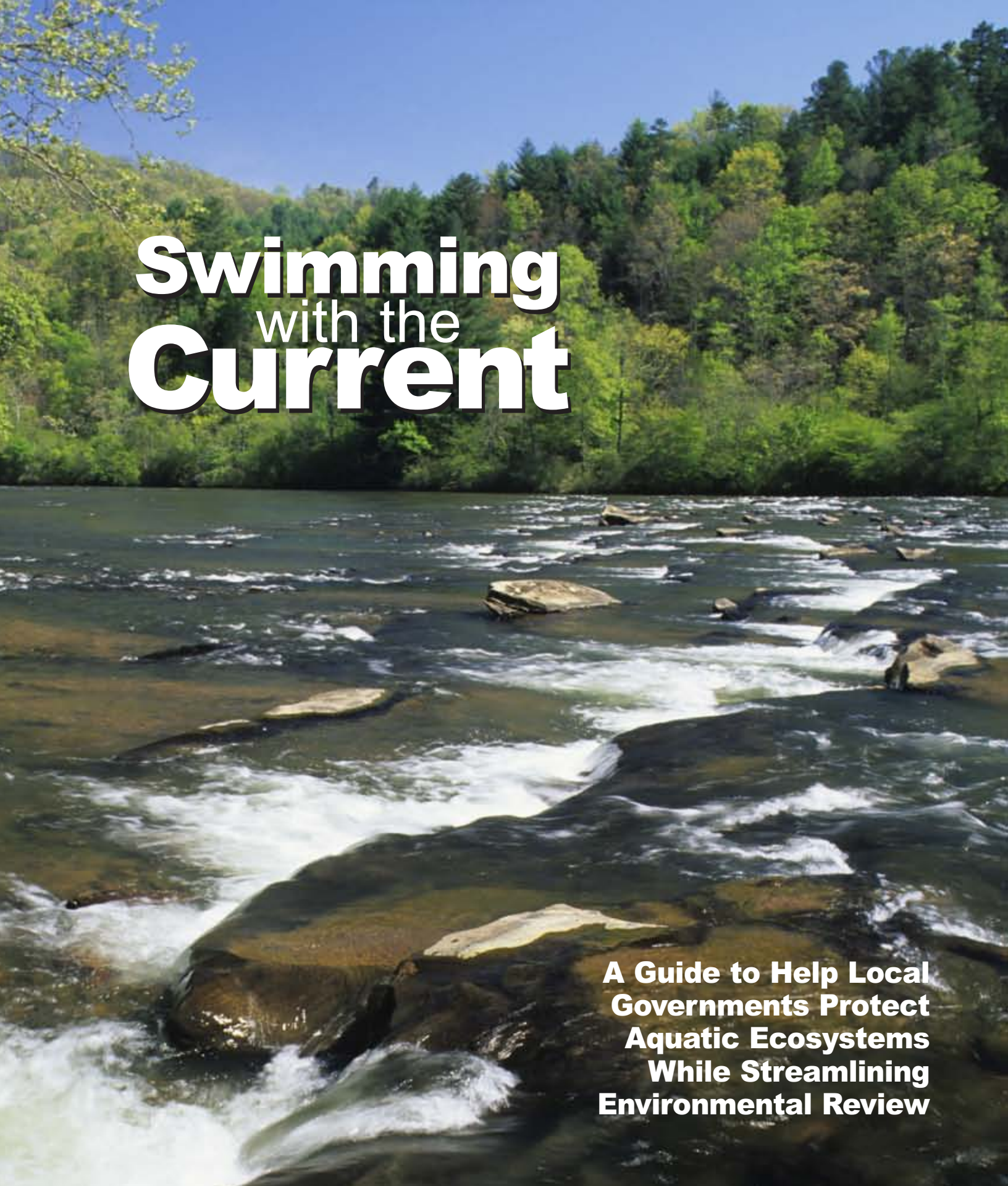

Swimming with the Current

A Guide to Help Local Governments Protect Aquatic Ecosystems While Streamlining Environmental Review

A Heritage Worth Protecting

NORTH CAROLINA IS BLESSED WITH MORE THAN 40,000 MILES OF RIVERS AND STREAMS. These rich aquatic ecosystems provide habitat for a remarkable diversity of species, and they furnish humans with water for drinking and for recreation.

These ecosystems are so important that citizens and governments have consistently expressed a determination to protect them. State and federal laws safeguard aquatic habitats and species and the critical roles they play in maintaining clean water and public health.

Unfortunately, there is sometimes a perceived conflict between protecting aquatic ecosystems and meeting the infrastructure needs of a community. With proper planning and foresight, this need not be so.

"Swimming with the Current" is a guide to help elected officials and county and municipal staff understand and protect the aquatic resources that society values. It is also meant to provide resources to ease the movement of a project through the environmental review process. State and federal regulators say that there's a right way to pursue an infrastructure project and there's a wrong way.

KEN TAYLOR / WILDLIFE IMAGES

The right way is to plan early, coordinate with state and federal agencies and incorporate measures to protect sensitive resources from harmful project impacts. This is how you "swim with the current" and watch your project follow its intended timeline.

The wrong way is to swim against the current— wait for the environmental review process to uncover environmental concerns or resist the actions requested to mitigate the effects of your project. Taking this approach, a local government will likely encounter project delays.

This booklet shows how local governments can protect their aquatic ecosystems while **ensuring that projects are reviewed and approved in a timely manner.** Healthy aquatic ecosystems produce healthy water and healthy citizens, and they are essential for the other species with whom we share the earth.

Contents

ACKNOWLEDGMENTS This booklet is a cooperative production of the N.C. Department of Environment and Natural Resources, N.C. Department of Transportation, N.C. Wildlife Resources Commission, U.S. Fish and Wildlife Service, N.C. Natural Heritage Program and the N.C. Office of Environmental Education. Special thanks are due to Melba McGee, environmental review coordinator of the Department of Environment and Natural Resources, for her leadership in initiating and coordinating this project.

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Additional copies of "Swimming with the Current" are available by calling the Habitat Conservation Program of the N.C. Wildlife Resources Commission, 919-707-0224.

