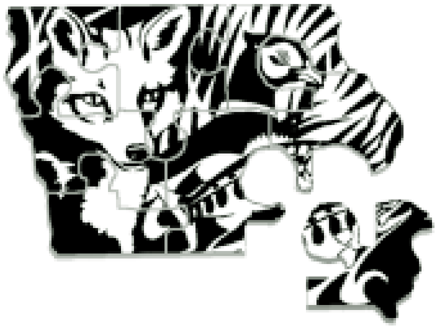

Managing Iowa Habitats:

Restoring Iowa Streams

Introduction

With six major river basins and more than 27,000 miles of perennial streams, Iowa is rich in water resources. Prior to settlement, Iowa's countryside was a mosaic of prairie, wetland, and forest. In less than 150 years, Iowa converted to other uses 99.9 percent of its prairie, more than 95 percent of its wetlands, and 70 percent of its forests.

The exchange of Iowa's prairies, wetlands, and forests for agricultural and urban development resulted in the environmental degradation of Iowa's rivers and streams, called *riverine* systems.

The conversion of the natural landscape communities to row-crops and concrete increased water runoff, causing significant deterioration in both surface water and groundwater quality. With grass and forest cover broken, lands adjacent to rivers and streams became pathways for soil, nutrients, and pesticides to enter the waterway.

The Iowa Department of Natural Resources (IDNR) reports 99 percent of Iowa's streams have been negatively impacted under human pressures in the last 150 years. This includes sedimentation, channelization, and nutrient and chemical pollution. And unfortunately, the resultant degradation is not limited by state boundaries. Iowa's runoff dumps into the Gulf of Mexico (approximately 1500 miles downstream) negatively impacting the coastal communities, as well.

Channel alterations to almost 80% of Iowa streams have interrupted natural flow regimes, increased flooding, and decreased biotic diversity.

A growing interest in protecting and improving river and stream habitats is the result of increasing awareness and understanding of the interdependence of people, wildlife, water, and land.

The restoration and management of Iowa's rivers and streams is important for enhancing or improving water quality, wildlife habitat, recreational opportunities, and aesthetics. This publication is to assist landowners in the restoration and management of stream and river habitats.

Defining Iowa's river and stream habitats

People restore and manage river and stream habitats for a variety of reasons. Proper management begins with a general understanding of stream ecology and the interrelationships between land and water.

Streams and rivers form when water, running over the land, collects in small

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Streams are usually smaller, with a steeper slope and faster current than rivers. Streams combine running and quiet water in a series of shallow runs interspersed with deeper pools. Rivers are usually bigger, muddier, slower, and deeper. The riffles and pools, typical of streams, are often absent.

Extensive root systems promote bank stability and overhanging branches provide shade. Leaves and twigs tumbling into the water are used in different ways by a variety of stream dwellers.

rills. The joining of these channels form headwater streams, which couple with other streams and create rivers.

Lotic (flowing) waterways, like rivers and streams, differ from *lentic* (calm) water systems, such as ponds and lakes, in several ways. One of the most distinguishing characteristics of rivers and streams is a faster current. Another difference is the associated plant and animal communities.

