

Low Maintenance Landscaping for MARINAS



YOUNG ENVIRONMENTAL LLC

BILL YOUNG, LANDSCAPE ARCHITECT

631 WRIGHT DEBOW ROAD

JACKSON, NJ 08527

732-928-1043 • FAX: 732-928-0660

rmscu@yahoo.com

ECOLOGICAL PLANNING • DESIGN • CONSTRUCTION



An example of alternative landscaping:
uses natives, reduces stormwater runoff, and has aesthetic appeal



Manasquan Environmental Center, Bog
and Pond.

Even a small landscape project can have a big impact:

- You CAN help to protect and restore aquatic resources and water quality: build a RAINGARDEN, limit paved surfaces, or landscape with natives.
- Even a little is a lot.

Impacts of impervious surface cover on stream health

	Impervious Cover
Sensitive Streams	0 to 10% impervious cover
Impacted Streams	11 to 25% impervious cover
Non-supporting Streams	26 to 100% impervious cover

10% Impervious

Streams in a watershed with more than 10% impervious surface begin to show signs of being impacted. Such impacts include high turbidity, elevated temps, excess nutrients and more. Organisms are stressed and habitat is impaired

TABLE 1.3 Water Quality Limitations on Fisheries of Perennial Streams

Limit	Miles Affected	Percent ^a
Turbidity	277,000	41.6
Elevated temperature	215,000	32.3
Excess nutrients	144,000	21.6
Toxic substances	90,900	13.6
Dissolved oxygen	75,400	11.3
pH	26,000	3.9
Salinity	14,600	2.2
Gas supersaturation	5,500	0.8

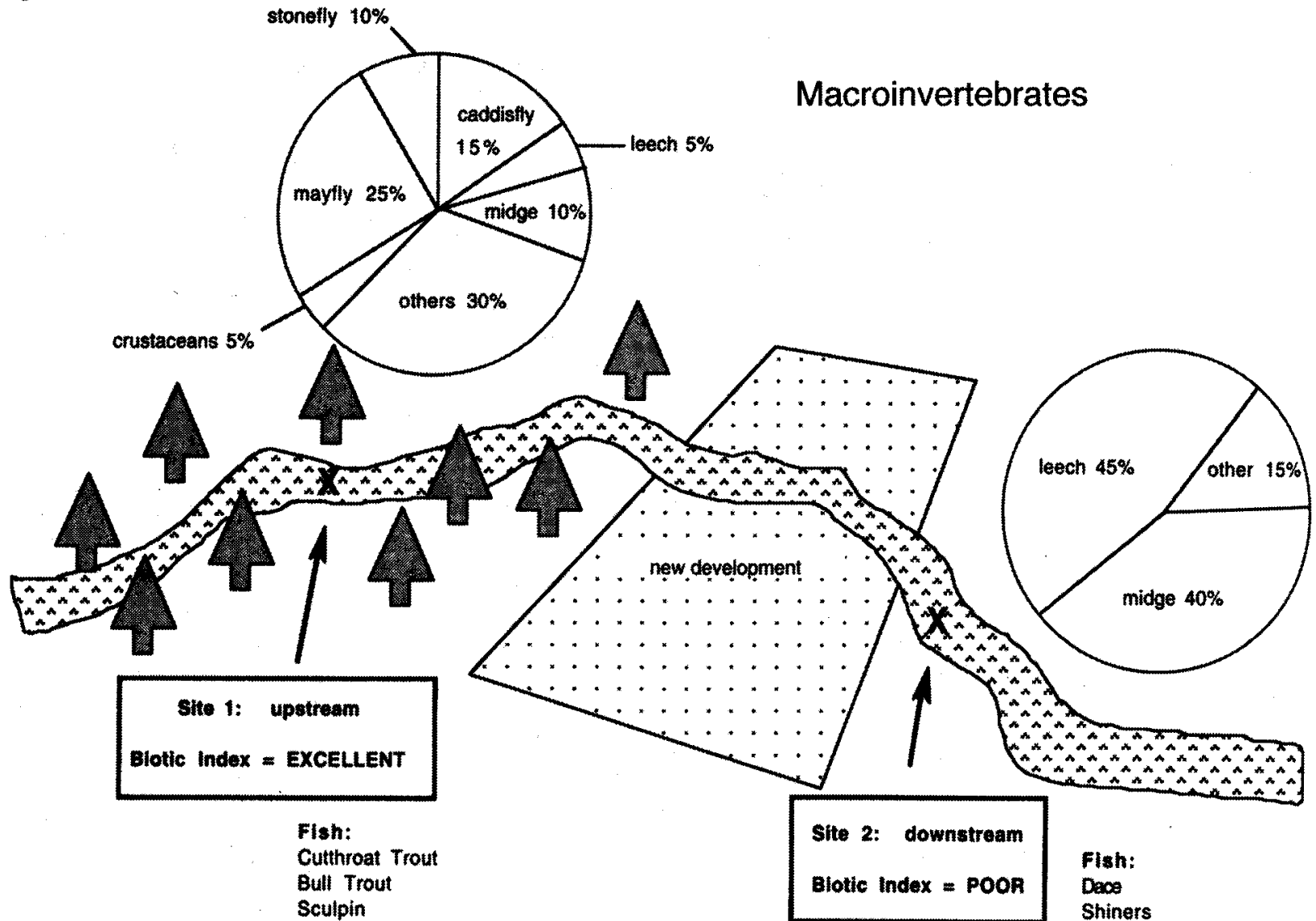
NOTE: Streams surveyed in 1982.