the aquatic world

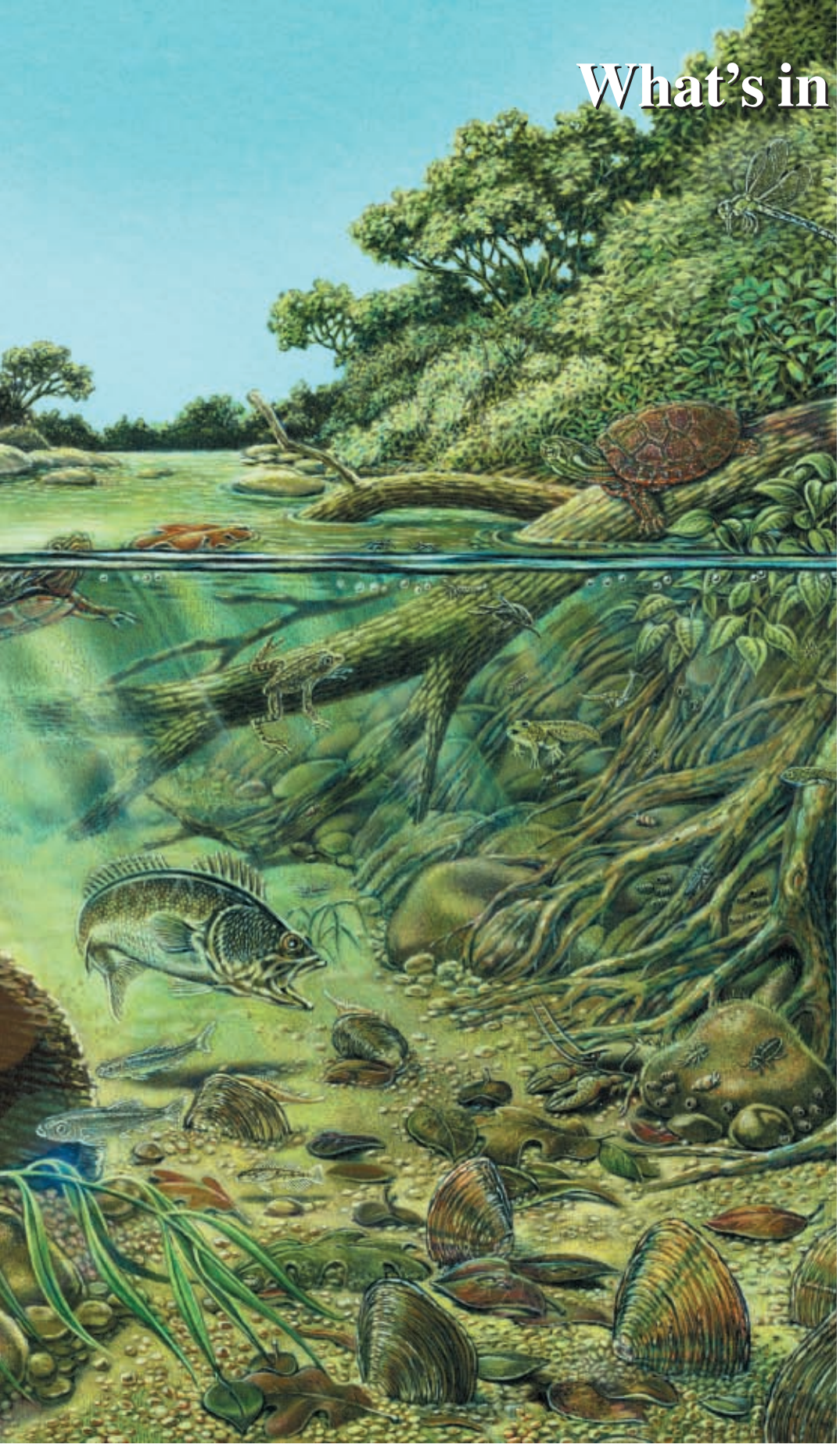


ILLUSTRATION BY JIM BROWN

What's in the River?

Aquatic ecosystems are rich, diverse and fragile.

Few of us appreciate what aquatic ecosystems are and what they do. They are the rivers and streams that meander across the landscape. They are the wetlands that puddle the land. They include the floodplains and even the forests that buffer the streams. All of these landforms—wetlands, floodplains, riverine forests and the river itself—are interconnected parts of aquatic ecosystems. Many of us come into intimate contact with these ecosystems when we boat, swim or fish, yet few of us know much about them.

Aquatic ecosystems are truly hidden worlds.

Like any other ecosystem, aquatic ecosystems are composed of an astonishing diversity of life forms. Familiar animals such as fish are part of a vast and interconnected web of life that includes freshwater mussels, crayfish, snails, turtles, salamanders and the aquatic larvae of mayflies, caddisflies, stoneflies and other insects. Aquatic ecosystems also support birds such as kingfishers, herons, ospreys and waterfowl as well as terrestrial species such as raccoons, beavers, muskrats, minks and otters. Some of these creatures eat plants, others are carnivores, and still others will eat just about anything. All ultimately depend on the quality of the water.

Astonishing Mussels

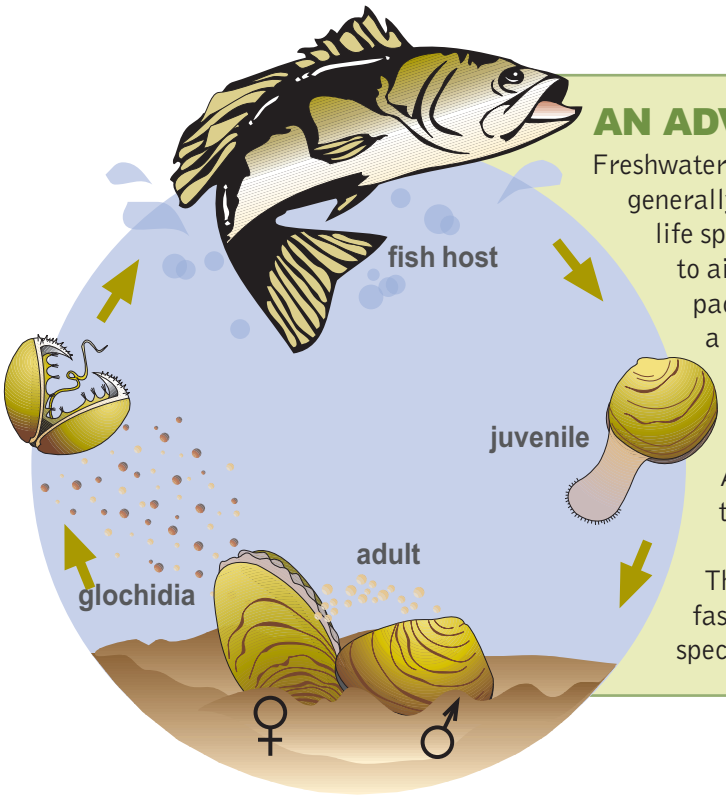
A river that cannot support mussels cannot support us.

North America has the richest diversity of freshwater mussels in the world; this diversity peaks in our southeastern rivers and streams. North Carolina has about 60 mussel species but half of these are considered rare and in need of protection. Like the canary in the coal mine, mussels are important indicators of a river's environmental health. An absence of mussels may indicate that pollution or something else is affecting the river. Mussels are also important links in the food chain, feeding many different wildlife species including muskrats, otters, raccoons and waterfowl.

A CRAYFISH IMPOSTER

Is it a crayfish or is it a mussel? Besides an eyespot on its mantle that resembles a crayfish and innards that look like crayfish legs and antennae, the anchored rainbow mussel can actually rock back and forth. It mimics the movement of a crayfish, right down to the crustacean's tail-tucking habit. Like all freshwater mussels, the rainbow depends on fish to inadvertently pick up its young and eventually transport them to a permanent home. Mussels produce gelatinous "packages" full of microscopic larvae called glochidia. By mimicking species that fish prey upon, mussels attract "host" fish. The mussel larvae attach to the fish and extract nutrients until they fall off, settle to the bottom and grow shells.

BILL ROSTON



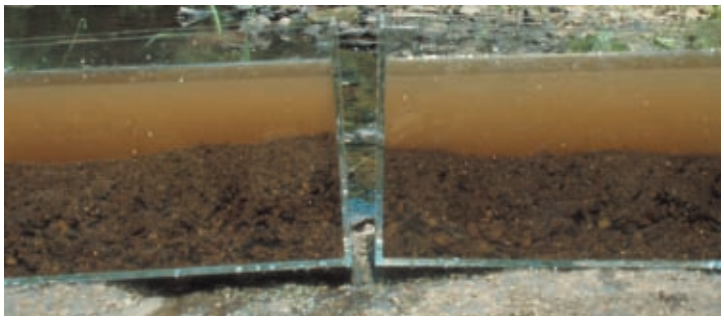
AN ADVENTUROUS LIFE!

