The Resource

Lakes and ponds are valuable resources that provide ecological, aesthetic, and recreational services.
Threats to the Resource

Lakes can be stressed by anthropogenic or natural influences

- Shoreline erosion
- Sediment buildup
- Eutrophication
- Algal blooms
- Invasive species
Lake Management

- Lake Ecology
- Eutrophication Issues
- Algae Control
- Biomanipulation
- Lake Dredging
- Shoreline Restoration
Lake Ecology
Lake Ecology

• Lake Morphology
• Water Quality Variables
• Aquatic Organisms
Lake System

- Bioassessment
- Physical Habitat
- Chemical Quality
Lake Morphology

Shape and Size

- Depth
- Surface area
- Volume
- Length of shoreline

Hydraulic residence time

- Determines flushing rate
- Usually a slow resupply of water
Water Quality

• Tends to vary with depth and season
  – Pollutant loading determined by land use
  – Sediments can be a factor
• Minimal reaeration from surface
• Riparian zones are very important
  – Protection of shoreline
  – Filtration
  – Nutrient uptake
  – Temperature
Water Quality

Water Quality Variables

- Acidity
- Alkalinity
- Hardness
- Color
- Turbidity
- Transparency
- Nutrients
- Dissolved Oxygen
- Toxic substances
  - Metals
  - Pesticides
  - Petroleum products
- Microorganisms
  - Bacteria
  - Viruses
  - Protozoa
Aquatic Organisms

- Plankton
- Macrophytes
- Invertebrates
- Vertebrates
- Microorganisms
Eutrophication
Eutrophication - definition

Excess nutrient and sediment load into lakes at a rate sufficient to increase the potential for high biological production and a decrease in basin volume.
Eutrophication

Causes

- Excess nutrients and silt entering lake system from runoff
- Nutrients can be sorbed on silt which can later become available to algae and plants
- Excess plants deplete oxygen and release more nutrients as they decay
- Nutrients can be released from sediments
Eutrophication

Common Symptoms

- Reduced clarity
- Large daily oscillations in dissolved oxygen
- pH shifts
- Algae blooms
- Excessive weed growth
- Fish kills
- Odor, aesthetic, and taste problems
Algae Control
Algae Control

Algae blooms are a tell tale sign of a nutrient enriched system.
1st defense: source control of nutrients

- Limit fertilizer use
- Landscaping to limit lawn area
- Native plant buffer to intercept nutrients in runoff - biofilters
- Manage leaf litter
- Maintenance of on-site septic systems
- Restrict boat traffic to prevent resuspension of phosphorous in sediments
Algae Control

Other algae control techniques

- Precipitate phosphorus with chemical addition (buffered alum)
- Dyes
- Aeration
- Barley straw
- Aquascaping
- Algaecides
- Physical removal – nets or booms
Buffered Alum

- Binds with inorganic phosphorus
- Phosphorus precipitates out of the water
- Best for deep lakes
- Use in lakes that flush infrequently
Buffered Alum

Application techniques

– Low dose whole lake application from a boat as a solid or a slurry
– Sediment blanket
– Flow metered dosing
– Integration with sediments
– Apply with an aerator
Buffered Alum

Potential problems

– Alum toxicity
– Stimulated growth
– Elevated bacteria counts (temporary)
– Temporary reduction in benthic assemblage

Cost

– $25 per bag or $0.50 per gallon
Dyes

- Block sunlight
- Reduce algae growth
- Best in shallow lakes with severe benthic or filamentous algae problems
- Can enhance blue color
- Liquid or powder form
- Inert dye similar to blue food colorant #5
- Use the dye in lakes or ponds that have limited outlets and a long detention time
- Usually lasts 6 to 8 weeks
Aeration

Artificial circulation brings oxygen-poor water up to the surface

- Surface Spray
- Paddlewheel
- Air Diffusers
Aeration

Benefits

– Provides oxygen for aerobic decomposition of organic matter
– Controls blue-green algae
– Prevents fish kills
– Liberates dissolved gases into the air instead of allowing them to build to harmful levels in the pond (NH₃, CO₂, H₂S, and methane)
Aeration