^aPercent of the 666,000 miles surveyed.

SOURCE: Judy et al., 1984.

Ecologists can determine impacts to streams by assessing the biota

figure 9.16



Stormwater Runoff from Marina Facilities Carries...

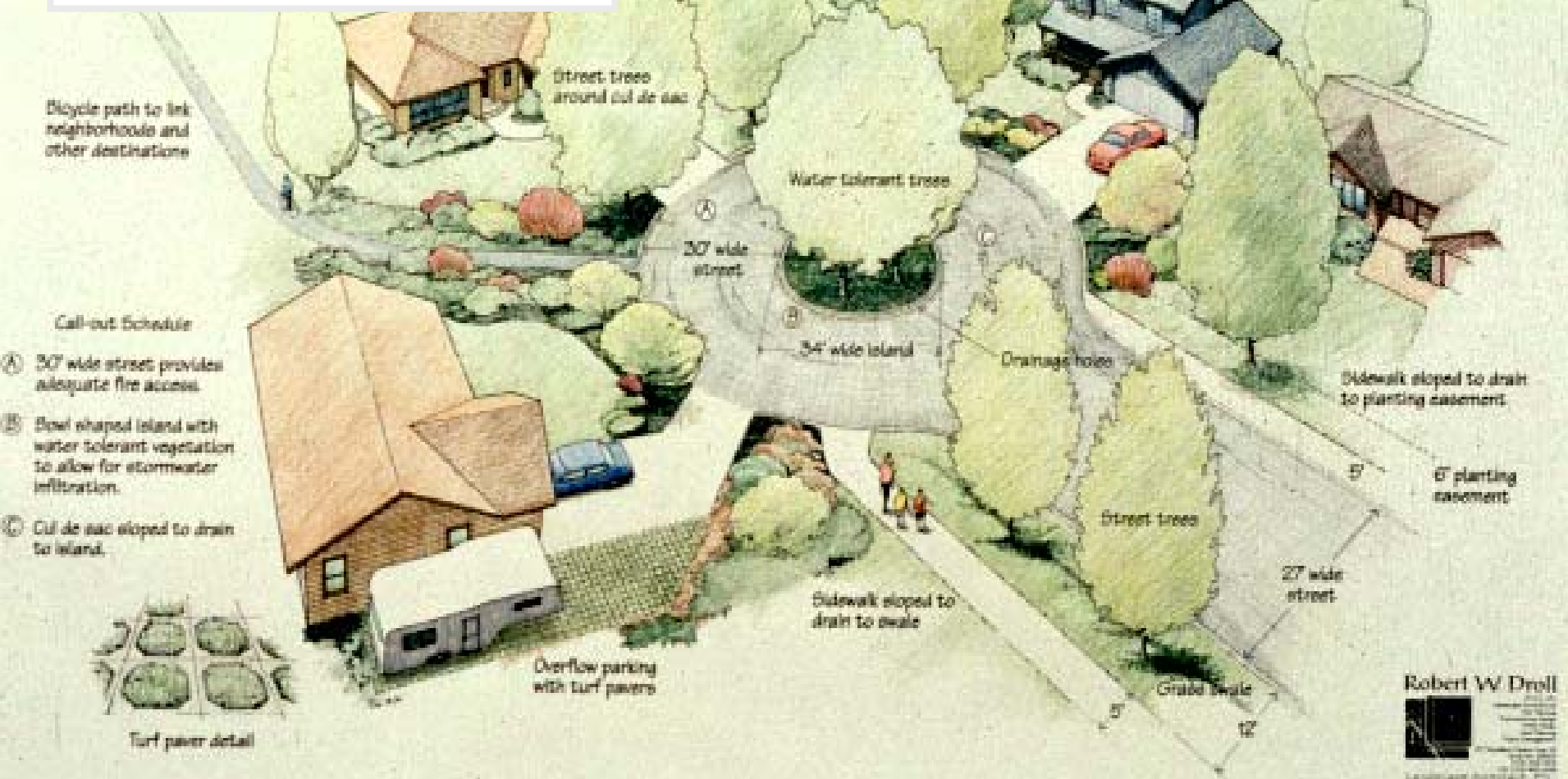
- Heavy metals
- oil
- hydrocarbons
- pesticides
- nutrients
- suspended solids

Suburban Rain Garden

- Using nature in design, here a swale is planted as a rain garden, slowing runoff, and promoting infiltration.



This plan utilizes several better site design techniques, including a vegetated island that allows stormwater filtration, shorter driveways, narrow streets, and alternate pavement for overflow parking. You can use similar techniques at your marina!