Freshwater mussels have a remarkable life cycle. Because they generally move only short distances in the stream bed during a life span that may reach more than a century, they rely on fish to aid them in distributing their young. Some female mussels package their larvae to look like something good to eat—a minnow, for example. As a fish approaches, hundreds of larvae, called "glochidia," attach themselves to the mouth or gills of fish in a parasitic relationship. Some mussels require a specific fish species to act as a host. After a few weeks, the larvae fall to the stream bottom to begin the juvenile stage of their life cycle.

The life cycle of freshwater mussels demonstrates the fascinating and virtually unnoticed connections among species in aquatic ecosystems.

MUSSELS HELP FILTER THE RIVER

Freshwater mussels help purify the water in our rivers and streams by filtering out pollutants and sediment. Mussels feed by pulling water into their gills through one aperture and expelling it through another. Mussels filter out suspended particles, eating algae and organic material, and packaging impurities and sediment as waste. Their filtering action helps to maintain clear streams as the accompanying photographs show. However, increases in fine sediment can destroy the filtering capacity of mussels.



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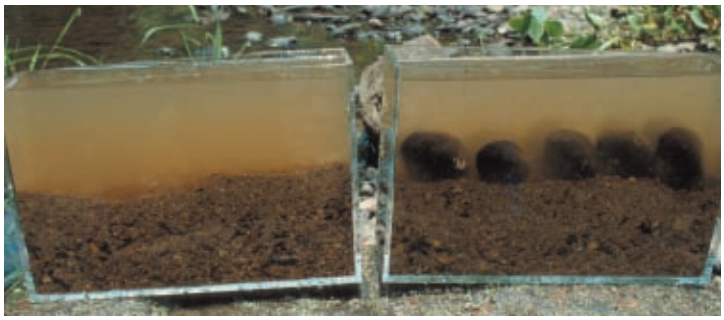
Side-by-side tanks are filled with muddy stream water. Mussels placed in the tank on the right are invisible.



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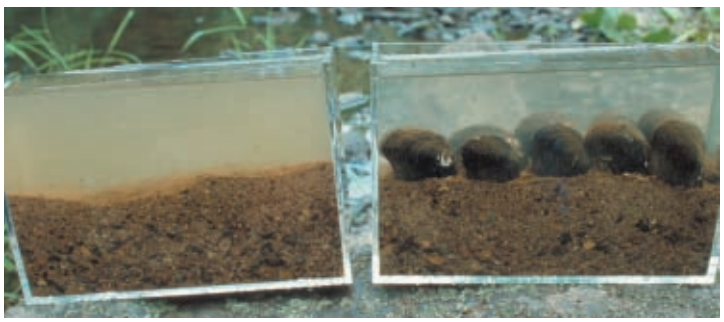
In five minutes, the mussels have become visible, while the water in the tank on the left is still murky.



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In 15 minutes, the mussels have substantially cleared the water.

0:50

In 50 minutes, the water in the mussels' tank is completely clear.

Why Aquatic Ecosystems Fail

Sediment is the culprit.

Aquatic ecosystems are failing today. Freshwater mussels are among the most endangered animals on earth. More than 30 of North Carolina's mussel species are listed as state or federally endangered, threatened or of special concern. Nearly one quarter of the state's 200 freshwater fish species are in similar straits and many crayfish species are in trouble as well.

Among the most significant reasons for this decline is the rapid change to the natural landscape that has occurred in recent times. Changes to North Carolina's natural landscape have occurred for thousands of years and they continue today. The scale of today's changes, however, is much greater than in the past. The state's population has grown by nearly 2.5 million people in the last 20 years and in the next 20 years it is predicted to grow by another 2 to 3 million. All of these people need houses, places to shop and safe roadways, but development removes vegetation and creates more hardened surfaces such as roads and parking lots. These in turn have profound effects on aquatic ecosystems:

- Construction causes erosion and increases the amount of sediment in rivers and streams. Sediment is the number one pollutant in the state and is a serious problem for aquatic species such as fish and mussels. Increases in fine sediments destroy fish-spawning areas and can overwhelm the filtering capacity of mussels, thus smothering them.
- Increased stormwater runoff can scour river bottoms and destroy the habitats of mussels, crayfish and other aquatic species.
- When riparian buffers are cleared, the loss of shade results in elevated water temperatures. Elevated water temperatures can affect aquatic species in various ways resulting in changes in species' distributions and aquatic community composition. A naturally vegetated riparian area acts as a buffer from the impacts of upland development, roadways, agriculture and forestry operations.

U.S. FISH AND WILDLIFE SERVICE

LAWRENCE S. EARLEY

Land disturbance from development (below) can accelerate the amount of sediment entering streams unless protections are installed. Muddy water enters streams from stormwater drains (left) and stormwater running off from streets, parking lots and other impervious surfaces scours stream banks (below left), creating even more sediment.