Surface agitators create turbulence

- Oxygen circulation
- Nutrient consumption
- Temperature control
Aeration

Selecting an aerator

- Oxygen Transfer Rates (OTR) in excess of 1lb/5kg per horse power per hour
- Pumps in excess of 300 GPM or 1200 LP per horsepower
- Recommend 1 to 3HP aerating units per surface acre
Aeration

Surface Spray

- Best vertical circulation in lakes less than 15 ft deep
- Create convection currents
- Break up algae mats
Aeration

Paddlewheel

- Shallow lakes
- Low above surface spraying
- Creates a strong current
Air Diffusion

- Best mixing for deep lakes
- Diffuser on lake bottom
- Supplied by an air compressor
Aeration

Considerations

– Keep units off the sediments
– Place aerator to create a positive current
– Align to prevent shore erosion
– Cost $500 to $7000 plus power
Decomposition produces compounds that inhibit or reduce algal growth.
Barley Straw

Application

- Contained in wire mesh and staked to the bottom
- Deployed in spring
- Approximately 225 pounds of straw per acre
- EPA considers barley straw an algicide
Aquascaping

“Water Gardening”

- The use of aquatic plants to create a desirable plant community
- Plants compete with algae for nutrients
- Serve as habitat for zooplankton to compete with algae for nutrients
- Deter geese
- Stabilize shoreline
- Improve aesthetics and habitat
Aquascaping

Planting

- Match species to depth
- Use diverse native species
- Be aware of invasive intrusion
- Includes vegetative buffers
Algaecides

Is it an algae or a plant?

– ID the algae
– Establish a nutrient control plan
– Select an appropriate algaecide
Algaecides

Active ingredients

- copper
- coppersulfate
- endothol
- percarbonate
Algaecides

Application

– Like herbicides, must be applied by licensed applicator in New Jersey
– EPA registered algaecides
– Apply according to label
– Water temperature requirements
– Usually apply once start growing, but not so late in the summer that decaying biomass is a problem
Algae Removal

- Removal with nets and booms
- Works best with filamentous algae
- A lot of biomass to dispose of
- Does not control source of problem
Other Chemical Controls
Herbicides

- 300 herbicides registered in US
- Approximately 12-15 for use in aquatic systems
- Contact herbicides
- Systemic compounds: work slowly affect metabolic pathways and may require days or weeks.
- Submersed herbicides applied as concentrated liquids, granules or pellets. Volume of water to be treated in acre-feet determines the amount of herbicide needed to control the weed.
• Aquatic Pesticide Permit for most applications of pesticides to any “waters of the State” or on aquatic sites.

• The purchase and application of a restricted use pesticide requires certification and licensing as a pesticide applicator. An application of ANY pesticide to an aquatic site requires an Aquatic Pesticide Permit.

• Contact NJDEP Pesticide Control Program (609) 984-6666.
New Jersey requires all applicators (both private and commercial) using restricted use or general use pesticides to become both certified and licensed.

Many of the pesticides used in aquatic weed control programs have restrictions on the use of the treated water for potable purposes and/or other uses such as swimming, irrigation, crop spraying or stock watering.
Biomanipulation
Biomanipulation

- Ecosystem control
- Manage aquatic plants
  - Introduce grass carp
- Manage algal blooms
  - Add predatory fish to eat the small minnows that feed on the zooplankton that feed on the algae
Biomanipulation

Grass Carp (White Amur)

- Biological tool for weed control
- Not native to US
- Triploid strain (sterile)
Biomanipulation

Grass carp considerations

- Can the problem plant be controlled by grass carp?
- Use only triploid certified fish
- Obtain appropriate permits
- Stock at least 8” fish in spring
- Stocking density 5-15/acre
- Monitoring
Biomanipulation

Palatable plant species

- Milfoil
- Naiad
- Elodea
- Coontail
- Curley leaf pond weed
- Duckweed
- Bladderwort
- Musk Grass
- Water star grass
- Cabomba
Biomanipulation

Regulation of grass carp in New Jersey

- Restricted to ponds less than 10 acres
- Fish certified triploid strain
- Only use if have more than 40% coverage of weeds, palatable to grass carp
- Restrict fish from downstream outlet
Biomanipulation