Things you can do

- Make a meadow out of lawn
- Convert pavement to gravel or soil
- Plant trees (they contribute to hydrologic cycle, save energy use, etc.)
- Stop spraying, cut down on irrigation and fertilizer
- Recycle and reduce wastes.
- Build a rain garden

The result can be beautiful as well!



Redirect runoff to a landscaped island.



Run "on"

Vs. runoff

09/23/2002

What you can do:

- Install BMP's
- Native Landscaping
- Reduce paving
- Reduce lawns
- Clean fueling practices
- Conservation of energy

RAIN GARDENS

A household way to improve water quality in your community



A marina
could SO
do this!



Rain gardens
are useful even where
little space is available.

Raingarden's typically
range from 100 to 300
square feet.

Tips for a productive rain garden

- Keep in mind that a rain garden is a "garden" not a prairie. The focus is on flowers, although some grasses can be used.
- When planting the rain garden, ask some friends to help. A few people helping for an hour can be fun for all and will allow you to get the planting done in a couple hours.
- In the weeks after planting, you may want to hoe dandelions and other weeds until the mature garden plants crowd them out.
- As the rain garden matures, you will need to thin the population of some plants to allow others to grow.
- Leave the dead or dormant plants standing over the winter. Many of the plants will provide seeds and shelter for birds. In spring cut back or mow the stalks to allow new shoots to emerge.
- Installation of a rain garden is slightly more work than a comparable area of lawn, but maintenance is low once plants mature.



A swale converted to a rain garden.



Baptisia australis,
Blue false indigo



Water only
during
establishment.



Joe-pye weed

Increase biodiversity

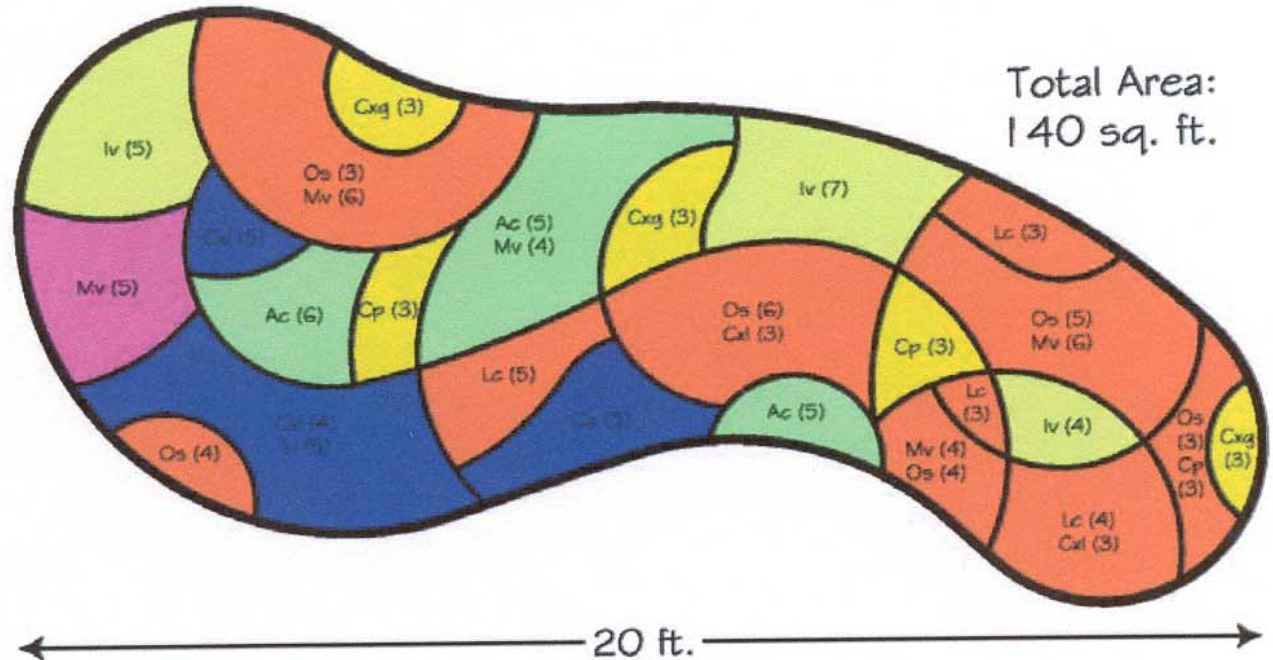


An example in Toms River

It's easier than it looks, hire a consultant to help you plan and design your rain garden

20 feet wide;
full to partial
shade
with clay
soils

7 ft.



Symbol	Species Name	Common Name	No. of Plants
Ac	Acorus calamus	Sweet flag	16
Cp	Caltha palustris	Marsh marigold	9
Ca	Campanula americana	Tall bellflower	5
Cxg	Carex Grayii	Bur sedge	9
Cxl	Carex lupulina	Hop sedge	15
Iv	Iris virginica-shrevei	Wild blue flag iris	21
Lc	Lobelia cardinalis	Cardinal flower	15
Mv	Mertensia virginica	Virginia bluebells	25
Os	Onoclea sensibilis	Sensitive fern	25

Total Plants Needed

140

Example: Rain Garden in Madison, WI

Grass you don't
have to mow...