KEN TAYLOR / WILDLIFE IMAGES

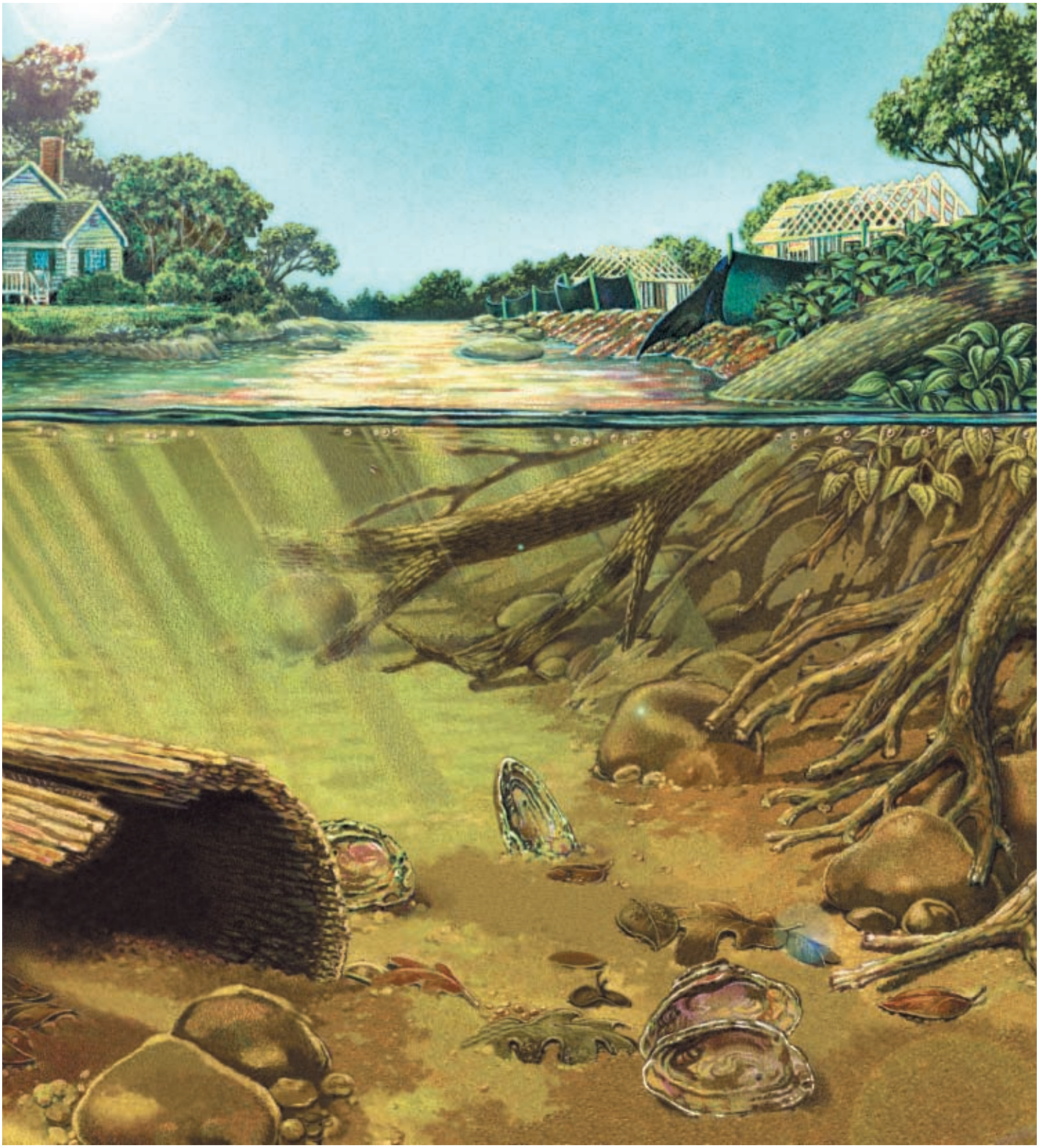


ILLUSTRATION BY JIM BROWN

UNFIT FOR LIFE: Rivers and streams can quickly lose their remarkable diversity when forest buffers are removed and hardened or paved surfaces in the watershed are increased. What was once a rich aquatic habitat suitable for many species is now a dead zone.

Why Environmental Reviews Take Time

Agency reviews assess potential project impacts.

Congress passed the National Environmental Policy Act (NEPA) in 1970. One goal of the act was to protect sensitive species such as mussels from the negative effects of development. North Carolina followed in 1971 with its own environmental protection law, the State Environmental Policy Act (SEPA). The environmental review processes established by NEPA and SEPA are tools that help decision makers understand the environmental impacts of a proposed action. Implementation of SEPA and NEPA is carried out by describing the project, each alternative and the environmental impacts in a public document. Based on the significance of the project proposed, either an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) is prepared.

Preparing the Environmental Document

- Specific guidelines for preparing an environmental document have been established and can be found at http://www.enr.state.nc.us/ then click on DENR Laws & Regulations under "Rules, Policies & Regulations."
- The Department of Environment and Natural Resources' 1-STOP permit assistance program helps customers determine the environmental permits they need for a particular project as well as permit decision timelines. 1-STOP permit assistance can be found at http://www.envhelp.org/html/permit_coordination.html.
- The State Environmental Policy Act is administered by the State Clearinghouse in the Department of Administration, see http://www.doa.state.nc.us/clearing/clearing.htm.

Local governments are responsible for determining whether a SEPA or NEPA document is required for their project. Guidance on when a SEPA document is required is provided at http://www.envhelp.org/html/state_environmental_policy_act.html. Additional information can also be obtained by checking with the appropriate state permitting agency. The appropriate federal permitting agency should be notified regarding NEPA.

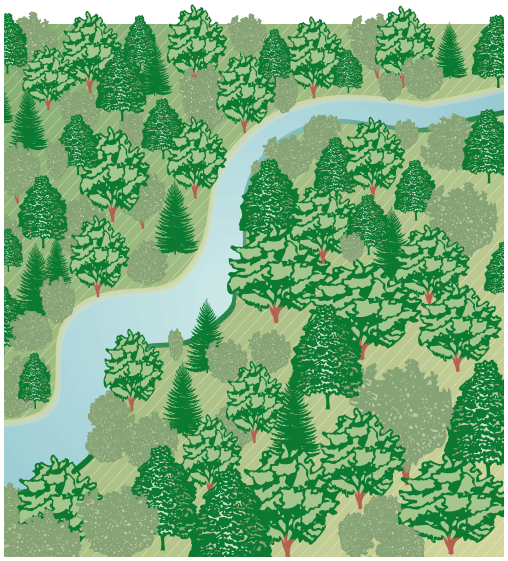
DIRECT, SECONDARY AND CUMULATIVE IMPACTS

A roadway is proposed to cross this forested stream. The stream ecosystem has intact riparian buffers that maintain good water quality and protect aquatic species.

1. The new road and bridge construction creates sediment flows into the stream. This is a direct impact on the stream.

2. Later, new homes are built. Curb and gutter systems draining to storm sewers channel water laden with oil, chemicals and fertilizers directly into the stream. These are secondary impacts on the stream.

3. Development increases in the watershed. More impervious surface is added that further increases the amount of water that flows off the land after it rains. These are reasonably foreseeable activities known as cumulative impacts.



The environmental reviews required by these state and federal laws look at two questions in particular:

1 Has an adequate inventory of the natural, historic or cultural resources that may be affected by the project been completed?

2 Have the effects—direct, indirect (or secondary) and cumulative—of the project on the natural resources been taken into account, have practical project alternatives been proposed and has mitigation for impacts been identified?

Depending on the project type, several state and federal agencies will review the project.

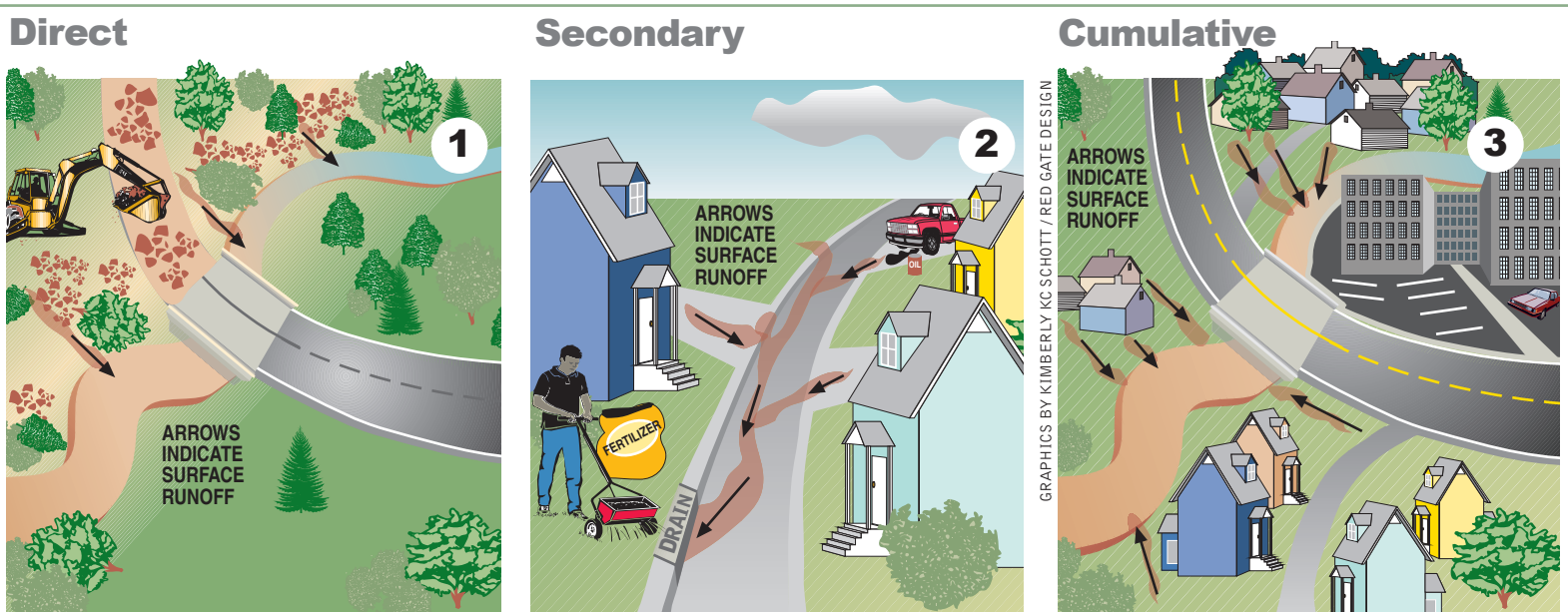
HOW LONG WILL IT TAKE?