Algae control

– Limit the population of fish that graze on zooplankton by introducing other predator fish
– Bottom line is to increase zooplankton population
Biomanipulation

Lake Hopatcong
- Considering biomanipulation with a nutrient management plan
- Need to conduct holistic fish survey
- Hybrid striped bass and brown trout considered
- Alewife the dominant zooplankton-eating fish

Oradell Reservoir
- Introduced hybrid striped bass to control perch and gizzard shad
Section #2
Lake Dredging
Why dredge?
- Deepening
- Limit nutrient cycling
- Reduction of macrophyte nuisances
- Removal of toxic sediments
Dredging Concerns

- Release of nutrients
- Resuspension of contaminants
- Destruction of benthic fish-food organisms
- Adequate disposal facility
- Cost
Lake Dredging

Sediment Sources

Stormwater outfalls, ditches
Bank erosion
Impervious surfaces
Agriculture
Construction sites
Lake Dredging

Sediment Testing

• Sampling
  – Sediment cores to project depth
  – Core composition

• Physical Analyses
  – Water content
  – Organic content
  – Particle size distribution
Lake Dredging

Chemical Analyses for upland disposal

total phenols
oil and grease
reactivity
nitrogen
phosphorus
minerals (Ca, Mg, K)
base neutral priority
pollutant organics

heavy metals
Petroleum Hydrocarbons (PAHs)
PCB’s, DDT, and metabolites
pH
sulfur
chlorides
chlorodane
Lake Dredging

Permits to dredge

County –

Soil Conservation District S&E Permit, may also need approvals to transport over county roads

State –

NJDEP Freshwater Wetlands

GP 1  Maintenance of existing structure
GP 13 Lake and pond dredging
Lake Dredging

State permits (cont’d)

NJDEP Flood Hazard Permit
NJDEP Bureau of Solid Waste (if landfilling)
Water Quality Certificate
NJDEP Lake Lowering, NJDEP Fish & Wildlife
Fish Stocking Permit, NJDEP Fish & Wildlife
NJPDES may be required as part of a hydraulic dredging project
Lake Dredging

Public Notice

Adjacent property owners
County planning board
Local planning board
Environmental Commission
General Permit 13

- May request permit no more than once every 5 years
- DEP may require testing of the sediment if it is suspected to be contaminated
General Permit 13

Required Documentation

- Aerial photography
- Original construction plans
- Core borings
- Show that dredging will go no deeper than the original configuration and bottom contours of the lake
- Show will not enlarge the lake beyond the original configuration
General Permit 13

Lakes larger than five acres

- A USGS quad map showing all of the upstream land and water surface areas draining to the lake
- Land use in the upstream drainage area
- List and locations of sediment sources that discharge directly into the lake or into a tributary within 1,000 feet of the lake
- An estimate of the percent impervious surface cover of upstream drainage area
Lake Dredging

Disposal of dredge material
Beneficial reuse vs. disposal at landfill

- Engineered uses
- Agricultural and product uses
- Environmental enhancement
- Roadway embankments
- Beach nourishment
- Use options depend on material type
Lake Dredging

Cost of dredging

Mechanical

– $8 – $25/ yd$^3$
– Plus containment

Hydraulic

– $6-$12/yd$^3$
– Plus travel
Shoreline Restoration
Geese in our Landscape

- Prefer large, flat managed turf areas close to a lake, pond or slow moving watercourse
- Good views of their surroundings (for predators)
- Prefer tender, mowed and fertilized turf grasses for food
- Return annually to nesting sites if it is to their liking
Geese in our Landscape
Erosion and Sedimentation
Nutrients and Water Quality Concerns

- TSS and TDS
- BOD (biological oxygen demand)
- Nutrients including Phosphorus and Nitrogen
- Bacteria (fecal coliform)
- Temperature
Why change the way we manage shorelines and streambanks?