...And
plants you
don't have
to water



Example Rain Garden Design/Install Madison, WI,



During the
storm...

Example Projects - Rain Garden Design/Install

Madison, WI,



...Shortly
thereafter

Rain gardens increase Biofiltration





A residential rain garden with ideas you can use as well

Case Study: Bay Head Yacht Club



Marina owner said: "Take this strip of land, and make it low maintenance"



Interpreted by landscape architect: "Design a native, historic ecosystem, like a dune"



Make a plan



Bring in lots of sand

Grade it into undulating topography





Bayberries, Beach plum, Switchgrass,
Coastal panic grass, Amelanchier,
Seaside goldenrod.

Plant native species, adapted to the exact
conditions being created (re-created)



Ta-da!

Just a small amount of maintenance to replace the sand.





And the rest takes care of itself!

While this may look nice, it's difficult and time consuming to maintain and causes adverse ecological consequences.



Consumption of Natural Resources

Fossil fuel:

- Mowers use 580 million gallons of gas/year
- Dwindling supply, higher costs
- Impacts To Public Health And Safety

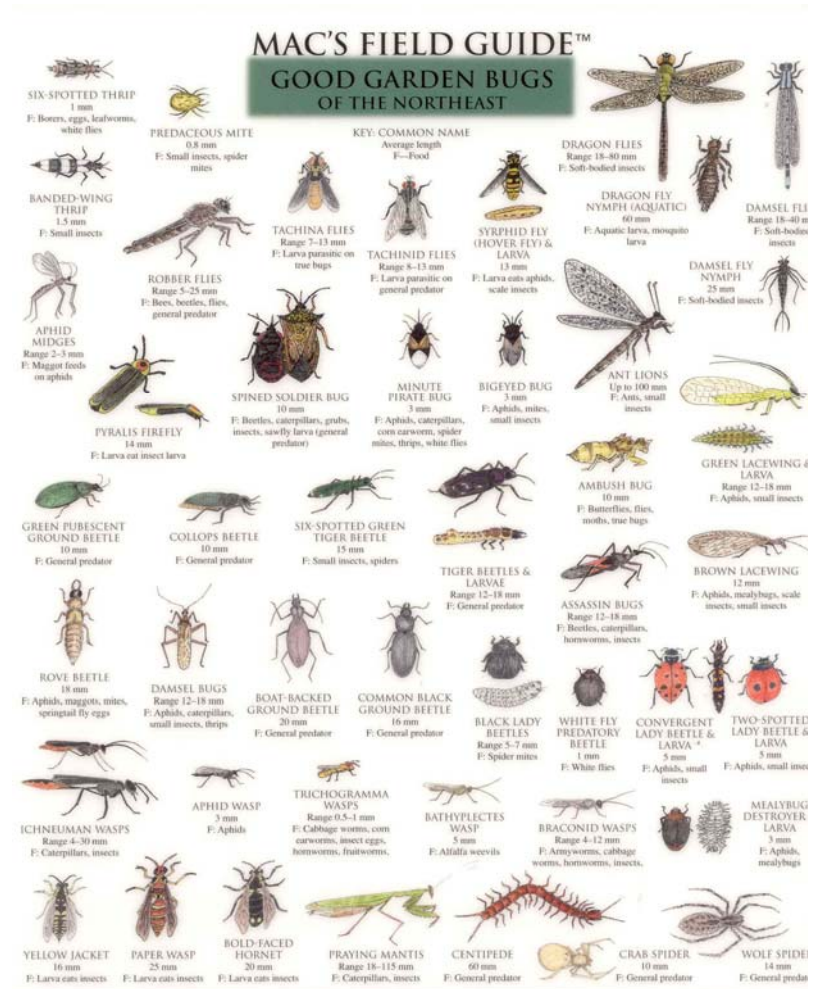
Water:

- 30% of total water consumption in the east is used for watering and maintaining lawns

Harm To Biodiversity

Pesticides

- 67 million lbs applied to lawns/year
- 60-70 million birds poisoned/year (US)
- <1% of the half-million plant and animal species considered pests (US)
- Beneficial species inadvertent targets of pesticides



Exotics mean loss of Diversity

Habitat	No. Vascular Plant Species	No. Breeding Birds
Native Prairie	200	28
Invaded by exotic plants	50	15
Buckthorn and Honeysuckle	25	4** ** European Starling very invasive

