Watershed and Lake BMP's

Best Management Practices Appropriate for Established Urban Communities

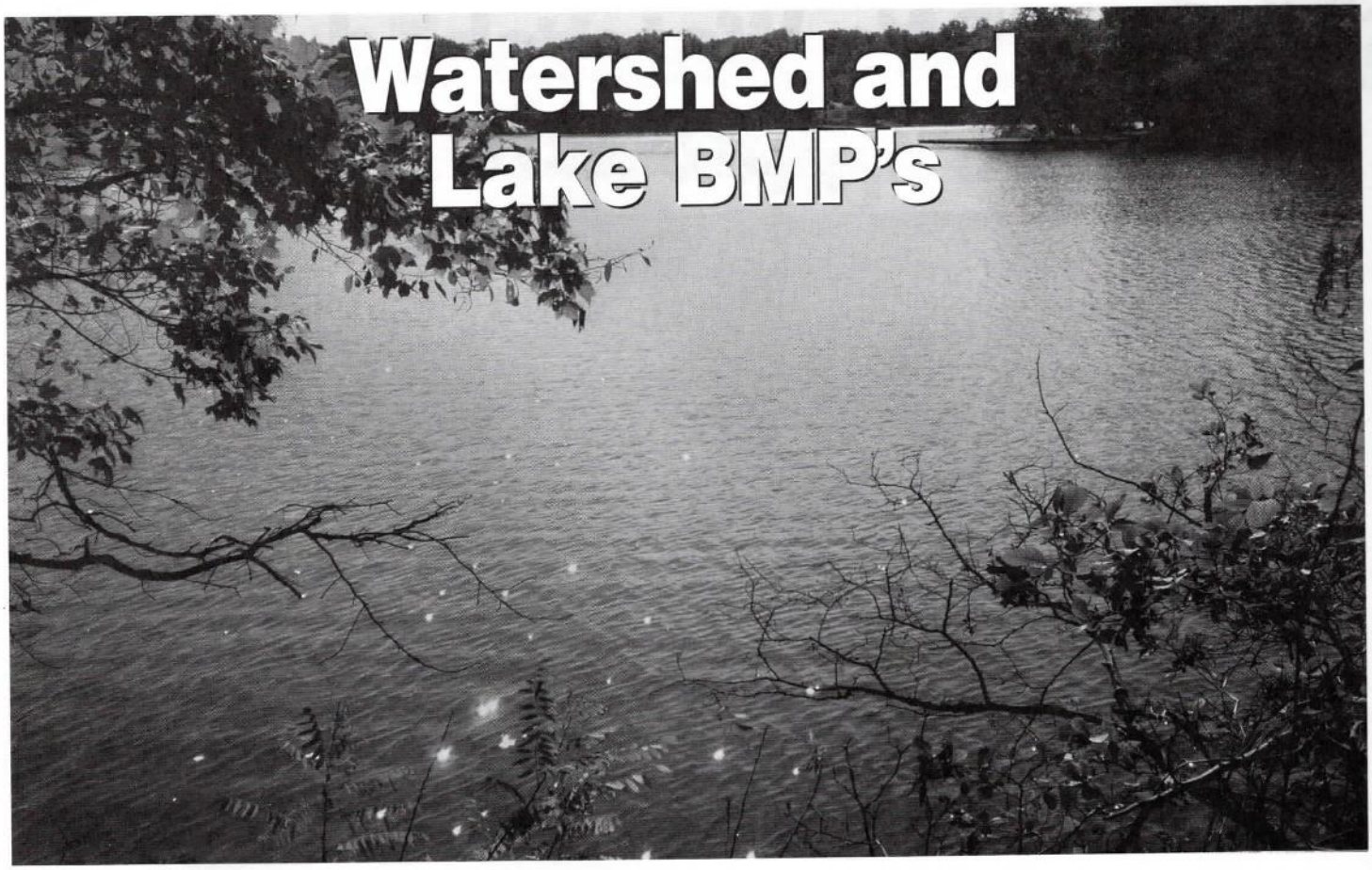
Holmes Run Watershed

Lake Barcroft Watershed Improvement District
Fairfax County, Virginia

Virginia Department of Conservation and Recreation

Urban Best Management Practices

1. Watershed and Lake BMP's
2. EPA Watershed Approach
3. Virginia Watershed Approach
4. WID Watershed Approach
5. Watershed Retrofit
6. Lake Barcroft and the Chesapeake Bay
7. American Heritage Rivers
8. JEB Stuart Park Restoration
9. Mansfield Subwatershed
10. Check Dams
11. Hydraulic Grade Line
12. Flow Regulators
13. Stormwater Flow Regulation
14. Regional Detention Facility
15. Extended Dry Pond
16. Subsurface Detention
17. Cisterns Contain Roof Drainage
18. Major Stormwater Detention
19. Sediment Dredging
20. Godzilla
21. Upstream Silt Trap
22. Debris
23. Diversion Debris Trap
24. Lawns Are Obsolete
25. Tons of Pollution
26. 21st Century Street Cleaning
27. Dry Sweeper Wins
28. Macroinvertebrates and You
29. Common Aquatic Macroinvertebrates
30. Hazardous Waste Cleanup Day
31. ABC's of Lawn Care
32. No-Phos Fertilizer
33. Lawn Care Helpful Hints
34. Barcroft Lawn Care
35. Phosphorus Monitoring
36. Algae Control
37. Streambank Stabilization
38. Erosion Control
39. Wetlands Are a Lake's Best Friend
40. Ancient Streams
41. Don't Dump
42. Lakes—An Unrecognized Asset
43. Aeration
44. Weed Harvester
45. Five Tons of Common Carp
46. How to Build a Seawall
47. Stormwater Structures
48. OK to Swim?
49. Much Ado About Dogs
50. Pestiferous Geese
51. Think Like a Goose
52. Help Yourself
53. Composting
54. Infiltration Trenches
55. Grass Swales
56. Worthless Dredge Spoil vs. Valuable Topsoil
57. Tree Screen
58. Gypsy Moth Control
59. Greenways
60. Highway Drainage
61. The City in Our Watershed
62. Action
63. Itty-Bitty BMP's
64. Lake Barcroft WID
65. Barcroft's Environmental Initiatives
66. Cost
67. Summary
68. Key Word Reference



Watershed and Lake BMP's

Urban communities that developed 20 or more years ago frequently have stormwater design deficiencies which cause difficult and expensive problems such as flooding, erosion, sedimentation, accumulated debris, impaired water quality, property devaluation, excessive maintenance costs, degraded residential amenities and infrastructure deterioration.

Usually, the basic problem is a lack of *temporary stormwater detention*. Sudden intense storms erode stream banks and transport huge quantities of sediment, debris and nutrients downstream to some sink, such as a lake, river, bay or estuary. Temporary stormwater detention devices such as surface ponds or underground tanks are a basic element of a modern stormwater management system designed to hold instantaneous peaks of stormwater long enough to flatten the hydrographic profile of the stormwater system to reduce the damage.

In newly developing cities today, Directors of Public Works, with the help of their staff and consulting engineers, design temporary stormwater detention devices. But when the community was developed earlier without these emergency controls, the most practical solution is to attempt to retrofit the existing stormwater system.

This booklet attempts to identify some innovative techniques to assist in the retrofit process. Some of these BMP's are methods of belatedly introducing temporary stormwater detention and others are unusual solutions to everyday public works problems in older urban areas. It consists of a series of Lake Barcroft Watershed Improvement District (WID) Bulletins, some of which have been published earlier. Essentially, they are single-subject essays.

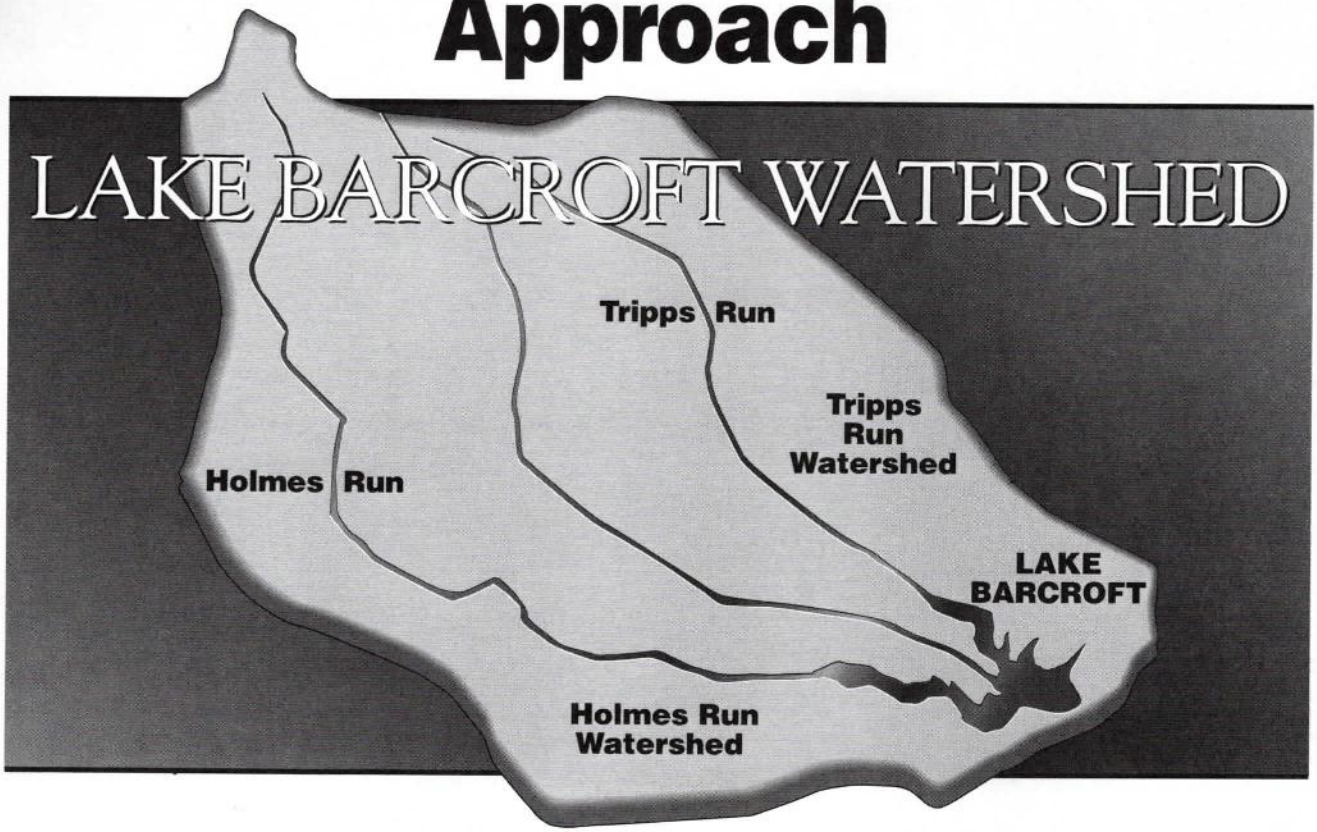
The WID is now in the 4th year of a 319 Grant by the *United States Environmental Protection Agency* for the purpose of identifying and demonstrating Best Management Practices (BMP's) appropriate for use in older urban areas. Administrative control is contributed by Virginia's nonpoint source control agency, the *Department of Conservation and Recreation*. WID develops the program by identifying conservation ideas, engineering and building the structures or adopting the practices within its 14.5 square mile upstream watershed.

You may browse this publication or refer to the subject index at the back of the booklet. WID is interested in *your* comments. Send them to WID at 3428 Mansfield Road, Falls Church, Virginia 22041. (703) 820-7700. e-mail: <lbwid@erols.com>.

This report and components of the projects outlined within were funded in part by a grant by the United States Environmental Protection Agency under Section 319 of the Clean Water Act.

A WID Bulletin

EPA's Watershed Approach



The U.S. Environmental Protection Agency says:

> "The watershed approach is a form of community-based environmental protection using hydrologic boundaries to define the area of interest. As such, it is characterized by a geographic focus, an emphasis on building partnerships, and a reliance on sound scientific techniques and management processes. We believe the watershed approach can significantly improve water resources restoration, protection and maintenance and achieve lasting environmental results."

EPA recently initiated a *Watershed Academy* which will consist of a number of training programs designed to involve multi-agency regulators and operating personnel in the concept of managing environmental protection on a watershed basis. This can bring the federal program closer to home by incorporating local situations, people and solutions. WID's continuing Holmes Run Watershed grant program is such a project. It is seeking solutions to problems which are damaging and expensive to Lake Barcroft and its partners in this venture: the *Fairfax County Department of Public Works*, the *Fairfax County Park Authority*, the *Virginia Department of Transportation* and the *Lake Barcroft Association*.

WID is installing various BMP's throughout its 14.5 upstream watershed to initiate a major watershed retrofit. Temporary stormwater detention will be introduced by inserting *flow regulators*, *check dams* and other devices. Water quality will be improved by BMP's to reduce erosion, sedimentation, debris and nutrients. New public and private cooperators will be recruited. Public interest will be stimulated resulting in increased watershed consciousness.

Water quality management programs depend on what is happening in your watershed. Do you know your watershed boundaries and its sources of pollution?

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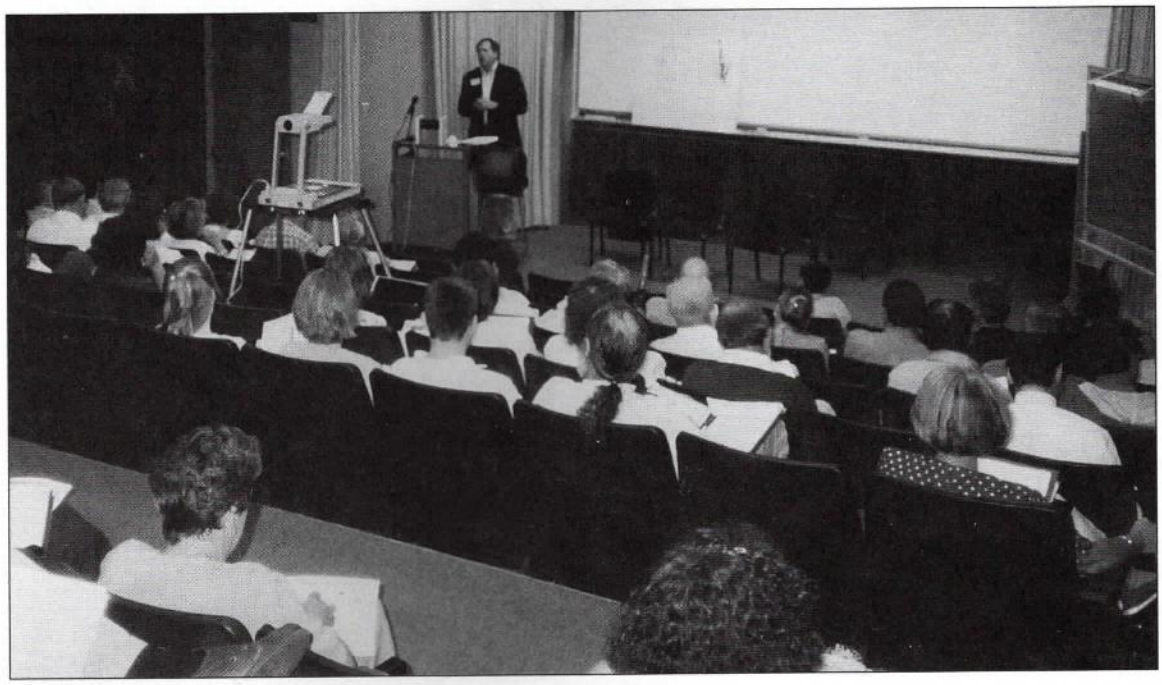
Furthering the Watershed Approach in Virginia



The Virginia Department of Conservation and Recreation helps support, train, and enhance networking among **Watershed Coordinators**, as part of its nonpoint source pollution control effort. Drawing from on-going NPS water quality improvement projects throughout the state, DCR arranges an information exchange to advance the concept of watershed based planning. The Commonwealth of Virginia is an important partner working to stimulate new water quality enhancement programs and coordinate federal and local efforts. This networking program is designed to provide useful project interchange from diverse environmental aspects concerning agricultural and urban planning activities, operational programs and regulatory responsibilities from various parts of Virginia. DCR also promotes Watershed Management by funding a number of local, Water Quality projects, through grants from the federal Clean Water Act as well as the Virginia General Assembly.

During annual information exchanges, watershed projects are enhanced by discussing Virginia's approach to addressing impaired waters, new techniques in watershed based management and specific guidance on such burgeoning techniques as Geographic Information Systems (GIS) and other capabilities of DCR and the *Natural Resources Conservation Service*. Major and minor watersheds are provided information about grants and other watershed funding opportunities and other resources available to watershed managers. Project case studies are exchanged and state policies and programs explained through these events. For more information, contact the Regional Water Quality Manager, of the DCR-DSWC Warrenton Field Office at (540) 347-6420.

Watershed managers play an important role in nonpoint source pollution control. Program information exchange capitalizes on diverse watershed projects.

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WID's Watershed Approach

WID's staff is acutely aware of the design deficiencies in its little 14.5 square mile watershed. Under the supervision of the three WID Trustees and Operations Director, WID's three regular operating employees, a few *outsource* personnel and part time workers, contractors and consultants are beginning a watershed retrofit to improve the stormwater system design. New ideas are being tried and new cooperators are being solicited. This booklet describes some of these concepts, which are best referred to as Best Management Practices or BMP's.

One facilitating facet of WID's program is its EPA 319 grant. It helps finance some of these projects. The most workable of these new ideas may be applied in other established urban communities around the country as EPA disseminates information about them. WID recognizes that while situations may be different elsewhere and encourages local leaders to tailor our ideas to their specific needs and circumstances.

The initial idea needs to be assessed for likely engineering feasibility. Once feasibility is determined and an engineering design is established, the most challenging aspect is getting approval to do something new and different. WID has discovered that a BMP which is not listed in the *Public Facilities Manual* is viewed with suspicion. Sometimes, the public is resistant to change even though their watershed is the primary beneficiary. Our UBMP's (Urban Best Management Practices) are a collection of grassroots level actions taken by local communities that can make a big difference. Some are more ambitious than others but all presented here seem feasible in a wide variety of established urban settings.

Correcting bad design and eliminating mismanagement pays dividends.

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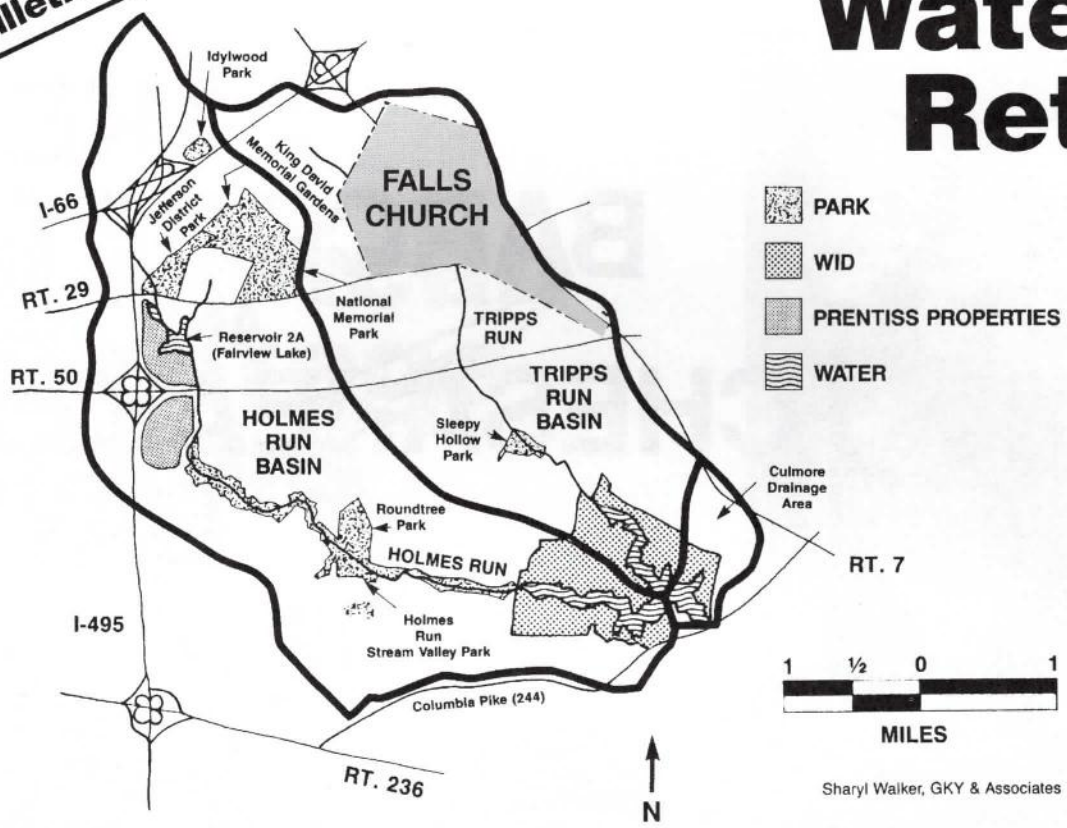
Watershed Retrofit



The concept of retrofitting existing watershed stormwater systems acknowledges the fact that earlier urban development lacked coherent design. A few decades ago, stormwater management consisted mostly of indiscriminately dumping excess runoff on whoever or whatever was downstream.

Lake Barcroft's little 14.5 square mile subwatershed cost literally **billions of dollars** to develop with homes, roads, commercial, industrial, institutional and recreational facilities. Spending only thousands to redesign this infrastructure can hardly be noticed. However, many retrofit BMP's provide leverage so a small improvement can produce a magnified benefit. Also, some recently identified BMP's are relatively inexpensive or may be paid for by the private sector.

Consider the recent emphasis on nutrient control which can improve water quality:

- The Holmes Run watershed yields approximately 10 tons of phosphorus a year to Lake Barcroft. However, a recent WID comprehensive phosphorus transport study reveals that the Lake removes over 54% of this phosphorus through several BMP's. The most recent Barcroft sediment dredging removed 14,000 cubic yards of phosphorus containing sediment at a cost of $222,000.
- The recent ten-fold increase in the capacity of the Lake's aeration system eliminated algal scums.
- Barcroft's ***No-Phos Fertilizer*** is used almost exclusively by the community's thousand homes which surround the Lake. These homeowners have spent $13,762 for this environmentally special fertilizer which was paid for by the private sector over a period of 7 1/2 years. All of these are BMP's

Unlike some of America's major watershed retrofit projects such as Tampa Bay, the little Holmes Run Watershed Retrofit Program currently expends perhaps one or two million dollars a year. Most of these improvements consist of BMP installations coupled with improved government agency operations.

Today, flooding, erosion and pollution transport can be prevented by BMP's which increase temporary stormwater detention using check dams, flow regulators and stream stabilization and can remove pollution with street sweeping and other sound maintenance programs. Government agencies and private sector projects, programs and policies can improve watershed stormwater management. Not billions of dollars . . . but certainly significant incremental improvement.

Individual BMP's have environmental value and provide substantial human benefit. Long-term watershed retrofit projects reverse environmental degradation trends.

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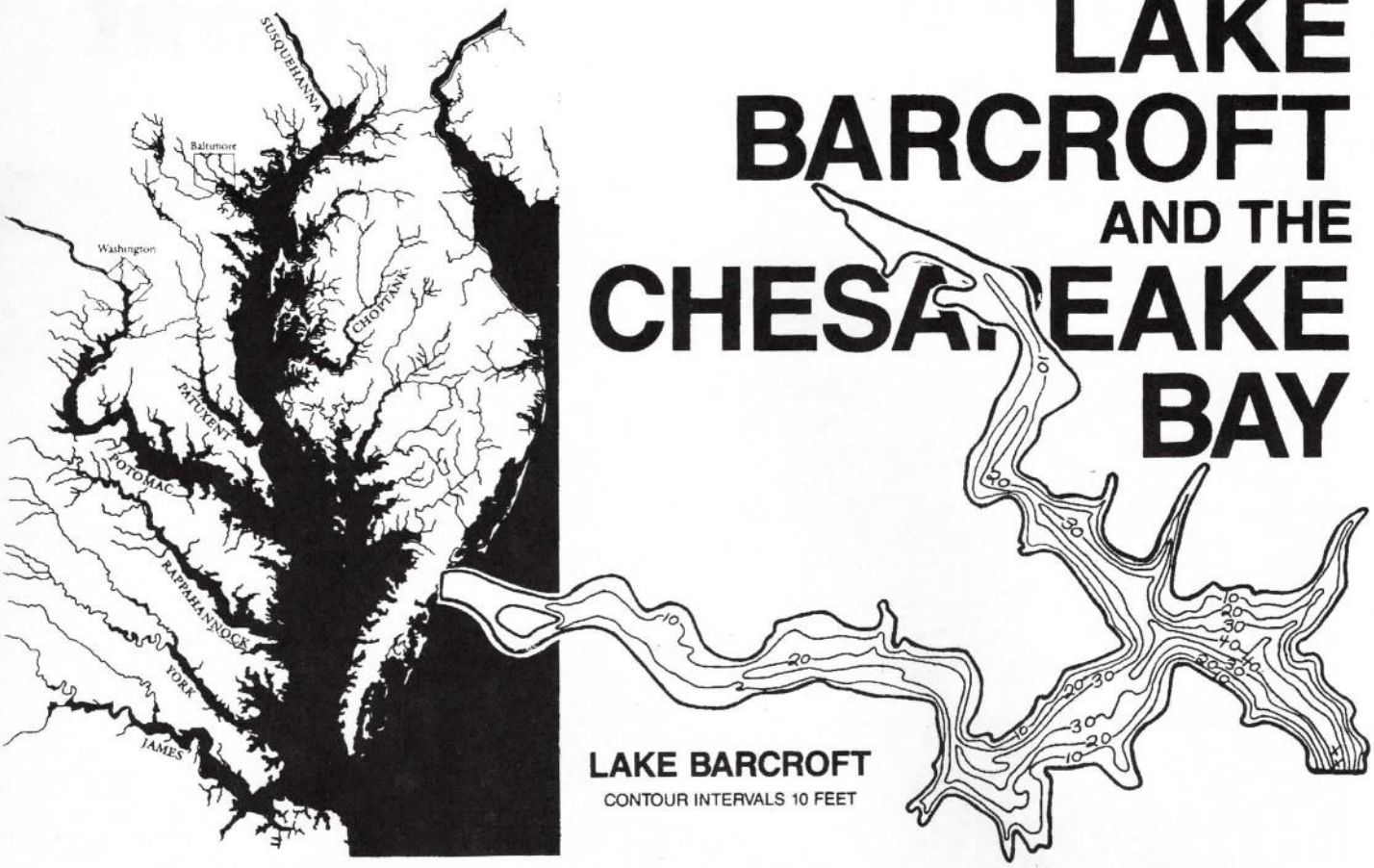
LAKE BARCROFT AND THE CHESAPEAKE BAY



Little Lake Barcroft and huge Chesapeake Bay are similar in the sense that both suffer from excess nutrients. Barcroft's "Please Don't Feed the Lake" program and the Chesapeake Bay Preservation Act both try to limit phosphorus to enhance water quality. What is good for the Bay is good for Barcroft . . . and vice versa.

Thus, it is advisable for Barcroft residents to support the Chesapeake Bay Preservation Act including its Virginia "Regulations" and its Fairfax County "Local Ordinance." This local ordinance institutes certain controls which promise to improve Lake Barcroft water quality. While the ordinance does impose certain development restrictions, in the case of our already developed community, residents should find them minimal, if indeed, even noticeable, in most cases.

The Lake Barcroft WID position on the Fairfax County local ordinance is supportive now that County officials have recognized the practical necessity of entering into a Maintenance Agreement between the WID and Fairfax County. This simple pact, which is generally agreed to and should materialize soon, permits WID to continue its sound conservation practices of lake dredging, debris removal, lake aeration and Please-Don't-Feed-the-Lake efforts by streamlining the processes of getting permits, paying fees and making studies.

Meantime, profiting from this intensified interest, the WID has developed a comprehensive phosphorus monitoring regimen to measure phosphorus transport to verify the efficacy of Lake Barcroft Management as a "Regional BMP." This study has measured the amount of reduction in phosphorus yield to the Chesapeake Bay that can be attributed to Barcroft's several conservation programs. WID's 54% annual reduction ratio is above the 40% target called for by Virginia and neighboring states.

Urban BMP's are necessary to ensure the preservation and enhancement of the Chesapeake Bay.

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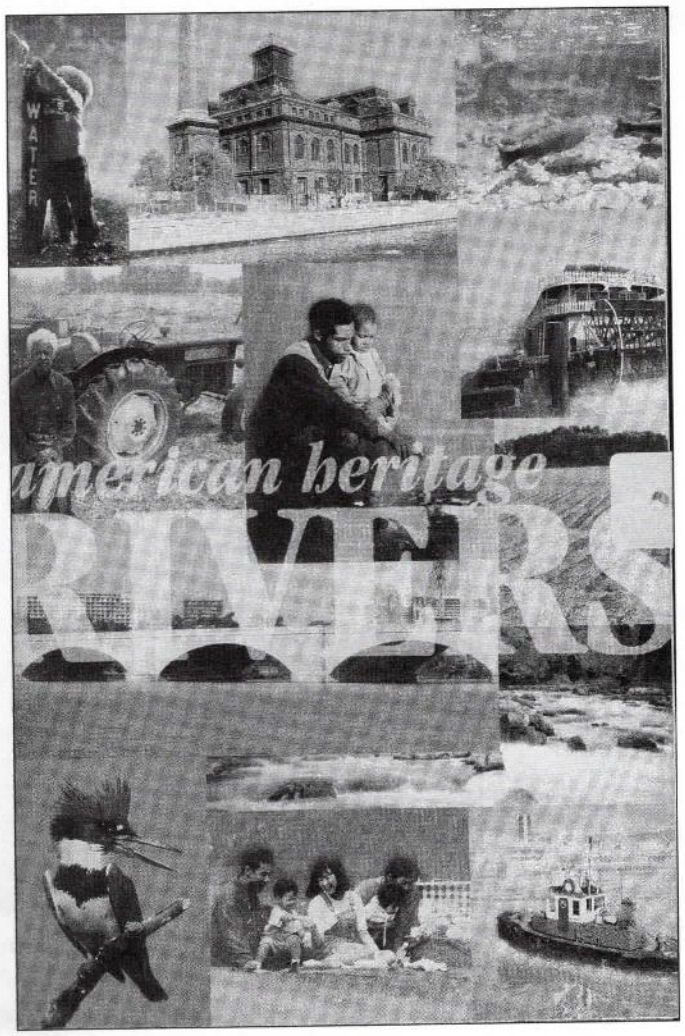
American Heritage Rivers



The **American Heritage Rivers Initiative** is a presidential innovation designed to recognize and assist communities that restore and protect their river resources in a way that integrates natural resource protection, economic development, and the preservation of historic and cultural values. It has three objectives: economic revitalization, natural resource and environmental protection, and historic and cultural preservation. Environmental, economic and social concerns will be addressed through a plan that is designed and driven by the local community.

The particular emphasis is on water resources. A wide variety of services will be provided by the federal government to local interests. Some of these resources are available for the first time and in an easy-access format. Such agencies as EPA, the Fish and Wildlife Service, the U.S. Geological Survey, the Corps of Engineers can be reached by mail, phone, and internet. Essentially, the Administration has pledged the full cooperation of it's massive environmental-conservation force in an unrestrained and simplified manner to local communities. Bureaucratic barriers will be broken and new lines of communication will be initiated.

A major function of the American Heritage Rivers Initiative is designating ten American Heritage Rivers during 1998. Before a stipulated deadline, nominations were solicited. WID noticed that the nomination rules mentioned urban situation and small streams. Accordingly, WID nominated **Tripps Run** as one of America's Heritage Rivers pointing out that Tripps Run has a long and distinguished history, an unusual accumulation of water resources problems and stimulating revitalization projects.

However having beaten the deadline, WID is eligible for *Special Benefits for Qualified Applicants*. They include an invitation to a national or regional symposium and site-specific data and computer software including environmental information, maps, community planning software and economic modeling tools.

American Heritage Rivers Initiative hotline is (888) 40-RIVER.

