did you know?

One square mile of salt marsh stores enough atmospheric carbon dioxide to offset the equivalent of 76,000 gallons of gasoline consumption annually.

32 square miles of water

7,300 acres of salt marsh

Average depth of the Bays: **3-8** feet

An environmental haven

Estuaries are incredibly rich and productive ecosystems whose salt marshes and shellfish filter pollutants and sediments from freshwater that drains into them. Estuaries also provide a crucial buffer for upland areas, protecting them from storm and flood damage and preventing erosion.

The Inland Bays contain more than 112 species of finfish and 40 species of shellfish and are a critical stopover area for migratory and resident birds. Let's take a look at some of the wildlife that call the Bays' diverse habitats home:

112

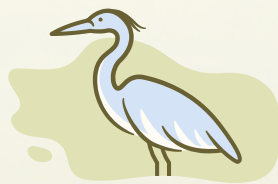
species of finfish

40

species of shellfish

Economic contributions of the Bays

Because the Bays are home to some of the region's most commercially important fish, they support hundreds of thousands of recreational fishing trips every year and offer a critical nursery for the commercial fish and shellfish industries. This is not to mention all the other recreational draws for nature lovers and outdoor enthusiasts, including boating, bird-watching, water sports, and more. The recreational activities in the Bays contribute a great deal to Delaware's multibillion-dollar coastal economy.



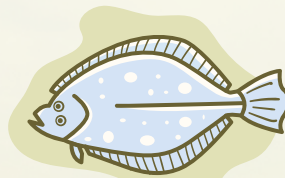
Maritime forest:

Ospreys, herons, egrets, bald eagles



Freshwater wetlands and tributaries:

Spawning and nursery habitat for striped bass, herring, shad, American eels



Shallow open waters:

Flounder, weakfish, tautog, blue crabs



Intertidal flats: Fiddler crabs, hermit crabs, snails, hard clams



Sandy beaches: Critical nesting habitats for diamondback terrapins, horseshoe crabs



Salt marsh: Ribbed mussels, marsh periwinkles, clapper rails, mummichogs, juvenile fish





Source: Chris Bason

Threats to Delaware's Inland Bays

Land-use evolution

The population of the Inland Bays watershed has increased dramatically over the past three decades, and the way in which we use the land has changed. Farms and forests are rapidly being replaced by developments, which grew by 31 square miles from 1992 to 2017. And with development comes impervious surfaces: Parking lots, roadways, and roofs now cover around 12% of the watershed's land area. Studies show that anything over 10% results in detrimental impacts to water quality.

As the watershed urbanizes, the loss of forests, wetlands, and natural shorelines impacts both migrating and resident animal populations in and near the Bays. Blue crab populations remain low, and abundant beds of bay grasses—a characteristic of healthy coastal bays—are still largely absent from the Inland Bays due to nutrient pollution.

Nutrient pollution

Overall, water quality in the Inland Bays is rated fair to poor. This is attributable, in large part, to nutrient pollution from nitrogen and phosphorus, which remains the greatest threat to water quality in the Bays.

Agricultural fertilizers, application of wastewater to the land, and runoff from urban areas and septic systems are among the greatest sources

of nutrient pollution to the Inland Bays. Excess nutrients fuel algal blooms that reduce the amount of oxygen in the water, killing fish and other aquatic wildlife. But nutrient pollution isn't just bad for the Bays—it can be bad for human health too. High nitrogen levels in drinking-water aquifers have been associated with cancers and birth defects.