How long does an environmental review take? The answer is difficult to predict and can depend on the project's complexity and whether revisions or clarifications to the environmental document (an EA or EIS) are necessary. Many officials set unrealistic schedules for the completion of their projects and become frustrated over what may be considered a "normal" time frame. This frustration often intensifies when the environmental review process requires revisions to the environmental document. Some typical reasons why an EA or EIS are returned for clarification or revision include:

- Inaccurate project description.
- Narrowly focused purpose and need section.
- Inadequate description of the loss, degradation or fragmentation of wildlife habitat that will occur as a result of the project.
- Inadequate evaluation of all reasonable alternatives that address the project's needs and purpose.
- Inadequate mitigation measures and best-management practices to avoid, minimize or compensate for impacts to habitat quality.
- Inaccurate project boundary that does not include the area for all potential impacts.

SECONDARY AND CUMULATIVE IMPACTS

Inadequate documentation of secondary and cumulative impacts (SCI), especially on listed species such as freshwater mussels, may prolong the project's review. In the past, reviewing agencies concentrated on direct impacts of projects, such as a roadway or bridge replacement. Secondary impacts, or indirect impacts, occur later as a result of the original direct impact. Secondary impacts may also include effects on air, water quality and natural systems that result from land-use changes and an increase in population density. Cumulative impacts result from the incremental effects of the original direct impact combined with other past, present and reasonably foreseeable future development projects in the area.



Cumulative impacts may appear to be individually minor but are collectively significant and must be documented with both direct and secondary impacts of a proposed project.

Today, secondary and cumulative impacts are getting more attention from agency reviewers because their effects can last longer and cause more damage than direct impacts. A bridge spanning a stream may seem like a single direct impact, but the secondary and cumulative impacts of the bridge may be much more dramatic over time. If the bridge improves access to undeveloped lands, it may lead to more development, driveways and parking lots, and thus stormwater runoff. A water or sewer line extension may similarly lead to additional development and stormwater runoff, thereby degrading water quality and threatening aquatic species. Thus, even though a construction project's "footprint" may be small, its secondary and cumulative impacts can affect aquatic species for miles downstream and for years to come.

SCI GUIDANCE FOR LOCAL GOVERNMENTS

The N.C. Department of Environment and Natural Resources (DENR) is developing specific guidelines for evaluating secondary and cumulative impacts (SCI). The purpose of these guidelines is to define and identify methodologies for assessing SCIs. The SCI guidance should be used when preparing SEPA documents for the DENR. See http://www.enr.state.nc.us/ then click on DENR Laws & Regulations under "Rules, Policies & Regulations."

The N.C. Department of Transportation (DOT) has a document titled "Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina." See http://www.ncdot.org/doh/preconstruct/pe/ ICI_Guidance.html.

The N.C. Wildlife Resources Commission's "Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality" can be found at http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7c3_impacts.pdf.

ASSESSING IMPACTS ON LISTED SPECIES

The presence of listed species in the project area also adds to the complexity of the environmental review and may lengthen its timeline. In aquatic habitats, listed species may include freshwater mussels, fish or crayfish. Because mussels generally move only short distances, the anticipated presence of rare mussels may require the following:

A mussel survey. A mussel survey is performed by a biologist who physically inventories the mussel populations over a section of stream. The process takes time and patience. Few biologists are licensed in mussel identification, and surveys must be conducted under optimal conditions —low, clear water which is most often encountered during the summer and early fall. Recent rain storms and stream turbidity may delay a mussel survey. To find a list of biologists authorized by the N.C. Wildlife Resources Commission, call the Habitat Conservation Program, 919-707-0224.

Whenever a federally listed species is present, a thorough assessment of direct, secondary and cumulative impacts will help in the preparation of a biological assessment. A biological assessment is an important component of the U.S. Fish and Wildlife Service's "section 7 consultation," a review process required by the Endangered Species Act when a project that is funded or permitted by the federal government affects federally threatened or endangered species. A biological assessment summarizes the impacts of a project on an endangered or threatened species and details the steps that will be taken to minimize or eliminate those impacts.

Additional conservation measures. The U.S. Fish and Wildlife Service may find that measures are needed to address the secondary and cumulative impacts of new infrastructure projects. Some state and federal water-quality programs require riparian buffers or other stormwater controls, but the focus of those programs is on pre-

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BILL LEA

venting water pollution rather than maintaining aquatic habitat. In most cases, the programs apply only in areas around waters requiring special protection (drinking water supplies) or waters suffering from specific water quality problems (coastal waters, nutrient-sensitive waters). Statewide, local governments regularly make planning decisions that affect the health of streams. Using local planning authority to protect streams can directly benefit local governments by facilitating the approval of infrastructure projects needed to support future growth and development.

A project redesign. Department of Transportation (DOT) or other agencies may find that a project has to be redesigned to avoid affecting the rare species. Thus, investing in a project design before surveying for listed species is risky and is not recommended.

Listed species, such as the endangered James spinymussel (bottom) and the Cape Fear Shiner (above), need protection when local governments are involved in construction projects that may affect streams.

BILL LEA

Identify Sensitive Resources and Habitats

Accessible databases can help.

What can local governments do to get their projects completed on time? Local governments can help themselves by planning well ahead of a project. Just about any construction project will require a permit of some kind. If public moneys are used in the project's construction, or if the project involves private use of public or state lands, the project may require the preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). Coordinating with state and federal agencies early in the planning of a project will help to expedite the review process (See Scoping, page 15).

With advanced planning, local governments can hasten the review process by identifying sensitive resources in the planning area and establishing sufficient mitigation measures through land-use planning and zoning.

BILL LEA

river otter

Without knowing where the sensitive species and important natural areas are, a local government will be unable to demonstrate that it is protecting them. Reviewing agencies recommend that communities identify their sensitive resources—areas with listed species or important natural areas—before development projects are planned. That way, projects can be designed to avoid those areas or mitigate for project impacts.

ACCESSIBLE DATABASES

Basic environmental screening can help a local government direct projects away from sensitive areas. With geographic information systems (GIS) capabilities, local planners or town administrators have access to information about the distribution of rare species, wetlands, stream classifications and the like that can help them understand the resources that might be affected by a project. National Wetland Inventory maps are not a good source for presence/absence of wetlands.

Publicly accessible databases and information sources that can help a local government learn about wetlands, the presence of sensitive species and habitats include:

N.C. Center for Geographic Information and Analysis (CGIA) (http://www.cgia.state.nc.us/). The traditional mission of the CGIA has been to build and maintain a statewide database of digital geographic information and to provide geographic information services to a broad list of clients—federal and state agencies, local government and regional organizations, the private sector and academic institutions. All work is performed on a cost recovery basis.