- Valuable and heavily used properties
- Aesthetic considerations
- Minimize routine maintenance
- Reduce long-term maintenance costs
- Nuisance wildlife management
- Soil protection
- Water quality protection
- Address watershed impairments
Changing the way we manage shorelines and streambanks

- Reduce amount of turfgrass – specifically areas adjacent to water
- Install vegetative buffers along shorelines and stream banks
- Place barriers to goose movement to and from water bodies
- Modify shorelines

- Reduce mowing frequency (let grass grow up to 8”)
- Reduce/eliminate fertilizing and watering
- Replace cool-season grasses (*bluegrass, fescues, ryegrass*) with warm season grasses/wildflowers (*bluestem, wild rye, sedges, asters, coneflowers, milkweeds*)
Landscaping Alternatives

- Meadow management areas
- No mow zones
- Naturalized plantings
Meadow Management

- Reduce mowing frequency in shoreline and streambank areas to a single monthly mowing at a height of 6-8 inches during the months of May through September:
  - This mowing regime will promote deeper root growth and soil stability
  - The regular mowing will keep invasives and woody species from becoming established
  - If necessary, in high visibility areas or high traffic areas, the shoreline or streambank can be mowed to a 4 inch height to provide a purposeful landscaped edge and a transition into adjacent areas
No Mow Zones

In shoreline areas, eliminating regular mowing of the shoreline edge for a minimum of 5-10 feet and allowing vegetation to grow to a height of 24 to 30 inches is recommended for several reasons:

- Reducing mowing will promote deeper root growth and soil stability at the pond edge.
- The vegetation will filter runoff from surrounding areas reducing nutrients and other pollutants in the pond,
- The vegetation will deter use of the facility by unwanted Canada geese through the physical and visual barrier,

- If necessary, provide access to the water’s edge for recreational use or aesthetic enjoyment with narrow mowed paths through the buffer at shallow angles to the shoreline and boulder landings or decks with a minimum 15” vertical face or drop to the water surface.
No Mow Zones
No Mow Zones
Naturalized Plantings

- Install native plantings adapted to flood plain and wetland conditions and eliminate regular mowing.
- This approach requires project planning to design, purchase and install plantings.
- Projects in shoreline and streambank areas may require wetlands and flood hazard area permits from NJDEP.
- This approach requires careful planning and a commitment to maintain new plantings during the establishment period.
- These plantings can often be done in conjunction with renovations or repairs.
- This approach is the “preferred” design option in NJDEP’s Stormwater BMP manual as it improves and protects water quality.
Naturalized Plantings
Naturalized Plantings
Existing Landscape Conditions
After Installation
One Year Later
Mosquitoes and Naturalized Plantings

- Mosquitoes can breed in almost any wet area containing standing water, including:
  - Containers/old tires
  - Catch basins
  - Gutters
  - Low wet spots in lawns

- Healthy naturalized systems provide habitat to many mosquito predators, including:
  - Dragonflies
  - Damselflies
  - Water Striders
  - Backswimmers
  - Predacious Diving Beetles

- Always provide and maintain access for inspection and treatment
Naturalized Plantings

- Seed in the spring or fall at a minimum rate of 15-25 lbs/acre and include a carrier and a cover crop
- Can be applied via broadcasting, hydroteening, or with a native ‘TRUAX’ seed drill
- Need to be mulched during establishment with weed free straw or wood fiber mulch
- Can be applied to bare soil, over-seeded, or to sites treated with glyphosate herbicide
- Do not require commercial fertilizers or pesticides
- Seed mix should contain warm-season companion grasses in combination with wildflowers
- Require a single annual mowing at a height of no less than 6 inches
Naturalized Plantings

### Common Wildflowers

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asclepias incarnata</td>
<td>Swamp Milkweed</td>
</tr>
<tr>
<td>Aster novae-angliae</td>
<td>New England Aster</td>
</tr>
<tr>
<td>Aster novi-belgi</td>
<td>New York Aster</td>
</tr>
<tr>
<td>Eupatorium perfoliatum</td>
<td>Boneset</td>
</tr>
<tr>
<td>Iris pseudacorus</td>
<td>Yellow-Flag</td>
</tr>
<tr>
<td>Iris versicolor</td>
<td>Blue-Flag</td>
</tr>
<tr>
<td>Lobelia cardinalis</td>
<td>Cardinal Flower</td>
</tr>
<tr>
<td>Lobelia siphilitica</td>
<td>Great Lobelia</td>
</tr>
<tr>
<td>Vernonia noveboracensis</td>
<td>New York Ironweed</td>
</tr>
</tbody>
</table>