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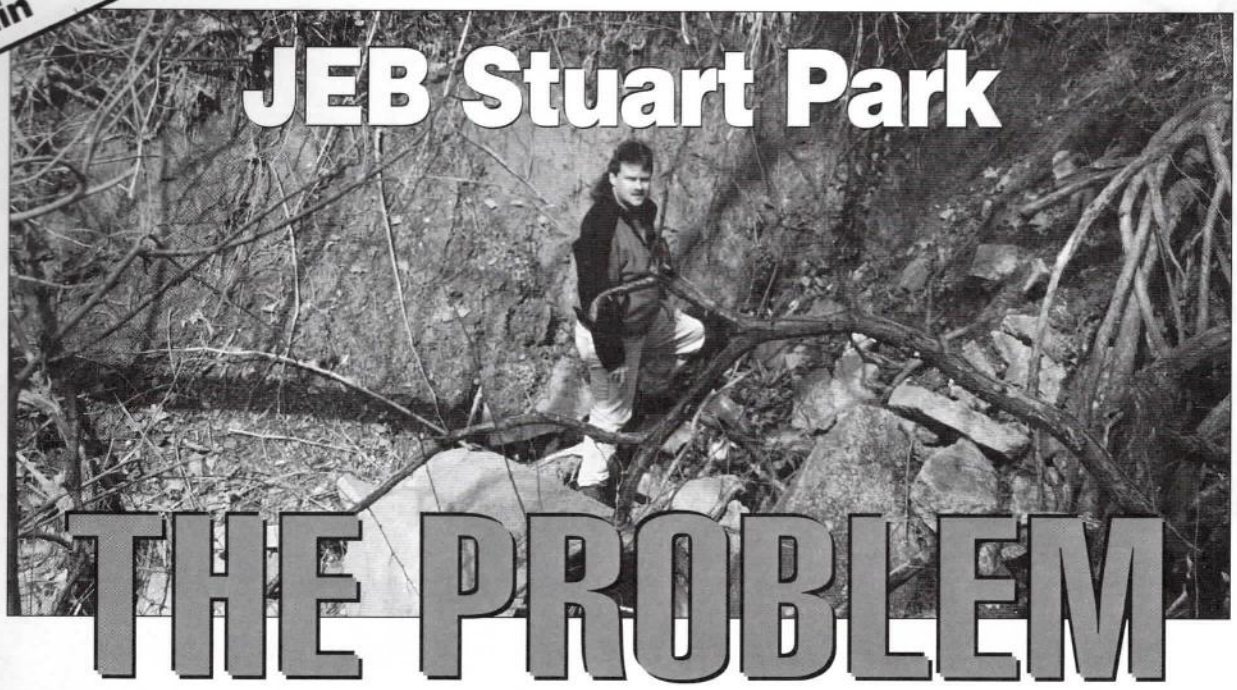

JEB Stuart Park

THE PROBLEM

The technicians call it a "*holistic solution.*" The dictionary defines holistic as *the theory that nature tends to synthesize units into organized wholes.* A year ago, concentrated storm drainage from the JEB Stuart subwatershed was eroding tons of sediment into Lake Barcroft with every major storm. Today, the problem is 90% to 95% eliminated by a combination of best management practices (BMP's) consisting of:

- two *flow regulators* in the piped storm sewers from JEB Stuart High School,
- a carefully engineered *plunge pool* constructed of Class I and Class II rip rap,
- a novel timber *check dam* to provide temporary stormwater detention,
- two smaller *check dams* made of available fallen tree trunks,
- a *biolog* to control stream bank erosion, and
- plain ordinary grass grown from seed and stabilized by jute netting.

No one of these BMP's would have predominately eliminated this erosion which had been occurring for several decades in this little park owned by the Fairfax County Park Authority. But the combination did the trick. The scheme was:

1. developed by the Lake Barcroft Watershed Improvement District,
2. designed by WID's engineering consultant GKY & Associates, Inc.,
3. verified by engineers from the federal Natural Resources Conservation Service,
4. authorized by the Fairfax County school system,
5. approved by the Fairfax County Park Authority,
6. constructed by a WID contractor and WID staff,
7. administered by the Virginia Department of Conservation and Recreation, and
8. paid for by The United States Environmental Protection Agency (60%) and WID (40%).

WID's 40% share consisted of *in kind* contributions such as the use of WID staff and equipment. The total cost of the two flow regulators, plunge pool, two check dams and vegetative plantings amounted to about $18,000. Amortized over time, it will be more than paid for by reduced future dredging costs.

In addition to controlling the erosion of the stream and the sedimentation of a cove of Lake Barcroft, this project stabilized continuing erosive discharge which eventually would have caused failure of a major storm drain under a public road, Peace Valley Lane. VDOT engineers inspected and approved the finished project.

This kind of thing is what EPA calls a *demonstration project* and such projects are the reason EPA and Virginia's DCR are willing participants in WID's 319 grant program.

Several different BMP's rehabilitate a small stream.
Several agencies cooperate in the process.

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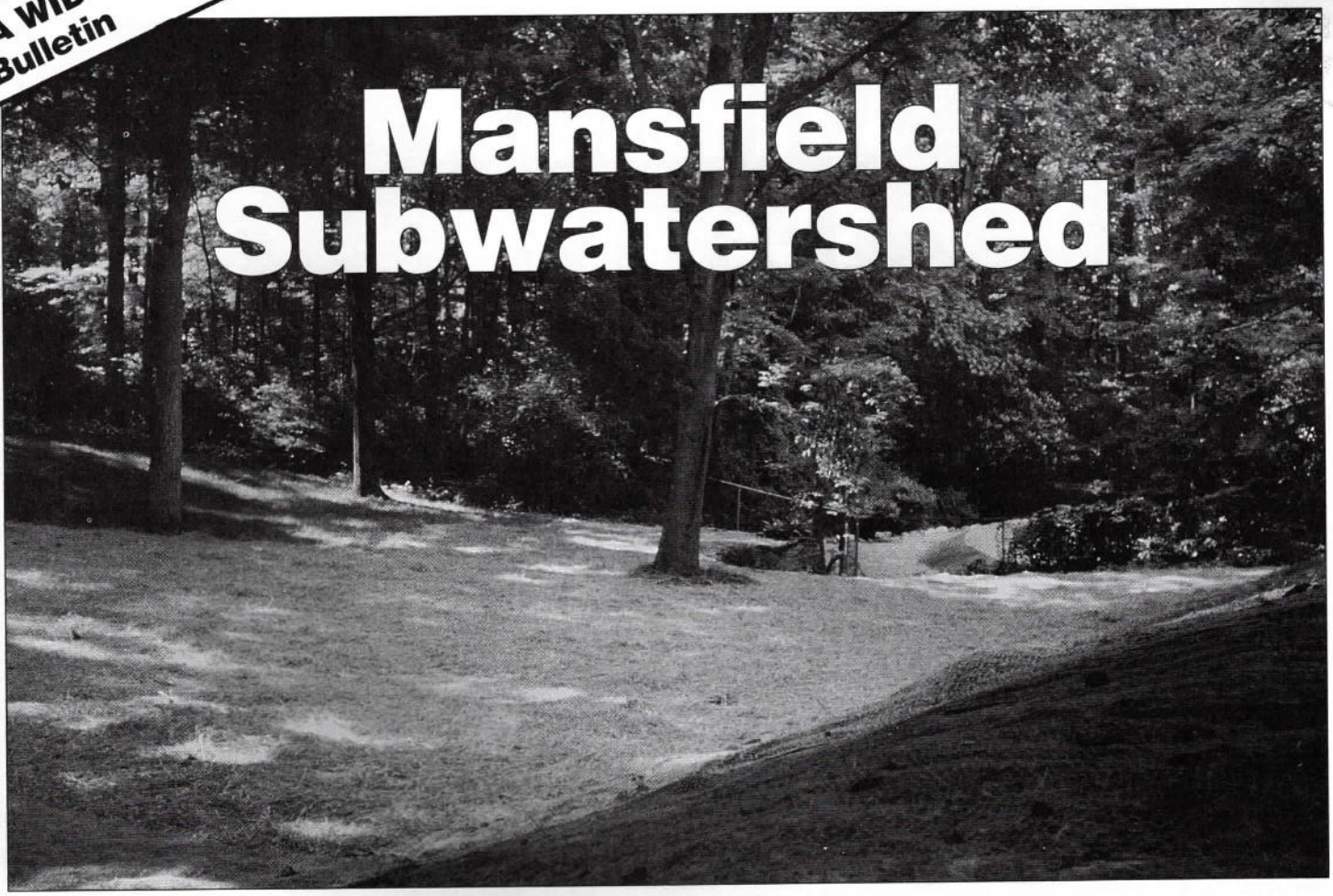
Mansfield Subwatershed



Undertaking a complete watershed retrofit on a subwatershed basis has the merit of providing aggregate substantial improvement as differentiated from a hopscotch approach which may hardly be noticed at the onset. Also, potential cooperators may be attracted to the process by being exposed to it.

In the case of the Mansfield Subwatershed in the Lake Barcroft Community, the process began as a private sector watershed improvement effort by two neighbors. They spent a considerable sum of their money building retaining walls and excavating sediment from their badly degraded cove of Lake Barcroft. They did this voluntarily . . . not at someone else's request. The WID's BMP development program offered to provide upstream protection in the form of a ***Check Dam*** which would be built at WID-EPA expense. Meantime, upstream in the subwatershed, a property owner had put his property up for sale at least partly because of a major drainage problem in the back yard. The WID program responded by proposing and constructing an ***Infiltration Trench*** including a new ***Stormwater Inlet Structure.***

A downstream neighbor expressed interest and the WID program proposed and constructed a ***French Drain*** to handle the discharge from the infiltration trench. Then, the next neighbor downstream called attention to her drainage problem and WID proposed and constructed an ***Open Air French Drain*** followed by a rip rap stabilized ***Plunge Pool***. Next the neighbor upstream of them all described his back yard erosion problem and WID proposed and constructed a ***Feeder Input French Drain.***

All of these different devices work together in tandem toward the same end objective. They provide temporary stormwater detention, trap sediment and debris, eliminate surface erosion and in the aggregate, reduce the stream hydrograph and thus improve water quality. The installation process was facilitated by the fact that all of the participants permitted access for construction equipment for their own and their neighbor's improvements. Each of the participants paid a part of the cost which in the aggregate amounted to about 30%to 40% of the total.

Mansfield Subwatershed Project cooperators include 6 families and 4 governments . . . Fairfax County, Virginia, EPA and WID.

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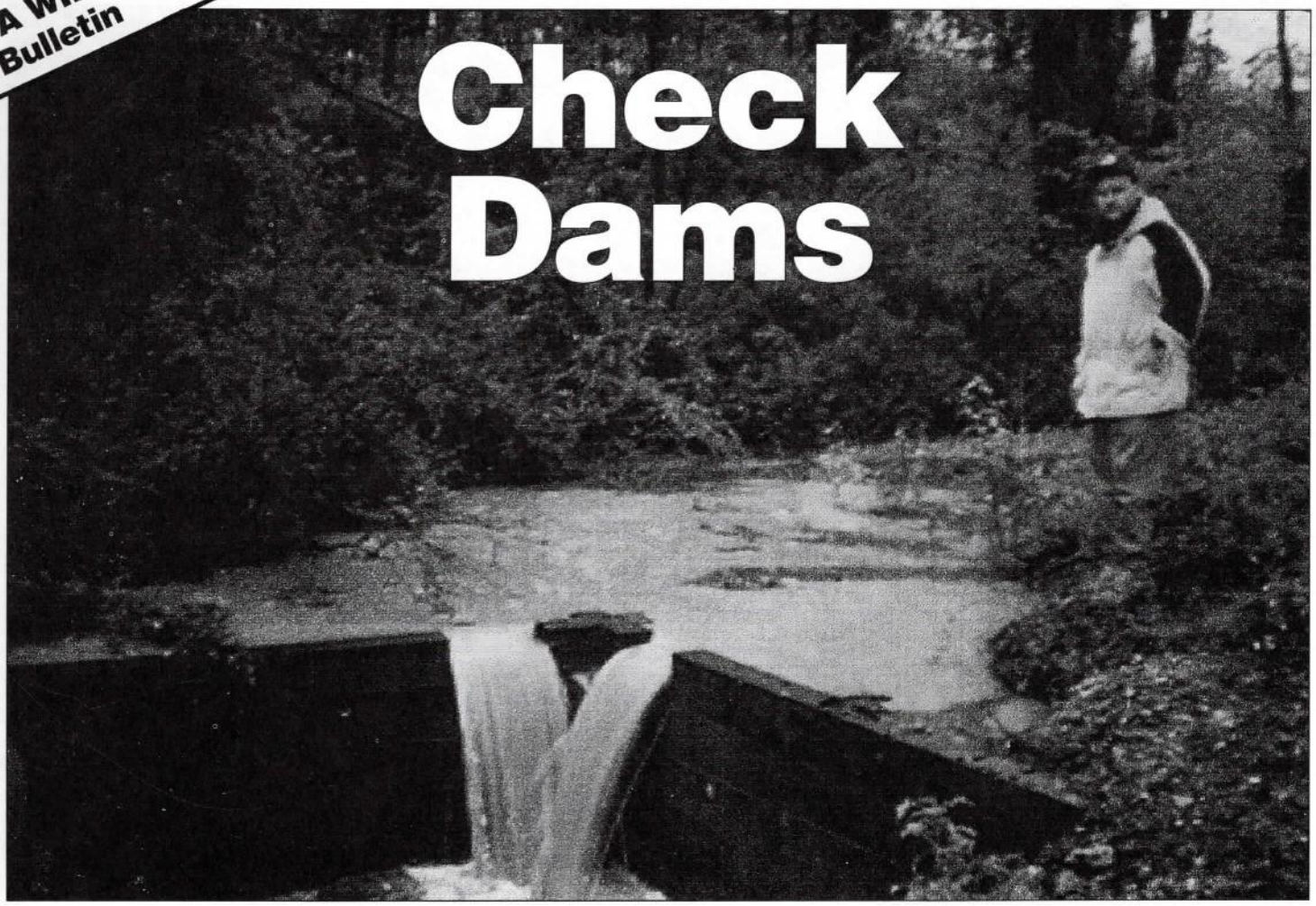
Check Dams



Check dams are useful in providing temporary stormwater detention. Installing check dam systems in upstream tributaries can reduce the sharpness of all stream hydrographs downstream. Check dam temporary detention reduces stream bank erosion and the transport of sediment, debris and nutrients downstream. Attempting to install them on major streams is more difficult because of volume and velocity of stream flow. Currently, it is impossible to get a Corps of Engineers permit in situations where the upstream watershed is greater than five square miles.

In the Holmes Run Watershed, WID has installed check dams made of timber, rip rap and used *Jersey Barriers*. More elaborate ones might be made of concrete. The above innovative design points its apex upstream to transfer hydraulic forces to the stream bank to minimize the possibility of sliding, uplift, toppling or disintegration.

One check dam has created a permanent wet pond which has additional ponding capacity, creates a mini-wetland and will likely promote biological species diversity.

Check dams require an interagency permit which is coordinated by the Corps of Engineers. The local COE representative has recently issued permits under *Nationwide 18* which recognizes their essential maintenance function and economizes the permitting process. Recently constructed WID check dams have been built of oak timbers instead of the customary CCA treated yellow pine. This eliminates the toxicity of arsenic and heavy metals used in the treatment process. Oak costs about 30% more but lasts longer. The design engineer can forecast whether or not accumulated sediment should be removed periodically.

Timber check dams are inexpensive and have a long life.

Surface check dams can be economical and offer a positive benefit/cost ratio.

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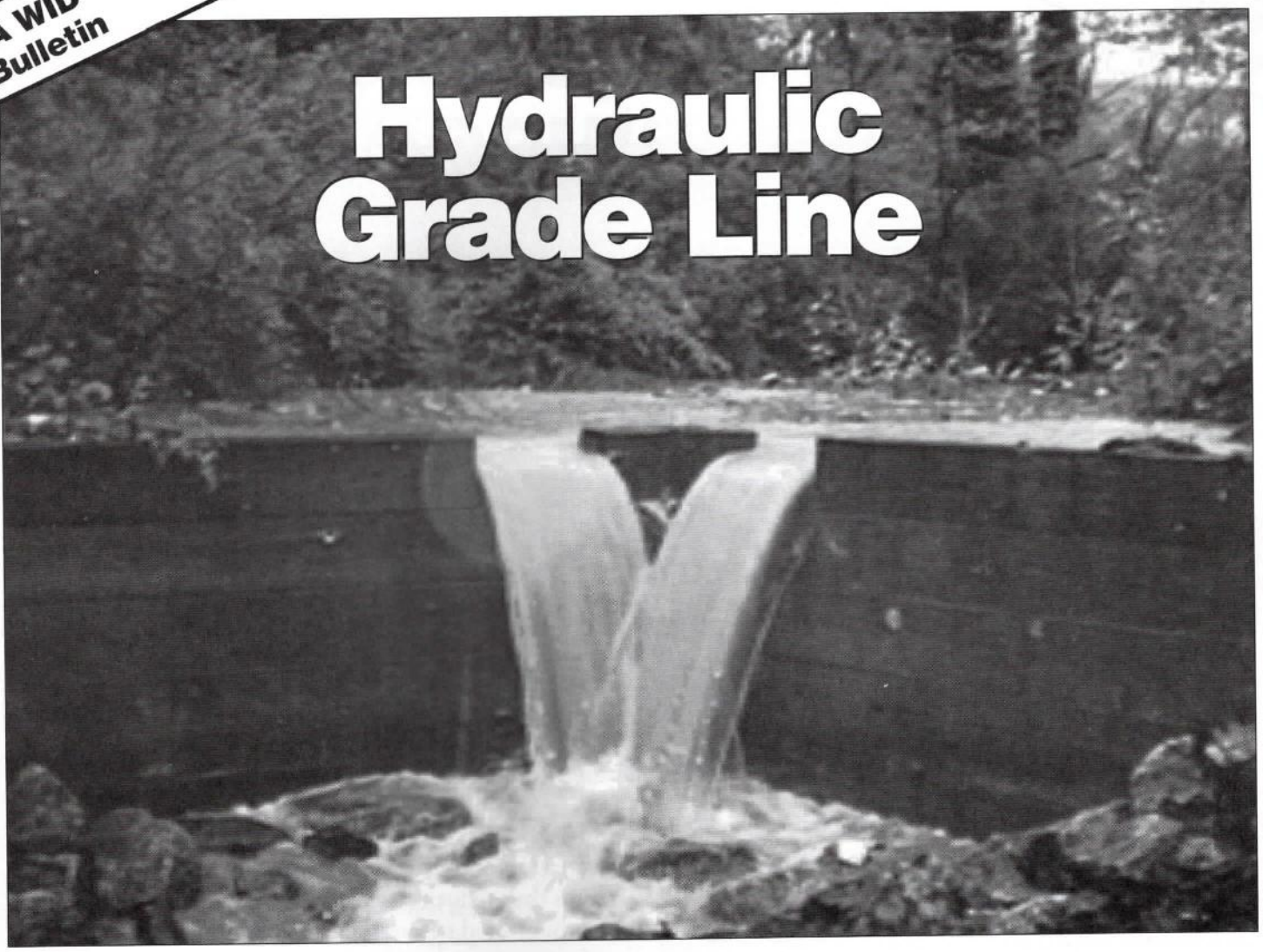
Hydraulic Grade Line



Question: Should we remove sediment which naturally collects behind check dams?

Answer: Sometimes *yes* . . . sometimes *no*.

If you do dredge and remove the sediment, you retain maximum stormwater detention capacity, which reduces erosion and the transport of various forms of pollution. However, if you let sediment stay and further accumulate until it is full, the check dam still serves a useful purpose. A series of such check dams flattens the average grade and thus reduces stormwater velocity and thus erosion. Essentially, the forward velocity must start all over again each time a check dam waterfall occurs.

Both processes are beneficial. The lower velocities reduce erosion and decrease the intensity of critical rainfall events.

In the real world, the judgment of whether or not to emphasize temporary stormwater detention or pollution deposition removal is based on economic and operational factors. How expensive will a repetitive dredging program be? Will it be cost effective? Will dredging be disruptive . . . possibly destroying attractive vegetation.

Your engineers will tell you that periodic check dams reduce the *hydraulic grade line* of a steep slope whether or not they are emptied but, of course, are more ecologically effective empty than full.

Check dams can slow stormwater flow velocity and/or catch sediment. Which should have the highest priority?

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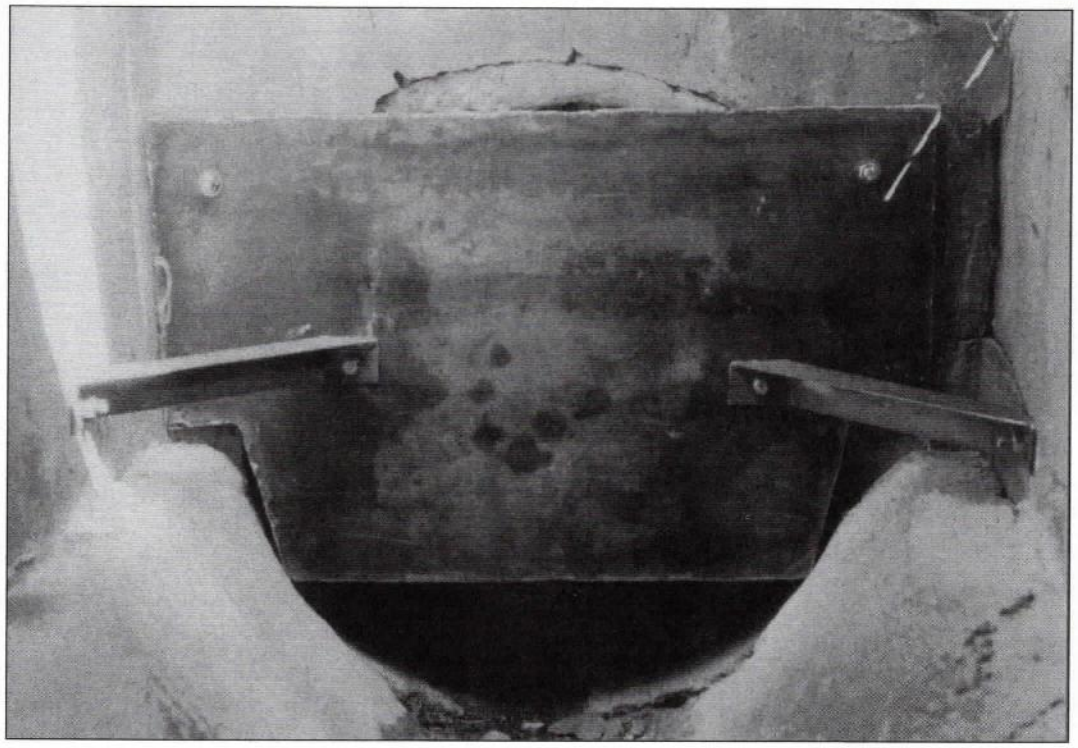
Flow Regulators



If surface check dams are inappropriate, consider underground flow regulators.

Lake Barcroft's worst enemy is flash flooding during storms. It causes erosion and transports sediment and debris to the lake. The solution would be to retrofit the upstream 14.5 square mile watershed to create temporary stormwater detention. This is the prime objective of WID's EPA 319 grant program.

WID's investigations reveal that major detention ponds are usually out of the question because all available sites have been preempted by urban development and permitting policy often blocks large remaining sites. Smaller multiple ponds are more likely to be permitted.

WID has developed a novel system of flow regulators to provide temporary stormwater detention which do not require federal permitting or public approval because they are underground and out of sight. They are easy to install and economical and can be retrofitted into an existing urban setting. They consist of underground storm sewer flow restriction barriers which cause storm water surges to back up temporarily in pipes and structures thus reducing peak flows of frequent small and medium sized storms. Flow regulators have several advantages over surface check dams. They don't require federal or state permits. They are inexpensive to construct and maintain. Since no one can see them or the water they are temporarily impounding, the likelihood of objections is greatly reduced.

Over a period of time, hundreds of these flow regulators could be installed in the headwaters and small storm sewer branches of the watershed to minimize peak flows and thus reduce flooding, erosion, and transportation of sediment and debris. WID has developed the basic designs to conform to various storm sewer situations.

WID's flow regulator program might offer new hope to older badly designed watersheds everywhere. However, public works officials acceptance of this concept is still uncertain. City and county officials need to be convinced of new ideas.

An economical, invisible and automatic new method of obtaining temporary stormwater detention. See technical article on Flow Regulators on the next page.

A WID Bulletin

Stormwater Flow Regulation

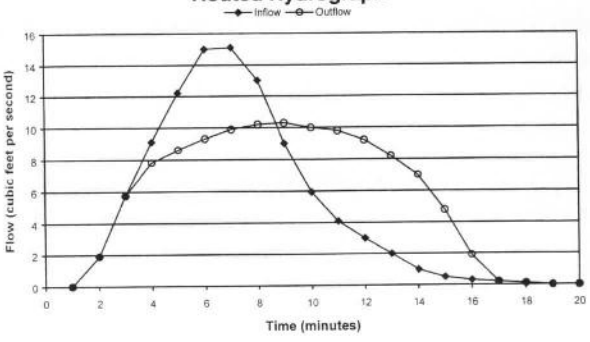
Rivers and streams develop over many hundreds or thousands of years—even the youngest. In the lifetime of a stream, urbanization can occur in an instant subjecting it suddenly to an onslaught of stormwater and contaminants. This is due to the relatively impervious urbanized landscape that sheds rainfall more quickly and completely than the porous natural landscape of the natural landscape in which the stream developed.

The infrastructure provided during urbanization to transport this runoff consists of curbs, gutters, storm drains, inlets, and storm sewer pipes. Traditionally, these have been designed to divert as much water as quickly as possible from the developed area to the stream during and after a storm to prevent its collection to flood streets, homes and other facilities. This adds to the problem downstream.

Today, most developers are required to provide BMPs in their designs to keep the post-development flows to no more than the pre-development flows for the two- and ten-year storms. This usually involves dedicating a portion of the development to a best management practice (BMP). This is usually a pond which stores runoff from the development and releases it downstream slowly through a small outlet keeping the outflow from the developed area at least as small as it would have been before development. The effect of a stormwater detention pond is depicted graphically below in *Routed Hydrograph*.

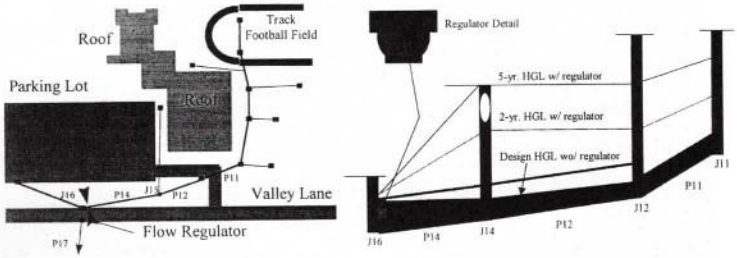
A hydrograph is simply a graph indicating how much water is flowing past a point of interest at various time intervals during storm runoff—flow versus time. Routed Hydrograph shows typical inflow and outflow hydrographs at a stormwater management pond.

Routed Hydrograph



A problem occurs in older developments like that surrounding Tripps Run. Such BMPs must almost always be part of the original development design. The political, financial, and engineering problems of "retrofitting" a development with a proper stormwater detention pond are very difficult.

J.E.B. Stewart High School Flow Regulator

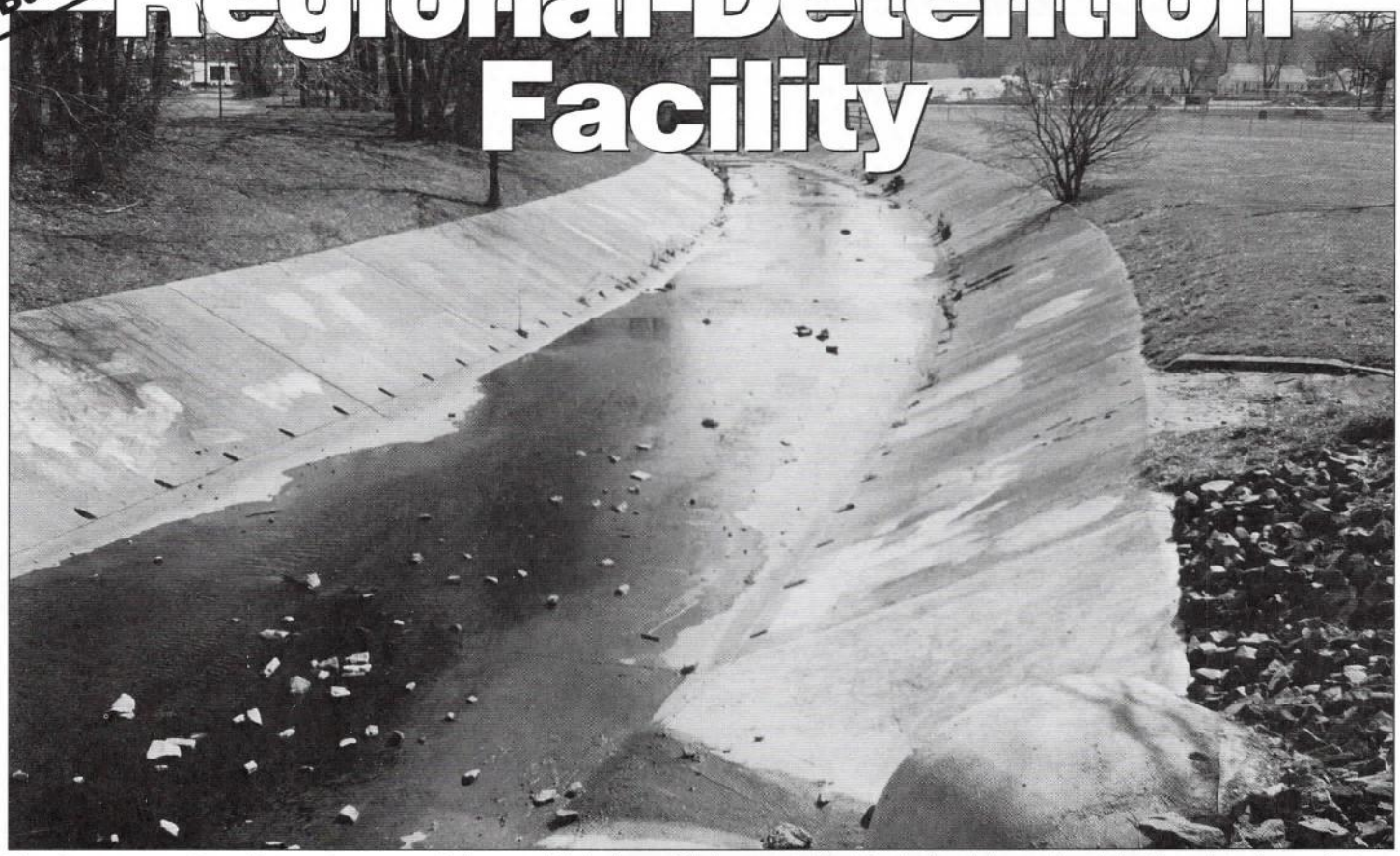


To solve this problem in Tripps Run, the Lake Barcroft Watershed Improvement District (LBWID) has adopted an engineering solution which can provide much of the benefit of traditional BMPs without incurring the political and financial penalties associated with stormwater management pond retrofitting. The concept is the **storm sewer flow regulator** and is being studied by the LBWID as a partial solution to stormwater management problems in the Tripps Run watershed. The device is placed in the storm sewer to partially block the flow of stormwater causing it to be stored within the pipe and released slowly as the storm proceeds. Early evidence indicates that as much as a 50% reduction in output flows can be achieved with such a device. *J.E.B Stewart High School Flow Regulator* depicts the operation of a single flow regulator placed at the bottom of the school's facility. This simple, inexpensive device can easily be installed pressing existing overdesigned storm sewer pipes and parking lot curbs and gutters into service as temporary stormwater holding areas and greatly reducing the flows downstream.

The LBWID has obtained a grant from the Environmental Protection Agency under §319 to study the device's potential and develop recommended guidelines for its use in mature watersheds. Plans include installation of a series of regulators, to quantify their cumulative effects. The result will be a workable stormwater management option for mature developments with older infrastructure.

A WID Bulletin

Regional Detention Facility



Tripps Run, as it crosses Route 50, is paved in concrete which was installed decades ago. This has minimized local flooding but also has accelerated flood flow velocity thus transferring the problem downstream and aggravating the overall problem instead of solving it.

The above paved ditch is a prime example of ineffectual stormwater system design. However, this publicly owned site could be converted into a modern regional detention facility.

The creation of **regional stormwater detention** facilities may be practical and cost effective. Proffer money from rezoning and site plan approval activities is designated to fund such facilities in the same watershed. The procedure is simple for major land developers and individuals or smaller groups applying for in-fill development authorization. Regional stormwater detention facilities are consistent with Chesapeake Bay Preservation Act policies and other public and private programs. They are a basic procedure available to implement stormwater retrofit programs to improve water quality, minimize flooding and the transport of sediment, debris and nutrients. They concentrate what otherwise could become a hodgepodge of smaller facilities and thus facilitate maintenance and reduce maintenance cost.