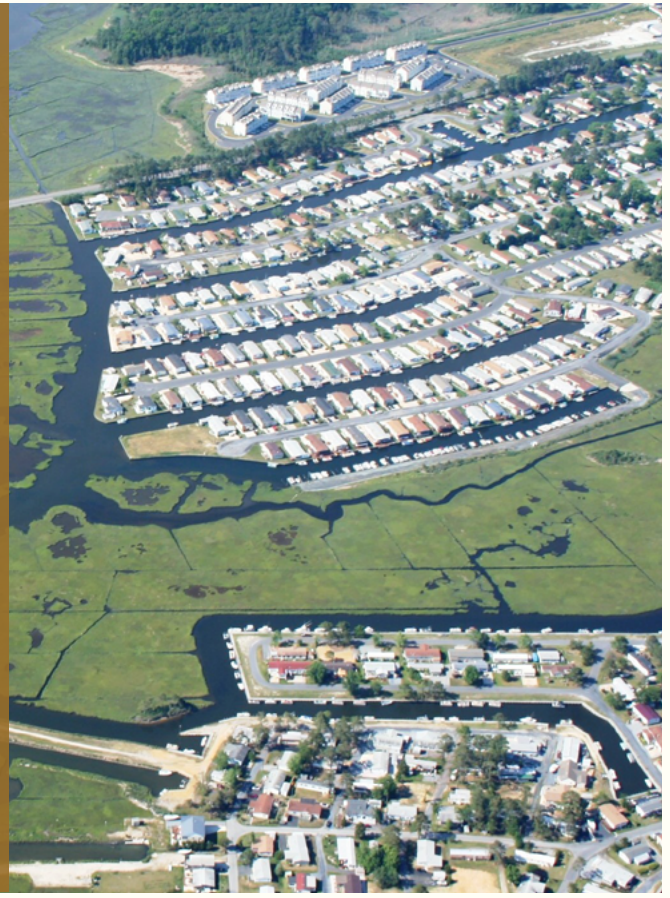
“We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.”

Aldo Leopold

Loss of forests and wetlands

Salt marshes provide highly valuable services to people and wildlife alike. They reduce flooding and erosion from storms, filter pollutants, trap and store carbon, and provide critical habitat for fish and other wildlife. Residential and commercial development along with sea-level rise threaten the diverse habitats across the Inland Bays watershed, including forests and wetlands.

In addition to facing threats from sea-level rise, salt marshes are drowning because old ditches dug to control mosquitoes are causing water to be trapped at the surface. The total acreage of salt marsh fringing the Bays is currently around 7,300 acres—a net loss of more than 3,500 acres since 1938.



Climate change and sea-level rise

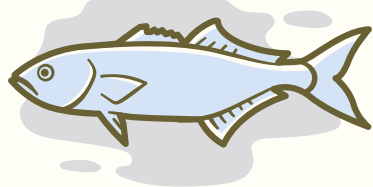
Habitat loss and sea-level rise driven by climate change are critical issues threatening the Inland Bays and the animals and plants that live here. The state of Delaware has the lowest mean elevation in the United States at just 60 feet, and the state's coastal communities have an even lower elevation on average. For example, the average elevation in Dewey Beach is about 8 feet. Delaware's flat topography and relatively low elevation make it particularly susceptible to the potentially devastating impacts of sea-level rise on coastal communities, infrastructure, and economies. Furthermore, the combination of ocean currents and sinking land makes Delaware's coast a hotspot for sea-level rise, as waters here are rising faster than in other areas along the Atlantic Coast.

Sea levels have already risen significantly—13 inches over the past 100 years—and because of the continued effects of climate change, waters will continue to encroach upon our shores. In fact, Delaware is projected to experience a sea-level increase of as much as 5 feet by the year 2100. Everyone will be impacted, and waterfront property owners will need to learn more about how to prepare for these conditions. This includes ensuring that you have flood insurance, but it also means learning key property-maintenance strategies to minimize storm and flood damage.

Meanwhile, plants and animals that rely on shoreline habitats need the support of Inland Bays residents more than ever to survive.

Did you know?

The baitfish in the Inland Bays, which depend on salt marshes and natural shorelines to reproduce and grow, are a key resource for local game fish, including bluefish. Bluefish, in turn, support recreational and commercial fisheries along the Atlantic Coast.



How-Tos for Inland Bays Homeowners

“What is the use of a house if you haven't got a tolerable planet to put it on?”

Henry David Thoreau

With their spectacular views, iconic wildlife, and diverse recreational activities, the Inland Bays are a truly special place to live. But owning a waterfront property can also present challenges for homeowners who want to preserve this unique environment and protect their investment. Some of the most common questions we receive at the Delaware Center for the Inland Bays are related to preventing or managing flooding and

erosion, as well as best practices for sustainable living and maintaining vegetation.

The solutions laid out in this book will not only provide guidance on how to protect your piece of paradise but also practical strategies that you, as a homeowner, can implement to do your part in enhancing the Inland Bays and their surrounding watershed.



Navigating your Homeowners Association (HOA) and local regulations

In order to make decisions on how to mindfully manage your waterfront property, you'll first want to ensure that you know where your property lines are. For instance, does your property end at the shoreline, or before?