### Aquatic Vegetation for Wet Ponds

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pontederia cordata</td>
<td>pickerelweed</td>
</tr>
<tr>
<td>Sagittaria latifolia</td>
<td>duck-potato</td>
</tr>
<tr>
<td>Saururus cernus</td>
<td>lizard tail</td>
</tr>
<tr>
<td>Scirpus atrovirens</td>
<td>green bulrush</td>
</tr>
<tr>
<td>Sparganium americanum</td>
<td>lesser burreed</td>
</tr>
</tbody>
</table>

### Warm Season Grasses

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrostis alba</td>
<td>Red Top</td>
</tr>
<tr>
<td>Agrostis palustris</td>
<td>Creeping Bentgrass</td>
</tr>
<tr>
<td>Andropogon scoparius</td>
<td>Little Bluestem</td>
</tr>
<tr>
<td>Andropogon virginicus</td>
<td>Broomsgedge</td>
</tr>
</tbody>
</table>

### Common Wetland Plants

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carex stricta</td>
<td>tussock sedge</td>
</tr>
<tr>
<td>Carex vulpinoidea</td>
<td>fox sedge</td>
</tr>
<tr>
<td>Carex crinita</td>
<td>fringed sedge</td>
</tr>
<tr>
<td>Juncus effusus</td>
<td>Soft Rush</td>
</tr>
<tr>
<td>Calamagrostis canadensis</td>
<td>Canada Wild Rye</td>
</tr>
<tr>
<td>Elymus canadensis</td>
<td>Canada Wild Rye</td>
</tr>
<tr>
<td>Poa palustris</td>
<td>Fowl Bluegrass</td>
</tr>
<tr>
<td>Puccinellia distans</td>
<td>Alkaligrass</td>
</tr>
<tr>
<td>Tripsacum dactyloides</td>
<td>Eastern Gamagrass</td>
</tr>
</tbody>
</table>

**NOTE:** Native wildflower and grass seed mixes available from Ernst Conservation Seeds in Meadville, PA
Native plant material available from Pinelands Nursery in Columbus, NJ
Expected Costs for Naturalized Planting Projects

- **Design Costs** – costs vary greatly depending on size and complexity of project
  - Tasks may include site survey, wetland delineation, preparing and presenting plans, and member education
- **Permitting Costs** – ($5,000 - $15,000)
  - Typical requirements may include:
    - Wetland delineation and letter of interpretation (LOI)
    - Individual or General Freshwater Wetlands Permit/s, Transition Area Waiver
    - Flood Hazard Area Permit (individual)
    - Soil Erosion and Sediment Control Plan
- **Expected costs for native seeding or plantings**
  - Native seed costs typically range from $25/lb to $45/lb depending on diversity of wildflowers. Installation costs range from $80 - $150 per 1000 sq ft
  - Native wetland plants cost approximately $200 - $250 per 1000 sq ft installed
Maintenance Requirements

- **Routine Maintenance**
  - Vegetation management
  - Debris and litter removal
  - Mechanical components maintenance
  - Inspections

- **Non-Routine Maintenance**
  - Stabilization and erosion control repairs
  - Sediment removal
  - Outlet repair or replacement
Routine Maintenance

- **Vegetation management**
  - Mowing should be done where and when it is needed
  - Effective groundcovers must be kept healthy to prevent erosion and damage to the system
- **Debris and litter removal**
  - Inlets and outlets should be regularly cleared of debris and litter to prevent obstructions and reduced efficiency of the system
- **Mechanical components maintenance**
  - All mechanical equipment, such as gates, valves, locks, aerators or other components must be kept in working order should an emergency arise
- **Inspections**
  - Regular inspections by designated personnel, owner, or operator should be made and clear records kept
Reducing Costs for Routine Maintenance