Regional detention facility sites are difficult to situate in an urbanized watershed where land development has already preempted most potential sites. However, some opportunities still exist in locations where publicly owned land can be converted to this contemporary important use. An example of this is the Tripps Run paved stream tract just north of Route 50, pictured above. Here, a 1.3 acre parcel contains a small playground and ball field that could be redesigned to also provide some stormwater detention as part of a multipurpose facility.

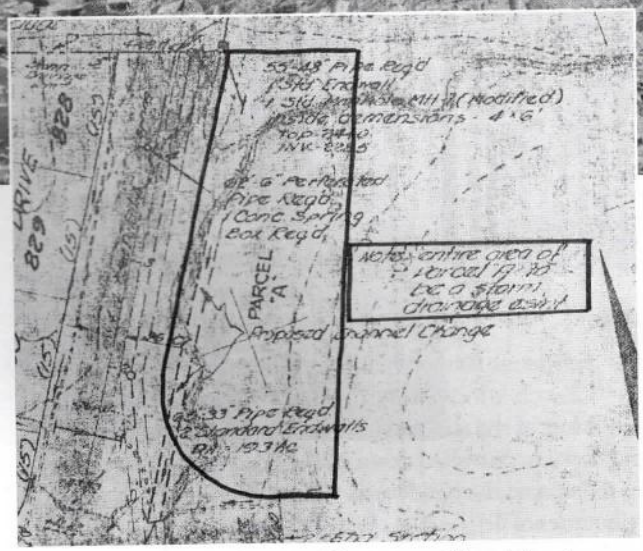
Construction funds could be obtained from accumulated proffer money and other sources. Periodic maintenance would be less expensive than current flood control maintenance downstream.

This is a potential stormwater management Best Management Practice.

Regional stormwater detention facilities can provide major water quality benefits. Each instance requires individual design, financial planning and administrative approval.

A WID Bulletin

Extended Dry Pond



Developer's July, 1953 Plat notes: "Entire area of Parcel A to be a storm drainage easement."

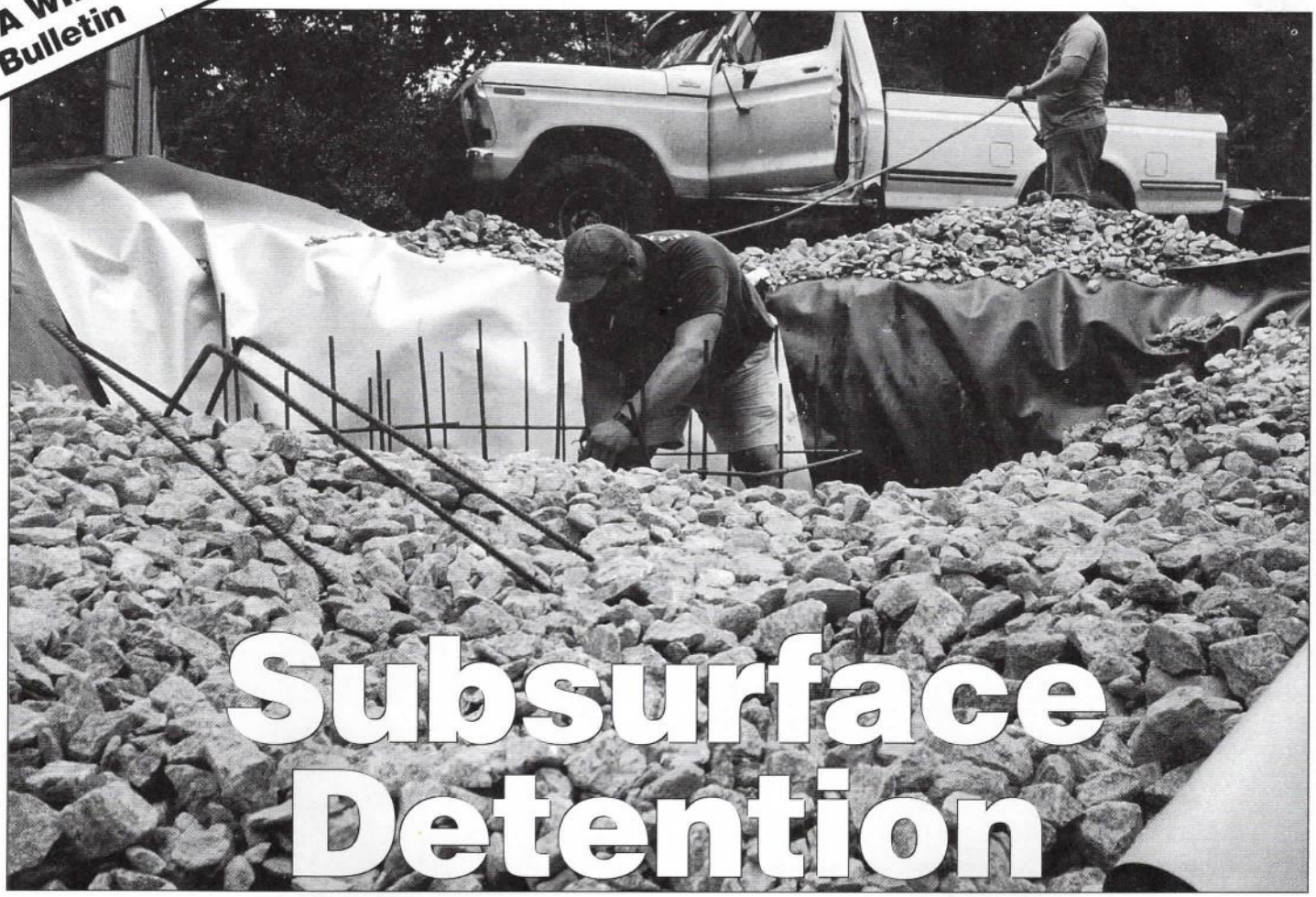
A 1.3 acre storm drainage outlot at the intersection of Glen Carlyn Drive and Blair Road has received a Corps of Engineers interagency permit for the construction of an **extended dry pond**. The 170 acre watershed above this location drains a large apartment complex, a large area of single family homes, a shopping center, a library, a school, several churches and a section of a major highway. Storm drainage pours in from one major and several minor piped storm drainage systems and flows out through a large culvert under Blair Road into Lake Barcroft.

This intensively developed area yields pollution at a much higher rate than the rest of the Lake Barcroft watershed. Apartment dwellers repair their cars on the streets and routinely discard their waste oil and oil filters into the storm drains and even directly into the outlot. The receiving cove of Lake Barcroft is the most polluted section of the Lake. Sediment accumulations are large and comments of the dredging company during the most recent dredging indicate that they had an oily-greasy texture.

Consulting engineering firm GKY & Associates, Inc. has designed a discharge structure which will retain the first 1/8 inch of runoff to be discharged within 48 hours which will catch about 90% of the first flush pollution. Virtually, all of the floatables will be trapped and most of the sediment. Special sorbent booms will catch both storm and non-storm grease and oil discharges. Currently, WID is investigating land acquisition, engineering design and related matters.

An old drainage outlot is now being actively investigated.
WID will benefit from cooperation from nearby residents, the County and the State.

A WID Bulletin



Subsurface Detention

The Mount Daniel Elementary School of the City of Falls Church is located on a hilltop in nearby Fairfax County. Most of the stormwater from the school's roof and playground flow uncontrolled down street-side gutters into storm drains to become the headwaters of Coe Branch which is one of the tributaries of Tripps Run. Peak flows during storms have caused homeowner flooding problems and contribute to Tripps Run's destructive flooding downstream in the City of Falls Church and below in Fairfax County causing considerable damage to the residential Lake Barcroft community.

The *Lake Barcroft Watershed Improvement District* (WID) is the recipient of a grant from the *United States Environmental Protection Agency* (EPA) for the purpose of identifying and implementing Best Management Practices in older urban neighborhoods. WID, aided by the EPA grant, has negotiated an inter-jurisdictional project with the City of Falls Church which has the approval of the City Manager and Falls Church School officials and Fairfax County officials. This project has installed a *subsurface drain system* to provide temporary stormwater detention to control surface and roof runoff, minimize stormwater peak flows, reduce erosion and improve water quality.

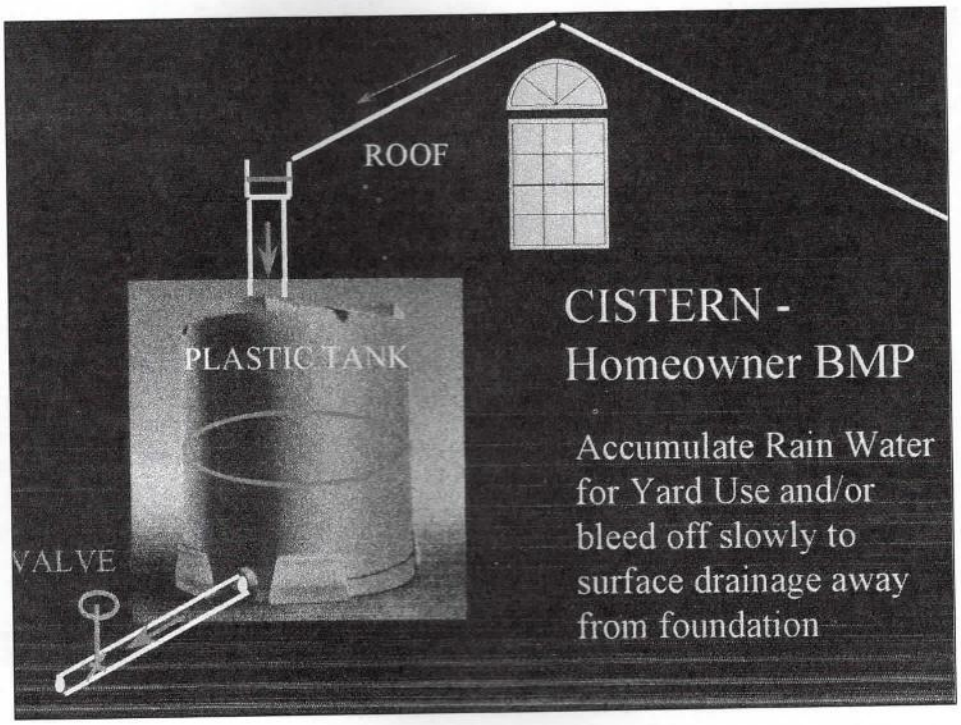
This underground system consists of a hole in the ground (HIG) filled with coarse aggregate or crushed rock, while maintaining a substantial stormwater storage capacity. The design pit is 15 feet square and 6 feet deep with an aggregate excavation capacity of 48 cubic yards. This pit is sized to accommodate the roof and playground area to provide 18 to 1 flow reduction of a 2 year peak and 2 hour detention. Essentially, it converts a sudden storm peak into a graduated outflow which contributes toward a flattened hydrograph of all drains and streams below.

WID can see only benefits to this project. It protects immediate residential property owners and contributes moderation to piped and open streams from Mount Daniel to the Chesapeake Bay. The roof downspouts nearest the playground and accumulated rain on and above the playground are channeled to the HIG inlet by a rolled asphalt curb which was installed as the school playground was repaved to repair its degraded condition by the school's paving contractor. The HIG discharge consists of an infiltration trench containing a small perforated pipe leading to the street curb and gutter system. The construction was completed during the summer vacation with day care programs utilizing playground areas at the other end of the school.

Temporary stormwater detention contributes toward watershed protection and renovation. A one-time project eliminates continuing damages and nuisance.

A WID Bulletin

Cisterns Contain Roof Drainage



The old fashioned cistern becomes fashionable again. Today, it is often more economical to install a small cistern tank than to struggle to control erosion from roof drains. The cost of an elaborate french drain could run into thousands whereas a small cistern tank would cost only a few hundred. The cistern tank could be located near the house and concealed by shrubbery. There are two possible modes of operation. The tank outlet valve could be normally closed to permit the accumulation of rainwater to use later for garden irrigation. Or it could be left slightly open to allow the gradual discharge of sudden rainstorms slowly enough to prevent yard erosion.

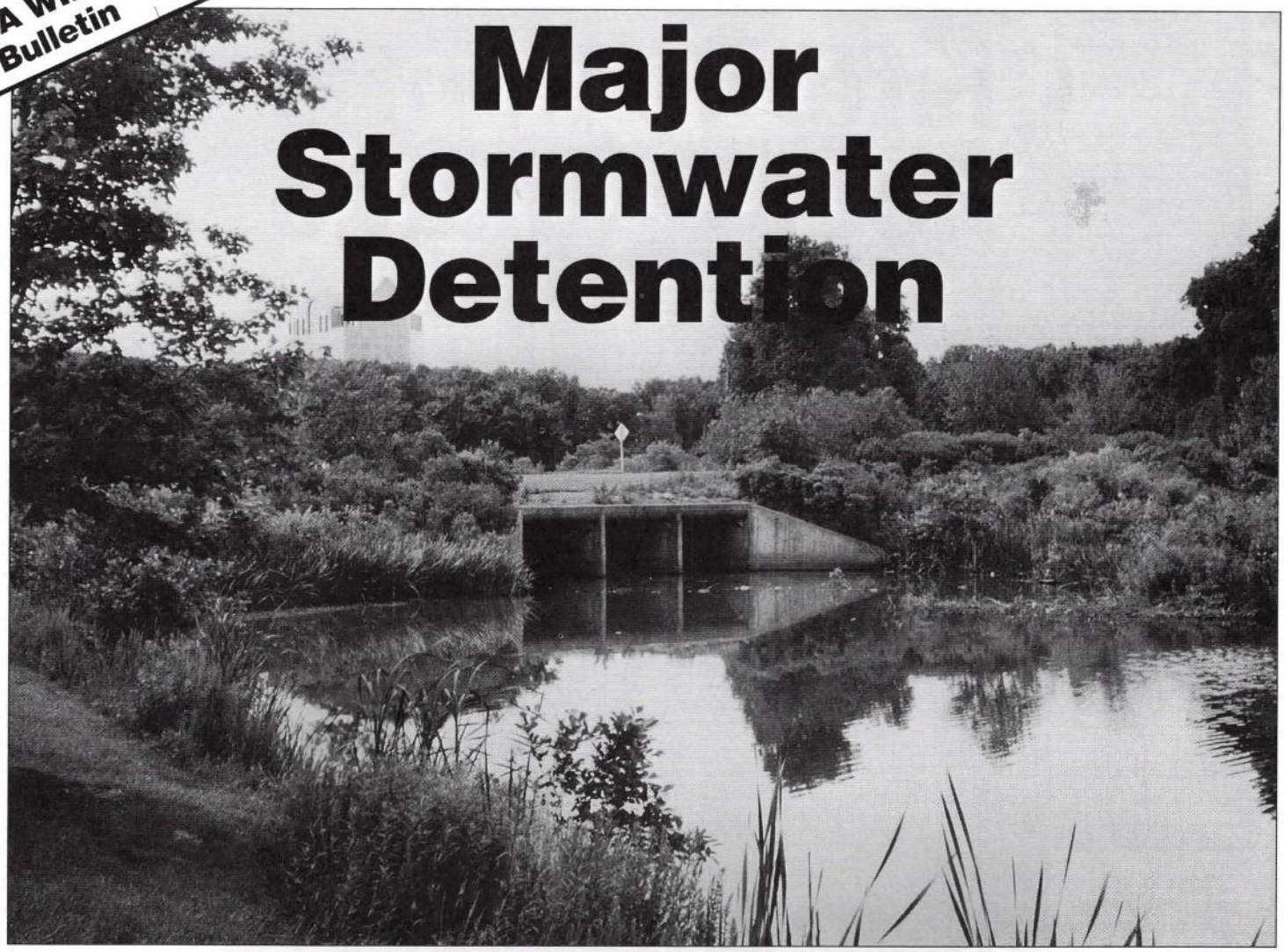
Modern feature cistern tanks can be ordered from a manufacturing company which specializes in plastic tanks for industry and government use. A 550 gallon tank should serve a typical roof area drain and including its inlet/outlet fittings will cost about $300. It would have a 48" diameter and a 81" height. The gutter down-spout would feed in the top with a regular garden hose outlet at the bottom.

Call (540) 665-3062 for more information. There also may be other manufacturers.

Grandpa's good idea comes to life again.

A WID Bulletin

Major Stormwater Detention



Holmes Run's most significant environmental improvement occurred in 1987 when the Fairfax County *Department of Public Works* designed and constructed the dam which created Fairview Lake in the upper portion of the valley. This was part of a carefully planned office park project on a large tract of land in the Lake Barcroft Holmes Run subwatershed instead of the usual single family home urban sprawl development. From that time to this, Fairview Lake has provided substantial temporary stormwater detention and has captured and contained the sediment and debris of 2.6 square miles or 35% of the Holmes Run subwatershed. It has its own lake management system and contemplates occasional sediment dredging as needed. Above Fairview Drive, Fairview Lake is separated from a large upstream arm which acts as a sediment collecting forebay.

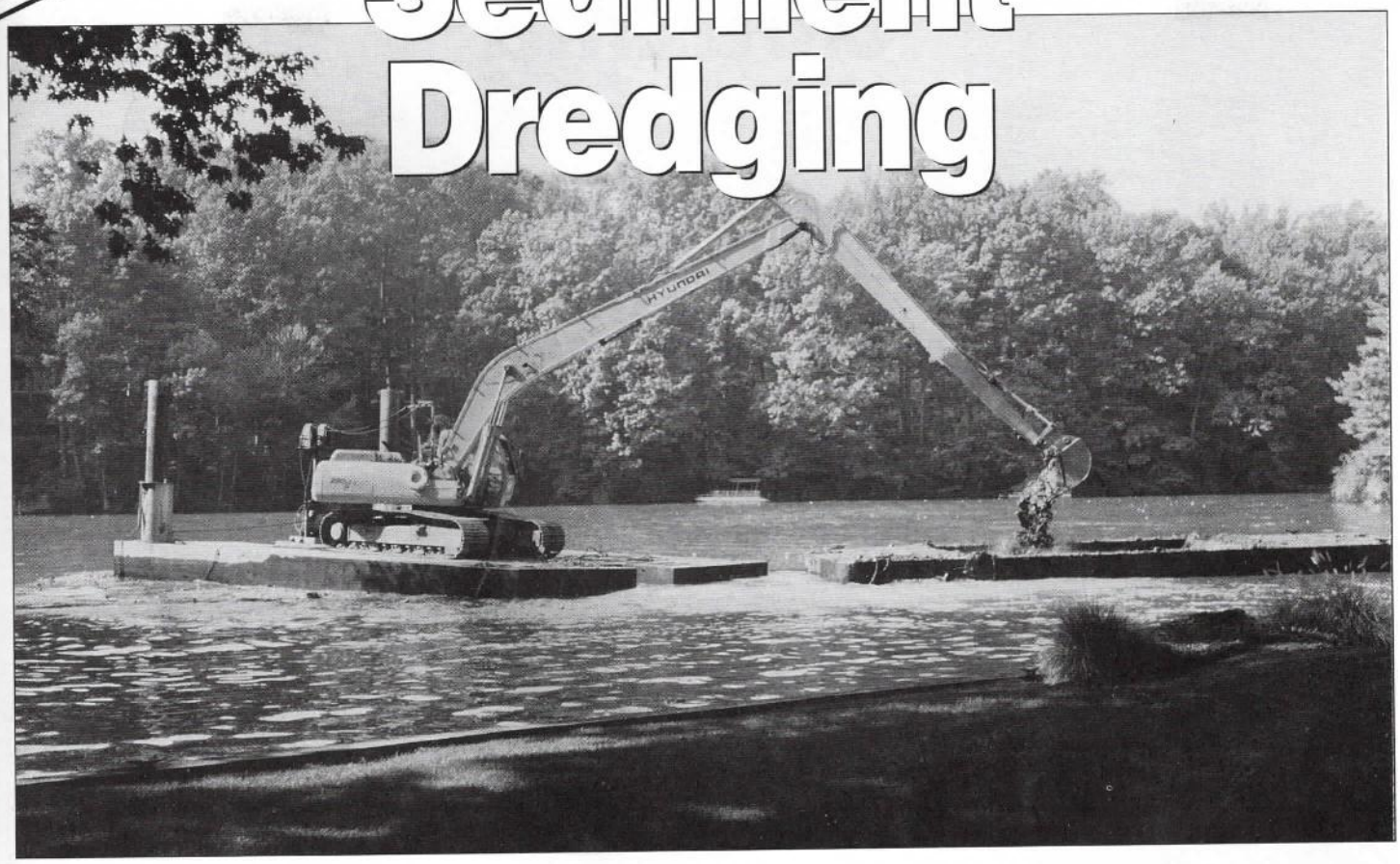
Today, by the construction of a weir in front of the forebay discharge to the lake, the temporary detention level of the forebay could be increased by 2½ feet. Thus, during a design storm, 15 acre-feet could be temporarily detained for gradual discharge to the lake. In dry periods, the pool depth would remain the same on both sides of the weir. This is certainly the largest single remaining stormwater detention potential in the watershed.

A proposed design is now being developed in preparation for this improvement. The cost of the project is very modest compared to the benefits.

Watershed evaluation reveals unexpected potential temporary stormwater detention projects when coupled with long term land use planning.

A WID Bulletin

Sediment Dredging



Still water lakes create favorable circumstances for sediment deposition and thus gradually degrade into swamps and ultimately dry land. Lake dredging improves water quality, enhances appearance, encourages recreation and protects property values.

Dredging alternatives include mechanical dredging, hydraulic dredging and lake-lowering dry removal. In September, 1997, WID dredged 14,329 cubic yards of sediment and transported it to a drying area for $222,537.50. Four mechanical dredging systems were used. 10,845 cubic yards were dredged by a floating rig consisting of a long-front excavator mounted on twin flexifloats using two large hopper barges. 900 cubic yards were dug by a Smalley floating backhoe with two hoppers. 219 cubic yards was dug by *Godzilla* which is a miniature custom made floating backhoe for tight coves. 2,365 cubic yards were dredged by a shore-based long-front excavator. This material was off-loaded by another long-front and trucked to drying areas.

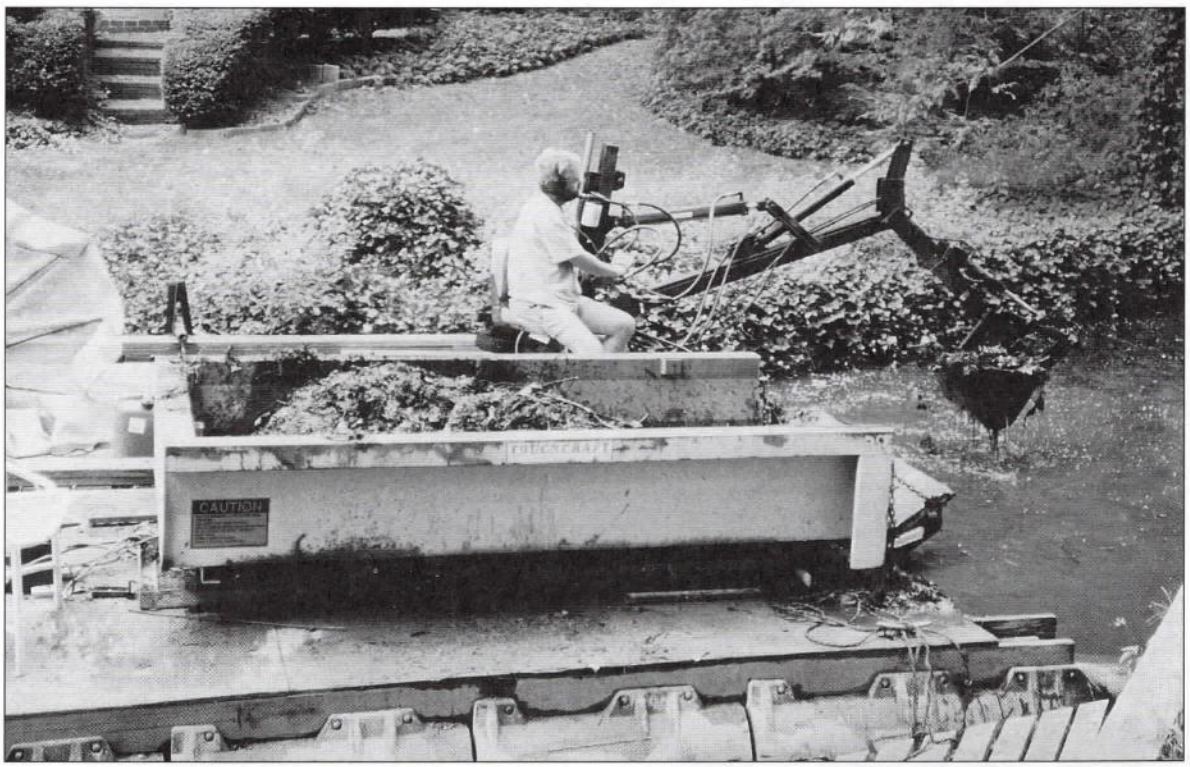
WID's dredging strategy is yearly emptying of lake forebays and a 3 or 4 year cycle of major dredging. The net result is maintaining the lake's basic detention volume and reestablishing lake depth to a minimum of about 6 feet. Since 1961, Lake Barcroft has spent about $2^{1}/_{4}$ million dollars dredging approximately 400,000 cubic yards of sediment.

Typical dredging procedures include a preliminary *bathymetric* survey to ascertain quantities and location, determination of the most economical dredging method, contractor bidding and actual dredging.

Dredging is expensive but a well-conceived and flexible program makes it feasible.

A WID Bulletin

Godzilla



Like the Japanese mythical giant prehistoric monster who goes around doing good, WID's little *Godzilla* goes around digging sediment out of Lake Barcroft coves. The only problem was that the WID staff found that the Godzilla dredge was too slow. Every time it filled its little home-made hopper barge with sediment, it had to quit digging and ferry the whole rig back to the dam area to dispose of it. The net result was an average daily yield of about 10 cubic yards.

Recently, WID decided to build a second hopper barge and increase Godzilla's staff manpower to permit continuous digging. WID contracted to have the new hopper built in Indiana rather than constructing it here and the result was an approximate $3,000 saving.

During the September Lake Barcroft dredging program, Godzilla and its two hopper barges set a new daily record by dredging and transporting to disposal 36 cubic yards of sediment. Since this equipment is owned by WID, it stands ready to be used at any time. This means that small volume dredging, such as cove clean-out, can be a continuous and on-going process to protect the integrity of the lake.

WID Superintendent *Sam Ellis* thought up the idea of the Godzilla mini-dredge years ago. He built it out of scraps which he had accumulated over a period of time plus a few specific hydraulic parts which cost a few dollars. He coaxed his ungainly looking invention to dredge muck out of Lake Barcroft's tight coves and waterfront areas. He rescued several lake coves from being drowned by storm drainage silt and litter. Today, he is supported by WID contractor *Wes Grant* of Vision Contracting, WID Staff Director *Ken Kopka* and WID Technician *Paul Gordon* in the continuing program to control pollution. WID thanks *Sam* for this idea and also for his initiative in his basic responsibility of maintaining the complex Barcroft dam.

A baby dredge can remove sediment in tight places around docks or in coves at reasonable cost.

A WID Bulletin

Upstream Silt Trap

Floating rig mechanical or hydraulic lake dredging is very expensive. Simple bank dredging, which requires only a long-front excavator and trucks, is much more economical. An upstream *forebay* can be constructed above a lake. Essentially, it is a little-lake-above-a-lake. Ideally, a series of such forebay removal facilities located in tandem upstream could catch a substantial portion of watershed sediment yield to protect the lake.

Forebay construction consists of digging an elongated chamber in the stream which is large enough to slow stream velocity sufficiently to permit high specific gravity sediment deposition while leaving the pit small enough to be reached by the excavator. Upstream and downstream stabilization can eliminate erosion and protect the work area.

The benefits of forebay dredging are both economical and operational. Less equipment is used . . . but more often. Equipment mobilization costs are greatly reduced. The dredging crew may be as small as two or three depending on the length of haul to the disposal area. Dredging *down-time* is minimized. Most important, the responsibility of sediment removal is dispersed throughout the watershed instead of being concentrated on the downstream lake.

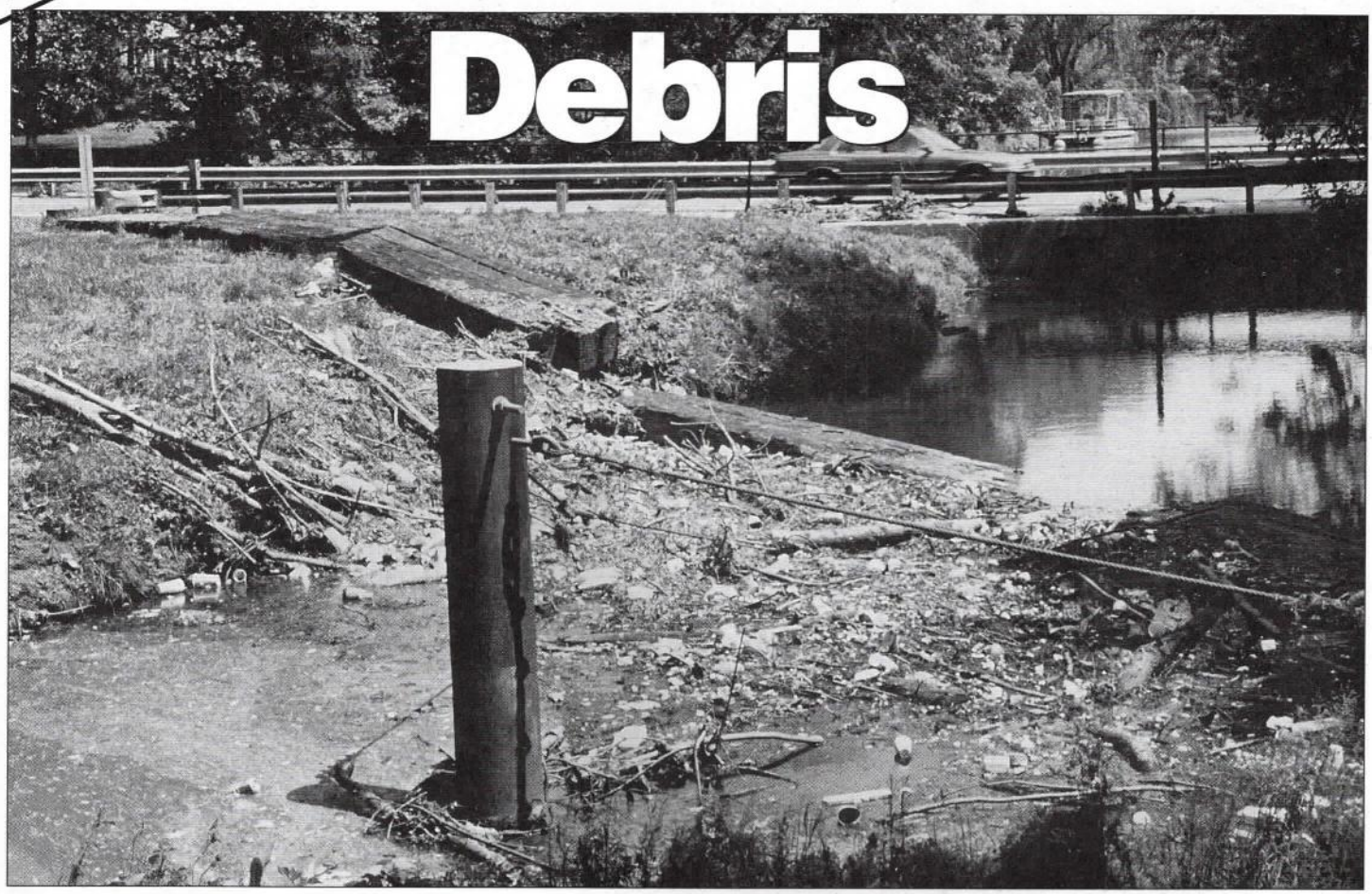
Why dredge? To protect the lake . . . to improve water quality . . . to protect property values. Essentially, a lake is a sump or sink which naturally converts itself into a marsh. Dredging is usually necessary because of upstream human activities and natural erosion. Lake preservation is a countermeasure.

Forebays remove the heavier sand and gravel which settle out in the short flow-through time. This material is superior for stable fill.

A lake is a valuable natural resource which benefits from management such as upstream erosion control and economical forebay dredging.

A WID Bulletin

Debris



This floating debris boom across Tripps Run above the Potterton Causeway traps large quantities of litter before it can get into the lake.

Back in the 1960's, Lake Barcroft decided to try to trap and remove litter before it got into the lake. But it was clearly impossible to build a simple barricade to catch this stuff because the huge volume of water during major storm events creates large hydraulic forces that can wash away impediments to flow. Thus, WID's consulting engineers designed an unusual "floating boom" which would rise and fall with the level of the incoming water and could trap much of this floating debris behind it.