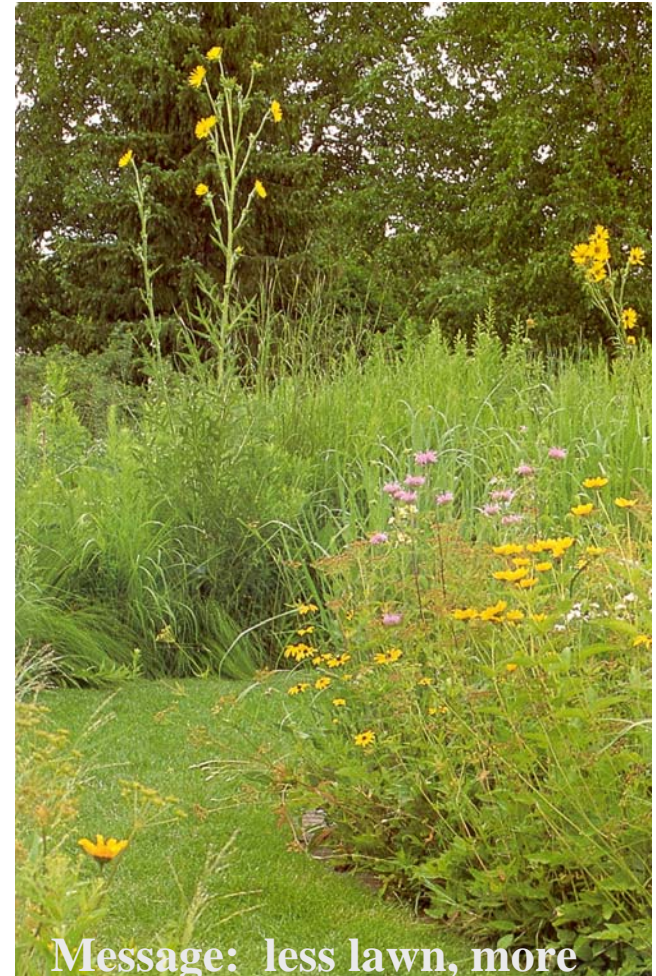
INVADER	ALTERNATIVE CHOICE	ATTRIBUTES/USES
JAPANESE HONEYSUCKLE (<i>Lonicera japonica</i>)	<ul style="list-style-type: none"> • Trumpet honeysuckle (<i>Lonicera sempervirens</i>) • Groundnut (<i>Apios americana</i>) • Hog-peanut (<i>Amphicarpaea bracteata</i>) • Canada mayflower (<i>Maianthemum canadense</i>) • Lowbush blueberry (<i>Vaccinium angustifolium</i>) • Gray dogwood (<i>Comus racemosa</i>) • Sweetfern (<i>Comptonia peregrina</i>) • Fragrant sumac (<i>Rhus aromatica</i>) 	<ul style="list-style-type: none"> ☞ Fragrant, showy flowers, shade tolerant woody vine ☞ Trailing vine ☞ Trailing vine ☞ Evergreen shade tolerant groundcover, fragrant flowers ☞ Shrubby groundcover, erosion control, wildlife value: fruit ☞ Thicket-forming clonal shrub ☞ Thicket-forming clonal shrub ☞ Shrubby groundcover, erosion control
NORWAY MAPLE (<i>Acer platanoides</i>)	<ul style="list-style-type: none"> • Oaks: red, black, scarlet, white, chestnut, post, bur, black-jack. (<i>Quercus rubra</i>, <i>Q. velutina</i>, <i>Q. coccinea</i>, <i>Q. alba</i>, <i>Q. prinus</i>, <i>Q. stellata</i>, <i>Q. macrocarpa</i>, <i>Q. marilandica</i>) • Maples: red, sugar, silver (<i>Acer rubrum</i>, <i>A. saccharum</i>, <i>A. saccharinum</i>) • American sycamore (<i>Platanus occidentalis</i>) • Hickory (<i>Carya cordiformis</i>) • Eastern cottonwood (<i>Populus deltoides</i>) • Sweetgum (<i>Liquidambar styraciflua</i>) • Lindens *(<i>Tilia americana</i>) □ (<i>Tilia cordata</i>, <i>T. tomentosa</i>) □ Ginkgo (<i>Ginkgo biloba</i>) 	<ul style="list-style-type: none"> ☞ Canopy/street tree, attractive fall foliage, wildlife value: nuts ☞ Fall color, canopy/shade tree ☞ Wide-spreading canopy/shade tree ☞ Yellow fall foliage, shade tree ☞ Fast growing shade tree, yellow fall foliage ☞ Canopy/shade/street tree, fall foliage ☞ Dense foliage, large crown, shade/street tree ☞ Urban tolerant, yellow fall foliage, canopy/street tree
ORIENTAL BITTERSWEET (<i>Celastrus orbiculatus</i>) & PORCELAIN-BERRY (<i>Ampelopsis brevipedunculata</i>)	<ul style="list-style-type: none"> • American bittersweet (<i>Celastrus scandens</i>) • Grapes (<i>Vitis</i> species) • Virginia creeper (<i>Parthenocissus quinquefolia</i>) • Virgin's bower (<i>Clematis virginiana</i>) • Trumpet honeysuckle (<i>Lonicera sempervirens</i>) • Moonseed (<i>Menispermum canadense</i>) • Greenbriar (<i>Smilax</i> species) 	<ul style="list-style-type: none"> ☞ Twining woody vine, wildlife value: fruit, yellow fall color ☞ Wildlife value: fruit, woody vine ☞ Wildlife value: fruit, woody vine, colorful fall foliage ☞ Fall flowering vine ☞ Fragrant, showy flowers, shade tolerant woody vine ☞ Sprawling vine ☞ Thorny woody herbaceous sprawling vines, wildlife value: fruit/nesting
PURPLE LOOSESTRIFE (<i>Lythrum salicaria</i>)	<ul style="list-style-type: none"> • Blue vervain (<i>Verbena hastata</i>) • Cardinal flower (<i>Lobelia cardinalis</i>) • Joe Pye weed (<i>Eupatorium maculatum</i>) • Native irises (<i>Iris versicolor</i>, <i>I. prismatica</i>) • Monkeyflower (<i>Mimulus ringens</i>) • Purple coneflower (<i>Echinacea purpurea</i>) • New York ironweed (<i>Vernonia fasciculata</i>) • Bee balm (<i>Monarda didyma</i>, <i>M. fistulosa</i>) • Blue false-indigo (<i>Baptisia australis</i>) 	<ul style="list-style-type: none"> ☞ Blue mid-summer flowers, wet tolerant ☞ Tall, late summer flowering, long lasting red blooms, wet tolerant ☞ Tall, late summer flowering, mauve flowers, wet tolerant ☞ Wet tolerant purple flowers, spring flowers ☞ Wet tolerant, purple flowers ☞ Tall, summer flowering, magenta blooms ☞ Tall, late summer flowering, purple blooms ☞ Tall summer flowering red-magenta blooms ☞ Tall blue-purple blooms, wide tolerance to conditions