• **Vegetation management**
  – Reduce need for mowing through alternative landscaping approaches where feasible and appropriate
  – Minimize use of commercial fertilizers and pesticides in shoreline and streambank areas adjacent to waterways

• **Debris and litter removal**
  – Install simple low cost retrofits such as the “Snout” on catch basins near the discharge to a pond or stream

• **Mechanical components maintenance**
  – Regular inspections and immediate repairs will reduce need for major replacements

• **Inspections**
  – Clearly identify appropriate personnel and have same individual conduct inspections at regular intervals
Non-Routine Maintenance

- **Stabilization and erosion control repairs**
  - If vegetation fails on embankments or in the basin, soil replacement, reseeding and stabilization should occur immediately.

- **Sediment removal**
  - During the establishment of a new basin, the basin should be inspected for excessive sedimentation. After establishment, the basin should be inspected twice a year and excessive sediment accumulated in the basin should be removed.

- **Outlet repair or replacement**
  - Should the system stop functioning as designed the outlet structure may require repair or replacement.
Expected Costs for Non-Routine Maintenance

- **Sediment removal estimated to be needed:**
  - Every 5-15 years for wet pond

- **Expected costs for sediment removal:**
  - Mobilization $5,000 - $15,000 (dependent on size of project)
  - Dredging work $10/cy - $20/cy (dependent on depth of sediment)
  - Disposal off-site $45/cy - $75/cy (extremely variable and dependent on hauling distance, quality of material, and disposal requirements)

- **Expected costs for pre-cast concrete replacement outlet structure:**
  - Approximately $5,000 - $15,000 depending on size of structure, access, and complexity of the installation
Reducing Costs for Non-Routine Maintenance

- **Stabilization and erosion control repairs**
  - Minimize steep embankments (greater than 3:1)
  - Maintain healthy groundcovers by not mowing shoreline and streambank areas to less than 6-12” inches in height

- **Sediment removal**
  - Install manufactured pre-treatment device prior to stormwater discharging into ponds and streams
  - Install a settling forebay near inlets where access can be provided and reached with available excavation equipment
  - Retrofit system for water-quality treatment

- **Outlet repair or replacement**
  - Conduct regular inspections to ensure system is functioning properly and debris and litter are not clogging outlet or spillway structures
  - Provide and maintain clear access to all structures of the system
Planning for Maintenance

- Clearly identify individual/s responsible for inspections and routine maintenance
- Provide a clear procedure for recording inspections and reporting maintenance needs
- Develop a routine maintenance schedule
- Develop and use a standard inspection form
- Clearly mark access areas for inspections and maintenance
- Identify and provide any specialized equipment or tools needed to properly maintain shoreline and streambank areas
- Develop an emergency protocol should the outfall or spillway system fail or not function as designed
Inspections...at a minimum, regular inspections should:

- Document any erosion or sedimentation and identify any needs for repair or replacement
- Provide review of the inlet and outlet/spillway structures and note any deterioration, evidence of malfunctions, or collection of debris
- Document condition of the vegetation, noting any evidence of poor health, establishment of exotic species or weeds, woody growth on embankments, or need for any replacement
- Note whether clear access to the facility is being maintained as specified in design plans
Permitting

- Flood Hazard Area Permit
  - General Permit (typically not applicable)
  - Individual Permit (generally required)
- Freshwater Wetlands
  - GP13 (Lake dredging)
  - GP16 (Habitat creation and enhancement)
  - GP17 (Trails and boardwalks)
  - GP20 (Bank stabilization)
  - Individual Permits and Transition Area Waivers
- Soil Erosion and Sediment Control Plan
Flood Hazard Area General Permits

- GP1 - Channel cleaning by a public entity under the Stream Cleaning Act
- GP3 - Bridge or culvert scour protection by a public entity
- GP4 - Stormwater maintenance by a public entity

NOTE: All general permits have very stringent requirements which must be met which limit the scope of proposed work and minimize impact to the channel and shoreline areas.
Bank stabilization or channel restoration