Then, you'll need to review any HOA and/or local ordinances that may apply to your property. Follow these steps:

- STEP 1**
Check your deed restrictions
- STEP 2**
If you live in an HOA, check the appropriate governing documents
- STEP 3**
Check town or county ordinances and possibly [state regulations and guidance](#)

Understanding Stormwater Runoff & Groundwater Contamination

“Do unto those downstream as you would have those upstream do unto you.”

Wendell Berry

What's in stormwater runoff?

Do you know where the rainwater that falls on or near your property actually goes—and what it carries with it? In undeveloped landscapes, a large percentage of the rainwater that falls over land will soak into the ground. But in developed areas, much of the soil may be covered by impervious surfaces such as pavement. This forces that water to flow over the ground's surface, where it collects and carries pollutants that contaminate the Inland Bays and their tributaries.



Source: Delaware Livable Lawns Program

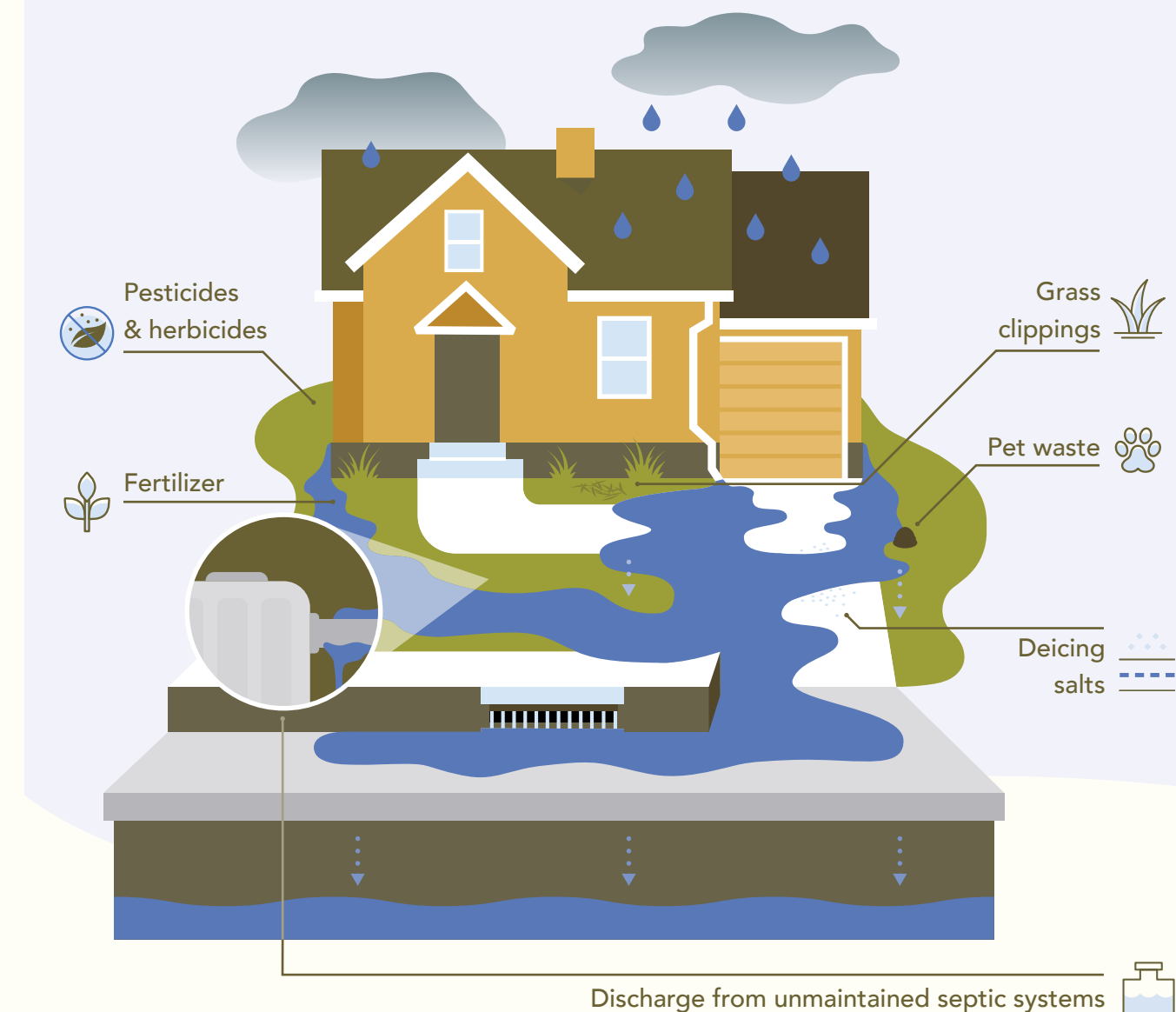
Groundwater pollution

Fertilizers and pesticides are also likely to leach into groundwater. Groundwater is any water below the earth's surface, and below the water table, that runs through spaces and cracks between the soil. In the Inland Bays watershed, almost all of our drinking water is from groundwater aquifers. The Inland Bays' sandy soils are more permeable than most, meaning

water travels through them relatively easily—and, as a result, pollutants can more easily enter our groundwater.

Groundwater pollution can contaminate well water and will eventually discharge into surface waters, contributing further to the pollution of the Bays.

Stormwater and groundwater may be contaminated with:



Best practices for minimizing runoff and groundwater contamination

Adopting small improvements like these can make a positive impact and help protect the Inland Bays and their watershed, starting right on your property.

- **Redirect or disconnect downspouts and gutters**

Oftentimes, gutters and downspouts direct rainwater onto paved surfaces such as driveways. Some even drain directly into a storm drain or nearby canal. Homeowners can disconnect or redirect these downspouts to flow into an area of the property where the water can soak into the ground, such as a lawn or garden, so long as this does not risk inundating structures.

- **Landscape with stormwater in mind**

Limiting or eliminating the usage of fertilizers, reducing runoff by planting native trees, installing rain gardens (landscaped depressions that collect runoff from impervious surfaces), and avoiding the disposal of grass clippings and leaves into storm drains or canals are significant ways you can protect the quality of the Bays.

- **Reduce impervious surfaces**