This system actually manages to catch a significant portion of this incoming litter which can be subsequently removed by a mechanical clamshell and dump trucks. There are two functions:

- The floating debris boom catches some of the flotsam which is subsequently removed and hauled to the landfill by the Fairfax County Department of Public Works.
- And the guard rails along Potterton Drive catch much of what escapes and this material is removed by the Virginia Department of Transportation.

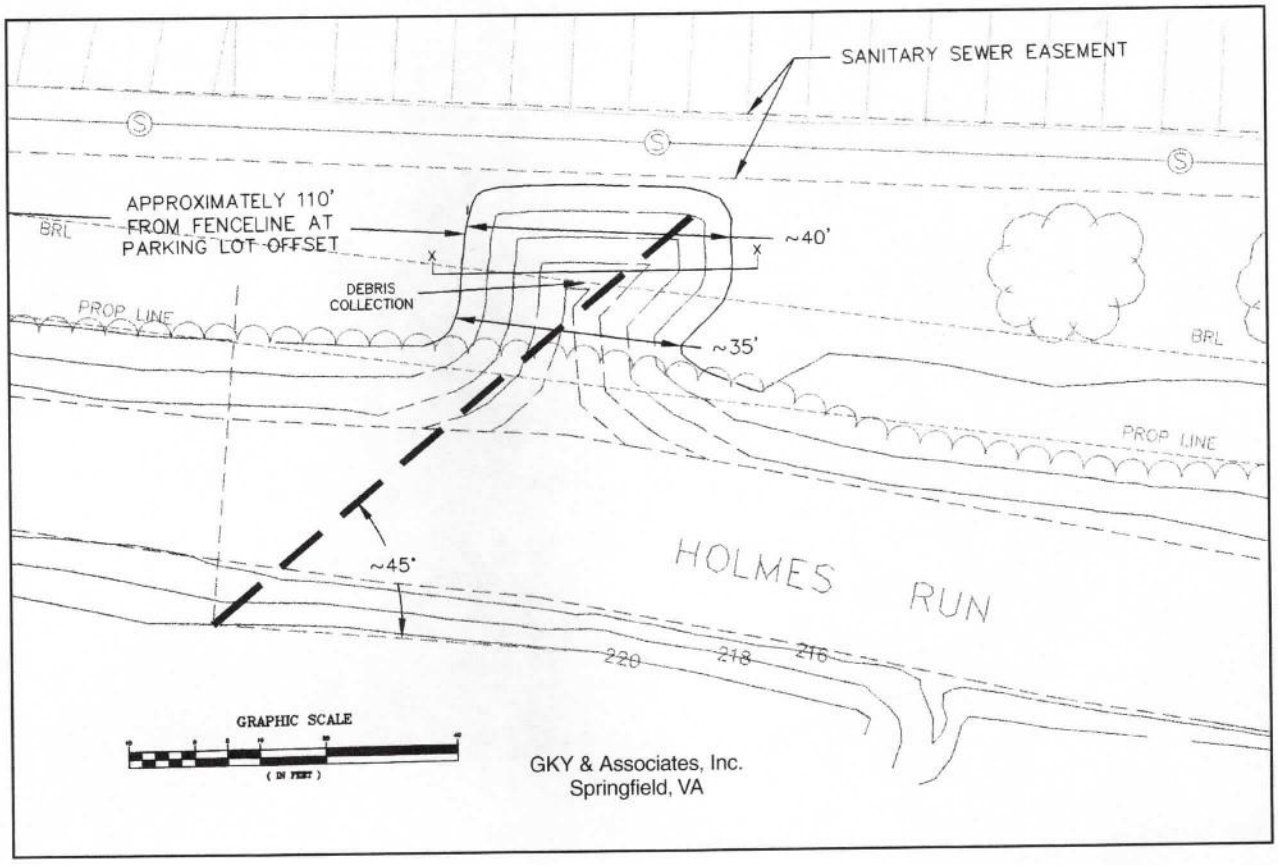
WID appreciates this cooperation by Fairfax County and the Commonwealth of Virginia.

This immense problem can be blamed on both **people** and **Mother Nature**. People discard litter in Barcroft's upstream 15 square mile watershed. And Mother Nature's natural function provides major storms to flush everything that will float downstream during big storms.

Thoughtless people create litter.
Thoughtless jurisdictions don't have street sweeping programs.

A WID Bulletin

Diversion Debris Trap



Of the four major pollution manifestations of sediment, debris, nutrient and toxics, only *debris* is benignly ignored by the Fairfax County nonpoint source pollution control planners. There are no actual or proposed comprehensive programs or plans to trap and remove floating debris. Instead, DPW and VDOT periodically clean up the ugly storm-driven mess at the Potterton Causeway which amounts to a fraction of the total watershed yield with the remainder being either physically removed by WID barge pick-up crews or WID periodic dredging contracts after the stuff has sunk to the bottom of the lake with the remainder simply collecting in deeper undredged portions of the lake.

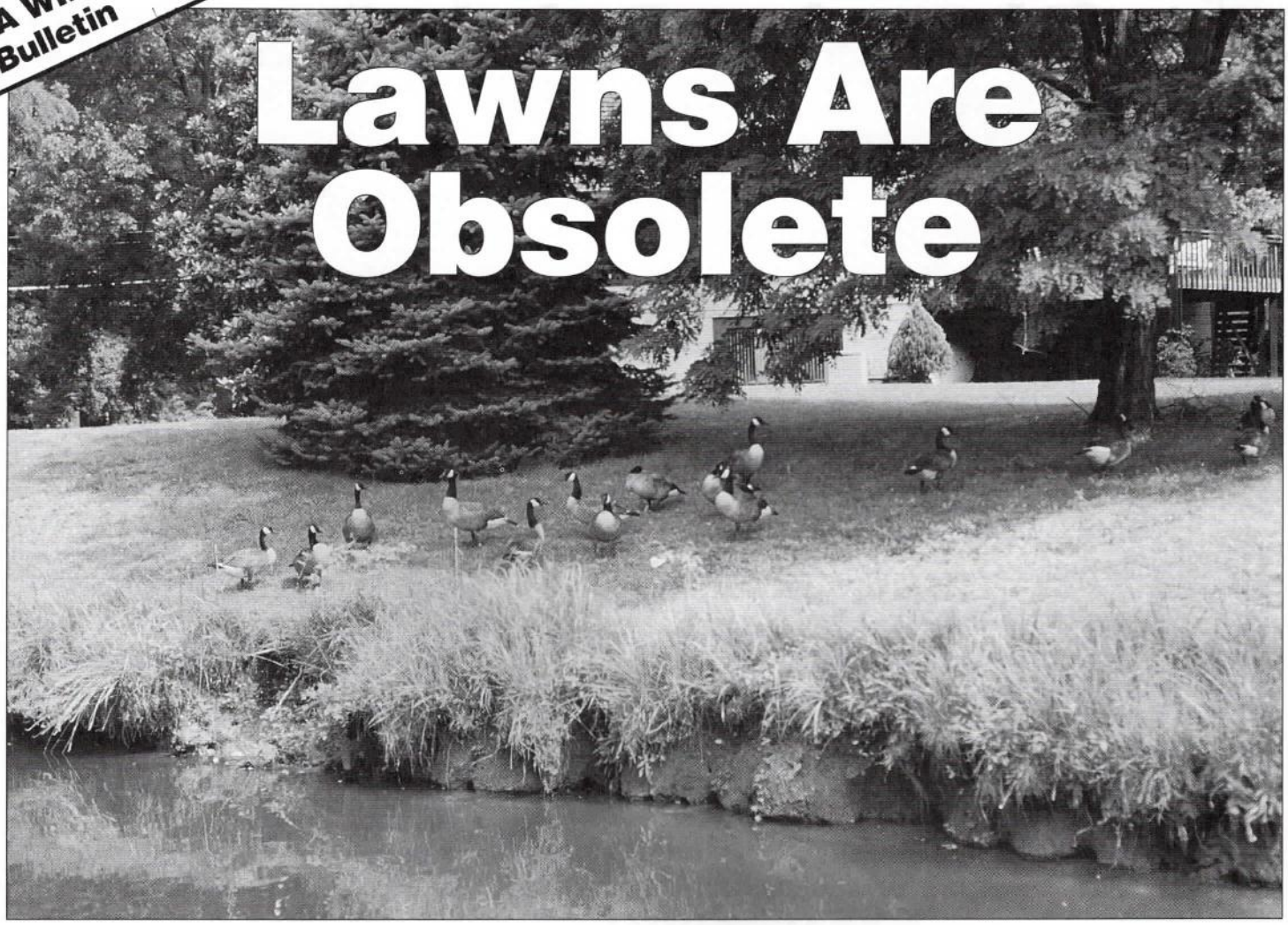
Since you cannot simply construct a debris barrier across the two major streams feeding into the lake, WID's 319 nonpoint source implementation project has designed and plans to build next winter one, perhaps two, diversion debris traps pictured schematically above. A firmly ground anchored diagonal floating boom catches and diverts a portion of the floating debris during storms into an adjacent small pond. After storms, WID's JCB-214 backhoe fishes the debris out of the pond and carries it away to start its trip to the landfill. Ultimately, the County's proposed new *Utility Fee* financing system should assume this responsibility as a normal watershed maintenance system.

Friendly cooperating partners in this novel scheme are *Sleepy Hollow Bath and Racquet Club, Inc.* and WID. SHBR agrees to the small stream-wide use area and WID agrees to construct the facility and maintain it thereafter. SHBR architect Carl Neuberg hails the technique as *state-of-the-art*. Mason District Planning Commissioner Janet Hall comments that *win-win situations like this are infrequent.*

A series of several such small installations throughout the watershed could replace the present chaotic debris management situation with a cost-effective control plan.

A WID Bulletin

Lawns Are Obsolete



Lawns have lots of problems: mowing, fertilization, weeds, grubs, sore muscles, hard pan, skimpy grass, erosion, crab grass, runoff pollution and ***geese***!

Environmental Buffer Strips replace all of that with a beautiful variegated vista which can include your favorite species of trees, shrubs, gardens and ground cover.

The Commonwealth of Virginia has published *Riparian Forest Buffer Implementation Plan* which describes the benefit of creating buffer strips along waterfronts. It defines the buffer as:

> *An area of trees, usually accompanied by shrubs and other vegetation, that is adjacent to a body of water which is managed to maintain the integrity of stream channels and shorelines, to reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients and other chemicals, and to supply food, cover, and thermal protection to fish and other wildlife.*

While it emphasizes the vitally important agricultural buffer concept which eliminates tilling to the water's edge and minimizes storm runoff polluted by nutrients and pesticides, it also discusses urban lawn buffer strips. They are narrower because of small residential lots. Local tax credit legislation conceivably could motivate increased private sector involvement.

Perhaps the simplest way to get rid of persistent resident geese which uproot and defecate on lawns is to plant an environmentally friendly buffer strip *without grass*.

A lush green lawn is not necessarily essential to human happiness.

A WID Bulletin

Tons of Pollution

Isn't it silly to let sand, gravel and miscellaneous debris sit in roadside gutters just waiting for the next big storm to wash this glop into the Lake? That's why the WID 319 Grant Program has a street sweeping program. $15,000 for 1995-1996; $10,000 for 1997; $20,000 for 1998.

So far, average sweeping data indicates:

- 800 pounds per mile of road
- 1000 pounds per hour of sweeping
- 1.2 miles swept per hour
- 17 pounds per dollar spent
- $55 cost to sweep a mile
- 7¢ cost per pound

A Quick Quiz:

1. Is it better to use a wet or a dry sweeper?
2. Should WID sweep the entire watershed?
3. Should WID sweep regularly?
4. Is there any point in sweeping where there is no curb or gutter?

EPA is interested in whether or not street sweeping in urban areas is an effective water quality Best Management Practice and how to go about it. WID's experience, so far, recommends sweeping areas close to the lake and close to streams and storm drains... particularly where major roads cross streams. Start after the last snow, try to sweep after long dry periods and quit before the leaves begin to fall. Commercial areas and other high intensity urban areas need most frequent sweeping. Some sweepers are much better than others.

The Virginia Department of Transportation is playing a vital role in this BMP demonstration. VDOT permits WID to dump its sweepings at its Merrifield work yard and subsequently hauls them to Lorton Landfill. This has the effect of doubling our yield per dollar invested.

1. Dry... because a dry sweeper picks up more pollution-laden fines.
2. No... because distant locations are often not cost effective.
3. No... It is more cost effective in the spring (snow-sand) and after dry periods.
4. Yes... Yield is significant, but don't sweep as often.

Street sweeping does more than improve community appearance.
Street sweeping removes pollution before it washes into streams.

A WID Bulletin

21st Century Street Cleaning

Benjamin Franklin first thought up the idea of street sweeping in the mid 1700's. Since then, street cleaning has always been a cosmetic program designed to pick up and remove what looks ugly. The fallacy is that nearly-microscopic particles of lead, copper, phosphorus, zinc and other heavy metals, which are among the most important non-point source pollutants, adhere to micron-sized particulates which turn to a sticky mud when swept by a wet sweeper. Why sweep if you don't remove what counts?

To test the relative efficacy of wet and dry street sweeping machines, WID contracted with a manufacturer of a dry sweeper for a two week watershed sweep. The newly developed Schwarze Industries EV series of sweepers blast the streets with 16,000 cubic feet per minute of dry air which is subsequently filtered to 2.9 microns before discharge. This waterless operation creates no corrosion, requires no pumps, tanks or water acquisition downtime. The Schwarze sweepers are primarily being used in the Mid-West and on the West Coast and in certain commercial applications. They have never been used extensively on East Coast streets.

WID swept Holmes Run watershed streets and compared the yield to the previous year's experience with a wet sweeper. To compare dry and wet sweeper yield and sweeping time, a simultaneous test was conducted with a wet sweeper which was contributed by the Virginia Department of Transportation. See the next page for details.

The two weeks of sweepings which measured several tons are being subjected to sophisticated laboratory testing to ascertain quantities of such properties as phosphorus and heavy metals. All told, nearly 30 individual parameters will be measured and compared to earlier tests made on the West Coast. This EPA financed demonstration may shed valuable new light on 21st Century Sweeping.

Nearly microscopic particles of lead, copper and other heavy metals are removed by new sweeping industry technology.

JOINT PRESS RELEASE

WID
Lake Barcroft Watershed
Improvement District

Northern Virginia Planning
District Commission

August 6, 1998
FOR IMMEDIATE RELEASE

Contacts:
NVPDC: Don Waye (703) 642-4628
WID: Stuart Finley (703) 820-7700

Dry Sweeper Wins

The EV-2 dry sweeper easily won a head-to-head competition against a customary wet sweeper on Sleepy Hollow Road in Fairfax County, Virginia in a comparative test conducted by the Lake Barcroft Watershed Improvement District (WID) on July 14, 1998. Two equally polluted sides of the road were simultaneously swept by a dry and a wet sweeper, with each sweeper then resweeping the other's leavings. Not only did the EV-2 pick up more material on the initial sweep (2700 pounds to 2160 pounds), but, in the subsequent re-sweep to recover missed material, the EV-2 out-swept the wet machine 5 to 1 (1080 pounds to 210 pounds).

This tends to substantiate the claims for the EnviroWhirl machines manufactured by Schwarz that their particulate management systems are capable of dislodging and removing highly polluted *fines* which are simply muddied by the wet-sweep process. Sweep samples of the two machines and earlier WID sweeping samples are being studied in comprehensive lab tests by the *A. and L. Eastern Agricultural Laboratory* in Richmond to ascertain levels of pollution, specifically measuring quantities of 25 parameters including heavy metals such as cadmium, chromium, zinc, copper, lead and mercury and also the intensity of phosphorus which is the principle focus of the Chesapeake Bay Preservation Act.

EnviroWhirl officials claim that their two present machines are a precursor of future technology and thus will revitalize the street sweeping industry which was demoralized earlier by the scientific findings of EPA's comprehensive *National Urban Runoff Program* (NURP) study which concluded that wet sweeping may do as much harm as good. NURP conceded that the wet process picks up gross contamination but misses and indeed rebroadcasts highly polluted fines which contain heavy metals and nutrients.

Two weeks of EV-2 sweeping in the WID watershed was culminated by a review seminar jointly sponsored by WID and the Northern Virginia Planning District Commission on July 20. A WID-produced video that illustrated the EV-2 dry sweep technique was shown and distributed at the seminar. While the mathematics of the various sweep results are complex and while the machine's inability to deal with wet materials is evident, the concept of marrying the twin objectives of improved urban appearance and water quality improvement was lauded by all present.

Seminar participant Supervisor Penny Gross of Fairfax County commented:

> "As the new chairman of the *Ad Hoc Chesapeake Bay Subcommittee* of the Metropolitan Washington Council of Governments and as a member of the Fairfax County *Revitalization Policy Committee*, I plan to suggest to both agencies and the Virginia Department of Transportation that they initiate a substantial effort to employ the worthwhile EnviroWhirl street sweeping technology on a jointly Funded and administered basis. The WID experiment demonstrates that the EnviroWhirl can have a marked effect in meeting the requirement of the Clean Air Act and the Clean Water Act."

Although the final judgement is in limbo as the laboratory measures quantities of heavy metals and nutrients swept, early indications are that this 21st century street sweeper is less commercial fantasy than real environmental fruition.

– END –

A WID Bulletin

Macroinvertebrates AND YOU

Tiny, spineless creatures crawling under rocks in a stream somewhere in Falls Church are important to people in Lake Barcroft. Here's why.

Our Lake is directly impacted by the nature of the tributaries flowing into it. Impervious surfaces and piped drainage within our watershed accelerate urban runoff. Increased storm flow volume and velocity erode streambanks and carry pollutants like sediment to our Lake. This type of habitat degradation also influences the ability of our tributaries to support aquatic life. Over the past five years WID Staff has been surveying the creatures that live on the bottom of streams within our watershed to gain an understanding of the relative "health" of this dynamic environment. The baseline data being collected now can be compared to future data to determine if significant changes in water quality and habitat are occurring.

Aquatic macroinvertebrates are collected, identified in the field; and each section of stream sampled is given a Water Quality Rating. The Water Quality Rating gives anyone looking at this data an idea about the stream's ability to support diverse aquatic life. The higher the score, the better. A good score means that not only is the quality of water good, but the organisms' habitat requirements are being met as well.

So far, no surprises have been found. The average Water Quality Rating for Tripps Run is Poor. Holmes Run scores slightly better with a rating of Fair. Recent surveys in tributaries of Holmes Run have not yielded a rating of above Poor.

As part of its 319 Grant the WID is retrofitting our urban watershed with novel techniques to decrease peak storm flows and trap pollutants like debris and sediment. Check Dams in tributaries and Flow Regulators in storm drains are Best Management Practices that slow down and capture accumulations of these materials so they can be intercepted before they reach our lake. The result of this cooperative effort could be an improvement in the habitat of microinvertebrates and you.

Biological monitoring describes the health of your water body.
Pollution reduces the number of species.

A WID Bulletin

Macroinvertebrates in Our Watershed

Some of the most common aquatic macroinvertebrates found in the tributaries of Lake Barcroft are shown below. The organisms are grouped according to their sensitivity to environmental stressors and their presence or absence is an indicator of the relative health of the streams feeding Lake Barcroft.

Sensitive

These insects can be found in good quantity tributaries with adequate habitat.

Water Penny
Order Coleoptera

Riffle Beetle
Order Coleoptera

Caddisfly
Order Trichoptera

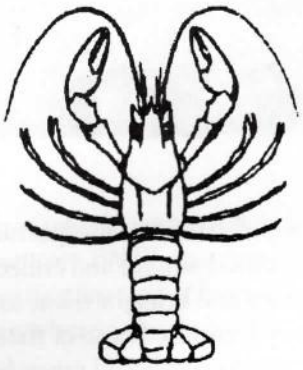
Somewhat Sensitive

These organisms below can be found in streams that are good or fair.

Fishfly Larva
Order Megaloptera

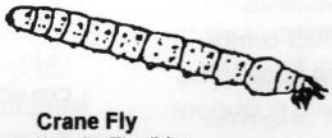
Clam
Class Bivalvia

Sowbug
Order Isopoda



Crayfish
Order Decapoda

Scud
Order Amphipoda



Crane Fly
Family Tipulidae

Tolerant

Stress tolerant organisms like these can be found in tributaries of any quality. Large numbers of these indicate polluted conditions.

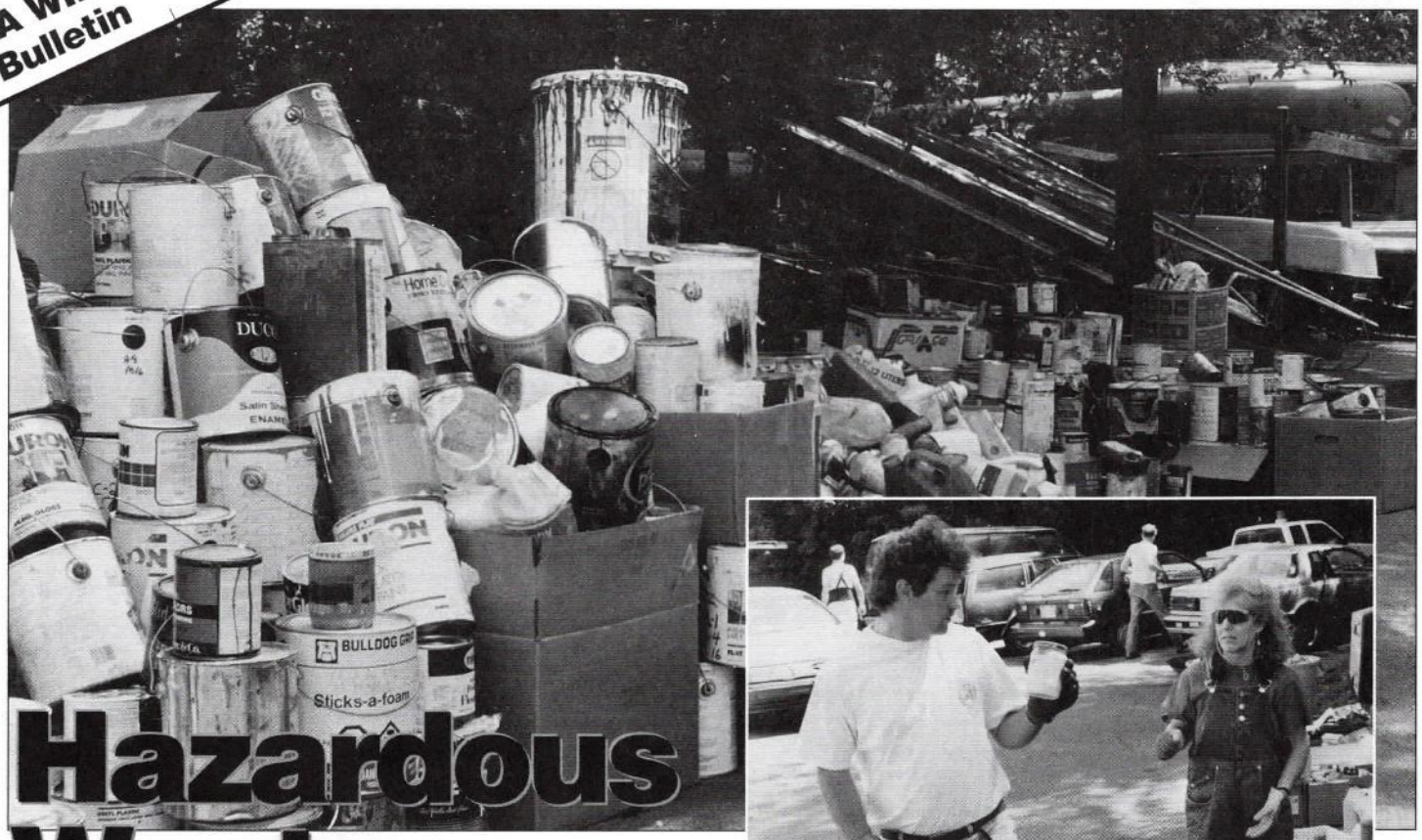
Aquatic Worm
Class Oligochaeta

Snail
Class Gastropoda

Blackfly Larva
Family Simulidae

Leech
Order Hirudinea

A WID Bulletin



Hazardous Waste Cleanup Day

On a stipulated Saturday morning, a thousand families scurried around and collected all of their toxic leftovers and brought them to the Hazardous Waste Cleanup location. Some of them were half empty cans and bottles. Some should never have been bought in the first place. Others may or may not have been poisonous but were a nuisance to have sitting around.

WID personnel, recognizing that they are not hazardous waste specialists, had solicited advice from the county's solid waste division. Their advice was to handle this materials in an orderly manner usually leaving the materials in their original containers and never mixing things together.

Specifically, each item should be clearly labeled:

- **Latex paint** (quart or larger containers)
- **Oil Base Paint** (quart or larger containers)
- **Solvents** (paint thinners, brake fluids, deck sealers, gasoline)
- **Chemicals** (herbicides, pesticides, insecticides, fungicides, rat poisons, toilet bowl cleaners, pool chemicals, creosote, ortho products, etc.)
- **Small Containers** (less than a quart—oil, paint, glues, caulk, wood patch, fingernail polish, petroleum based flammable, aerosol cans, antifreeze, etc.)
- **Motor Oil** is unacceptable. Dispose of it anytime at service stations which are willing to recycle oil.

After the Hazardous Waste Cleanup Day, the WID crew kept the materials out of the rain and away from people and pets until delivery to the local jurisdiction's solid waste transfer area during working hours the next week.

A coordinated household hazardous waste collection program is convenient for homeowners, prevents indiscriminate dumping of toxic wastes and helps protect the environment.

A WID Bulletin

ABC's of Lawn Care

The traditional *happy homeowner* can unintentionally be a significant environmental polluter. An intense individual, who *loves* his lawn, is an instant expert on lawn care and will expend great effort and much money to have a perfect green lawn without any weeds or pests, does not comprehend that a nice lawn can be maintained without phosphorus-rich fertilizer, herbicides and pesticides using recommend lawn Best Management Practices such as turf aeration, high cut mowing and spot pest treatment. When it comes to fertilization, *more is better.*

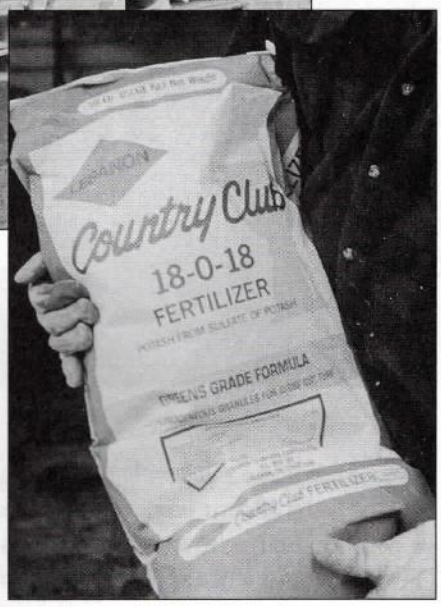
Nevertheless, here are some lawn BMP's which are endorsed by some (but not all) specialists:

- ***Don't overfertilize.*** Use less than the manufacturer or the lawn company recommend.
- ***Don't use a fertilizer which contains herbicides or pesticides.*** Use lawn care BMP's to solve such problems. Or, if you must, *spot treat* instead of broadcasting these toxic materials everywhere.
- ***Try to obtain a No-Phos fertilizer with slow release nitrogen.*** Most established lawns get enough phosphorus from atmospheric deposition because of home heating, automobile exhaust, solid waste incineration and electric power generation. See the next *WID Bulletin* for details on this.
- ***Experiment with non-fertilization.*** Most lawns will thrive with a few basic BMP's which are listed in another *WID Bulletin*. Some cost money . . . but others are free.

A home owner is an environmental manager. Enlightened ones enrich our lives. Misinformed ones contaminate streams and lakes and threaten Chesapeake Bay preservation.

A WID Bulletin

No-Phos Fertilizers



The phosphorus in phosphorus-rich fertilizers washes into streams, lakes and estuaries and causes obnoxious algae scums which reduce water quality, look ugly and take the pleasure out of swimming. Phosphorus leachate also contaminates groundwater and can becomes a regional problem.

The solution is to use a ***No-Phos fertilizer*** which contains nitrogen, potassium, sulfur and certain important micronutrients. Phosphorus is needed to establish new lawns and to stimulate blossoming and blooming. However, since established lawns are not expected to blossom or bloom, and since substantial quantities of phosphorus depose from the atmosphere as particulate matter and during rain storms, why not use a *No-Phos fertilizer?*

Dr. Ken Young of GKY and Associates, Inc. computed that 484 50-pound bags of 5/10/5 fertilizer would yield a runoff to the lake of 132 pounds of phosphorus.

How to get No-Phos Fertilizer

Organizations can call one of the major fertilizer formulation companies and order a truckload of perhaps 50 bags of *No-Phos Fertilizer*. The formulator will simply mix a balanced batch and leave out the phosphorus. The *Lake Barcroft Watershed Improvement District* has done this successfully with different formulators. Delivery is usually quite prompt and the cost is only slightly higher than bulk-produced fertilizers. In addition to phosphorus, WID also avoids herbicides and pesticides. You may phone WID for advice at (703) 820-7700.

Anyone may buy a 50 pound bag of 18-0-18 No-Phos fertilizer which will be shipped by UPS. Call WID for details. If you need a large quantity, purchase a load from a fertilizer formulator.

One 50 pound bag is sufficient for the average lawn.
Apply only once a year in early autumn before the leaves fall.

A WID Bulletin

Lawn Care Helpful Hints

Everybody has ideas on lawn care. WID's particular perspective is clean water . . . how to prevent ugly algae blooms in Lake Barcroft. Recognizing that phosphorus is Barcroft's limiting nutrient and realizing that most phosphorus excesses are the result of improper lawn fertilization programs, WID has developed its now well known *No-Phos fertilizer* which it recommends to local residents.

A water quality sensitive lawn care program involves these concepts:

- Only 10% of Barcroft community lawns need *any* fertilization because nutrients are recycled as you mow the lawn if you don't remove the clippings.
- Most Barcroft lawns don't need added phosphorus because of the continuous deposition of phosphorus from the atmosphere.
- But if you feel the need to fertilize, do it lightly and use the No Phos fertilizer.
- And particularly don't fertilize in the spring . . . provide a light fall application.

The WID clean lake lawn care regimen also suggests some helpful hints:

- High mowing heights: 3 inches.
- Don't rake up and remove the clippings
- Instead of the complicated soil testing procedure and its usual misleading fertilization recommendations, call WID at 820-1300 and ask the staff to probe-test your lawn to determine the need for you to add lime to balance the pH (no charge).
- To combat crabgrass, use preemergent crabgrass herbicide in early spring.
- Don't apply blanket coverage of chemicals to control weeds or pests after emergence when only spot treatment is necessary.
- Instead of subscribing to a complicated, expensive and polluting multi-phase lawn contract, use a simple mowing service if you need help.

If you want a 50 pound bag of No-Phos fertilizer, send a check to WID for $30 and a note explaining where to deliver it.

Algae blooms are caused by excessive nutrients, usually phosphorus. Most phosphorus yield is caused by careless home owners who over-fertilize their lawns with phosphorus-rich fertilizers.

A WID Bulletin

Barcroft Lawn Care

Lake Barcroft water quality can be enhanced by minimizing pollution. The most damaging and expensive pollutants are *sediment, debris, phosphorus and pesticides*. They are yielded by the Lake's upstream watershed. Areas close to the lake are more damaging than remote areas. Accordingly, the residents and property owners in the Lake Barcroft community which surrounds the lake are most important. Their careful land use can minimize this yield and thus improve the quality of Lake Barcroft water and the Holmes Run discharge to the Chesapeake Bay.

The Lake Barcroft Watershed Improvement District (WID) and the residents and property owners in the Lake Barcroft community are natural partners with a common set of goals and objectives. Other government agencies such as the federal *Environmental Protection Agency, Extension Service*, the state *Department of Conservation and Recreation* and the local *Fairfax County Department of Public Works* and *Fairfax County Park Authority* can contribute valuably. But the most important players are the people who live here and manage their lawns and gardens, since they are already motivated by an active interest in maintaining the value of their homes. What they need most of all is information . . . sound and useful information.