Help stop the spread of noxious invasive species



Flood Damage / Erosion

- Lawns only able to absorb 1/10 rainfall of a forest
- Turf has shallow root system; not able to stabilize streambanks
- Runoff results in erosion, flooding,
- aquatic habitat destruction



Message: less lawn, more meadow

What is Native Landscape Design?

Order/Aesthetic Appreciation – Native



Beauty is found in the elegant complexity

Why Plant Native Plants?

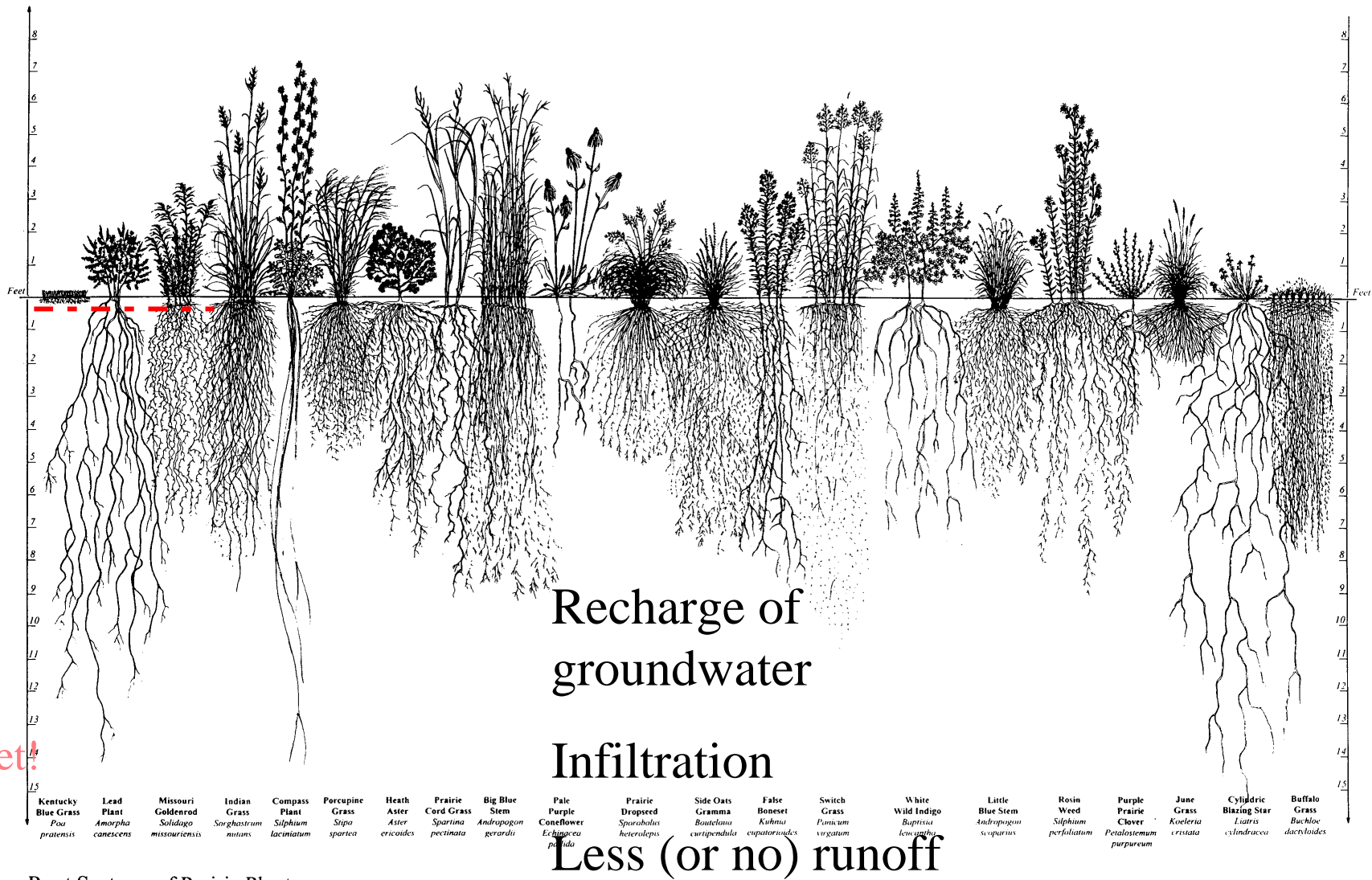
- Local plants have been here since pre-colonial times.
- Local flora and fauna have been associated with each other through the ages, they are adapted to each other.
- The foliage, nectar, pollen, fruits and seeds are familiar and preferred by our native birds, butterflies, and other insects and animals.
- Native plants support 10-15 times more wildlife than non-natives and provide the foundation for the backyard web of life from microorganisms to hawks.
- Native plants are drought tolerant and do not require extra water except when first planted.
- Pesticides should not be necessary since the local flora have defenses against indigenous diseases and insects.