Using alternatives such as pervious asphalt or concrete, or permeable pavers, allows rainwater to soak into the ground while also helping to filter out potential pollutants that could otherwise reach the Bays.

- **Minimize contributors to groundwater pollution**

Reducing your usage of fertilizers, pesticides, and herbicides will help prevent these chemicals from entering groundwater reserves. See the “Landscaping & Gardening Tips” section of this guide to learn how using native plants and other tactics can help you minimize chemical use. Meanwhile, check out the “Managing Septic Systems & Wastewater” section to learn the importance of maintaining your septic system to prevent contaminants from wastewater reaching the Bays.

- **Report a problem**

You can help protect the Bays by reporting cases of pollution entering local waterways. Infractions may include spills of oil or other hazardous waste, filling-in of wetlands areas, and unauthorized wastewater discharges. If you notice any strange odors near a storm drain or dead fish in nearby waters, it can be a sign of pollution and should be reported.

Delaware Natural Resources and Environmental Control (DNREC)
Environmental Crimes Unit: (800) 662-8802



Landscaping & Gardening Tips



Source: Lorene J. Athey

With skill and care and knowledge, we can ensure that there is still a place on Earth for birds in all their beauty and variety—if we want to. ... And surely, we should.



Sir David Attenborough

Your very own nature preserve

With natural areas increasingly disappearing as a result of development, sea-level rise, and other human activities, it's time to reconsider what a yard can be. Your landscaping doesn't have to be just for decoration. Instead, your property can be a crucial preserve for those native Delaware plants and animals that have lost much of their habitat.

Our local landform is designated as a coastal plain. Coastal plains are low-lying, sea-adjacent landmasses, and are common around the world. The soils are sandy, the wind may carry salt spray, and wetlands abound. The flora that are native to the Inland Bays watershed maintain a naturally balanced ecosystem, but the threats of pollution and invasive species—harmful plants and animals not native to the area—can disrupt this delicate balance.

Fortunately, you can help restore what's been lost and remove what doesn't belong, starting right in your own yard. In this section, we'll share practical strategies for prioritizing native plants and combating invasive species.



Prioritizing native plants

Homeowners in the Inland Bays—or anywhere, for that matter—should try to landscape and garden with native plants and trees whenever possible and ensure that any non-native varieties they use are not invasive. In fact, replacing areas of grassy lawn with native plants can have some huge benefits. Let's take a look.



Source: Doug Tallamy

Chicks of almost all native songbirds depend on a diet of insects, like caterpillars, that need native plants to survive.