The WID staff is small and it cannot personally manage all 1,000 lawns in the Barcroft community. However, WID can develop and disseminate information, conduct liaison with other government and private groups and render limited specialized direct services which a homeowner would be unlikely to initiate personally. Here are some examples of the kinds of service which WID staff can perform within existing time constraints:

- Staff members can return phone calls to the WID answering machine (820-1300) and provide general advice regarding procedures and problems including lawn care, wildlife management and pest and weed control.
- Staff members can do a quick visit to a resident's lawn to make easy-to-take pH measurements to guide the home owner on the desirability of adding lime to the soil and how much to add.
- Staff members can explain to that portion of the population which is interested in a more comprehensive soil survey how to take a soil sample and where to send it for accurate and impartial lawn care recommendations and help you with interpretations.
- The WID generally recommends against over-fertilization and also recommends the use of WID's special *No-Phos Lawn Fertilizer* which can be purchased for $30 per fifty pound bag which is enough for an average Barcroft lawn for a year.
- The WID generally recommends that residents avoid purchasing fertilizer from stores because of the inevitable high phosphorus content and the usual inclusion of damaging pesticides and herbicides.
- The WID recommends that lawn renovation can usually be achieved economically and easily by adding specially screened WID topsoil which already contains adequate nutrients and can be purchased delivered for $25 for a 3 cubic yard load.
- The WID strongly recommends avoiding blanket pesticide and herbicide applications. Home owners can do this by simply restraining the natural impulse to kill pests and kill weeds or using only *spot* applications. However, when a resident uses a lawn care service, it is important to choose one which shares WID's concern for sound environmental management. Ask the WID staff to give you a short list of such progressive lawn care services who have agreed to conform to WID standards in a general way.

Helpful Lawn Hints

- Call WID at 820-1300 and ask *Ken Kopka* for advice or help.
- Request a no-cost pH probe test to determine need to add lime to your lawn.
- Use only WID's No-Phos lawn fertilizer.
- Augment your soil by adding WID topsoil.
- Ask WID about aeration of the soil for long-term lawn improvement.
- Ask for WID's list of cooperating lawn care companies.
- Ask for WID's informative 4 page *Please Don't Feed Our Streams* brochure which provides detailed recommendations regarding lawn mowing height, spot pest and weed control treatment, etc.
- Remember that terms such as *organic, natural, environmentally safe, earth friendly* are sometimes commercial gimmicks rather than scientific facts.

Meantime, the Extension Service (Department of Extension and Continuing Education) may be able to provide advice and counsel within its staff and budget limitations. The Extension Service Agent for Fairfax County is:

Ms. Patricia McAleer at 324-8556
12055 Government Center Parkway, Suite 936, Fairfax, VA 22035

She has a particular interest in Barcroft lawn management technology and can send you a wide variety of federal, state and local publications on various specialized subjects.

No-Phos Watershed Protection Formula

To reduce algae in the lake and improve water quality, the Lake Barcroft Watershed Improvement District recommends using WID's specially formulated no-phosphorus fertilizer. It is a 18-0-18 mix made of 100% slow-release ingredients.

Procedure:

- A 50 pound bag costs $30. Enough for coverage of a 12,000 square foot lawn.
- Make out the check to WID and mail to **WID, 3650 Boat Dock Drive, Falls Church, VA 22041.**
- The bag will be delivered to your home promptly. You may attach a note indicating where you would like the bag left if you are not home at the time of delivery.
- Autumn application before the leaves fall is the recommended time of year.
- For more details, ask WID for "Please Don't Feed our Streams" brochure which contains many helpful lawn care and environmental hints.
- If you have questions, call WID at 820-1300. If staff is not available to the phone, they will return the call as soon as possible.

A WID Bulletin

Phosphorus Monitoring

Temporary downstream weir measures Barcroft dam outflow to calibrate phosphorus monitoring computer system performance curve.

Phosphorus is the villain. A study by GKY & Associates indicates that 10 tons of phosphorus washes down into Lake Barcroft each year from its upstream watershed. This stimulates the growth of algae which can give the lake a green look in the summer. Sometimes algae float to the surface and form ugly scums. The Chesapeake Bay Preservation Act has established criteria to protect water quality which stipulate significant reductions in nutrient yield.

WID conducted a comprehensive phosphorus monitoring program to measure *actual* phosphorus input to the lake from upstream and the output downstream to the Potomac and the Chesapeake Bay. This monitoring measured the quantity of phosphorus arriving at Lake Barcroft and what happens to it. For example, how much phosphorus does WID remove by:

- dredging and removing sediment to which it is attached;
- harvesting and removing submerged aquatic vegetation (SAV);
- collecting and removing floating debris such as leaves;
- immobilizing phosphorus in the bottom muds with the aeration system.

WID staff collected water samples regularly and additionally during major storm events. Chemical laboratory analysis determined how much phosphorus there was in the water entering and leaving the lake . . . how much there was in a harvester load of SAV . . . how much in a load of leaves . . . how much in miscellaneous floating debris . . . and, most importantly, how much in a cubic yard of dredged sediment. WID's consultants concluded at the end of a year's study that Lake Barcroft removed 54 percent of incoming phosphorus from the transmission stream.

To measure the outflow during large storms, WID has developed a computer gauging system which will tell instantaneously and cumulatively how many cubic feet per second are being discharged downstream.

Barcroft residents should be interested to learn that 12.8% of the input phosphorus load washes off Barcroft subbasins, mostly from Barcroft lawns. This amounts to over half a ton a year. This is why you should buy and use WID's No-Phos Watershed Protection Formula fertilizer. **Just send a check for $30 to WID and you will have a 50 pound bag delivered to your home promptly.**

The Chesapeake Bay Protection program needs 40% reduction of phosphorus. Urban lake management can provide up to 54%.

A WID Bulletin

Algae Control

Control of excessive algae in Lake Barcroft may be achieved by a combination of several influences. WID's program includes:

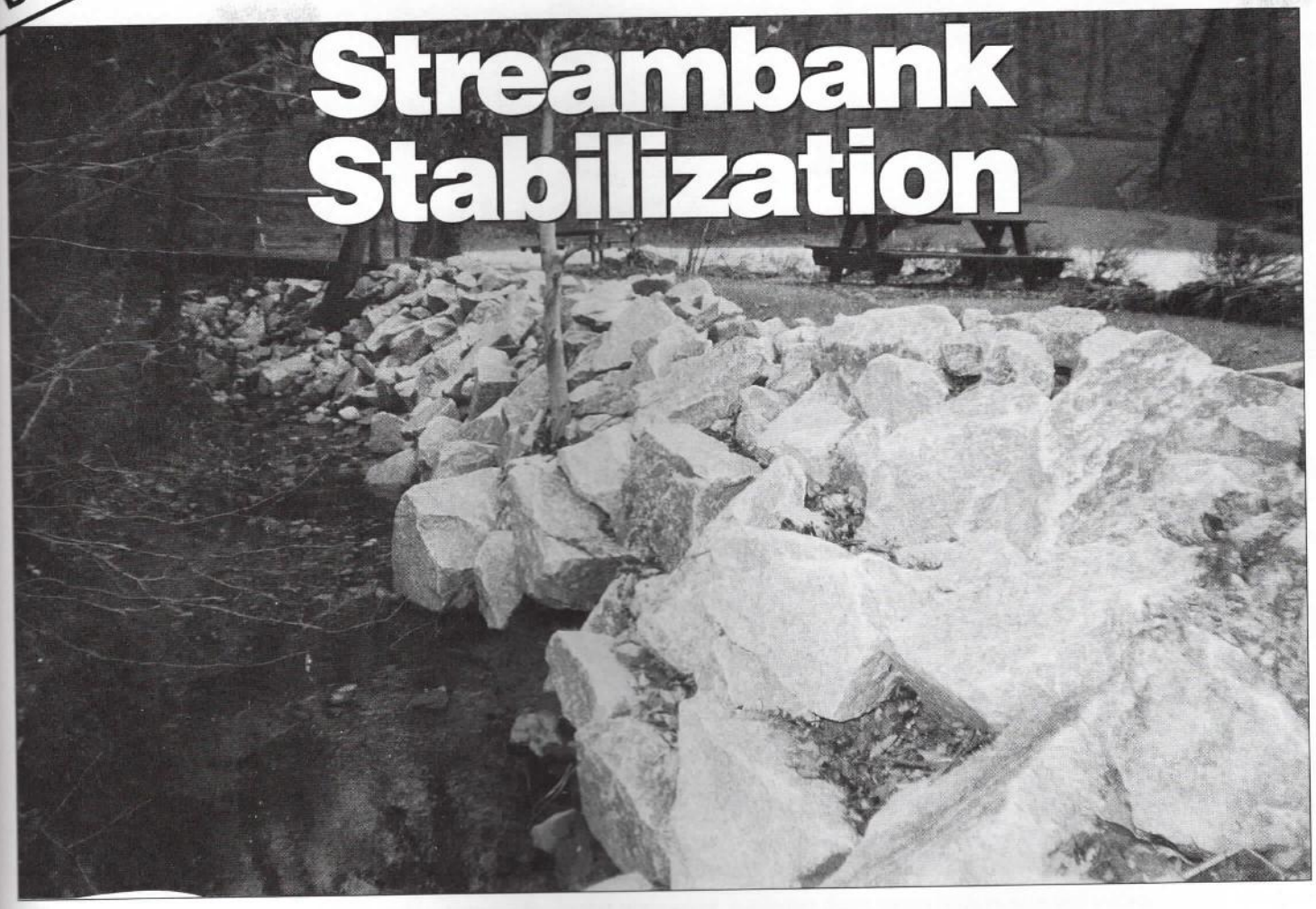
- **Aeration Expansion**—By increasing the power input to the aeration system from 20 horsepower to 70 horsepower, lake water circulation is increased to reduce recycling of phosphorus from bottom mud and inject oxygen in deep waters.
- **No-Phos Fertilizer**—By encouraging Barcroft residents and upstream residents to use WID's *No-Phos Watershed Protection* fertilizer, the amount of phosphorus yield to the lake is reduced somewhat from the present figure of ten tons a year.
- **Food Web Manipulation**—Shifting from planktivorous to piscivorous fish increases the number of large-bodied zooplankton species which graze on algae. Removing rough fish such as carp and adding Largemouth Bass should encourage this natural process.
- **Biological Monitoring**—By learning more about the lake's biology, WID may be able to devise new techniques to minimize eutrophication and thus control algae better.

YOU can help! Participate in the Lake Barcroft algae control program by using WID's No-Phos fertilizer. A fifty pound bag costs $30. This is enough for an annual fertilization which should be done in the fall. Despite what some lawn care companies will tell you, established lawns don't need supplementary phosphorus. Since Barcroft homes are on or near the lake, eliminating this source of pollution is essential. Don't hire a "tank truck" lawn care service. Insist that you want fertilizer which contains **no** phosphorus . . . preferably WID's fertilizer which you know contains no phosphorus or pesticides or herbicides. Call 820-1300 to buy a bag.

Algal scums are an avoidable nuisance.
Preventing them will upgrade water quality and maintain adjacent property values.

A WID Bulletin

Streambank Stabilization



Structural streambank stabilization can control streambank erosion that is due to excessive runoff in cases where flow velocities exceed two ft/sec or where vegetative streambank protection is inappropriate. Riprap is the most commonly used structural material. When possible, slope the banks to a 2:1 slope or flatter. Place a gravel filter or filter fabric on the smoothed slopes before installing the riprap. Class II riprap chinked with Class I provides sufficient stability for small streams. The toe of the rip rap should be placed at least one foot below the stream channel bottom or below the anticipated depth of channel degradation. Protect between well-stabilized points in the stream channel, emphasizing the outer banks of stream meanders. Use the design velocity of the peak discharge of the 10-year storm. Structural measures must be effective for this design flow and must be capable of withstanding greater flows without serious damage.

Alternatively, streambank armoring can be provided by wire mesh gabion baskets, reinforced concrete, or grid pavers. The design engineer should carefully evaluate the possibility of using vegetative stabilization or streambank raparian restoration techniques which would be more economical and might be more compatible with natural stream characteristics.

The erosive forces of flowing water can cause immense damage. One-time stabilization may be very cost-effective.

A WID Bulletin

Erosion Control

There can be a marriage of mechanical engineering and riparian restoration techniques in stream restoration programs. Such a cooperative project is planned by the *Lake Barcroft Watershed Improvement District* and the *Northern Virginia Soil and Water Conservation District* in the proposed Custis Parkway Stream Restoration Project in Fairfax County, Virginia.

An erstwhile attractive little stream flows between two halves of a bifurcated suburban roadway. What once was an attractive brook is now marred by erosion, cut banks, falling trees and threatened power poles. It has become a stormwater management problem. The traditional solution has been to install pipes to replace the stream. However, engineers and conservationists of WID and NVS&WCD are proposing a program which will merge mechanical stabilization and riparian restoration.

This promising procedure will employ certain mechanical processes such as little check dams to level the effective hydraulic grade line and rip rap stabilization and certain riparian restoration techniques such as biologs and grass/ground cover/wildflower concepts in such a manner that a synergistic solution can be developed which combines stability and beauty . . . artificial and natural techniques.

Already, the Custis Parkway stream is daylighted out of a pipe and then back into a pipe several blocks later. Without building a massive structure or disturbing existing vegetation, it is possible to revitalize this stream into an attractive natural attribute through a combination of structural and riparian restoration techniques. This could control erosion and protect existing trees, power poles and roads.

Instead of "either/or", try ingenuity and cooperation to facilitate stormwater restoration design.

A WID Bulletin

Wetlands Are A Lake's Best Friend

This wetland in the headwaters of Holmes Run temporarily detains stormwater, minimizes downstream bank erosion and traps sediment, debris and nutrients

Unnoticed and unappreciated are several large wetlands upstream in Holmes Run. By detaining stormwater and filtering out pollution, they tend to counteract the negative effects of intense urban development in the valley. Farthest upstream are several forested wetlands in Fairview Park. Midstream along Homes Run are a series of stream valley parks which are mostly forested. These wetlands are resource protection areas managed by Fairview Park and the Fairfax County Park Authority supported by Fairfax County land use policies which prohibit their destruction for development and Chesapeake Bay Preservation regulations.

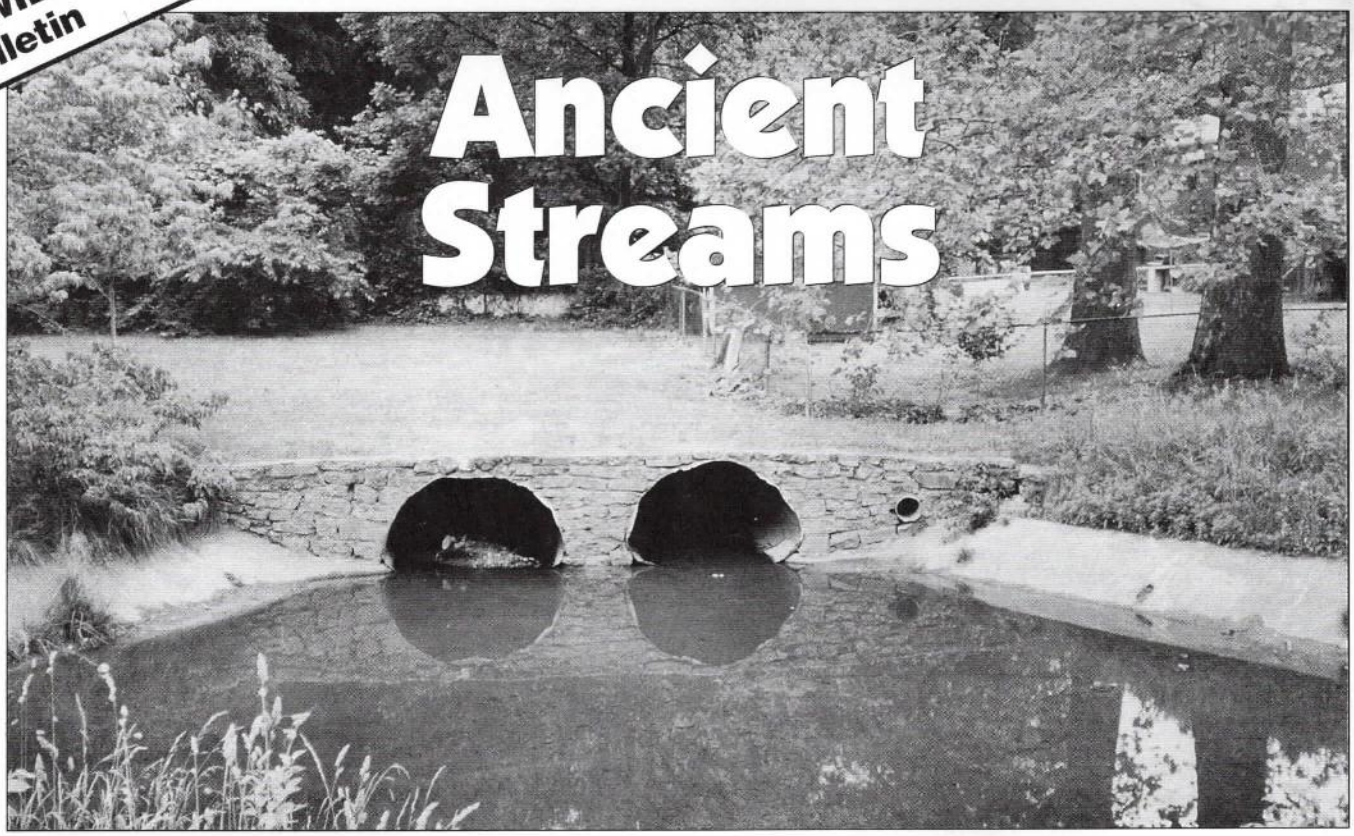
Although wetland management policies are complex and vary from place to place, certain fundamentals are obvious. While a wetland need not be saturated continuously, it functions best with optimum water retention. Thus, there are national regulations against draining wetlands. They provide limited storm water detention, act as pollution filters, serve as a valuable habitat for all sorts of creatures and plants, act as natural corridors, are visually attractive, serve as nature study areas and may help recharge groundwater.

Wetland management needs to be more protective than vigorous. In the case of Holmes Run, management seems to be needed. Most of these upstream wetlands seem to drain too quickly and there is a tendency towards monoculture of invasive plants such as honeysuckle instead of hydrophytic vegetation. Engineering baffles and weirs to flood overbanks and promote sinuosity of flow path will enhance wetland pollution control efforts.

It is national and local public policy to protect wetlands. They are popular and cost effective pollution filters.

A WID Bulletin

Ancient Streams



Coe Branch *of Tripps Run flows out of a pipe. It drains most of the central part of the City of Falls Church, Virginia. It was named after* Amzi Coe, *an 18th Century owner of Mount Hope which faced the stream. Today it is 100% piped or enclosed in a paved ditch except for sheet flow and gutter flow at its headwaters.*

As urbanization takes place and infiltration ratios go down, once peaceful streams turn into raging torrents during sudden storms. Until recently, public works officials either piped or paved the stream at the insistence of flooded homeowners. Today's engineers require temporary stormwater detention equal to the impact of urbanization. But what about the streams that are already piped and paved?

The Falls Church *Village Preservation and Improvement Society* has an idea. Retrofit stormwater drainage systems to add temporary stormwater detention and then restore the piped streams to daylight them. Coe Branch is one of the Society's first targets because it is next to an elementary school and Coe Branch flowing through a city park would make an effective environmental classroom. Here is the Society's rationale:

- An open stream channel can hold more water than an enclosed pipe, thus mitigating flooding.
- Groundwater can easily drain evenly into an open channel, whereas groundwater cannot enter an underground pipe and therefore ponds.
- When heavily planted with native vegetation and lined with large stone, a stream channel provides a filtering system to help improve water quality. Conversely, an underground pipe is a breeding area for rats and other pests, and does not improve water quality.
- An underground channel is more expensive to maintain and repair than an open stream channel.
- Stream channels can be aesthetically pleasing through their landscape features, whereas an underground pipe is merely invisible to the public.
- A stream channel conveys understanding to the public of our connection between stormwater runoff and stream health, whereas underground pipes hide that connection.
- Stream channels provide recreation value to the community, whereas underground storm drains require expensive maintenance.

Ancient streams deserve to be restored as part of a watershed retrofitting project.

A WID Bulletin

Hike a stream sometime and you can see instances where homeowners and commercial establishments are dumping their waste into the stream adjacent to their property. Usually, they throw it into the stream and wait for the next big storm to wash it away. Typically, it consists of leaves, tree trimmings and miscellaneous yard waste. Only a small percentage of streamside property owners do this, but the effect is disastrous. Why do they do it? Often it is simply easier than carrying it to the street for solid waste pickup. Some of them may think it is a normal acceptable procedure.

Legally, this waste is pollution. Throwing it in a stream is illegal. But enforcing the law is tedious and generally ineffectual. An interested party or official must take the initiative to visit the stream, obtain evidence, get permission to develop a case and take it to court. Then, the jurisdiction may or may not win the case or be satisfied with the severity of the court's decision. Whereas this is a proper and desirable procedure, as a practical matter it is insufficient to solve a continuous and massive problem.

Often volunteer groups hike a stream despite fences, disapproval of adjacent property owners, danger and possible legal liability. They can easily collect a mass of junk polluting the stream but then have to figure out how to transport it and dispose of it. Whereas this may be a desirable procedure, it doesn't prevent future dumping.

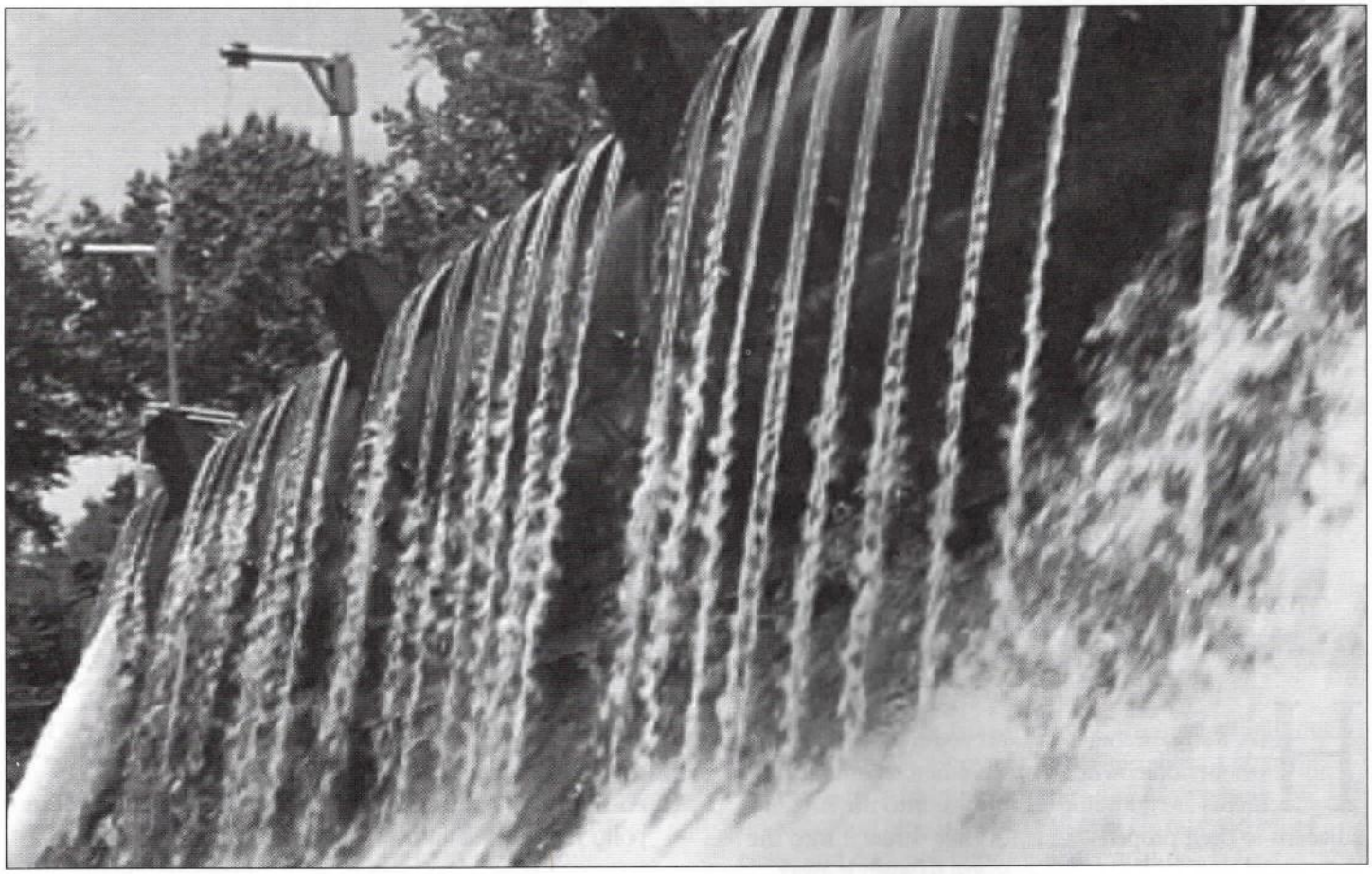
Stronger ordinances would help. Making stream dumping a felony would help. Generating publicity with specific news stories with vivid pictures would raise public awareness. Essentially, the responsibility of preventing stream dumping is a jurisdictional one. The county or city which passively permits such dumping to continue year after year is clearly negligent of its magisterial duties.

Consider this idea. A jurisdiction such as a county or city could pass an ordinance stipulating that it is desirable public policy for streams to be in public ownership but recognizing that condemning streamside property of lawful property owners would be unfair. However, the ordinance could stipulate that dumping in a stream is illegal and can constitute the basis for eminent domain acquisition. Would this motivate better behavior? We don't know because we haven't tried it yet.

It is better to motivate than litigate.

A WID Bulletin

Lakes—An Unrecognized Asset



Many lakes reduce the watershed yield of phosphorus, nitrogen, suspended solids and coliform bacteria. A lake is a sink. Thus, it catches and collects things. Accordingly, this beneficial effect must be the result of complex biological and chemical functions which occur gradually in a large body of water. A well managed lake, which dredges sediment, removes debris, circulates inflows with the lake volume and has an aeration program to reduce phosphorus yield, improves the environment much more than one which has no management program.

Federal, state and local environmental managers could help lakes perform this useful task by:

- providing matching funds for lake management functions such as dredging and aeration;
- eliminating or simplifying permitting processes;
- installing and maintaining *watershed* BMP's to prevent erosion and minimize pollution.

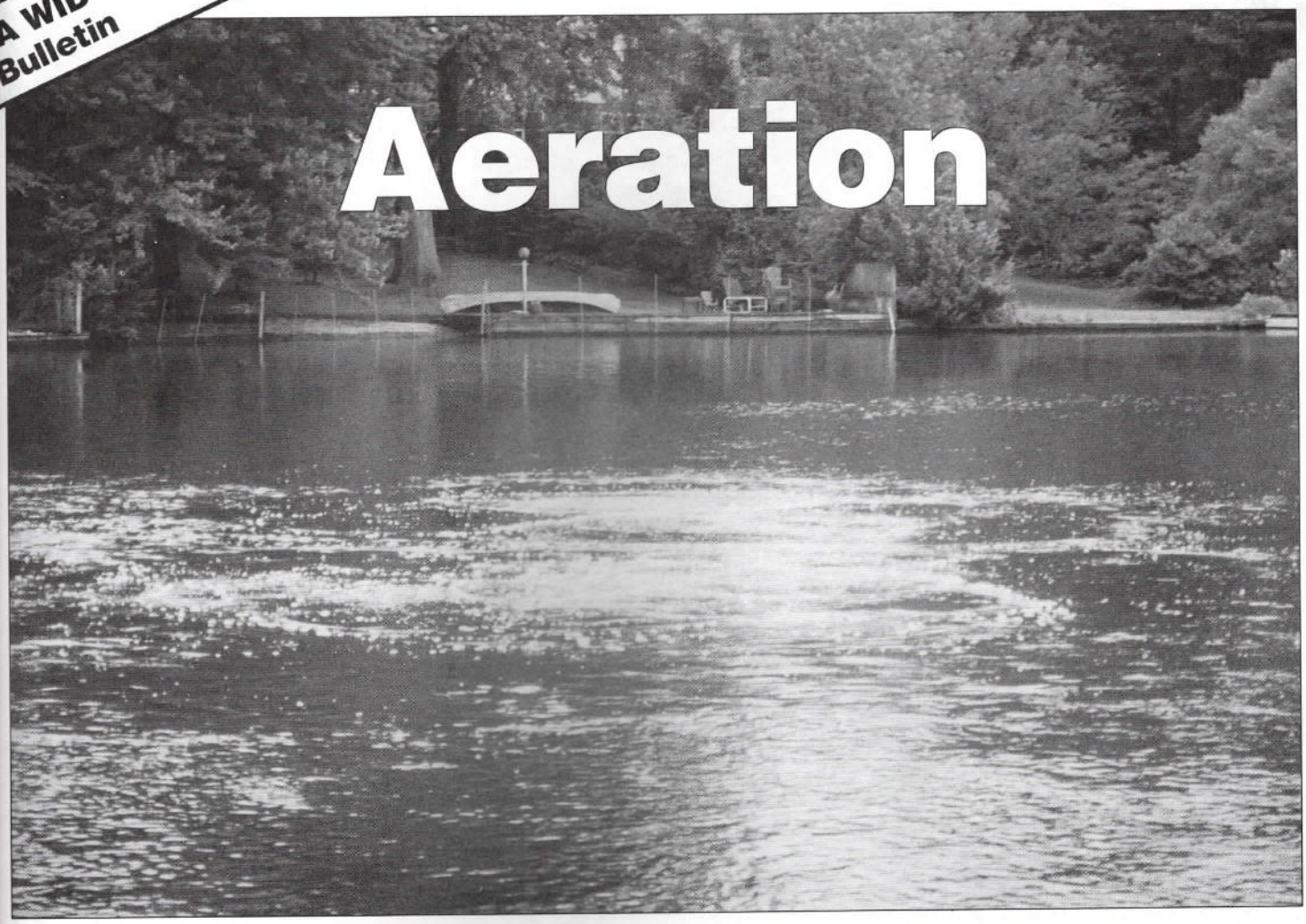
Pollution control and nutrient yield could be greatly increased by incorporating lakes into the total environmental process. In particular, the vitally important process of controlling nutrient yield could be greatly increased. A recent study revealed that Lake Barcroft removes over 54% of its input phosphorus.

Fundamentally, the environmental management programs of local, state, and federal governments and lake owners have never been closely integrated. Each one goes its own way. Why not an environmental initiative to utilize lakes' potential to improve water quality?

Lake BMP's can improve water quality from local streams to the Chesapeake Bay. Interagency cooperation is the missing link.

A WID Bulletin

Aeration



Small bubble **aeration** systems can minimize or eliminate algal scum pollution by a process called lake mixing. A temperate climate lake with water depths of 3 meters or greater will develop a *thermocline* which separates the relatively clean, warm, oxygenated surface water from the septic, cold bottom waters which contain pollution causing an occasional rotten-egg-like smell. The aeration system releases small bubbles of air along an emitter system which entrains colder bottom waters to the warmer surface, thus causing circulation and mixing the lake creating constant temperature top-to-bottom. This injects oxygen to the bottom which inhibits the benthic muds from recycling phosphorus into the water column. Since phosphorus is the *limiting nutrient* in most freshwater lakes, this process diminishes the natural creation of algae.