Environmental Benefits of natives:



- They perform better in our local soil, moisture, and light conditions
- They do not require supplemental water, fertilizers, pesticides, or excessive labor
- Trap pollutants—Native plants can store and filter runoff and can remove 94% of sediment, 43% of phosphorus, and 70% of nitrogen pollution from rainwater – USEPA
- Contributes to desirable wildlife habitat
- They have deep root systems (8'–15') that help soils infiltrate better.





Root Systems of Prairie Plants

Conservation Design Forum, Inc.

Where most non-native turf grasses are.

Economic Benefits: saves you money, too!

Turf Grass Lawn with an Irrigation System vs. Native Prairie; from Seed Estimated Annual Cost Per Acre; for a Five-Acre Planting Project

Turf Grass Lawn								
	Year One	Year Two	Year Three	Year Four	Year Five	Annual Thereafter		
Installing Seed, Mulch and Fertilizer	\$ 2,770.00							
Mowing	\$ 2,400.00	\$ 2,500.00	\$ 2,600.00	\$ 2,750.00	\$ 2,900.00	\$ 3,000.00		
Fertilizer Application		\$ 750.00	\$ 765.00	\$ 770.00	\$ 780.00	\$ 790.00		
Irrigation System	\$ 4,000.00	\$ 400.00	\$ 500.00	\$ 500.00	\$ 600.00	\$ 750.00		
Municipal Water	\$ 1,500.00	\$ 800.00	\$ 800.00	\$ 800.00	\$ 800.00	\$ 800.00		
Aerating/De-thatching		\$ 850.00		\$ 875.00		\$ 1,115.00		
Annual Expense	\$ 10,670.00	\$ 5,300.00	\$ 4,665.00	\$ 5,695.00	\$ 5,080.00	\$ 6,455.00		
Total Cost After Five Years	\$ 31,410.00							
Native Prairie								
	Year One	Year Two	Year Three	Year Four	Year Five	Annual Thereafter		
Installing Seed and 2-1/2" Plugs	\$ 4,300.00							
Mulching	\$ 675.00							
Mowing	\$ 800.00	\$ 400.00						
Spot Herbicide Treatment	\$ 200.00	\$ 500.00	\$ 500.00	\$ 330.00	\$ 200.00	\$ 150.00		
Prescribed Burn		\$ 2,125.00	\$ 2,150.00		\$ 2,200.00	\$ 550.00		
Annual Expense	\$ 5,975.00	\$ 3,025.00	\$ 2,650.00	\$ 330.00	\$ 2,400.00	\$ 700.00		
Total Cost After Five Years	\$ 14,380.00							
Notes:								
1 Project size is 5 acres, contiguous; costs are per acre for a project of this size						Total Annual Cost		
2 Prairie installation includes seeding 20 species and planting 500 2-1/2" plugs						Turf	Prairie	
3 Prairie burn cost is based on one prescribed burn every four years						Year One	\$10,670	\$5,975
4 Figures are not adjusted for inflation						Year Two	5,300	3,025
5 To compare turf grass lawn without irrigation, simply subtract irrigation system from turfgrass cost						Year Three	4,665	2,650
						Year Four	5,695	330
6. Prairie seed and plug installation can be made less expensive by including fewer species and fewer or no plugs						Year Five	5,080	2,400
						Five Year Total	31,410	14,380