Why it's important

- **Native plants are well equipped for life in the Inland Bays watershed**

They're adapted to the soil and salinity, the wind and the waves. Their root systems are longer and can slow down runoff into local waterways.

- **Native plants can reduce pollution**

Fertilizers and pesticides can devastate waterways, but native plants require no fertilizer once they've been established. And less grass means less mowing, which cuts down on a source of air pollution.

- **Local animal species rely on native flora**

Birds, butterflies, and other wildlife depend on native plants for shelter and food; non-native plants don't support the food resources that most native species need. And shoreline environments are particularly important habitats for many of these species.

- **Native plants can reduce water usage**

Lawns can require substantial watering over the course of a year. Native plants that thrive within the typical climate of the Inland Bays can greatly reduce your annual water usage—and your water bill.

- **Native plants save you time and money**

Native plants require less maintenance overall, and this reduces the time and money you spend on landscaping and gardening.



Six strategies for planting native flora

1. *Remove invasive plants as soon as possible:* Invasive plants can be harmful to native plants and animals, so it's essential to remove them before they spread. Replace them with natives whenever possible.
2. *Use as many native plants as you can:* Aim for 100% of your plants to be native to the region. At least 50% is a great start to reaching that goal over time.

Tip: If planting all natives right away isn't an option, consider replacing non-natives when they die with native plants. That way, you can make the transition gradually.
3. *Water and fertilize minimally:* Once native plants are established, you no longer need to water them as often—and you won't need to fertilize them at all.
4. *Cut down on your lawn size:* Limit lawn areas to places where it's most functional, such as walking areas or places for play.
5. *Make your yard a Certified Wildlife Habitat:* Provide food, water, cover, and places for wildlife to raise their young. Visit the Delaware Nature Society's [Garden for Water and Wildlife program](#) to learn more.
6. *Put the right plant in the right place:* Depending on whether your yard abuts saltwater or freshwater, see page 21 for a few recommendations for great native plants to establish.



Pictured: Beach plum

Pictured: Seaside goldenrod



- Important for fall monarch butterfly migration








- Erosion control
- Water filtration
- Fall/winter berries important for birds, especially yellow-rumped warblers

- Erosion control
- Produces flowers and edible plums

Pictured: Eastern red cedar

Saltwater

-  **Saltmarsh cordgrass**
(*Sporobolus anterniflorus*)
-  **Saltmeadow cordgrass**
(*Sporobolus pumilus*)
-  **Marsh elder**
(*Iva frutescenes*)
-  **Groundsel bush**
(*Baccharis halimifolia*)
-  **Seaside goldenrod**
(*Solidago sempervirens*)

Freshwater

-  **Southern bayberry/wax myrtle**
(*Morella cerifera*)
-  **Marsh/seashore mallow**
(*Kosteletzkya pentacarpos*)
-  **Beach plum**
(*Prunus maritima*)
-  **Dune grass**
(*Ammophila brevilgulata*)
-  **Eastern red cedar**
(*Juniperus virginiana*)

Using fertilizers

Fertilizers pollute waterways, so you should avoid using them whenever possible. Here are a few strategies for minimizing their use while maximizing their effectiveness:

- Have your soil tested for fertilizer needs by the University of Delaware Cooperative Extension.
- Use compost or natural organic fertilizers instead of synthetic chemical fertilizers.
- Never apply fertilizers within 50 feet of water or impervious surfaces.
- Never apply fertilizers before a forecasted heavy or long-term rain event.
- In the Inland Bays watershed, fall is the most effective season for fertilizing your lawn. Spring fertilizing might cause short-term growth, but this will ultimately deplete your grass' energy and make it less likely to survive the summer.

Combating invasive species

Invasive plants can destroy wildlife habitat and overwhelm and displace native plants by competing for light, space, water, and nutrients. And that's not just limited to your property: They spread to other people's properties and natural areas where they destroy wildlife habitat. As a result, they can be costly. According to the U.S. Fish and Wildlife Service, invasive species cost the United States billions of dollars annually.



Identifying invasive species

The unfortunate reality is that many invasive plants have already taken up residence in many Inland Bays backyards, and more are arriving. Some of the most common invasive species found in the Inland Bays include:

- Common reed (*Phragmites*)
- Japanese honeysuckle
- Oriental bittersweet
- Chinese privet
- Exotic bamboos
- Bradford pear
- Japanese knotweed
- Wisteria
- English ivy
- Maiden hair grass

Not sure if you have invasive plants in your yard? Visit inlandbays.org/property-guidebook for resources to help you differentiate native flora from non-natives.