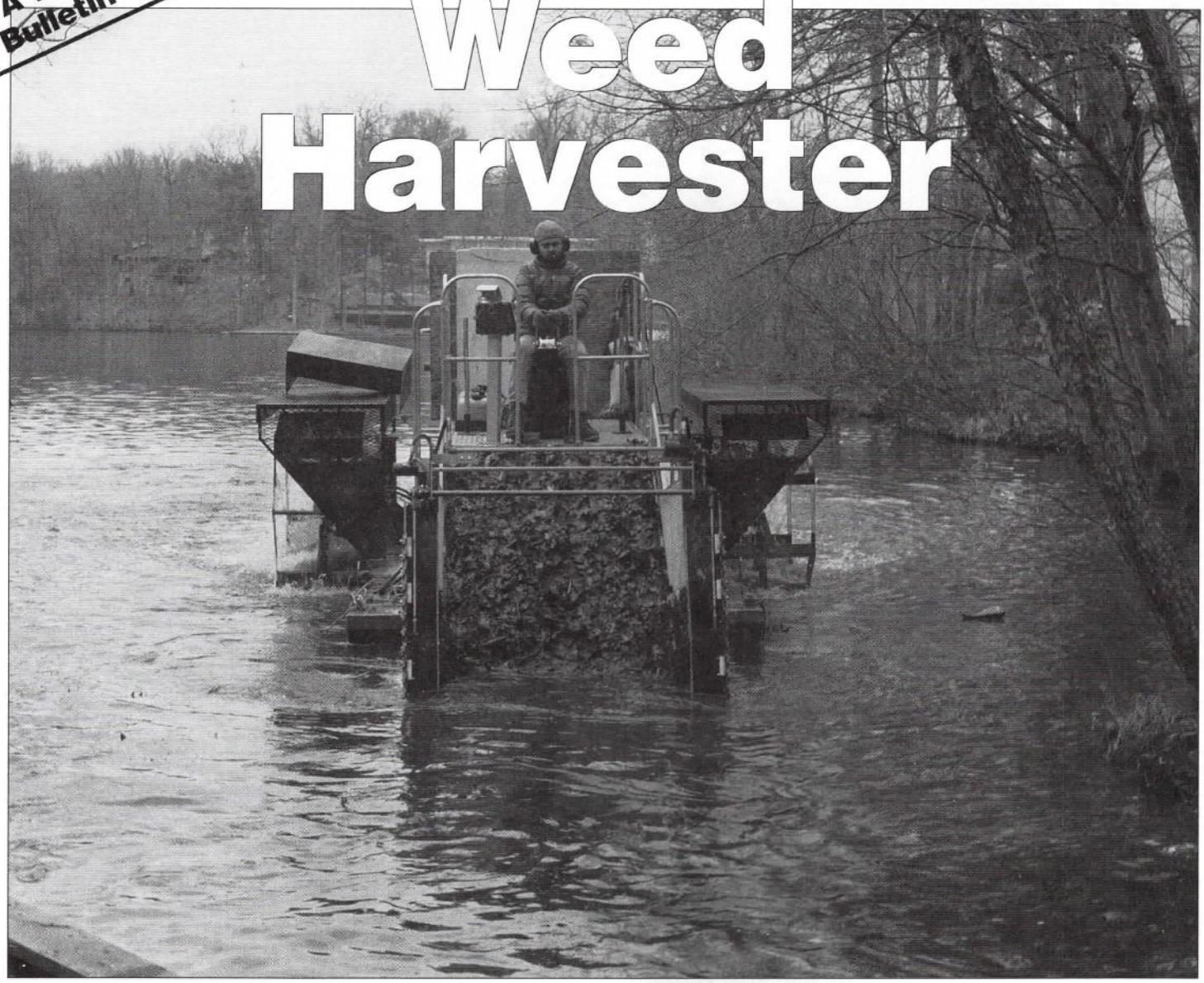
An aeration system consists of a compressor and associated tanks, pipes and hoses to force air into a lake bottom emitter system. In temperate climates, such a system can be turned on in March and run continuously night and day until mid-November when it is turned off to prevent freezing. The system is driven by electricity and is automatic. Aeration system design is intricate. Sizing is important since an under-sized aeration system can actually create a deleterious effect. The rule of thumb for sizing the system is that you need 10 cubic meters per minute of air flow for every square kilometer of lake surface area.

Since residential property values are substantially depressed by a presence of visual pollution, residential urban lakes find aeration system benefits greater than the costs. The presence of an aeration system is ecologically beneficial because lake water quality is improved for local and downstream interests including the Chesapeake Bay.

Lake aeration improves water quality in a lake and its downstream discharge.

A WID Bulletin

Weed Harvester



Submerged aquatic vegetation (SAV) and submerged leaves and other pollution are a lake manager's nightmare. However, with a weed harvesting machine, cleanup becomes practical. The machine's reciprocating blades cut the SAV close to the bottom and a succession of conveyor belts lifts the material out of the water, into a storage area amidships, then out the back of the machine for automatic discharge into a truck or storage area.

WID's program to remove overgrown SAV some years ago has been very successful. In addition to the mechanical weed harvesting program, 280 sterile grass carp were introduced to the lake which gorged themselves until today there is no noticeable problem.

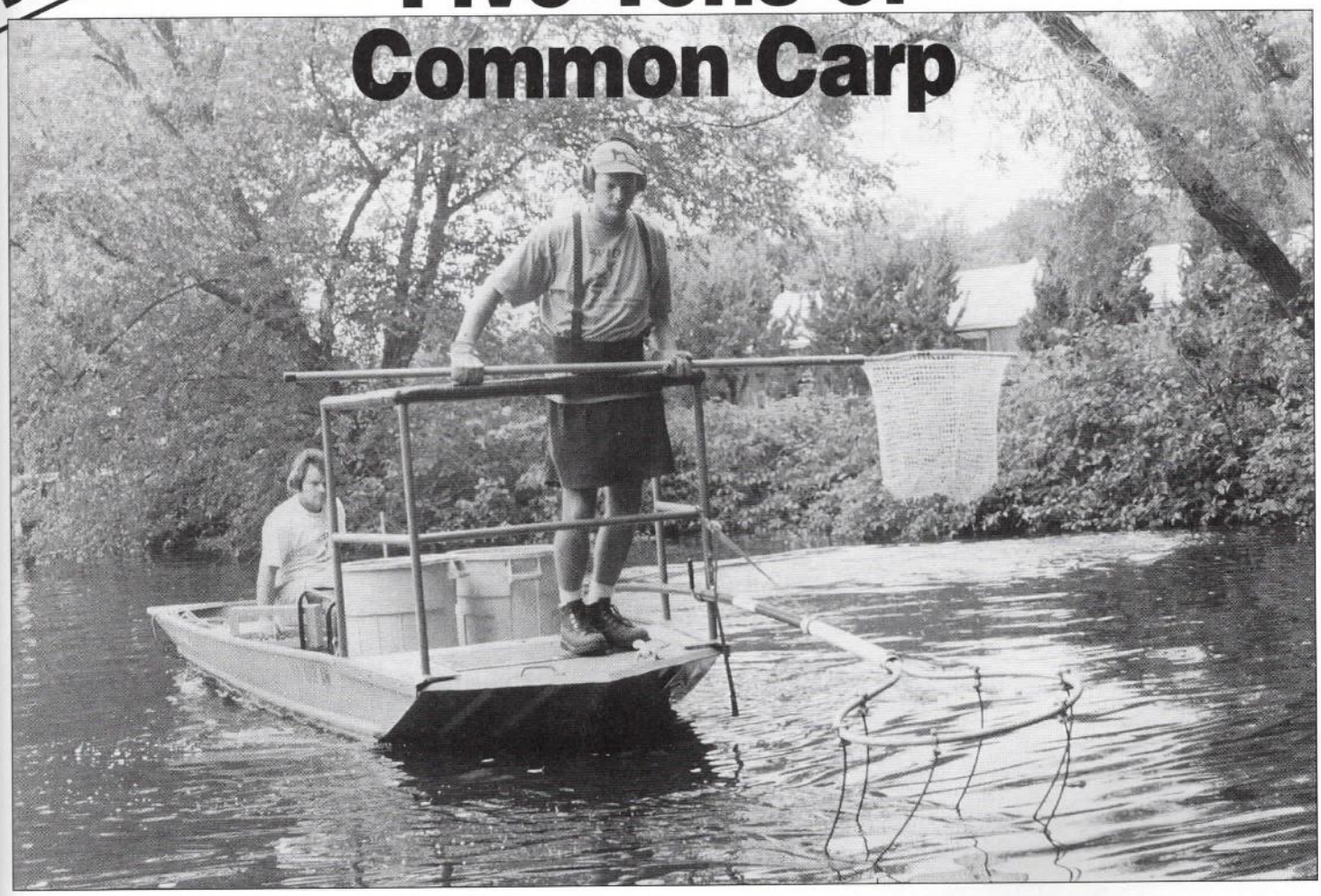
The harvester machine is now put to work picking up floating or submerged debris. Submerged leaves are the worst. Hand removal is impossible. However, the harvester can skim the bottom and retrieve tons of leaves.

Operating the top-heavy side-wheel machine is tricky. Keep an eye on the load balance to avoid capsizing. Keep the reciprocating blades off the bottom to protect them. Personally manhandle big logs.

Impossible jobs solved by ingenious machines.

A WID Bulletin

Five Tons of Common Carp



WID's new electrofishing boat removed five tons of Common Carp from Lake Barcroft last year. Why?

Basically, Largemouth Bass and Bluegill are a pair . . . predator and prey. They coexist in the lake. But living in the same habitat are several species of exotic fish such as Common Carp, Grass Carp, Koi and Goldfish. Most damaging is Common Carp. They compete with Largemouth Bass and Bluegill for food. They eat submerged aquatic vegetation and thus destroy Bass and Bluegill habitat. In search for food, Carp roil the water re-suspending silt making more nutrients available for algae and suffocating the eggs of other fish.

A lake can only support a limited number of fish, no matter what type. Until WID staff began removing carp, the lake biomass seemed to consist mostly of Common Carp. The relatively new fishery management *Top Down Theory* suggests that is fruitless to stock more and more Bass at great expense when it is cheaper and more effective to remove their competition, the Common Carp, to make more room in their ecologic niche for them to reproduce naturally.

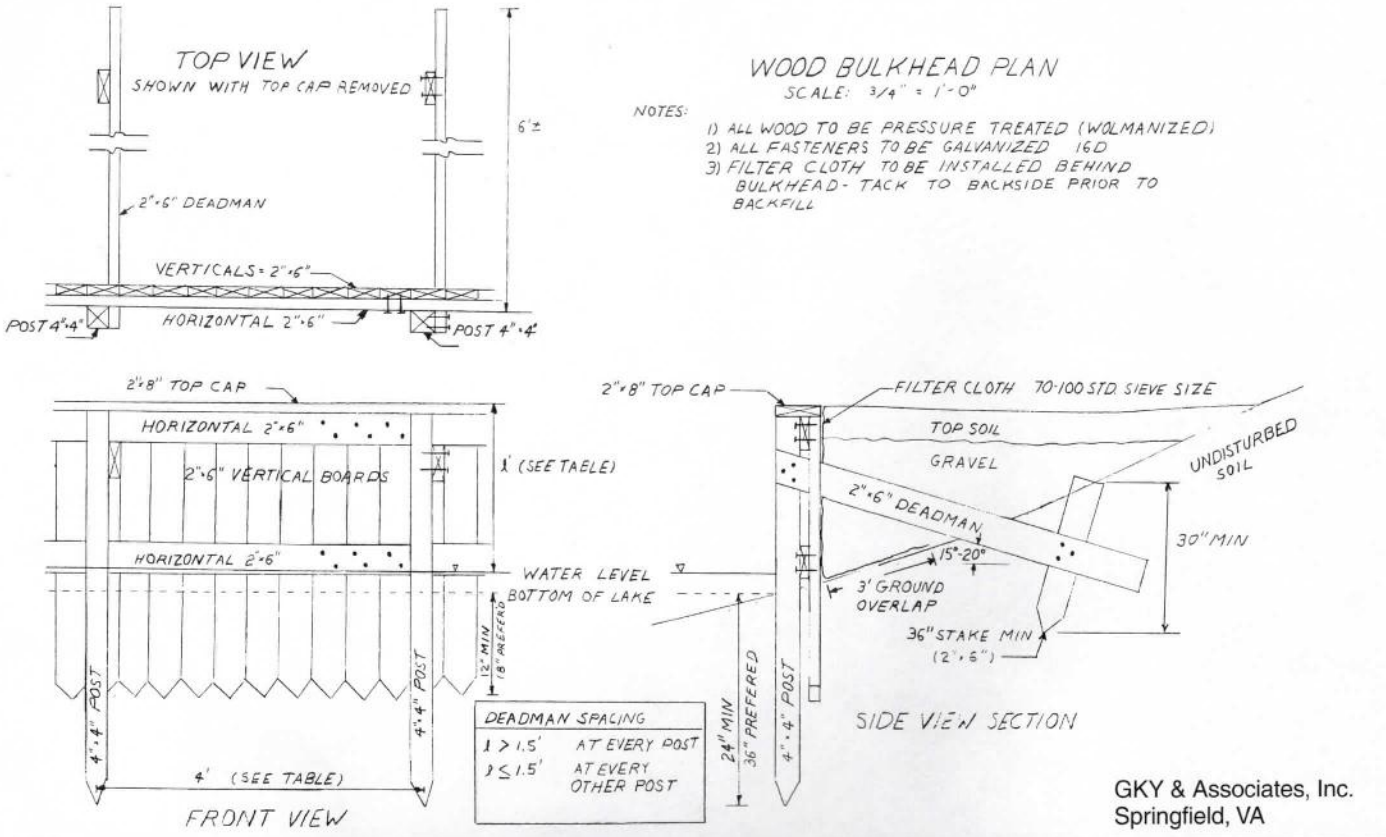
The electrofishing technique is quite simple. An electric charge into the water shocks and stuns most nearby fish. Unwanted fish such as the Common Carp are removed and desirable fish are allowed to recover and swim away safely.

Using this shocking procedure, WID staff stocked a little pond on the Beach 3 peninsula for an Earth Day event with several hundred Bluegill and a few Largemouth Bass. The kids loved it.

Fishery management today consists of more than fish stocking.
Invader species introduced by humans can monopolize many bodies of water.

A WID Bulletin

How to Build a Seawall



GKY & Associates, Inc.
Springfield, VA

Improperly built seawalls have a tendency to tumble. With proper design, top quality materials and skillful construction, they should last two or three decades. Above is an engineering drawing appropriate for lake Barcroft waterfronts.

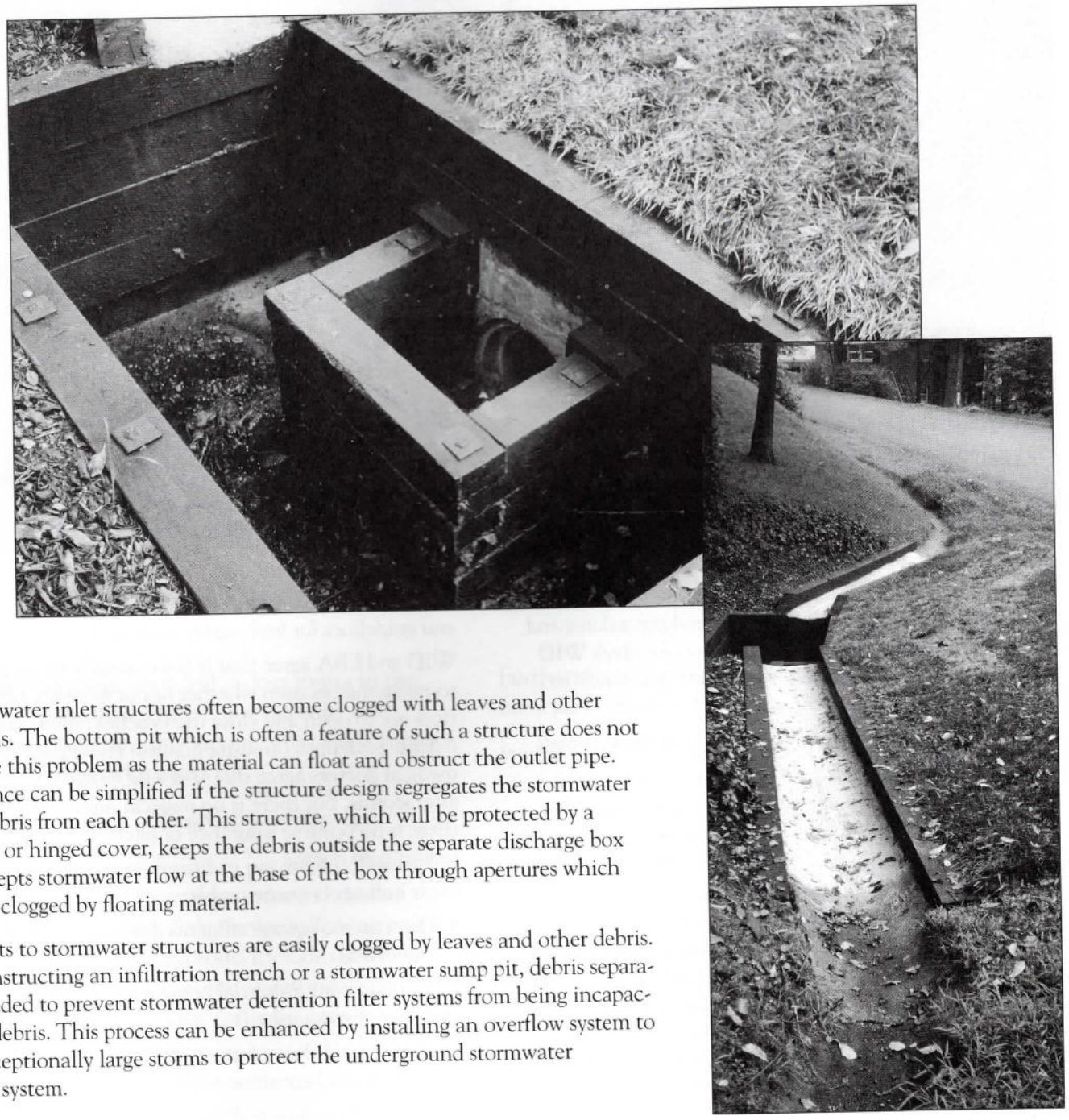
Here are some hints:

- Hire an experienced marine contractor. Ask to see a wall he has built. Talk to the owner.
- Use thoroughly wolmanized timbers to lengthen the life of the wall. For water contact, stipulate 2" x 10" tongue-in-groove Southern Yellow Pine with CCA treatment of 1.0 pound per cubic foot. Local stores usually have only .4 CCA treatment. To obtain timber suitable for marine use, contact G.E. Frisco, Inc., Upper Marlboro, Maryland at (301) 249-5100. Ask for Dave Doeller.
- Alternatively, it is possible to use oak timber to construct an arsenic-free chemically inert retaining wall. It will cost about 30% more but will last longer than treated timbers.
- Be sure the posts and vertical timbers are driven to refusal to ensure that the wall doesn't kick out at the bottom.
- Be sure there are adequate support deadmen and that they are securely fastened. Many contractors prefer a concrete deadman with corrosion resistant steel tieback cables.
- Fill behind the wall with gravel to minimize hydrostatic pressure on the wall.
- Remember to use filter cloth to prevent the gravel from clogging.
- You must obtain a building permit from the Fairfax County Department of Environmental Management (324-1997). The purpose of the DEM permit is to ensure that you have a sound retaining wall. Your builder should apply for the permit for you and may be required to submit an engineering drawing.
- Also, you must obtain approval of the Architectural Review Committee of the Lake Barcroft Association (941-1927).

Waterfront seawalls provide frontage stabilization to prevent shoreline erosion. However, consider other alternatives that are more environmentally friendly.

A WID Bulletin

Stormwater Structures



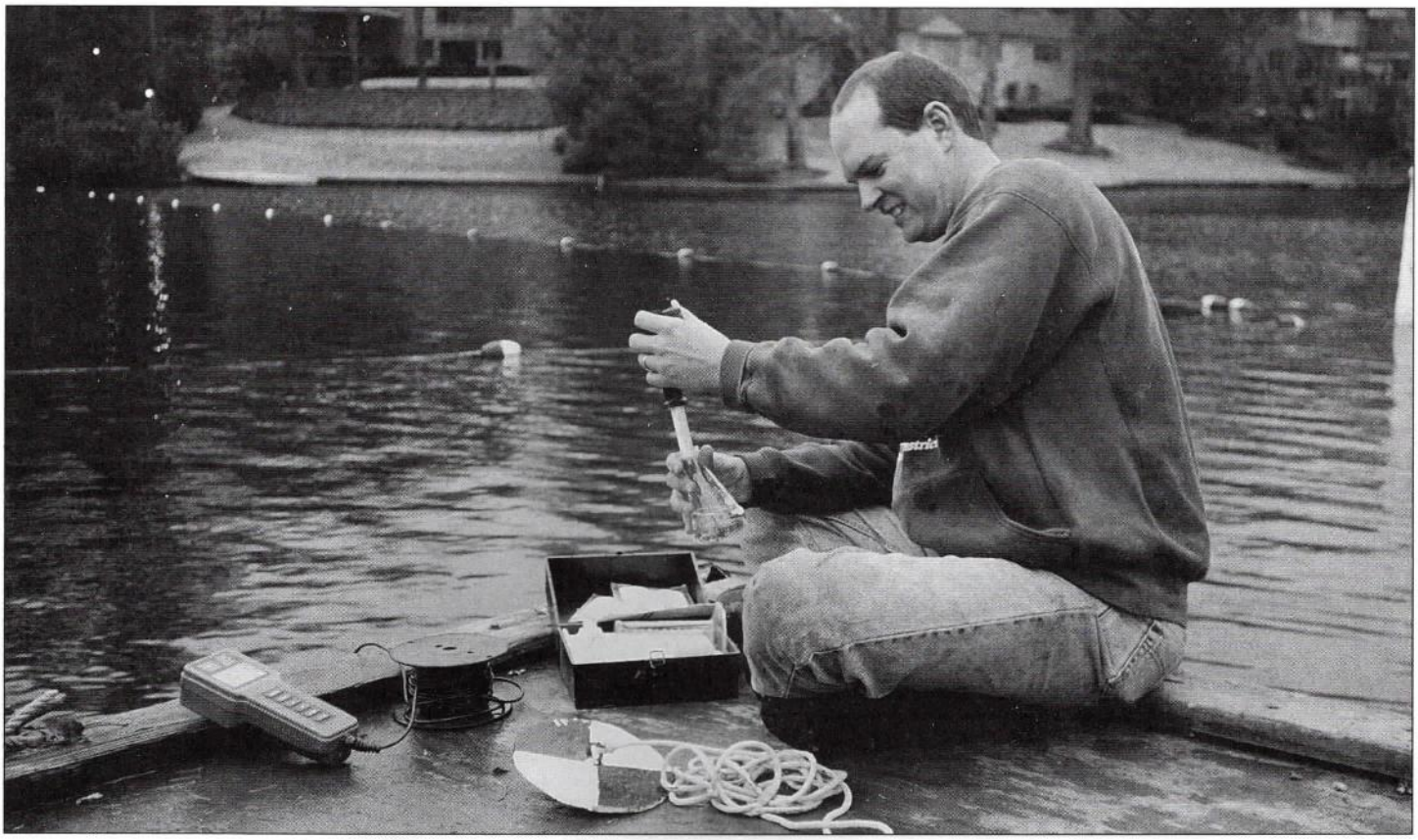
Stormwater inlet structures often become clogged with leaves and other debris. The bottom pit which is often a feature of such a structure does not solve this problem as the material can float and obstruct the outlet pipe. Maintenance can be simplified if the structure design segregates the stormwater and the debris from each other. This structure, which will be protected by a removable or hinged cover, keeps the debris outside the separate discharge box which accepts stormwater flow at the base of the box through apertures which cannot be clogged by floating material.

Grate inlets to stormwater structures are easily clogged by leaves and other debris. When constructing an infiltration trench or a stormwater sump pit, debris separation is needed to prevent stormwater detention filter systems from being incapacitated by debris. This process can be enhanced by installing an overflow system to bypass exceptionally large storms to protect the underground stormwater detention system.

Leaves, branches and other debris clog inlets and outlets of stormwater structures. Debris segregation can simplify maintenance problems.

A WID Bulletin

OK to Swim?



For over thirty years, Lake Barcroft water has been tested periodically using professional procedures and approved laboratories. The purpose of today's WID testing is **NOT** to inform residents whether it is safe to swim. The purpose is twofold:

- to reaffirm that there are not any leaks in the County's sanitary sewer mains upstream; and
- to assist in lake management procedures by measuring the amount of oxygen in the water, the presence of nutrients which cause the lake to look green from algae, etc.

The Lake Barcroft Association, which is in charge of Barcroft's beaches, is conducting a new series of tests to verify and refine the established procedure regarding swimming in the lake. For decades, since heavy rains flush all kinds of pollutants down to the lake, it has been standard practice for residents to avoid swimming in the lake immediately after rain storms. The procedure has been for Barcroft life guards to close the beaches during and after rain storms as a sensible precaution. LBA wants to ensure that its instructions to life guards are consistent with state and federal guidelines for fresh water swimming.

WID and LBA agree that it is the **resident's responsibility** to make the decision whether or not to swim. LBA's practices are to open and close the beaches based on state and federal guidelines on water quality. These guidelines and medical doctors agree that it is wise to avoid swimming after storms. But there is no magical number of days . . . there is no positive assurance of safety. If you are in doubt, talk to your doctor.

Most indicators are favorable:

- There are no sewage effluents discharged in the Barcroft watershed;
- No significant industrial or commercial wastes are generated in the watershed;
- Lake Barcroft has a forty year record of safe swimming which should continue indefinitely.

But, the bottom line is that the decision of when to swim must be made by **you**.

Water quality monitoring is an important lake management tool that can also inform the public. Whether or not to swim is a* personal *decision.

A WID Bulletin

Much Ado About Dogs

Illustration by Jack Keith

WID figures that there are 6,541.3 dogs living in the Lake Barcroft watershed. If each dog deposits one pound of waste each day, this amounts to over 3 tons a day . . . over a thousand tons a year.

Dog owners, please buy and use a pooper-scooper.

Bacteria and parasites are found in pet waste. Diseases that can be transmitted from pet wastes to humans include *Campylobacteriosis*, *Salmonellosis*, *Toxocariasis* and Toxoplasmosis. The symptoms include diarrhea, fever, muscle aches, headache and vomiting . . . and, occasionally, more serious consequences.

Furthermore, it is inconsiderate to litter your neighbor's yard or public areas.

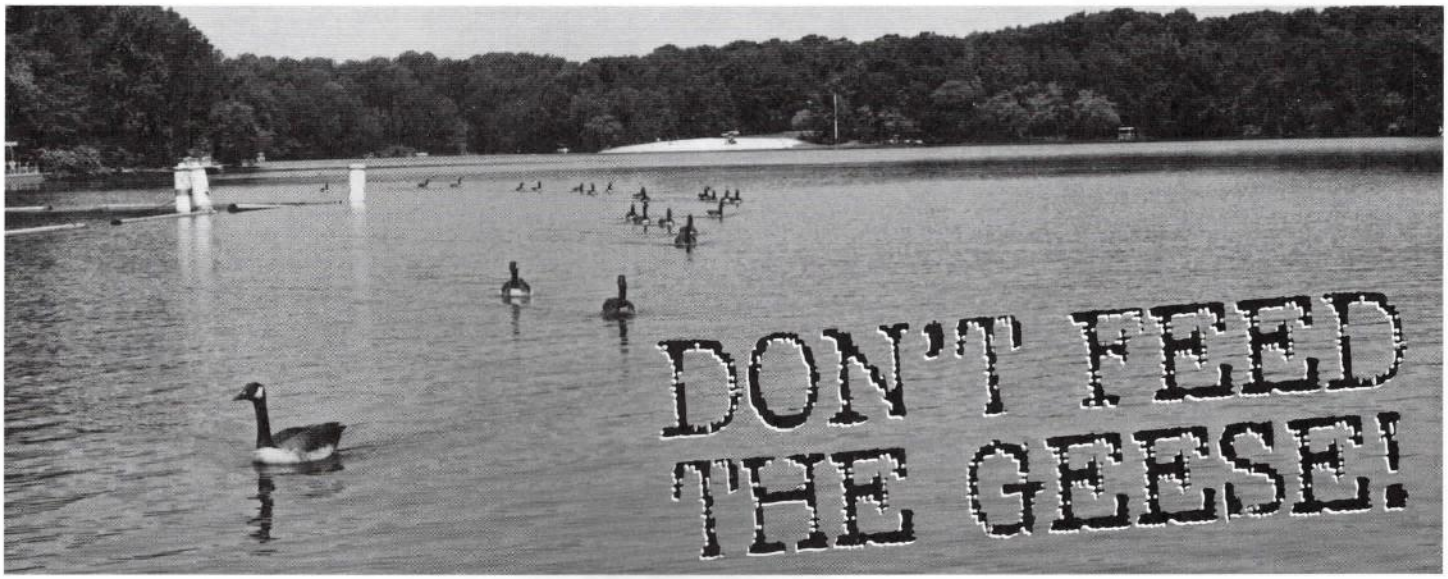
It is also illegal. County ordinances stipulate that dogs are not allowed to run loose in Fairfax County. They must be kept under control at all times and are not permitted to foul other's lawns or public areas. Violations are a Class IV misdemeanor with a possible $250 fine.

Flush it down the toilet, bury it in the yard or put it in the trash. NOT . . . in the nearest storm drain! Thank you.

People with Pooper-Scoopers Prevent Pollution

A WID Bulletin

Pestiferous Geese



The magnificent goose with its wild honking and orderly flight formations is being urbanized into an actual pest by uninformed humans who persist in feeding them stale bread. As they delight their children, these well-intentioned folks don't comprehend that they are luring geese out of their natural habitat and habits into an artificial way of life which is foreign to their traits and is contrary to the order of nature.

And so today there are two kinds of geese . . . ***natural geese*** which ply the east coast flyway . . . and ***nuisance geese*** which live here all year long defecating on lawns and congregating in such numbers that they constitute a major source of water pollution. The federal Migratory Bird Treaty Act, which was designed to protect the natural goose which was then threatened with extinction, now complicates nuisance goose control. It makes it a federal crime to capture or kill nuisance geese or addle their eggs without a permit from a state office of the U.S. Fish and Wildlife Service. The solution seems to be to convince people to act more rationally. Specifically,

Don't feed the geese.

Most people are capable of recognizing that they are actually harming wildfowl by domesticating them with free food. The resident goose who stays at Lake Barcroft twelve months a year lives a sedentary life compared to the migratory creature he once was.

The Lake Barcroft WID minimizes local reproduction by obtaining a permit from the government and addling eggs in the nests around the lake. This is a painless process of wiping the eggs with cooking oil which prevents their hatching. Fencing can sometimes minimize lawn and beach damage but is usually outwitted by these smart birds.

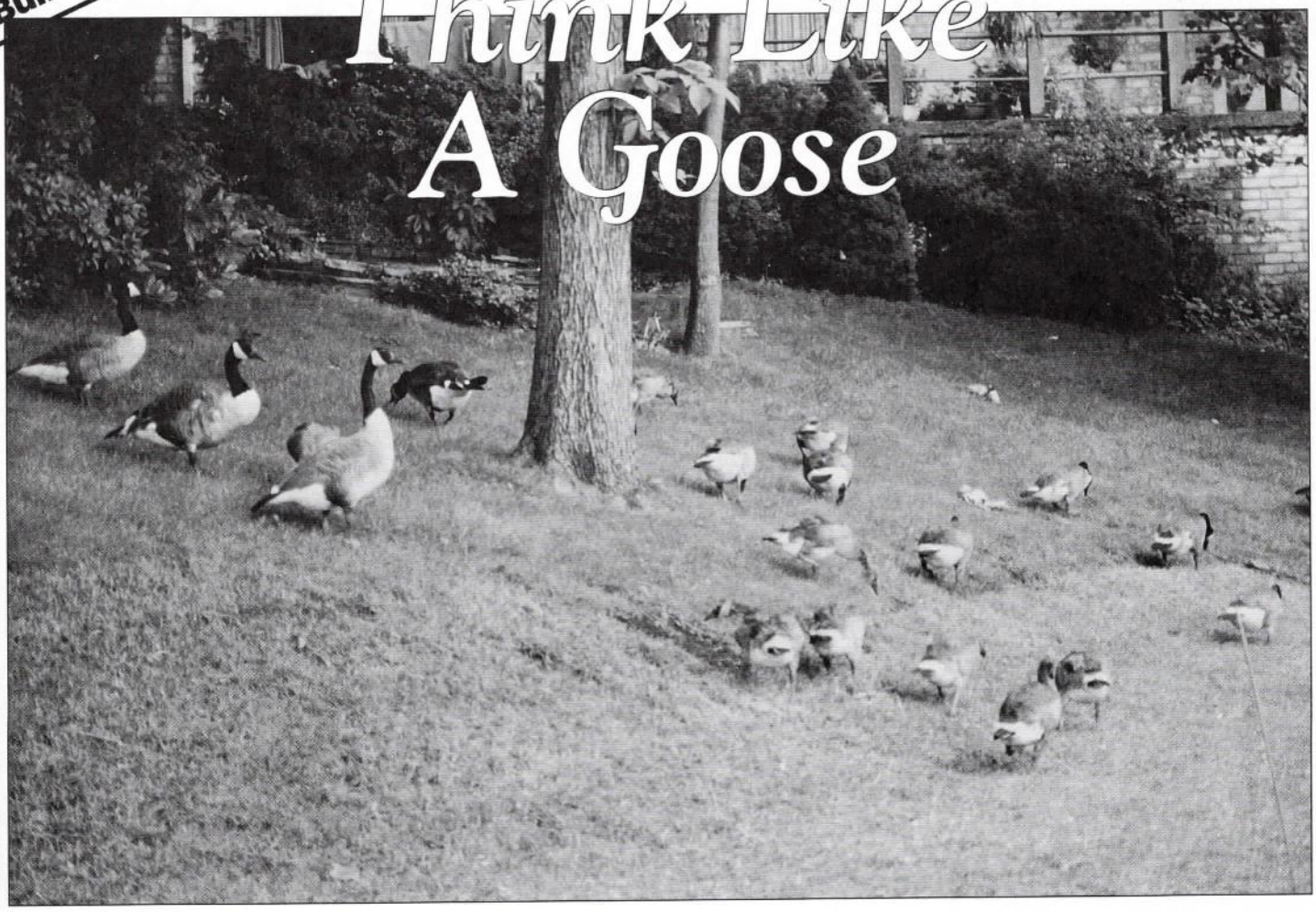
Another potential goose control technique is to replace green lawns with natural buffer strips of multi-species greenery. This attracts fewer geese and simultaneously reduces water quality impact from over-fertilization of lawns.