Among the products that CGIA offers is "BasinPro," a two-CD collection of extensive environmental and river basin data (1.0 GB) packaged for local governments as an ArcGIS tool.

NC OneMap (http://www.NCOneMap.com). NC OneMap links computer servers throughout the state to provide free access to federal, state, county and even municipal geographic data on the Internet. Government agencies, utilities, private firms, schools, universities and individual citizens can use an online data inventory to identify which agency manages the data. They can view, search and even download these data to create their own maps of a project site. New data sets will be added over time and data is updated continuously. GIS software is not needed to access and view the data at NCOneMap.com, although manipulating downloaded data will require GIS capabilities.

N.C. Natural Heritage Program (http://www.ncnhp.org). Data about natural areas and rare species compiled by this agency have been used by local governments for designing and implementing ecologically sound development projects. This information has been used in planning pipeline corridors, roads, communication towers and municipal utility projects.

Data may include:

- GIS layers portraying records of endangered, threatened or special concern species; high quality natural communities; and significant natural heritage areas known in a region.
- County lists of rare species and high quality natural communities.

Local governments and consultants can find information about the life history and distribution of mussels in data compiled by biologists who conduct mussel surveys. Rare species and habitats should be identified well before projects are planned.

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Natural Heritage Program information can be found in several inventories and databases. It should also be noted that distributions of rare species are changing all the time.

1. **County-wide natural heritage inventories** (919-715-4195). The Natural Heritage Program conducts county-wide inventories that identify significant natural areas. By 2020 detailed inventories will be completed for all 100 counties. Some information is available for all counties now.
2. **Aquatic inventories.** County natural heritage inventories may not fully document the distribution of aquatic species across the state. That's why biologists have begun county-by-county aquatic surveys. These inventories will offer a more precise record of rare aquatic species and habitats.
3. **Natural Heritage database** (www.ncnhp.org/pages/heritagedata.html). An important source of publicly accessible information is the comprehensive database compiled and maintained by the Natural Heritage Program. Users can query the Web-accessible database for the presence of rare species or habitats within particular counties, or request site-specific information from the program.

N.C. Wildlife Resources Commission (http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7b1.htm). This agency offers information on the life history, distribution and listing status of aquatic species, including fish, mussels and crayfish. This information is also included in the Natural Heritage database. Ask for the regional coordinator for the basin of interest (919-707-0224).

N.C. Division of Water Quality (http://h2o.enr.state.nc.us/basinwide/). As part of its mission, the division prepares basinwide water-quality plans for each of the 17 major river basins in the state. The plans compile data on each subbasin within a river basin and characterize waterbodies within them according to specific water quality parameters. The goals of basinwide planning include: identifying and protecting high resource value waters.

If the project affects a stream classified as an Outstanding Resource Water, the local government might choose to steer the project away from the stream. At the very least, where high-quality streams are affected, the environmental review would require more stringent best management practices. For more information contact the basin planner responsible for your basin of interest (919-733-7015).

Office of Environmental Education (http://www.eenorthcarolina.org). Educational resources are available for planners or citizen groups through the Office of Environmental Education (919-733-0711). These materials include a river basin booklet that explains the concept of a river basin and the ways people affect water quality; brochures featuring ecological, historical and cultural information on each of the state's 17 river basins; and a poster-size river basin map that can help you determine in which basin the project is located.

N.C. Division of Coastal Management (http://dcm2.enr.state.nc.us). This agency is responsible for maintaining Areas of Environmental Concern (AEC). Their Specific Use Standards specify the types of projects and construction methods that may be used in AEC. Ask for the Division of Coastal Management office nearest you (919-733-2293) or (252-808-2808).

Coordinate with State and Federal Agencies (Scoping)

Scoping can save time.

Scoping is often the first contact between proponents of a project and the public. If a formal meeting is held, people on both sides of an issue will be in the same room. The primary purpose of scoping is to identify key project issues and establish the framework within which issues are to be addressed. Scoping activities often expedite environmental impact analysis and early coordination with the appropriate state and federal agencies. A formal scoping notice should be submitted in writing to the State Clearinghouse in the Department of Administration. This allows the review agencies to ask questions regarding the effects of a project on growth, its proximity to sensitive areas and species, its possible impact on wetlands, the size and capacity increase of a proposed facility, potential secondary and cumulative impacts and other related issues. Scoping helps the applicant identify the best alternatives to be incorporated into the environmental document.

Scoping is a process intended to highlight significant issues and eliminate insignificant issues, thus saving time in preparing the environmental document. It is a way for the local government to understand the environmental issues and possible consequences of a proposed project before preparing an EA or EIS. Scoping is required during the NEPA process; in the SEPA process it is optional, although highly recommended. Scoping can be done for any project. It encourages applicants and reviewers to think about a project proposal early on, thus reducing the chances of overlooking a significant issue or alternative.

A cooperative meeting among natural resource agency and municipal government personnel resulted in reduced impacts from this sewer line crossing of a stream where sensitive species were known to occur. Aquatic surveys were conducted on the stream before construction to ensure that mussels were not located in the vicinity of the crossing. The crossing was then constructed "in the dry" to prevent sediment from traveling downstream. Other sediment-control devices were also installed. The water was temporarily impounded on both sides of the crossing, and the stream water was pumped around the crossing.

Protect Sensitive Species and Habitats

Local government planning and best management practices are essential.

The authority to decide how land is used in cities and counties around North Carolina is vested in local governments and their citizens. As local governments increasingly confront issues of urban growth into rural areas, they are looking for ways to control and direct their development.

Controlling non-point source pollution (also called polluted runoff) is often an important growth issue for resource agencies and it is essential for the protection of aquatic species and habitats. As was shown on page 4, a mussel's entire reproductive life is connected to the presence of fish, and both are linked to the presence of adequate habitat and clean water. Young mussels especially require clear water with the right flow, temperature and oxygen levels as well as stable substrate. Mismanaged development throughout a watershed increases the amount of impervious surface and disrupts functioning aquatic ecosystems. To reduce these impacts on aquatic ecosystems, stream biologists recommend a variety of strategies for local governments to consider:

LAND-USE PLANS

Without a land-use plan, a local government has no blueprint for future development. A land-use plan enables citizens and their elected leaders to consider in a public forum the areas best suited for industrial and residential growth and the areas where such growth would be inappropriate. Using the environmental information it has collected, the community will know the locations of its important farmland, areas of historic value and sensitive natural areas. It can then decide how to protect these areas.

Grassed swales in subdivisions reduce the amount of stormwater pollution entering rivers and streams.

The development and implementation of a land-use plan designed to protect and maintain these resources is an essential step in moving a project expeditiously through the environmental review process, and it also adds value and provides long-term benefits to your community. Of course, a land-use plan without "teeth," one that does not direct growth away from sensitive species or areas, is not beneficial. Although land-use plans are important for planning purposes, these plans can be readily changed and exemptions can be made. Therefore, a land-use plan alone is usually not a sufficient mitigation measure. Many agencies prefer local governments to have ordinances in place, or at least commit in writing that ordinances will be drafted to protect sensitive species and habitats.

Yellowbelly slider

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CREATING LAND-USE PLANS

N.C. Councils of Government (COG). Eighteen regional councils across the state provide help to local governments. Some provide local and regional planning and technical services to local government members in the areas of community development, land use, zoning, water, solid waste and GIS mapping. For a complete list of COGs, see http://www.nclm.org/weblinks.htm.