Removing invasive plants

There are two main approaches to removing invasive plants: mechanical and chemical. Once you've identified an invasive species, it's time to mindfully choose your strategy.

Mechanical removal is a great place to start, as it doesn't introduce chemicals or other potential contaminants into the environment. Mechanical techniques include:

- **Pulling and digging:**
Removing a plant's root system is a great way to ensure these species don't return.
- **Suffocation:**
Smothering small seedlings and plants with layers of plastic or mulch for several seasons can kill the invasive species.
- **Cutting or mowing:**
Cutting or mowing a plant regularly can limit or completely eliminate its ability to photosynthesize. Be sure to do so before it sets seed.

Chemical removal should be your last alternative, as chemicals can have a lasting impact on the environment. But they are necessary to control certain invaders such as *Phragmites*. The two most broadly useful herbicides are glyphosate and triclopyr. Make sure to take these precautions:

- **Don't broadcast spray:**
Focus spray on specific, targeted areas and individual plants, applying it around the bottom of the plant or the stump.
- **Pick your product carefully:**
If you're spraying near water, you'll need to use a chemical formulation specifically labelled for aquatic use. For instance, when spraying in dry upland areas, you can use any formulation containing the active ingredient glyphosate, such as common Roundup®. But in wetland areas, you must use a formulation that is labeled "FOR AQUATIC USE," such as Rodeo® or Aqua Star®.

Got *Phragmites*?

Phragmites can be an especially difficult plant to remove. If you or your community have more than 5 acres of *Phragmites*, you may qualify for financial assistance under the *Phragmites* Control Cost-Share Program offered by DNREC's Division of Fish and Wildlife, which can cover a majority of the cost of removal.

To learn more, visit the [DNREC Division of Fish and Wildlife's](http://dnrec.delaware.gov/fish-wildlife/) website.



Managing Septic Systems & Wastewater

“Land and water are not really separate things, but they are separate words, and we perceive through words.”



David Rains Wallace

The impact of septic systems

Onsite wastewater treatment and disposal systems—commonly known as septic systems—are a large source of nutrient pollution in the Inland Bays. When you don't properly maintain your septic system, more pollution is likely to end up in groundwater and the Bays. There, they can reduce oxygen levels in the water, harming or even killing fish and wildlife.

Contaminants from wastewater can also pose a threat to public health, leading to the spread of bacteria and disease. If you own a holding tank or septic system that does not have a high efficiency for nutrient removal, the most effective thing you can do to minimize its pollution is to see whether your property is eligible to hook up to a central sewer system. Visit the County's [sewer and water web page](#) for more information.

If that's not an option right now, it's important to understand how to properly maintain your septic system. Have conventional systems pumped by a septic service professional at least every 3 years. When installing a new system, your property may be required to use an innovative/alternative (I/A) system that provides a higher level of treatment. The maintenance requirements vary depending on the type of system. To learn more about septic system maintenance and inspection requirements to protect the Bays, as well as your and your family's health, visit inlandbays.org/property-guidebook for additional resources.

Did you know?

Before a change in property ownership, a household septic system must be pumped and inspected by a service professional. Should it not pass inspection, actions must be taken to bring the system into compliance. This includes replacing the entire system if necessary to meet current standards and regulations.



Building Buffers to Protect Wetlands & Wildlife



Plans to protect air and water, wilderness and wildlife are in fact plans to protect man.



Stewart Udall

The benefits of buffers

Buffers are natural areas that separate developed land uses, such as houses and roads, from wetlands and water in order to protect these features from human encroachment and pollution. Often called “riparian” buffers because of their proximity to waterways, they provide some of the region’s most ecologically functional and biologically diverse habitats.

Buffers also protect existing habitats, especially wetlands, which are essential to filtering

pollutants and protecting the quality of our drinking water, streams, rivers, and Bays. Sussex County is home to 47% of Delaware’s wetlands but has already lost about half of its original wetlands due to drainage, development, and sea-level rise. All of this means that preserving and enhancing buffers on waterfront properties in the Inland Bays is a critical step to protecting the environment and maintaining property values.