Meantime, reason your with goose feeding neighbors. Call WID at 820-1300 for an informative article called *Canada Goose*.

The same Migratory Bird Treaty Act which saved the Canada Goose from extinction has made* non-flyway *geese into a pest.

A WID Bulletin

Think Like A Goose



A goose doesn't think of pest control or environmental management. Geese don't have committees, think tanks, political action programs or welfare organizations. The average goose is a simple creature. *"I like it here"* is about the extent of its cogitative process.

Goose heaven is a lake or other water + a nice green lawn. Thus, goose pest control boils down to **habitat modification**. Since an environmental manager can't remove the water, replacing lawns with vegetative buffer strips is a possibility.

Weird pest control functions include: . . . Border Collie herding . . . mothballs . . . plastic swans . . . propane cannons . . . mechanical clappers. . . bubble gum . . . ultra high frequency noise generators . . .salt . . . dried blood . . . slingshots . . . guns . . . monofilament lines . . . stuffed owls . . . stuffed foxes . . . electric fences . . . goose relocation . . . anthranilate . . . remote controlled boats . . . aircraft lure migration . . . fences.

Now, there is one that partially works. A fence can move a goose 100 feet to the south . . . but not out of town.

While it may not be helpful to you, explain to your friends that the predominant species is *Granta canadensis maxima.* These 12 pound geese were considered virtually extinct in the mid-1950's.

Recommended Solution: Habitat modification.
Or, if you prefer, call your Congressman.

A WID Bulletin

Help Yourself!

Stockpile of leaf mulch soil conditioner at Beach #5 silt storage area available to Barcroft gardeners.

Yard work often requires small quantities of topsoil and mulch. Now, WID is offering to help. In the silt drying area of Beach #5, there are separate stockpiles of dredged sediment, leaf mulch and wood chips. It's a "Help Yourself" arrangement.

Here are some ideas:

- *Topsoil*
  This dredged sediment is nutrient rich and reasonably friable (easily crumbled). Often a good method is to mix some leaf mulch in with the sediment to incorporate organic content. It won't be as good as expensive topsoil you might buy . . . but is much cheaper.
- *Mulch*
  WID has obtained leaf mulch from Arlington County which is so thoroughly composted that it can be used directly as a mulch or mixed with dredged soil to make topsoil. This dark material is actually a high quality soil conditioner.
- *Wood Chips*
  WID has a stockpile of wood chips obtained from professional tree trimming companies. This can be used as a mulch to maintain moisture in the soil and protect plants from freezing. You may decide to mix wood chips and composted leaves into mulch.

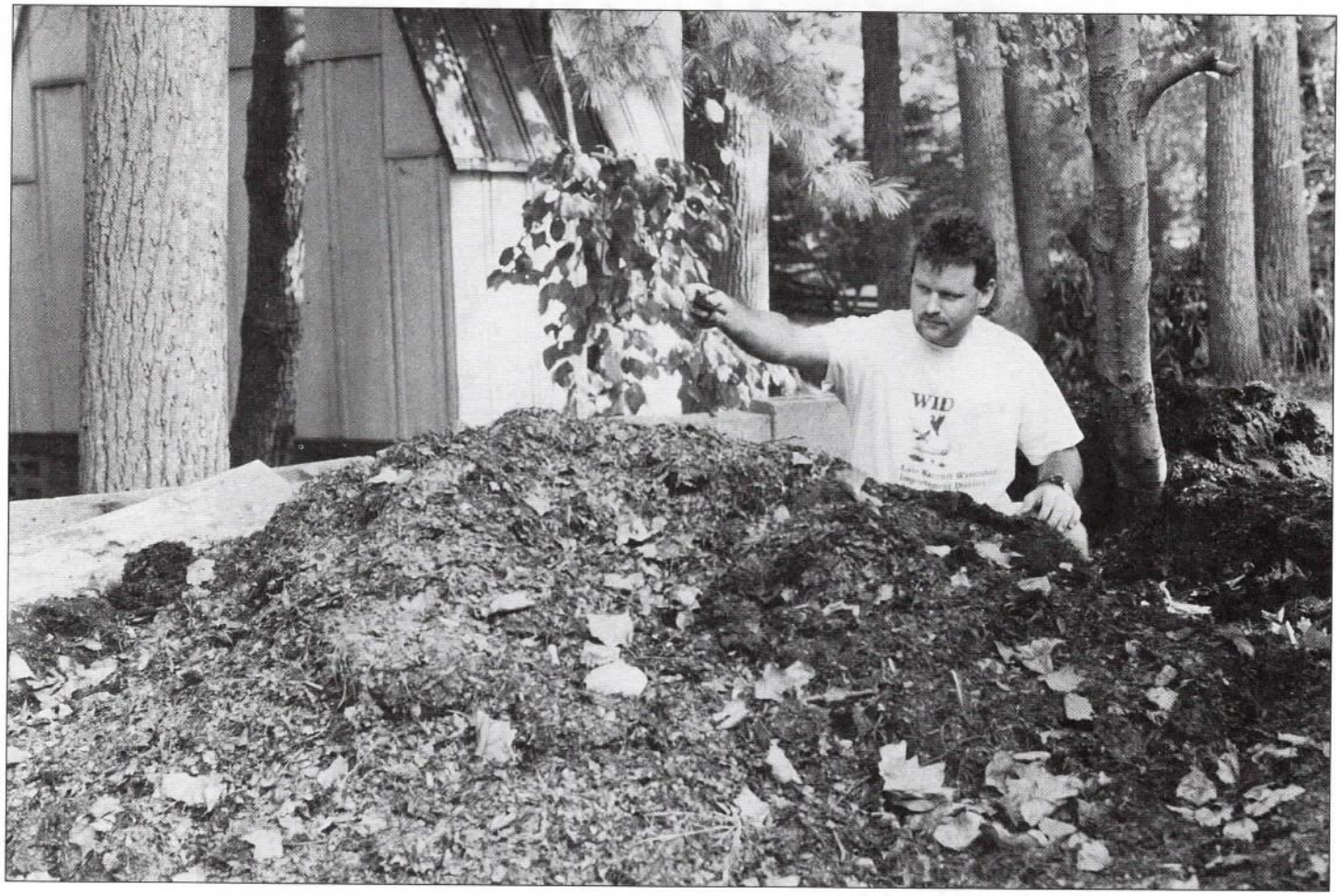
Here's How to Help Yourself:

Beach 5 sediment drying area has piles of *screened sediment*, *leaf mulch* and *wood chips*. You may walk in and help yourself. If you wish to drive your car in, the security cables will be either down or unlocked every Friday from 9 a.m. until 3 p.m. except in winter.

Home gardening reduces erosion and storm runoff and thus in an environmental Best Management Practice. Why not use WID's free gardening materials?

A WID Bulletin

Composting



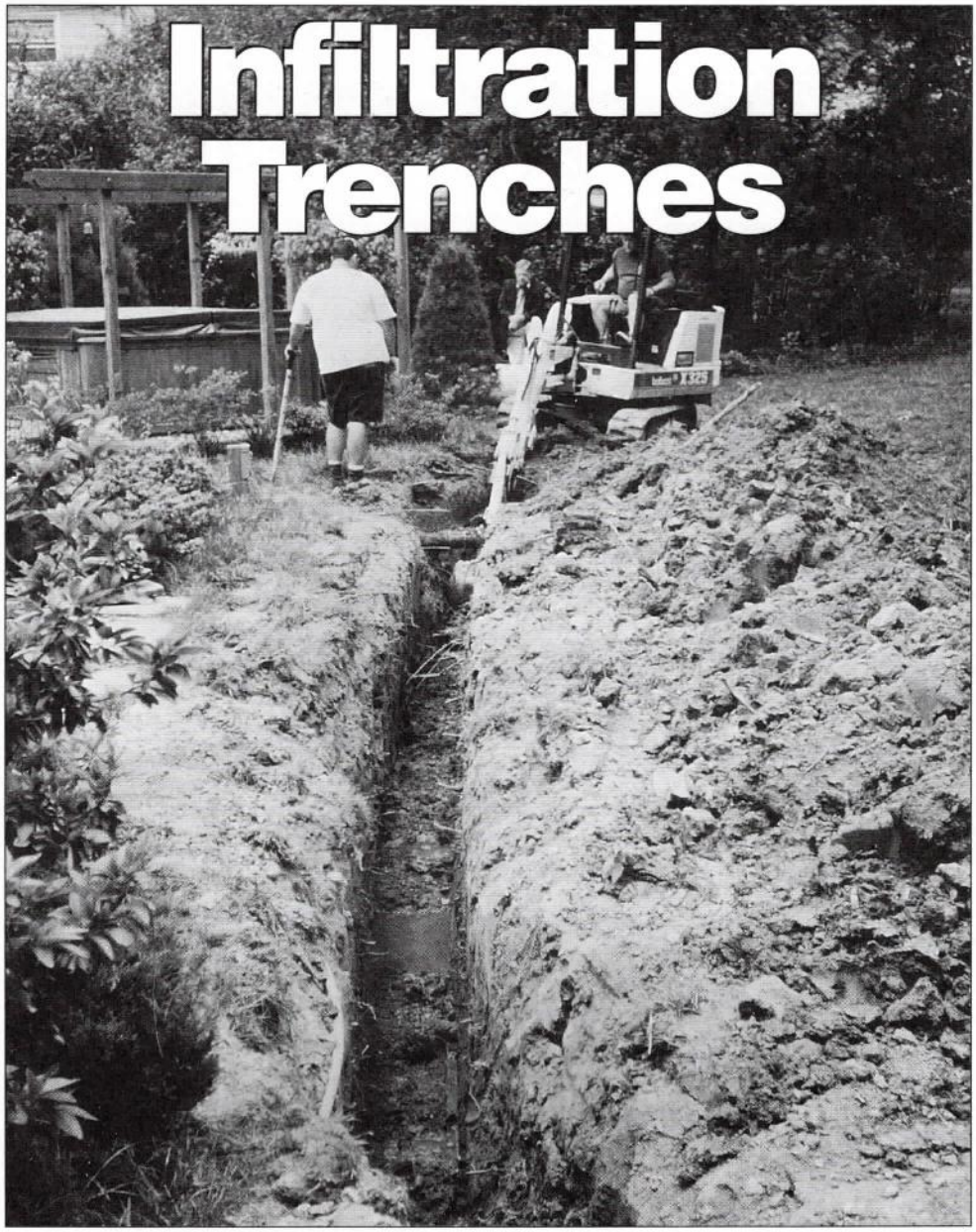
It seems a bit silly to haul all your leaves to the street to be trucked away and then rush to the store to buy fertilizer and compost for your gardens. Why not make your own compost . . . and go light on the fertilizer?

There are all kinds of composters. Pictured above is the simplest and most economical of all. It's just a big pile of leaves somewhere in your yard. Another approach is a home-made structure to hold the leaves more compactly as they gradually cook into compost. And finally, there are some commercially manufactured composters which take very little space. One model is a plastic box about 23 inches square which is fed from the top and yields compost from the bottom. Another one about the same size rotates to mix the compost periodically.

The best gardeners provide nutrients with compost instead of chemical fertilizers.

A WID Bulletin

Infiltration Trenches



Infiltration trenches are designed to encourage stormwater infiltration into groundwater, to reduce runoff volume and peak discharges. By retaining a permeable surface along the trench, stormwater runoff seeps into the trench and either percolates deeper into the ground or travels along the trench to its discharge point. By penetrating lawn hardpan, a filter trench can greatly increase soil percolation. Removing surface flow greatly reduces erosion and downstream sedimentation.

The trench contains a 6" perforated drainage pipe and small crushed stone (2 inch) wrapped in permeable geotextile filter cloth to let the water out and keep the soil fines from clogging the rocks. The holding capacity of the trench is based on the void ratio of the aggregate used in the system.

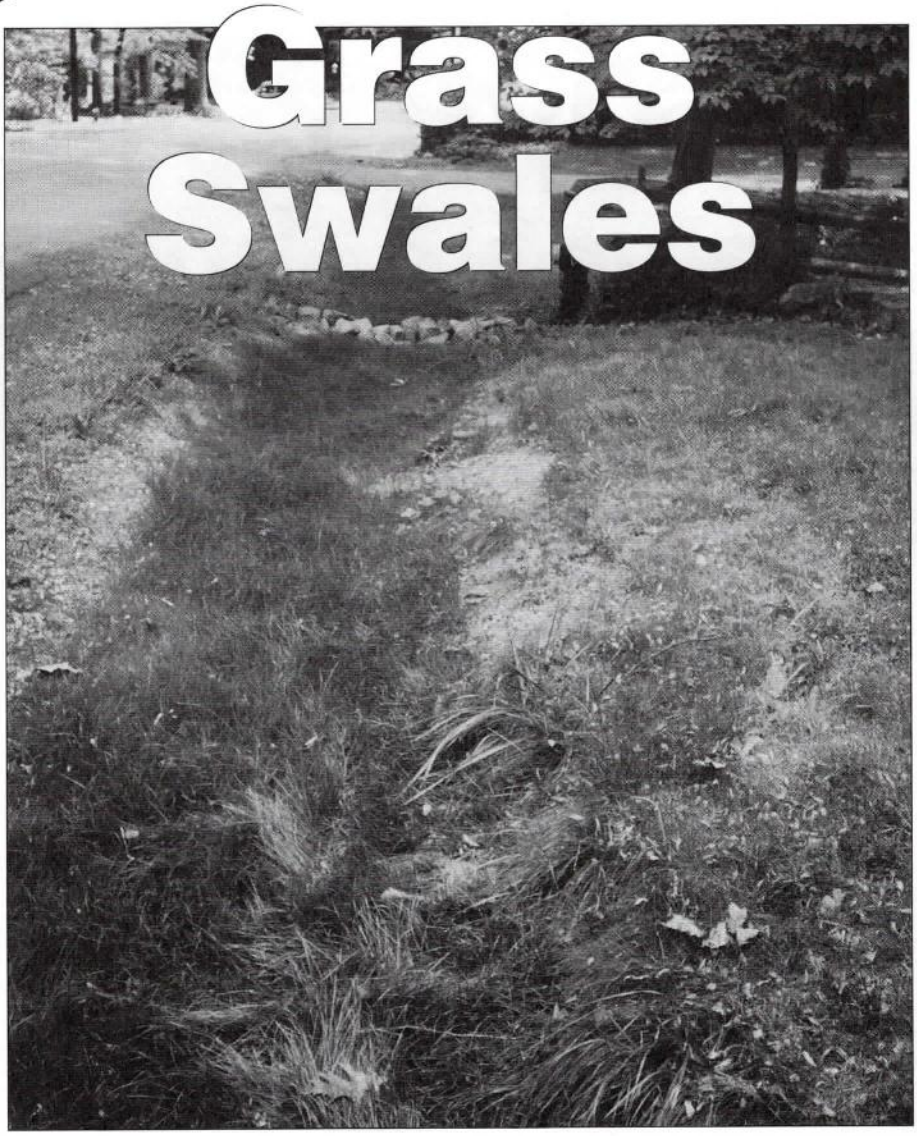
An infiltration trench should only be used in suitable soils that percolate and should be inspected periodically to be sure the system is functioning properly and that the crushed stone is not clogged.

Filter trench systems are often used to prevent cellar flooding, to channel roof drainage away from buildings and to provide an underground channel for inflowing water. They are superior to pipes because of greater groundwater infiltration, temporary stormwater detention and peak flow reduction properties.

Instead of fighting gully erosion, construct an infiltration trench.

A WID Bulletin

Grass Swales



The simplest and most economical roadside stabilization technique is the **grassed swale**. It is a contoured ditch which is planted in grass and can be periodically mowed to maintain a neat turf. It is not as sturdy or stable as a concrete curb-and-gutter system because vehicles which run into it during wet weather will gouge ruts and perhaps destroy the turf. However, it has the benefit of costing less to install and has a rustic or natural appearance which appeals to many home owners and, most importantly, the runoff velocities in a grass channel are much lower than road gutters.

Grassed swales are often preferred in cul-de-sacs and other low traffic residential areas. Avoiding parking on them can protect them and homeowner maintenance can restore them. However, resident individual response to this maintenance responsibility is differentiated depending on time availability, personal preferences, etc. An important factor is that a government agency owns the roadside land which lies within its highway right-of-way and thus homeowners technically can be required to obtain permits for extensive engineering modifications. Difficulties are often experienced when driveway under-drains are not properly maintained. Neglect can result in the grassed swale deteriorating into an ugly and dangerous eroding ditch.

Successful grassed swale design depends on low-flow, low velocity conditions. To install a new grassed swale, staked jute netting will often give the grass seed time to establish before the jute netting biodegrades. The above picture illustrates the end result when the Virginia Department of Transportation regraded a seriously eroded roadside ditch, added topsoil, limed, planted grass and stabilized it with pegged-in jute netting.

Good initial design, tender loving care and patience = grassed swale success.

A WID Bulletin

Worthless Dredge Spoil vs. Valuable Topsoil

WID has purchased a topsoil screening machine called the Royer™ Model 365 Shredder. This converts dredge spoils into a rich friable topsoil useful for gardens, lawn rehabilitation and fill. The screening process removes sticks and stones, roots, tin cans and miscellaneous junk. Since these dredge spoils originally washed down stream to Lake Barcroft, they are coated with nutrients and thus no fertilizer or other enrichment is needed.

Perfect for gardens or lawns. To create a new garden, composted leaf mulch might be added. To rehabilitate a weedy lawn, top it with topsoil and seed new grass at the right time of year.

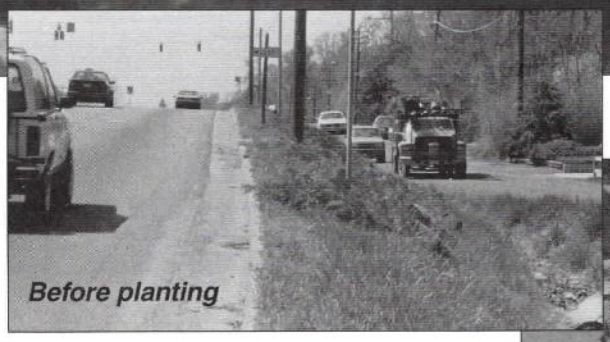
Barcroft residents can obtain a 3 cubic yard load for a delivery charge of $25. This is a fraction of the usual market price for topsoil. If you want a load of topsoil, call WID or send a note explaining when you want it and where it should be dumped.

About half of the cost of a typical lake dredging project is dredge spoil disposal This material is usually contaminated by rocks, branches, tin cans and various kinds of non-biogradable trash. Screening out this pollution converts a large portion of a useless waste into a valuable product.

Adding topsoil can create a rich weed-free lawn which, in turn, will prevent erosion and minimize stormwater runoff, thus improving water quality.

A WID Bulletin

Tree Screen



Leyland Cypress tree screen along the median between Columbia Pike and the Columbia Pike service road.

The southeast corner of the Lake Barcroft community consists of eleven houses fronting on the Columbia Pike Service Road. From these living rooms, residents can see and hear an endless stream of traffic . . . particularly during morning and evening rush hours. Headlights intrude into windows. The whine of cars constitutes an everlasting background for conversation and even sleep.

While great efforts have been made to beautify the Columbia Pike entrance to the community at Aqua Terrace, no one had seriously contemplated ameliorating this problem area . . . **until** the Small Business Administration of the Department of Commerce and the Virginia Department of Forestry came along. Using SBA small business incentive funds, they offered a cooperative tree-planting grant program if the local sponsor provided matching funds and assurance of perpetual maintenance.

Barcroft applied and received a grant of $5,752 which was matched by $2,500 from the Improvements Committee of the Lake Barcroft Association and $2,500 from the Lake Barcroft Watershed Improvement District. 150 Leyland Cypress trees have been planted. At the intersection of Columbia Pike and Aqua Terrace, two low gardens were planted instead of trees which would have blocked driver/pedestrian sight.

Within a four years, these 5' to 6' Leyland Cypress trees have grown into an impressive evergreen screen to beautify Lake Barcroft and reduce the impact of highway runoff and traffic to this section of the community.

Urban traffic disturbance can be ameliorated by an economical tree screen. Cooperators included federal, state and local governments, WID and LBA.

A WID Bulletin

Gypsy Moth Control

Gypsy moth caterpillars found under a burlap flap with biological control agents at work.

Gypsy moth management is an environmental pest control technique intended to protect trees and forests from destruction and reduce human nuisance and economic damage. Essentially, local groups or government agencies pay to protect their property. A local program may range from simple monitoring, to production and release of biological control agents, to complex aerial spraying, depending on the intensity of gypsy moth infestation.

Currently, the WID's forested residential area is relatively free of this leaf-eating pest. This year's recommendations are: *no aerial spraying, no biological control, and continued gypsy moth risk assessment survey in the form of larval survey, male moth trapping and new egg-mass survey.*

In earlier years, WID's most effective control was aerial spraying using Bt which is specific to gypsy moths. In addition, WID has lured or trapped male moths, has released several species of parasites and has monitored conscientiously. WID has constructed a truck-mounted spray unit which reaches 35 to 40 feet high which is an economical method of reducing gypsy moth populations when aerial spraying is not warranted. The same truck sprayer also controls the Eastern Tent Caterpillar which specializes in fruit trees and precedes the gypsy moth season by a few weeks.

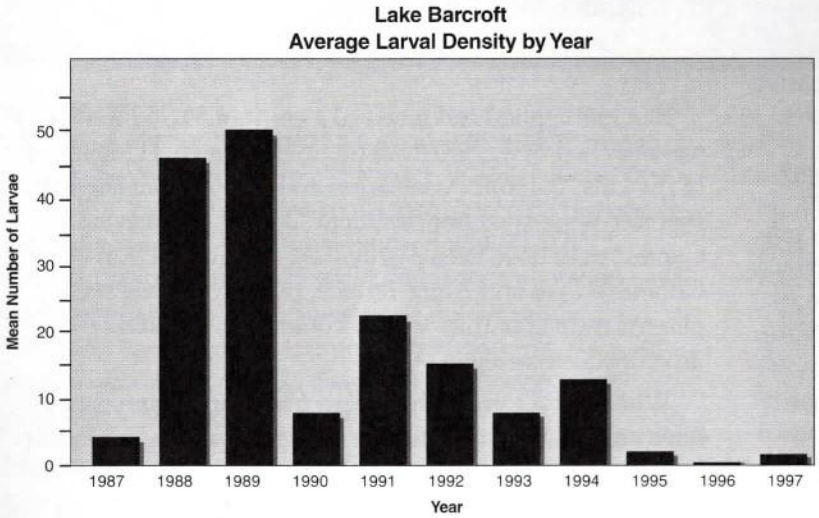


FIGURE 1. Average larval density per burlap band throughout Lake Barcroft from 1987 through 1997.

Future emphasis may be on the gypsy moth fungus which can be initiated by man but is spread naturally by gypsy moths. Parasite release and aerial spraying may be incorporated in intense infestations.

WID's professional consultant is the National Gypsy Moth Management Group. The program's basic philosophy is to **prevent** intense infestation through carefully planned annual analysis and action and early intervention. Homeowner knowledge and cooperation greatly improve the program. WID's regular monitoring network consists of 100 of the community's 1,000 homes.

Trees are valuable environmentally and economically.
Preventing intense gypsy moth infestation can be done cost-effectively.

A WID Bulletin

Greenways

The Fairfax County Park Authority is initiating a countywide *Greenways* project which can provide immense benefits in the years to come. It is based on a new emphasis on ecological concepts summarized in a recently developed Park Comprehensive Plan for 1995-2010 which is being incorporated into the Fairfax County comprehensive plan. Greenways typically represent Chesapeake Bay resource protection areas and occupy lands near water courses. As such they may be amenable to enhancements such as check dams, hydraulically improved wetlands, riparian restorations and the like.

FCPA defines Greenways as linear open space corridors which connect parks and recreation sites, areas of significant and sensitive ecological and heritage resource value, wildlife habitats, riparian corridors and Countywide trails with each other and with residential communities, employment and commercial areas and transit destinations.

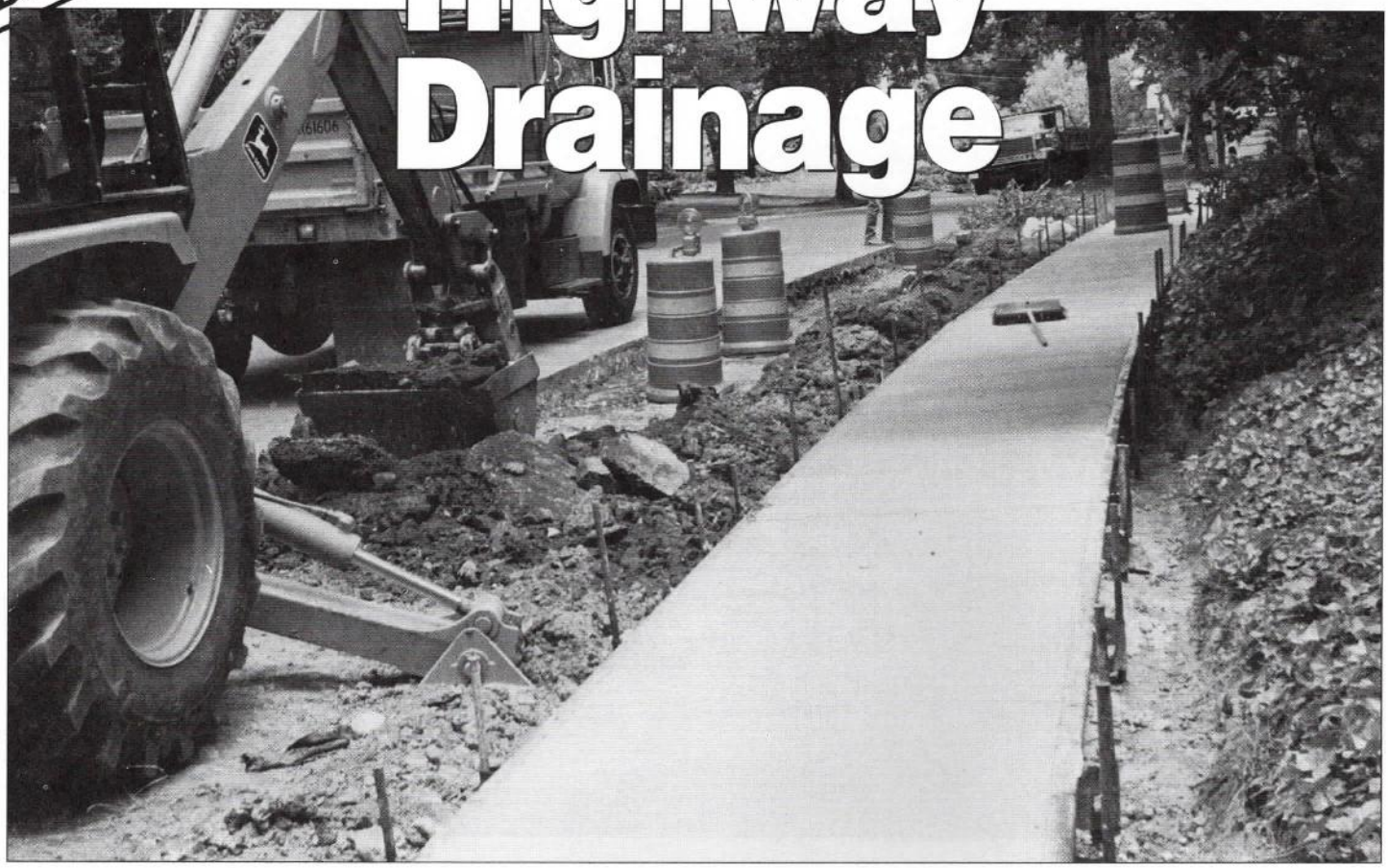
Lake Barcroft's logical contribution is to continue to function as an ecological preserve in the midst of an urban agglomeration. The natural habitat, consisting of the lake, its forested beaches and woodsy home sites, is home for all kinds of natural creatures from shrews to foxes. WID's wildlife management program includes fish stocking and trash fish removal, wood duck nesting boxes and goose population control, eradication of the gypsy moth and home owner wildlife problem solving.

The Lake Barcroft WID cooperates with the Fairfax County Park Authority in several ways. Recent improvements in JEB Stuart Park were installed through WID's 319 grant program and future projects are contemplated involving FCPA's stream valley parks. Future 319 grant Holmes Run watershed projects are designed to be consistent with the Park Authority's environmental and ecological objectives.

Greenways are* connections *which sometimes contain trails for human access and always contribute to wildlife habitat.

A WID Bulletin

Highway Drainage



VDOT construction of curb and gutter, new sidewalk and improved drainage.

A state or local highway department is an active player in watershed stormwater management programs. Storm drainage doesn't respect boundary lines . . . it just flows downhill . . . often with unusual and unexpected financial and political consequences. Thus, the typical watershed manager often asks for help and vice versa.

Typical situations include:

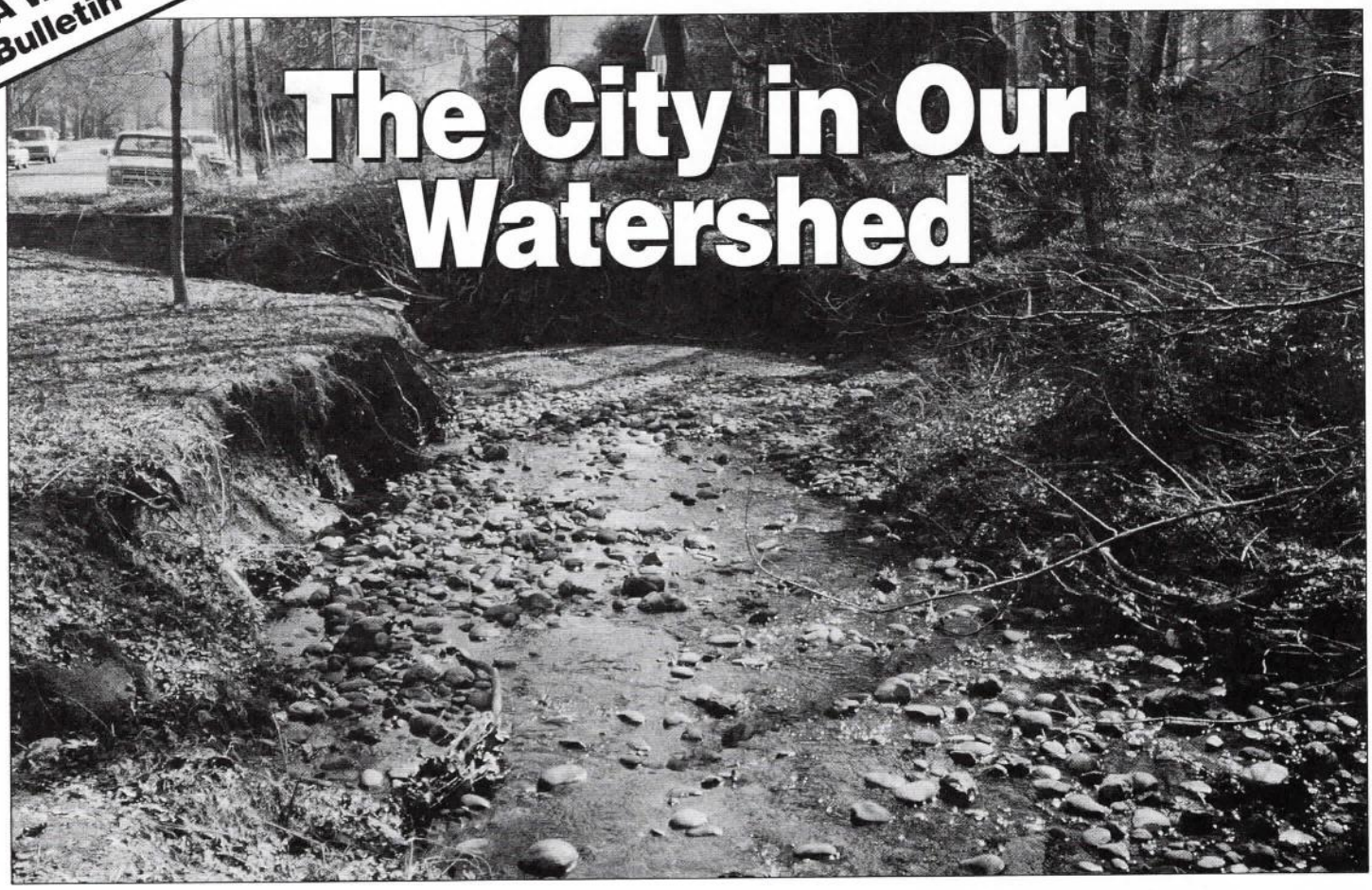
- WID adopted all of the highways within its official taxing district boundaries. In so doing it accepted at least partial responsibility for roadside litter pickup and, in return, was granted the privilege of performing limited maintenance such as erosion control, ditch cleanout, roadside plantings and median mowing. This involves careful consideration because a non-highway agency must abide by highway department specifications and standards as well as safety procedures.
- WID's street cleaning program inspired the Virginia Department of Transportation to permit unloading swept debris at a convenient VDOT maintenance yard. This constituted a working partnership in which VDOT shared the expense of street sweeping with WID.
- WID suggested improvements to an intersection which was dangerous to drivers and pedestrians including school children. WID developed a proposed engineering design. Shortly thereafter, VDOT adopted the design and installed curb and gutter and improved the drainage situation thus solving the problem. See picture above.