Community Planning Program (http://www.dca.commerce.state.nc.us/cpp/). Part of the N.C. Division of Community Assistance, this program provides professional planning assistance to local governments. It offers specialized assistance in land-use planning, among other services, and a publication titled "Land-Use Planning Guidelines" is available for download from the program's Web site. Call 919-733-2853 for help.

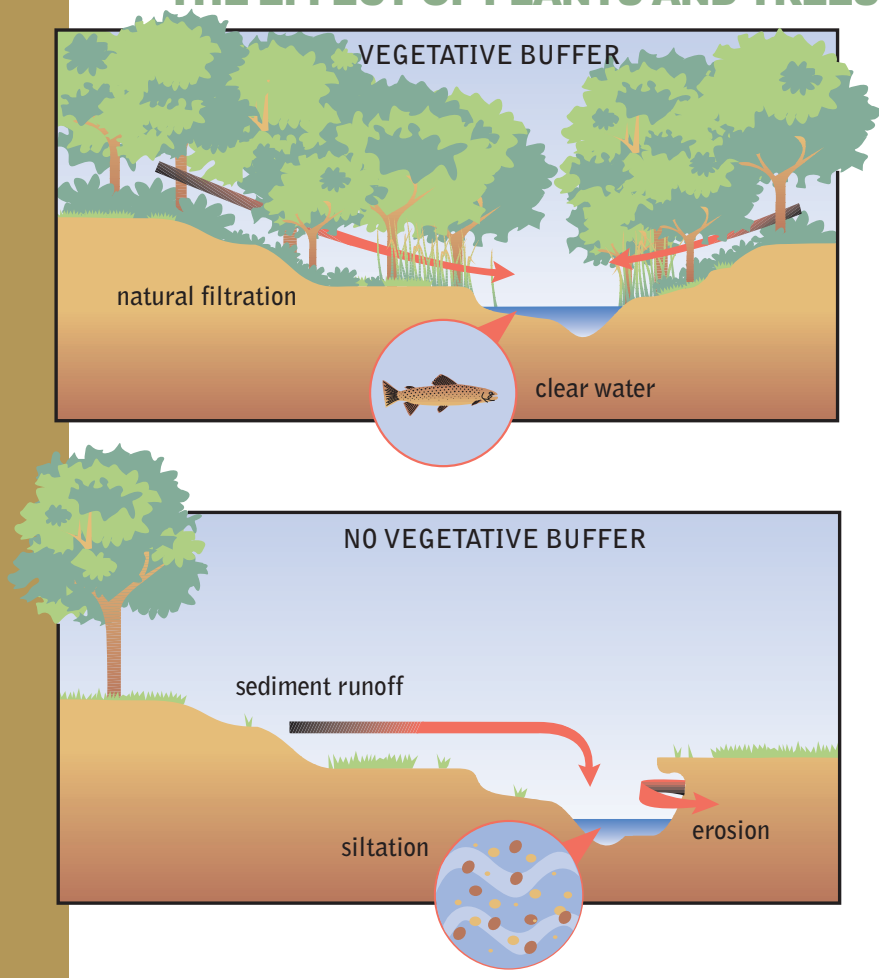
N.C. League of Municipalities (http://www.nclm.org). A nonpartisan federation of more than 530 cities, towns and villages in North Carolina that advocates for municipalities at the state and federal level, it provides a forum for the exchange of ideas among municipal officials, promotes excellence and efficiency in municipal government and provides services and information that will help municipal officials meet the needs of their citizens.

Low Impact Development Center (http://www.lowimpactdevelopment.org). Low Impact Development is a new, comprehensive land-planning and engineering design approach with the goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds.

Division of Coastal Management (http://dcm2.enr.state.nc.us). The Coastal Area Management Act (CAMA) requires each of the 20 coastal counties to have a local land-use plan in accordance with guidelines established by the Coastal Resources Commission. Each land-use plan includes local policies that address growth issues such as the protection of productive resources (farmland, forest resources, fisheries), desired types of economic development, natural resource protection and the reduction of storm hazards. Once a land-use plan is certified, the Division of Coastal Management uses the plan in making CAMA permit decisions and federal consistency determinations. At the local level, land-use plans provide guidance for both individual projects and a broad range of policy issues, such as the development of regulatory ordinances and public investment programs.

The creation of a pervious parking lot (left) and the installation of drainage basins (below) are best-management features of development in environmentally sensitive areas. Both help reduce the amount of pollution entering streams.

THE EFFECT OF PLANTS AND TREES



BEST MANAGEMENT PRACTICES AND MITIGATION

Agencies that review a local government's infrastructure project will also look for best management practices (BMPs) that mitigate the impacts of a project. They may ask such questions as:

Are forested buffers in place? Maintaining wide forested buffers is a key element in watershed protection. Forested buffers filter pollution, stabilize stream banks, reduce the destructive effects of flooding, provide woody debris and organic litter that are food sources for fish and aquatic invertebrates and serve other functions.

In the Tar-Pamlico, Neuse and Catawba river basins, the state has enacted rules to protect and manage riparian buffers. The rules, however, may be insufficient to protect sensitive species. Where these species exist, a minimum 100-foot undisturbed, native forested buffer is recommended for perennial streams and a 50-foot undisturbed, native, forested buffer is recommended for intermittent streams. In watersheds that support federally endangered or threatened species, a 200-foot undisturbed, native, forested buffer is recommended for perennial streams and a 100-foot, undisturbed, native, forested buffer is recommended for intermittent streams.

Is proposed infrastructure routed outside of the riparian buffer? By fragmenting a buffer, infrastructure such as sewer lines has the potential to impair stream functionality. Thus, stream crossings should be minimized and infrastructure kept outside of forested buffers. Since riparian buffers stabilize the stream banks, an additional benefit to installing infrastructure outside of the riparian buffer is that it is better protected from becoming exposed by channel migration.

Is commercial or residential land development planned outside of the 100-year floodplains? Concentrating built-upon areas out of floodplains will leave riparian buffers intact and cause less property damage.

Are impervious surfaces minimized? Research has shown a strong correlation between the percentage of impervious or hardened surfaces — roads, parking lots, driveways, sidewalks— in a watershed and stormwater pollution. Watersheds with less than 10 percent imperviousness are generally more capable of maintaining functioning aquatic ecosystems. At greater than 10 percent, a watershed is more likely to be considered impacted, and above 25 percent, it is generally considered degraded. Protection of open space, clustering structures within a site and use of pervious ground cover can help reduce the amount of runoff within a development.

KEN TAYLOR / WILDLIFE IMAGES

Wide forested buffers are key elements in watershed protection plans.

Are steps being taken to control erosion and sediment? Sediment is the number one pollutant entering rivers and streams and it is often connected with the construction of new development.

Other mitigation measures or best management practices recommended during the planning stages of a project include:

- Avoiding wetlands
- Reseeding disturbed areas and planting native trees and plants
- Eliminating fill and culverts where practicable
- Minimizing clearing and grading
- Avoiding steep slopes
- Maintaining erosion-control devices
- Preserving natural areas and plants

MITIGATION AND BEST MANAGEMENT PRACTICES

N.C. Wildlife Resources Commission's "Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality" gives a detailed list of land-use practices that help protect species and habitats, including listed species. http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7c3_impacts.pdf.