Key benefits of buffers include:

- Removing pollutants from groundwater and surface water runoff
- Providing habitat and travel corridors for wildlife, especially birds
- Allowing the natural inland migration of tidal wetlands as sea levels rise
- Protecting shallow-water habitats such as bay grass meadows
- Sustaining open space, property values, and the rural character of the Bays
- Acting as a natural sponge to reduce flooding

Requirements and essentials for effective buffers

At the time of this publication, Sussex County required a buffer of natural vegetation at least 50 feet wide along tidal waters and wetlands, as well as perennial streams, in developments that were approved by the county after 1988. Certain towns around the Inland Bays, such as Ocean View, also have their own buffer requirements.

Even if these regulations don’t apply to your property, a good rule of thumb is that the wider the buffer, the better. Wider buffers keep more pollution out of wetlands and waterways. They also offer more and higher-quality habitat for wildlife.

Elements of a buffer

Ensuring your buffer has many layers of vegetation, from the soil to the canopy, provides more nooks and crannies where wildlife can live and minimizes erosion and pollutant runoff.

Did you know?

Forested buffers are 36% more effective at nitrogen removal from runoff and groundwater than grassed buffers. Excess nitrogen can cause excessive aquatic plant growth, which can be harmful to animals, and can also pose a risk to human health.

Elements of a typical buffer include:



Plant roots

Create porous soil to maximize water absorption, reduce runoff, and hold soil to help prevent erosion



Understory

Provides food and shelter for wildlife such as birds



Ground vegetation & leaf litter

Traps and filters pollutants, provides habitat for insects and invertebrates



Canopy

Branches and leaves of trees slow the speed of falling rain, minimizing erosion

Example of a forested buffer along Love Creek

Managing and enhancing buffers

Mature buffers that are populated with native plants require little to no maintenance. In fact, the less you disturb them, the better. Consider the following approaches to improve or expand an existing buffer.

- **Widen your buffer:**

The wider your buffer is, the more benefits it provides.

- **Mulch around new plants:**

If a “duff layer” of leaves, twigs, and other organic material doesn’t yet exist, add 3–4 inches of wood-fiber or pine needle mulch that can serve as a natural fertilizer, stabilize soil, and help retain moisture.

- **Increase planted groundcover:**

This can be used as an alternative and complement to mulching. Establish native grasses or aesthetically pleasing low-growing plants such as partridgeberry, sedges in the genus *Carex*, or ferns.

- **Remove invasive plants and add diversity and complexity with native species:**

The more layers of plants you can provide, the better. Planting a diverse mix of native flora ensures the resilience of the buffer and attracts a variety of wildlife.

- **Leave dead trees if they do not pose a potential danger:**

Many wildlife species require dead trees, fallen or standing, as a source of food and place to nest. Natural debris like leaf litter and sticks in forested areas provide cover for small wildlife as well.

- **Never throw yard waste into buffer areas and don’t rake into buffers:**

Compost grass clippings and other yard waste for a source of free fertilizer.

- **Frame your view:**

Buffers don’t have to block water views; in fact, they can frame and enhance them. Plant taller trees to surround the view, choosing species such as oaks that can be pruned if needed. Establish lower-growing shrubs between these trees to create a focal point.

Reporting buffer mismanagement

Any activities that disturb the water or soil may require a permit. These activities include adding or removing fill to a wetland area, dumping sediment in the water, installing a pond, or changing water flow. To protect the Inland Bays environment, it’s important to learn the rules and report potential violations.

How to report potential violations depends on where you live and the activity observed. Minor impacts, such as vegetation removal in a buffer, can usually be handled on the local level. If you have an HOA, review the HOA rules, report potential violations, and request their enforcement. If you live in a town, contact officials there to report. Or if you live outside of a town within Sussex County, call the [County Constable’s Office](#) at (302) 855-7819.

More serious violations, such as filling waterways with soil or improper stormwater discharge, may be reported to the following organizations:

- [Department of Natural Resources and Environmental Control: \(800\) 662-8802](#)
- [U.S. Army Corps of Engineers Philadelphia District: \(215\) 656-6728](#)
- [Sussex Conservation District: \(302\) 856-2105](#)

For all inquiries, make sure to request a follow-up, including an explanation of whether there was a violation and the reasons why or why not. If you feel the rules or codes are not protective enough, you have the option to seek greater protections through the support of elected officials.



Protecting Inland Bays Shorelines



You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make.