Friendly relations with a highway department are most likely to succeed if a watershed manager appreciates that the highway department's stormwater control program is an important but ancillary objective.

Highway departments can provide valuable help but have a primary responsibility of moving traffic quickly and safely.

A WID Bulletin

The City in Our Watershed



The headwaters of Tripps Run originate in Fairfax County . . . then flow into the City of Falls Church . . . then flow into Fairfax County again . . . and finally flow into Lake Barcroft. Each suffers a negative impact. Falls Church and Fairfax County have significant flooding and erosion problems and Lake Barcroft has an expensive sediment dredging problem.

Today, thanks to the U.S. Environmental Protection Agency's 319 grant program, WID is in a position to help solve everybody's problem. By installing *check dams*, *flow regulators* or *riparian restorations* in upstream tributaries, localized temporary stormwater detention can reduce peak flood flows and thus minimize erosion and the transmission of sediment, debris and nutrients downstream.

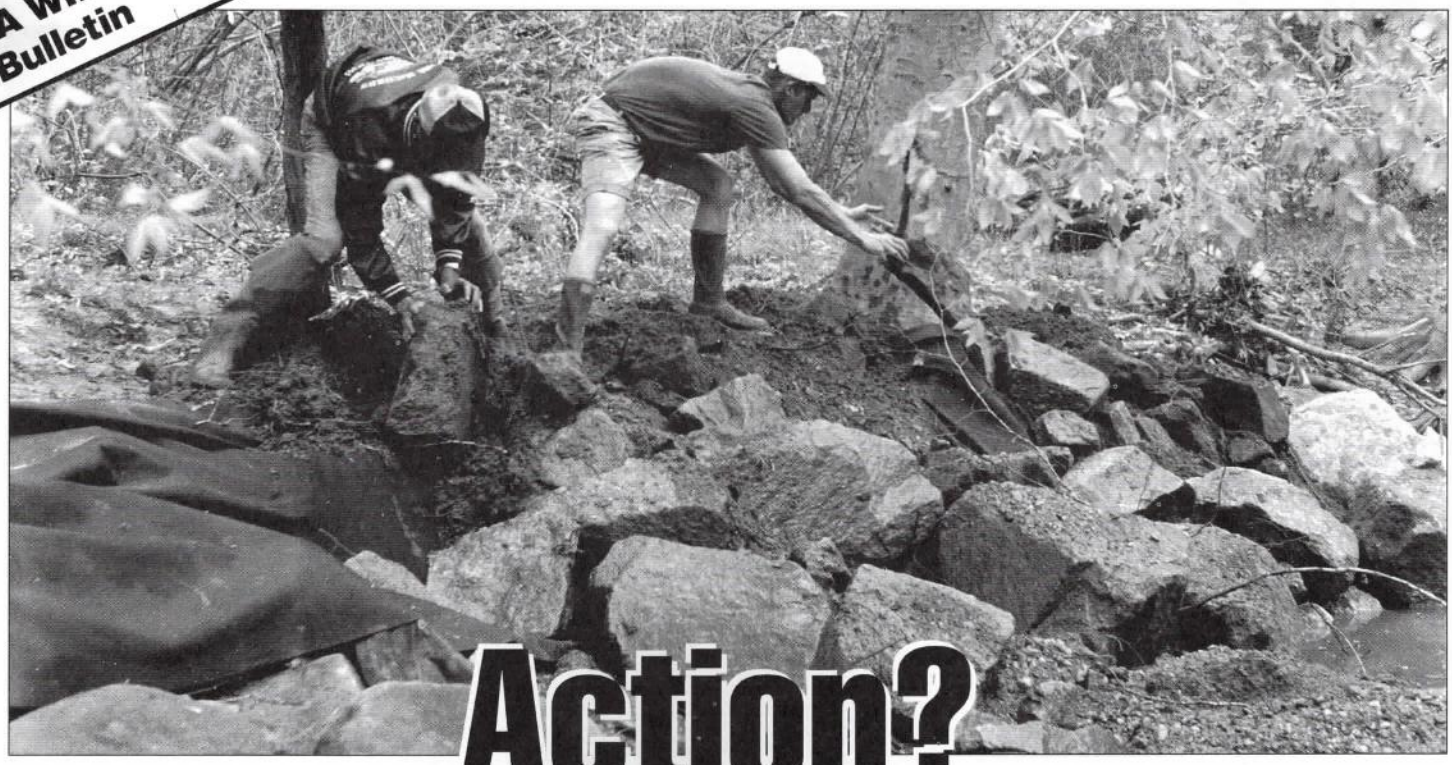
The picture shown above illustrates an eroding section of Tripps Run as it flows into the City of Falls Church. The soil which washed out here eventually will migrate to Lake Barcroft. However, the installation of a series of small check dams here could minimize flooding in the city and the county and the watershed yield to Barcroft. Corrective measures like this in enough tributaries could constitute a watershed retrofit that would correct storm drainage design deficiencies.

Today, for the first time, there is inter-jurisdictional contact as WID's 319 grant program proposes the installation of small tributary improvements in the entire upstream watershed. This will provide certain opportunities for the installation of such improvements in the City of Falls Church. The first project to be completed is a stormwater detention facility to reduce peak stormwater flows from Falls Church's Mount Daniel Elementary School on Tripps Run headwaters which happens to be located in Fairfax County. The project has been approved by the City Manager and school officials.

Numerous Falls Church leaders and officials are anxious to begin the possible restoration of Tripps Run and its tributaries which drain two thirds of the city to a natural state as proposed by the Falls Church Village Preservation and Improvement Society. WID hopes to help.

Inter-jurisdictional cooperation and coordination can produce bigger and better results than the customary go-it-alone policy.

A WID Bulletin



Action?

Watershed retrofit programs are as varied as the watersheds themselves. Some may start little and expand as cooperators are attracted and projects are initiated. Others might begin more ambitiously as a result of a plan or a conference. But all of them require a grasp of the watershed concept in which all of the participants interrelate and a recognition that novel ideas usually are needed to remedy existing difficulties.

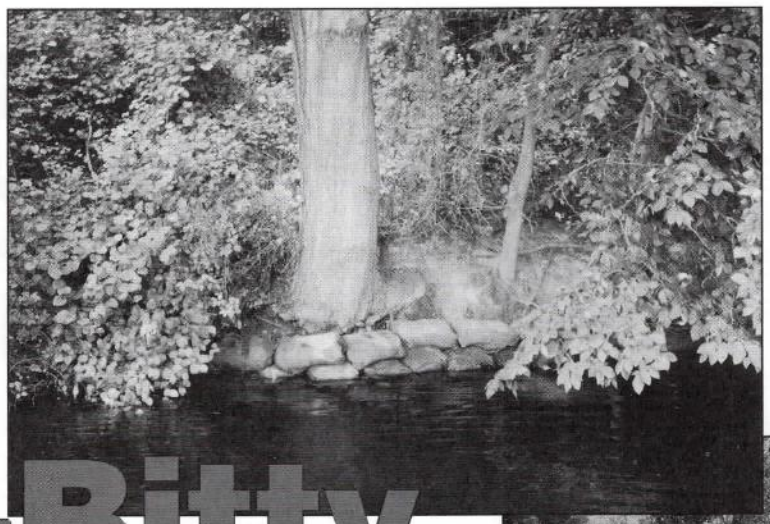
In the case of the Holmes Run Watershed, the WID Trustees approved, the WID staff went to work, cooperating agencies agreed to participate, information was exchanged and gradually the watershed's stormwater design deficiencies began to be modernized. Here are some events WID experienced along the way:

- **Regulators to retard flows from high school roofs and parking lots.** **Cooperator: Fairfax County School Board**
- **Check dams** to provide temporary stormwater detention required a Corps of Engineers permit. Soon, the Corps developed a streamlined permit application process and designated *Nationwide 18* as the institutional procedure.
  Cooperator: U.S. Army Corps of Engineers
- **Street sweeping** to remove sediment and debris before it washed into streams and the lake needed a nearby disposal area. The *Virginia Department of Transportation* volunteered permission to off-load at a VDOT maintenance facility instead of a long trip to the landfill.
  Cooperator: Virginia Department of Transportation
- **Parkland access** needed to construct check dams and stabilize stream banks to control storm flows from JEB Stuart High School. Interagency meetings and plan submission result in project approval.
  Cooperator: Fairfax County Park Authority
- **Private property access** needed to stabilize Beach 2 stream's eroding banks. Meetings with Lake Barcroft Association result in agreement and $4,640 contribution.
  Cooperator: Lake Barcroft Association
- **School group access** needed to develop a stormwater detention facility at the Mount Daniel School. Meetings with City officials resulted in agreement plus contribution of stormwater detention tanks and playground restoration.
  Cooperator: City of Falls Church
- **Streambank access** needed to stabilize banks of Tripps Run just above Lake Barcroft. Property owner and WID meet and agree on project design with property owner contributing $3,500. **Cooperator: Private Property Owner**

Basically, however, watershed retrofit is important and demanding enough to require a manager, staff, contractors, equipment and administrative support. How much effort is expended may be proportional to the amount of continuing stormwater damage to individuals and the community.

Watershed retrofit programs are very different and employ novel ideas.

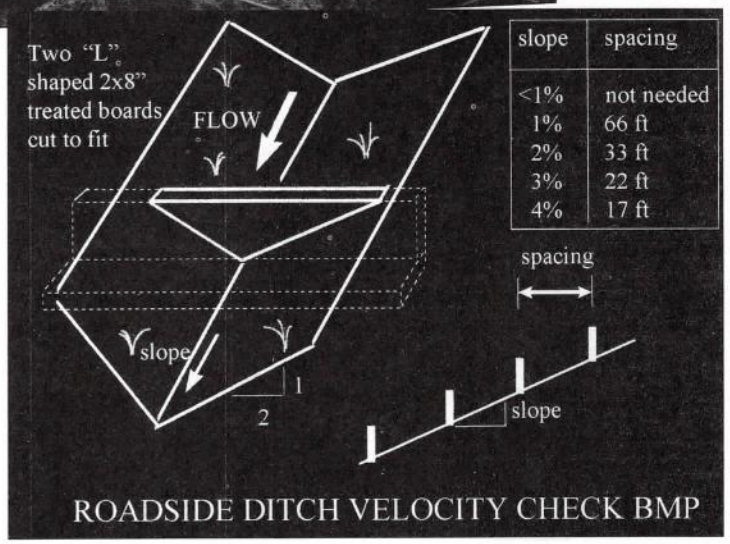
A WID Bulletin



Itty-Bitty BMP's

A few lesser Best Management Practices include:

- **Undercut Bank Erosion Control** can be achieved by putting dry premix 2500 PSI concrete into tied-closed burlap bags which are tucked firmly into lakeside or streamside cavities. They quickly harden into uniquely shaped concrete fillings which prevent further erosion.
- **Sport Fish Habitat** can be provided by dumping weighted surplus Christmas Trees into a lake at an appropriate depth. Instead of laboriously netting or tying the spreading limbs, pre-negotiate with Christmas Tree vendors to donate season-end unpacked surplus trees.
- **Buffer Strips**, consisting of a variety of ground cover, shrubs and trees, are an important agricultural BMP to control tilled field erosion and pollution runoff. In an urban single family home streamside or lakeside setting, the strip can be narrower but will filter out nutrient and pesticide runoff.
- **Roadside Mini-Check Dams** can fit into narrow roadside ditches. On steep slopes, they reduce runoff velocity to minimize erosion. They can be made of short 2" x 8" boards.



ROADSIDE DITCH VELOCITY CHECK BMP

These inexpensive BMP's solve special problems and can contribute to a watershed retrofit.

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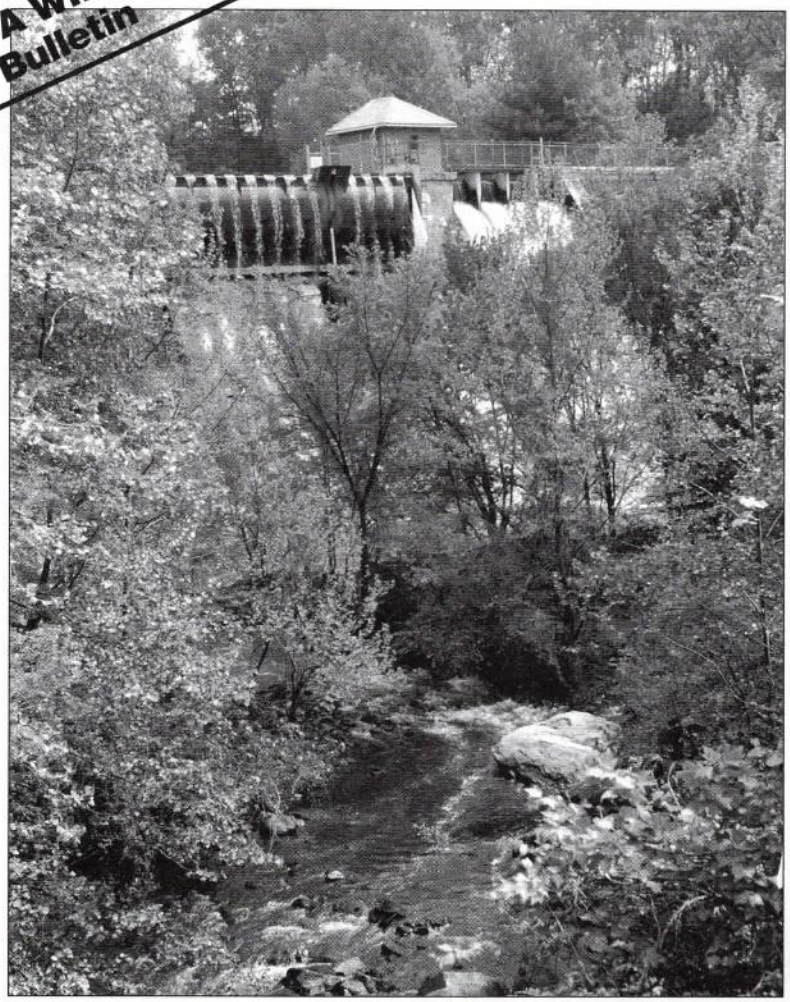


Lake Barcroft WID

When Hurricane Agnes washed out an earthen section of the Barcroft Dam in 1972, the Lake Barcroft community was a giant mud flat . . . but no lake. It was then that the **Lake Barcroft Watershed Improvement District** was created. A **WID** is a local taxing district authorized for conservation purposes in the Virginia Code. Its immediate purpose was to authorize a municipal bond issue of $2,000,000 to restore the dam, install a new bascule gate to serve as a dam spillway and dredge sediment from the bed of the lake. Now, 26 years later, the debt service on that bond issue is near termination and the Barcroft WID has become a familiar lake management fixture to residents of the Lake Barcroft community.

WID's tasks include various lake management and environmental improvement activities which would not be performed for a private lake by the county, state and federal governments. Most expensive is lake dredging which is budgeted by WID at an average amount of $100,000 a year. Next most expensive is the WID staff which performs wide-ranging duties including removal of floating debris, erosion prevention, 319 grant programs, gypsy moth control and wildlife management.

EPA's *319 Grant* tasks the WID with identifying and implementing **B**est **M**anagement **P**ractices appropriate for use by older urban communities elsewhere in America in accordance with nonpoint pollution control provisions of Section 319 of the federal Clean Water Act. This function which has the approval of EPA and the Virginia Department of Conservation and Recreation authorizes WID to develop projects in the entire upstream 14.5 square mile watershed in association with various cooperating landowners and agencies. The ultimate concept is to retrofit the Lake Barcroft watershed to eliminate stormwater system design deficiencies to reduce flooding and improve water quality and thereby reduce the cost of lake management.

The WID Trustees recommend the use of WID's *No-Phos Fertilizer* to minimize lawn care phosphorus runoff to augment WID's aeration system in the continuing effort to control algae. You can obtain screened topsoil for a small delivery charge. To obtain advice or help from the WID, call 820-1300.

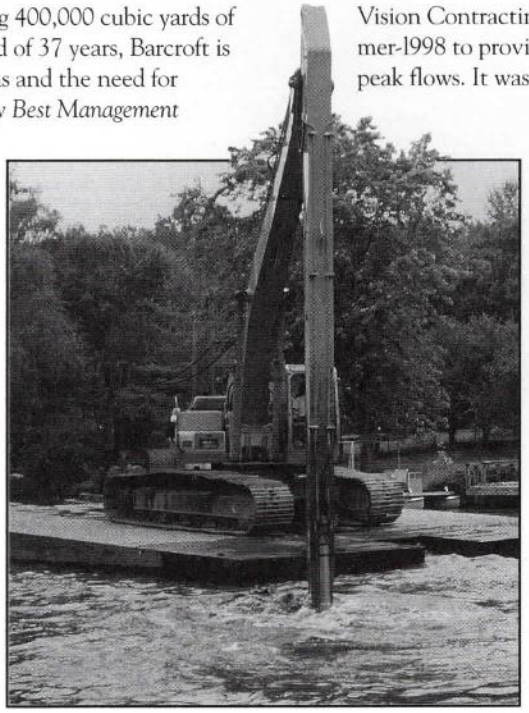
Lake Barcroft Watershed Improvement District • 3650 Boat Dock Drive, Falls Church, VA 22041 • 820-1300
WID Environmental Engineer • GKY & Associates, Inc., Springfield, VA

A Virginia WID is a local taxing district.
There is only one WID in Virginia.

A WID Bulletin

Barcroft's Environmental Initiatives

Having spent over $2,000,000 dredging 400,000 cubic yards of sediment from the Lake over a period of 37 years, Barcroft is acutely aware of soil erosion problems and the need for greater vigilance by government to create new *Best Management Practices* to minimize such costs and improve water quality.



Lake Barcroft residents are fortunate to live in a sophisticated community with an urban lake with five active swimming beaches. WID's current water quality lab is the Occoquan Monitoring Lab which is operated by Virginia Tech. Consistently, coliform counts are well below state and federal standards. No sewage treatment plant effluents or significant industrial wastes are discharged in Barcroft's upstream watershed. As a sensible health precaution, Barcroft residents simply don't swim during or immediately after big rain storms. Despite a few contemporary pet peeves such as geese, noise, cut-through traffic and occasional juvenile vandalism, the Barcroft community is more attractive than the average suburb. Aesthetic features include grass swales instead of curb and gutter, winding and sometimes steep roadways, a privately owned Barcroft Forest and LBA's Architectural Review Committee vigilance to prevent weird design aberrations.

However, there is one Fairfax County proposal which Barcroft voters could support which would greatly benefit the community. It is a ***Utility Fee*** system to provide funds-certain for the Fairfax County stormwater management effort. Recently, Fairfax County has been spending about a million dollars a year on stormwater system maintenance. Considering that WID is spending $750,000 in one very small watershed (an area less than 4% of the County), the Fairfax County expenditure is clearly inadequate. The proposed system would provide between $18,000,000 and $25,000,000 a year for important erosion control and flood prevention facilities. Interestingly, the Utility Fee (which is comparable to a water bill) would be based on the amount of impermeable area in each home owner's property with all Barcroft properties falling in the same category and being given a reasonable credit for WID's stormwater control program. This would cost each homeowner about the same as he is now paying in taxes for money which ends up being diverted into causes more popular than storm sewers. The extra funds will come from impermeable areas owned by commercial, industrial and multifamily residences. Other communities nationwide are handicapped by the same problem of inadequate resources for stormwater management and are adopting the Utility Fee system. Already, 320 communities have adopted it, and more are in the process.

WID's EPA 319 grant program is now in its fourth year and has an annual aggregate budget of $250,000. Its purpose is to identify and implement BMP's, Best Management Practices, which can be useful in retrofitting older urban watersheds. WID's outsource contractor Vision Contracting Services completed *check dam* #8 in summer-1998 to provide temporary surface detention of stormwater peak flows. It was built of seasoned oak to eliminate the arsenic and heavy metals in pressure treated timbers.

WID has devised what it calls **flow regulators** which provide sub-surface stormwater detention which no one will ever notice and which do not require expensive Army Corps of Engineers permits. Several of these have been built and are successfully operating.

In 1998, WID completed comprehensive subwatershed construction activities in one valley which drains directly into the Lake. Here six property owners cooperated with the WID. Another subwatershed has been comprehensively treated with several BMP's which have eliminated flooding and virtually done away with erosion which had occurred for several decades. This involved cooperation of the Fairfax County Park Authority, the Fairfax County School System and the Virginia Department of Transportation.

Other WID propaganda:

- Don't fertilize your lawn. But, if you must, use the ***WID No-Phos fertilizer*** which costs only $30 delivered for a year's supply instead of some phosphorus rich algae-producing commercial fertilizer from your neighborhood store.
- Use a ***pooper-scooper.*** Or, give away your dog.

Future improvements are being installed in the Barcroft watershed.

- The Sleepy Hollow Bath and Racquet Club, Inc. is cooperating with the WID in authorizing the initiation of a program which, if applied in several locations, can greatly reduce Barcroft's floating debris problem.
- Another potential detention project is being designed which would reduce Tripps Run's critical Causeway flooding by about 5%.
- A relatively simple and inexpensive BMP is being submitted for approval which will provide 600,000 cubic feet of stormwater detention to reduce Holmes Run's tendency to flood.
- The new generation Envirowhirl dry street sweeper is making its first East Coast appearance on Barcroft watershed streets.

WID feels that the general outlook is good because of the gradually emerging interagency cooperation, of such agencies as the *Fairfax County Department of Public Works* the *Fairfax County Park Authority* and the *Virginia Department of Transportation*; continuing homeowner cooperation with the WID staff who are responsible for stormwater management, dredging, debris removal and operation of the dam; and the active support of the *Virginia Department of Conservation and Recreation* and the *United States Environmental Protection Agency*.

A WID Bulletin

Cost

LBWID EPA 319 GRANT PROJECT REPORT FORM						DATE may 98	
SITE		**TASKS**		**STAFF**	**TIME**	**HR RATE**	**TOTAL**
CD - B2		design		Ken	18	$25.95	$467.10
CD - B5		construction		Paul	24	$18.04	$432.96
CD - Omara		maintenance		Finley	0	$18.63	$0.00
FR JEB		repair		Sam	0	$19.95	$0.00
FR stoney 1-2		inspection	X				
FR - Bailey				**Totals**	**42**		**$900.06**
misc EC							
CD- Timber	X						
VEHICLES				**MLS/HRS**	**RATE**	**TOTAL COST**	
truck				20	$0.31	$6.20	
JCB				0	$15.00	$0.00	
					Total	**$6.20**	
Contractor Labor						**TOTALS**	
49 hours @ 35.00 per hour						**$1,716.00**	
MATERIALS						**TOTALS**	
4 10' #8 rebar		10.16 ea				$40.64	
concrete & misc		$121.59 $ $40.63				$162.22	
repair landscape		tree				$100.00	
Rentals						**TOTALS**	
air compressor		2 days				**$277.34**	
				GRAND TOTAL		**$3,489.71**	

The various elements of a watershed retrofit project can range from hundreds to millions. The amount of money available depends largely on political considerations. Systematic analysis is better than wild guesswork.

The above *Project Report* reveals that it cost $3,489.71 to construct a 30 foot long check dam to control erosion and provide temporary stormwater detention in a small subwatershed. This was built in a high cost suburban area employing a combination of staff services and outsource contract services. The staff cost rates included retirement and other fringe benefits. The contractor worked on an hourly basis but could have been retained on a firm fixed price bid basis. These costs did not include engineering design or possible subsequent maintenance and repair. Equipment usage was charged at typical rates.

Engineers are capable of estimating project costs in advance basing their calculations on established engineering data plus personal local experience. A total watershed retrofit project might consist of numerous elements. The individual elements may have differentiated cost effectiveness and/or anticipated contemporary damage reduction. Thus, the project may be quick and comprehensive or protracted into a long-range improvement project.

Coordination, permitting and public relations associated with implementation make rapid deployment difficult.

The ultimate BMP is the analysis of proposed improvement project costs vs. contemporary stormwater damage rates.

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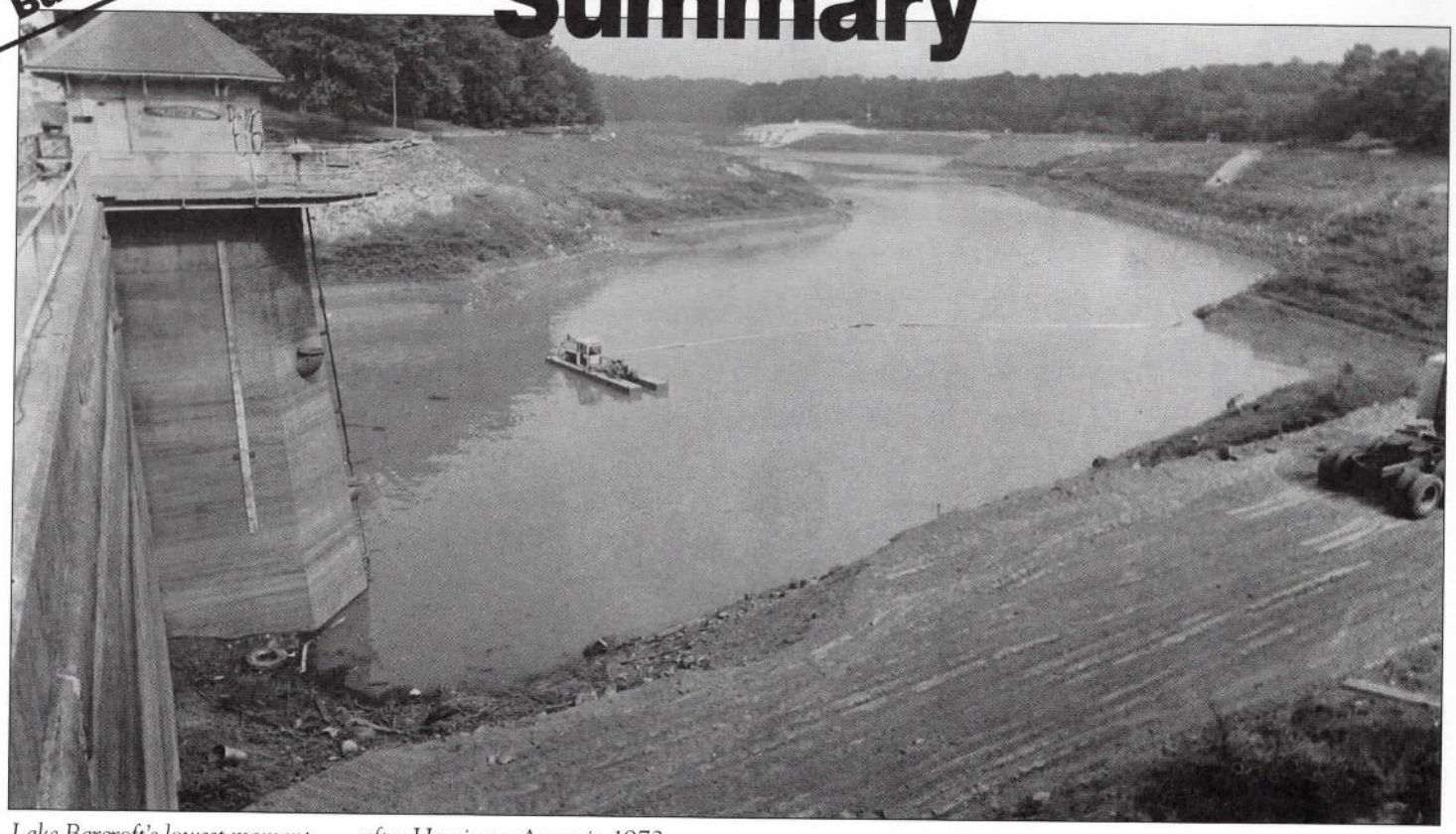
Summary



Lake Barcroft's lowest moment . . . after Hurricane Agnes in 1972.

This booklet is intended for older established highly impervious urban communities suffering from design deficiencies which cause serious environmental problems such as flooding, erosion, sedimentation, debris and nutrient problems, along with a wide variety of special nuisances. The ultimate solution would be a comprehensive watershed retrofit which would introduce balance and greater equilibrium among the forces and factors affecting the watershed and the quality of the water within it. However, such a major retrofit is likely to be expensive, protracted or even susceptible to opposition from individuals or organizations for real or hypothetical reasons. Cities that are almost totally paved constitute a more difficult and expensive problem. Semi-urban communities often may still have sufficient undeveloped (in-fill) space to permit more traditional BMP's along with growth controls to stimulate modern stormwater design features.

This continuing 319 grant project has been a demonstration effort as differentiated from a research program. Instead of devising an abstract watershed *plan*, WID has devoted its planning efforts to identifying and developing hands-on solutions that promise to be effective and practical. Our activities have injected us into a few procedural disputes as WID attempted to concentrate on implementing rather than performing a theoretical study. This booklet includes numerous aspects which have not been funded by federal or state grant funds and the aggregate program retains a spirited independence. The booklet was written by WID Operations Director Stuart Finley. He and the WID Trustees invite comments, suggestions and interagency discussion.

The WID experience in the Holmes Run Subwatershed in Northern Virginia benefited from ideas contributed by its regular employees, cooperating contractors, its consulting engineering firm of GKY and Associates, Inc. and various environmental and engineering friends. WID appreciates the support of its taxpaying public and the contributions of the *United States Environmental Protection Agency* and the *Virginia Department of Conservation and Recreation.*

For further information, call WID at (703) 820-7700, its consulting engineer GKY & Associates at (703) 642-5080 or write to WID, 3428 Mansfield Road, Falls Church, Virginia 22041.

Key Word Reference

Reference Materials

Chesapeake Bay Local Assistance Department, *Local Assistance Manual*, 1989.

Department of Conservation and Recreation, *Virginia Erosion and Sediment Control Field Manual*, Second Edition, 1995.

Department of Conservation and Recreation, *Virginia Erosion and Sediment Control Handbook*, Third Edition, 1992.

Stormwater Management Handbook, available for distribution Fall 1998.

State Agency Contacts

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Richmond, Virginia 23219
(804) 225-3440

WID Lake Barcroft Watershed Improvement District

3428 Mansfield Road • Falls Church, Virginia 22041
(703) 820-7700

Lake Barcroft in the early 1950's was a fledgling community with a few homes, some significant problems and a promising future. Originally, this 700 acre tract of land surrounded the Barcroft Reservoir which was owned by the Alexandria Water Company as a reserve supply for dry summer months. In 1950, it was purchased by Col. Joseph Barger who subdivided it into approximately 1,000 homesites, built roads, installed sanitary sewers and followed the stormwater dictum of the times which allowed roadside ditches and required a few concrete ditches.

In the ensuing nearly half century, the Lake Barcroft community has survived its shaky beginnings and grown into a mature major subdivision with assessed valuation of a third of a billion dollars. Vacant lots can be counted on the fingers of one hand. The burgeoning swamps at the Holmes Run and Tripps Run inlets to the lake have been dredged and the sediment removal program has continued annually removing about 400,000 cubic yards of sediment at a cost of over $2,000,000.

The Lake Barcroft Watershed Improvement District was authorized by referendum in 1973. Since then WID has progressed from an emergency restoration role to a continuing operation and maintenance function to a watershed improvement agency. Now in its fourth year of an EPA 319 grant, WID is charged with the responsibility to identify and implement Best Management Practices appropriate for application in established urban communities.