- Requires the applicant to provide a detailed analysis of the specific problem that is to be corrected.
- The Department shall issue an individual permit to restore to a stable condition a bank or channel, which has become eroded, unstable and/or ecologically degraded, only if it is clearly demonstrated how the proposed project meets a very specific set of engineering design solutions.
FWW General Permit 13

- Authorizes up to one acre of dredging
- Work cannot disturb wetlands or transition areas adjacent to the lake, pond, or reservoir
- If water levels are to be lowered a permit is required from NJDEP Division of Fish & Wildlife
- Activities have to minimize disturbance to downstream environments and timing of work must be adjusted to protect fish spawning periods
- Work will not be authorized more than once every 5 years
FWW General Permit 16

- Authorizes habitat creation & enhancement activities
- Project must be sponsored or substantially funded by a Federal or State agency
- Activities must be part of a comprehensive restoration plan and improve the values and functions of the ecosystem
- Examples include: altering hydrology to create wetlands, breaching a dike or berm, placing habitat improvement structures, regrading to provide for proper wetland topography, managing vegetation to increase habitat diversity or control nuisance flora
- No Application Fee!
FWW General Permit 17

- Authorizes construction of trails, boardwalks, or pedestrian bridges for use by non-motorized vehicles and pedestrians
- Disturbance to wetlands/transition areas/state open waters cannot exceed ¼ acre (no limit on public owned lands)
- Trails and boardwalks no wider than six feet
- Must be designed to minimize disturbance to wetlands and transition areas and preserve existing hydrology
- Project shall incorporate features designed to educate users about the importance of wetlands
• Authorizes bank stabilization activities to reduce or prevent erosion (does not authorize channelization or stabilization of the bottom of the stream)
• Must use vegetative or bioengineering methods unless demonstrated need for other methods
• Limits for stabilization activities include:
  – No more than 150 feet of rip-rap
  – No more than 300 feet of bioengineering
  – No more than 500 feet of stabilization under an NJDEP funded project
  – Unlimited use of vegetative planting measures as set forth in Chapter 16 of the NRCS Engineering Field Handbook
• Activities can be used in combination and limits are calculated as total linear footage of streambank
FWW Individual Permits and Transition Area Waivers

- Costly and generally difficult to obtain
- Applications require a detailed environmental report and alternatives analysis
- Projects may require wetlands mitigation
- Review and approvals can take up to 12 months
- Each project is reviewed independently and all issues closely evaluated by assigned reviewers
Common Permitting Stumbling Blocks

- Obtain an accurate wetlands delineation and site topographic survey including stream cross sections if activities include work in a stream channel
- Understand any issues regarding threatened and endangered species (will determine wetland buffers)
- Determine any special resource protection areas (Highlands or Pinelands)
- If a project involves more than 1 acre of disturbance or ¼ acre of new impervious areas stormwater management regulations and reviews will apply
- Answer questions and get a jurisdictional determination early – conduct a pre-application meeting with NJDEP LURP
Review and Questions
NEMO (Nonpoint Education for Municipal Officials)

Created at the University of Connecticut in 1991

- Natural Resource Protection is the Goal
- Land Use is the Issue
- Local Officials are the Target Audience
- Education is the Method
Example NEMO Workshops

- **Linking Land Use to Water Quality**
  
  This workshop addresses the relationship of land use to natural resource protection with an emphasis on water quality. It explains the concepts of nonpoint source pollution and watersheds as well as reviewing the impact of land use on water resources.

- **Planning for Stormwater**
  
  This workshop reviews planning and site design options to reduce both the amount and the impact of impervious surfaces.

- **Open Space Planning**
  
  This workshop includes methods and options on how to inventory, prioritize and acquire open space.

- **Managing Stormwater in Urban Areas**
  
  This presentation focuses on “restorative redevelopment” strategies and opportunities for managing stormwater in urban areas.
Example NJ-EMO Projects

- Low-water use Landscaping demonstration sites
- Lake and pond management strategies for public and private properties
- Impervious surface build-out analysis
- Best management practices for Public Works facilities
- Stormwater management planning
- Drinking water conservation
- Green Infrastructure and stormwater best management practices (BMPs)
References


References


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Lake and Pond Management

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