Jane Goodall

Threats to Inland Bays shorelines

Inland Bays shorelines are eroding at an average rate of 1.4 feet per year, with wind and wave energy playing a role in causing this. And the effects of erosion combined with nearshore development and rising sea levels can be devastating: Between 1938 and 2007, the Inland Bays estuary experienced a net loss of 32% of salt marsh. That's 3,500 acres.

Over the years, waterfront property owners have sought to slow or stop shoreline erosion by building hardened shorelines. Nearly 20% of shorelines in Indian River and Rehoboth Bays have been hardened by bulkheads, riprap, rock revetments, gabions, and other types of hard infrastructure. But contrary to popular belief, some of these structures fail to protect shorelines—and they can actually lead to more damage. One study found that, after Hurricanes Irene (2011) and Arthur (2014), 93% of post-storm damage was actually caused or made worse by bulkheads, while properties with natural shorelines exhibited significantly less damage.

Hardened shorelines also fall short of maintaining many of the ecological functions that natural shorelines serve. The transitional habitat between the aquatic and upland zones of natural shorelines provides nurseries, protection, and food for wildlife. Hardened shorelines eliminate this habitat. Meanwhile, they don't protect properties from flooding as well as living shorelines do, nor do they provide the critical water filtration and pollutant removal benefits that permeable soil, marsh grasses, and shrubs do.

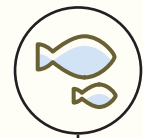
Natural shorelines provide a range of critical benefits to the Inland Bays ecosystem. This, in turn, supports recreation and tourism and increases property values. That's why wider adoption of nature-based shoreline stabilization methods, such as living shorelines, by waterfront property owners is crucial for the preservation and restoration of tidal wetlands and shoreline habitats.



Example of a living shoreline constructed with nature-based materials including logs, branches, and native plants. Location: Delaware Botanic Gardens at Pepper Creek.

The benefits of living shorelines

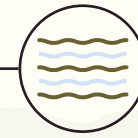
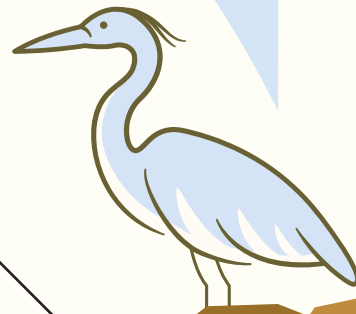
Living shorelines are engineered designs that incorporate a range of natural materials, from wooden logs and oyster shells to coir fiber logs and wetland plants. They're better for the environment and often are more durable and cost-effective for property owners.



Protects nesting and feeding areas for fish and wildlife



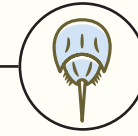
Promotes erosion protection and coastal resiliency



Reduces pollution



Traps harmful carbon emissions



Creates nesting habitat for terrapins and horseshoe crabs



Low-maintenance and cost-effective



Protects habitat for wetland plants and animals



Supports shellfish population like oysters and mussels

To learn more about the benefits of living shorelines, visit inlandbays.org/property-guidebook.

Want to install a living shoreline?

We highly recommend that you contact a specialist who has a background in coastal engineering and marine construction to ensure a properly designed project. To view resources for homeowners, learn more about state and federal permit requirements for living shoreline installations, and access a list of providers in the region, visit delawarelivingshorelines.org.



Making a Difference Together

When it comes to preserving the natural wealth and beauty of the Inland Bays, every action can make a difference. That's why we hope to inspire waterfront property owners like you to care for your property in a way that benefits you, your family, the community, and the environment. Thank you for your efforts in helping to preserve our shared Inland Bays home for generations to come.

Additional Resources

Additional resources on landscaping, living shorelines, septic systems, and much more are available at inlandbays.org/property-guidebook.

Source: Lisa Swanger



Did you know?

Diamondback terrapins are the only truly estuarine turtle in North America. They are non-migratory and spend their entire lives in bays, creeks, salt marshes, and coves. Coastal development and hardened shorelines reduce available sandy beach nesting habitat, and sea-level rise can make the problem even worse.



DELAWARE CENTER FOR THE
INLAND BAYS
Research. Educate. Restore.

Source: Marianne Walch

The Delaware Center for the Inland Bays is a nonprofit organization and a National Estuary Program. It was created to promote the wise use and enhancement of the Inland Bays watershed by conducting public outreach and education, developing and implementing restoration projects, encouraging scientific inquiry, sponsoring needed research, and establishing a long-term process for the protection and preservation of the Inland Bays watershed.

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