LAND CONSERVATION

Land acquisition and establishment of conservation easements are two of the best tools that can be used by municipalities and counties to protect water quality. Fee-simple acquisition is the easiest way for a local government to protect land. In exchange for a tax benefit, a landowner may choose to sell the land to a municipality at a bargain price or even donate it. Conservation easements are legally binding agreements between a landowner and a conservation organization (government agency, local land trust) that protect the land in perpetuity. The landowner cedes the development rights to the conservation organization but retains ownership of the land.

Help is available to local governments to negotiate and make purchases of land for conservation. Since its founding in 1996, North Carolina's Clean Water Management Trust Fund has awarded almost 500 grants worth nearly $400 million to cities, counties and local government agencies to protect water. The nearly two dozen local land trusts located throughout the state are well-versed in the legal work necessary to negotiate a conservation easement purchase. Land trusts, often partnering with local govern-

ments, have helped protect more than 162,000 acres of land in the state.

As part of the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program, grants are provided to local governments to purchase private property in flood prone areas. To date, FEMA has provided grants in North Carolina to purchase more than 4,900 parcels of land as a result of hurricanes Fran and Floyd. Once purchased, the parcels become city or county owned and carry deed restrictions into perpetuity that would prevent their use for anything but green space. In general, such uses include parks for outdoor recreational activities, nature reserves, unimproved permeable parking lots and other uses consistent with Pre-Disaster Mitigation Grant Guidance for green space acquisition. Some structures are allowed, but nothing that is non-permeable. Any variances to these uses, including roads or buildings, must be approved by the FEMA regional office.

WATERSHED PROTECTION THROUGH LAND CONSERVATION

- For more information on the Clean Water Management Trust Fund, call 919-733-6375, or go to http://www.cwmtf.net.
- For information about North Carolina's network of land trusts, contact the Conservation Trust for North Carolina, 919-828-4199, or go to http://www.ctnc.org.
- For more information regarding the Hazard Mitigation Grant Program, contact the Hazard Mitigation section of the state's Division of Emergency Management, or go to http://www.ncem.org/mitigation/hmgp.htm.
- For a listing of the Environmental Education Centers in your community including state parks, nature centers, botanical gardens, wildlife refuges, coastal reserves, aquariums, educational state forests, science museums and the N.C. Zoo, call 919-733-0711, or go to http://www.eenorthcarolina.org.

PLAN AHEAD

The continued growth of North Carolina's cities and counties has the potential to compromise the state's natural and cultural environments. To protect these important assets while ensuring orderly growth and development, the state and federal governments have created NEPA and SEPA. A carefully considered plan for growth and the implementation of best management practices to protect an area's aquatic resources are key to a more timely environmental review. If the plan and the BMPs are in place ahead of any demands for new infrastructure, the environmental review process will go more smoothly and delays will be less common and less costly.

IN SUMMARY

North Carolina is a diverse, rapidly growing state where natural resources could be lost to us in the absence of a widespread awareness of their existence, their significance and their value. Natural resources are neither isolated from each other nor from people. Each element is an integral part of the ecosystem. When one part of the system is affected, others feel the impact. It is environmental education that provides the knowledge, understanding and awareness that gives us the ability to make informed environmental decisions.

Although freshwater species can be easily overlooked, the booklet Swimming with the Current provides important conservation steps and resource data critical for the protection of our waters, wetlands and aquatic habitats. Aquatic species can be protected through both traditional land conservation measures and through best management practices identified in this booklet. Responsibility for the care of North Carolina's natural systems rests in our hands. It's a heritage worth protecting.

Before Your Project Begins . . .

◎ Are permits required for your project?

◎ If permits are required for your project, contact your permitting agency to discuss whether a SEPA document is required.

Information Sources

◎ N.C. Department of Environment and Natural Resources (http://www.enr.state.nc.us)
◎ Customer Service Center (http://www.envhelp.org)
◎ State Clearinghouse (http://www.enr.state.nc.us/files/laws.htm)

What Your Environmental Document Needs

◎ Accurate project description
◎ Clear statement of project purpose and need
◎ Description of the site, surrounding area and service area
◎ Description of environmental impacts within the project boundary
◎ Inclusion of sensitive features (rare species, natural heritage sites)
◎ Selection of feasible alternatives
◎ Adequate mitigation and means to enforce (after avoidance)
◎ Consideration of direct, secondary and cumulative impacts
◎ Maps

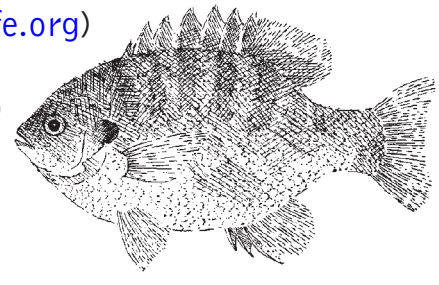
Planning Checklist:

❑ Have you contacted state or federal natural resource professionals to discuss your project (scoping)? See p. 15.

❑ Have you identified sensitive species and habitats in your area? See p. 12.

Databases to Use

◎ N.C. Wildlife Resources Commission (http://www.ncwildlife.org)
◎ N.C. Natural Heritage Program (http://www.ncnhp.org)
◎ N.C. Division of Water Quality (http://h2o.enr.state.nc.us/)
◎ N.C. OneMap (http://www.NCOneMap.com)
◎ N.C. Center for Geographic Information and Analysis (http://www.cgia.state.nc.us/)



Planning Checklist continued:

- ◎ N.C. Pollution Prevention and Environmental Assistance (www.p2pays.org)
- ◎ U.S. Fish and Wildlife Service (http://www.fws.gov/)
- ◎ Low Impact Development Center (http://www.lowimpactdevelopment.org)
- ◎ National Flood Insurance Program (http://www.ncfloodmaps.com)
- ◎ National Wetlands Inventory (http://wetlands.fws.gov/)
- ◎ Coastal Habitat Protection Plan (http://www.ncfisheries.net/habitat/chpp1.htm)

❏ Does your area have a land-use plan? See p. 16.

Creating Land-Use Plans

- ◎ N.C. Councils of Government (http://www.nclm.org/weblinks.htm)
- ◎ The Community Planning Program (http://www.ncdca.org/cpp/)
- ◎ N.C. League of Municipalities (http://www.nclm.org)

❏ Does the land-use plan direct growth away from sensitive species and habitats? See p. 16.

❏ Are adequate mitigation and best-management practices in place to protect your natural resources? See p. 18.

- ❏ Are forested buffers in place?
- ❏ Is utility infrastructure routed outside of the forested buffer?
- ❏ Is development being planned outside the 100-year floodplain?
- ❏ Are impervious surfaces being controlled and stormwater adequately treated?
- ❏ Are erosion, sediment and toxic chemicals being controlled and waterways protected?
- ❏ Are you preserving green space and minimizing land disturbance?
- ❏ Are you preserving natural areas, plants and wetlands?
- ❏ Are you protecting natural processes?

❏ Have you protected the watershed through land acquisition or conservation easements? See p. 19.

- ❏ Clean Water Management Trust Fund (http://www.cwmtf.net)
- ❏ Conservation Trust for North Carolina (www.ctnc.org)
- ❏ N.C. Nonpoint Source Management Program (http://h2o.enr.state.nc.us/nps)
- ❏ N.C. Public Water Supply Section (http://www.deh.enr.state.nc.us/pws/index.htm)
- ❏ Source Water Assessment and Protection in North Carolina (http://204.211.89.20/Swap/)

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http://www.ncdot.org

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1721 Mail Service Center
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http://www.ncwildlife.org

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