Typical Native Species Used in Formal Gardens



Iris
versicolor



Geum
triflorum



Lobelia
siphilitica



Helenium
autumnale



Rudbeckia
hirta



Ratibida
pinnata



Andropogon
scoparius



Bouteloua
curtipendula

Aesthetic Benefits

- Diverse, unique, and constantly evolving



Burr oak
Quercus macrocarpa
75-100' High



Sneezeweed
Helenium autumnale
2-4' High, Blooms
Aug-Oct

Culver's Root
Veronicastrum virginicum
3-5' High, Blooms
July-Aug

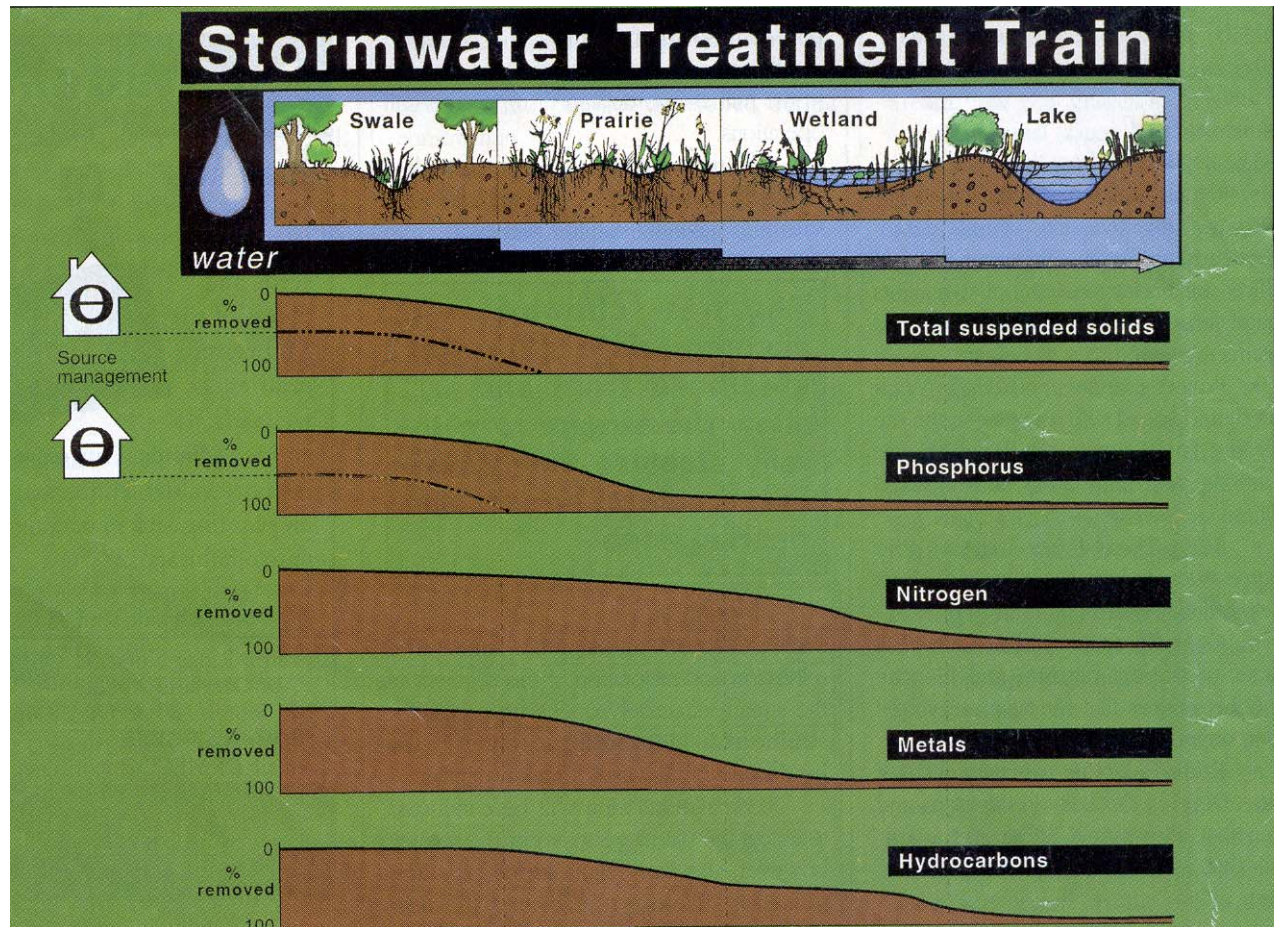


Maintenance

Integrated Pest Management (IPM)

- Monitor and assess
- Cultural controls first (mulching, healthy conditions)
- Least toxic chemicals
- Follow label directions carefully
- Spot treat rather than broadcast
- **Careful Nutrient Application**
 - Test soil to determine appropriate fertilizer
 - Use organics and slow-release
 - Apply sparingly and at correct time, according to directions
- Little to none needed for natives

BMPs such as swales, native plantings, treatment wetlands, and created ponds help reduce pollutant loads to the water body



Additional Information and Resources

- *Rain Garden Manual for NJ:* avail from the Native Plant Society of NJ <http://www.npsnj.org/>
- *Low Maintenance Landscaping for the Barnegat Bay Watershed:* avail from the Rutgers Cooperative Ext of Ocean County
- *Check out the list of native plant growers in your Clean Marina Guidebook*