A stream community

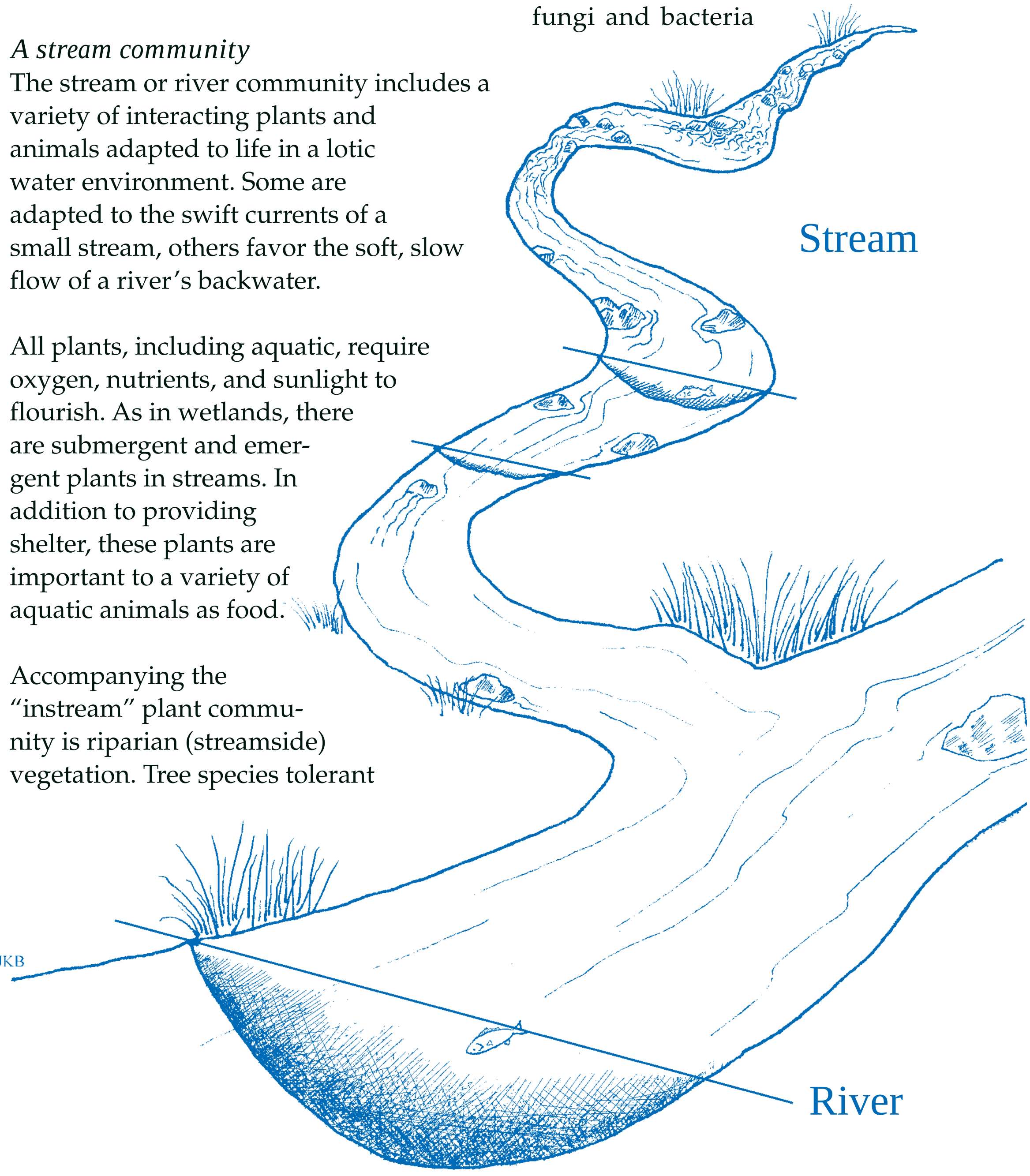
The stream or river community includes a variety of interacting plants and animals adapted to life in a lotic water environment. Some are adapted to the swift currents of a small stream, others favor the soft, slow flow of a river's backwater.

All plants, including aquatic, require oxygen, nutrients, and sunlight to flourish. As in wetlands, there are submergent and emergent plants in streams. In addition to providing shelter, these plants are important to a variety of aquatic animals as food.

Accompanying the "instream" plant community is riparian (streamside) vegetation. Tree species tolerant of wet soils, such as cottonwood, silver maple, and willow, grow on the moist banks of streams and rivers.

Both instream and riparian vegetation influence the water temperature and the stream's productivity as water moves downstream.

Also important to stream productivity are the *decomposers*. A collection of aquatic fungi and bacteria



change dead organic debris (contributed by sources inside and outside of the stream) into *detritus*, which is eaten by other stream residents.

In addition to the microscopic decomposers, there are a variety of stream invertebrates that help transform large particulate material into small pieces and dissolved substances.

Many aquatic plants and animals have specific habitat requirements such as water temperature or oxygen levels. Other water characteristics that influence plant and animal communities include water depth, velocity (speed), and turbidity (clarity). Excessive nutrients and sediments, carried in runoff from adjacent lands, adversely affect these water characteristics.

Land use and stream quality
The land uses within a watershed and adjacent to rivers and streams influence a variety of environmental characteristics including plant and animal communities, visual appeal, and water quality.

With more than 90 percent of Iowa land in farms, agricultural production is economically important to Iowa. Unfortunately, the practices associated with row-crop and livestock production often are intensive and cause stream degradation.

An average annual soil loss from Iowa farms of 9 tons per acre coupled with the annual application of almost 6500 tons of fertilizers has ranked soil and nutrients as the top two pollutants found in Iowa waterways.

The imbalance created by this excessive pumping of agricultural pollutants into Iowa's waterways compromises environmental health and the well-being of people downstream. In addition, it costs farmers money that literally goes "down the river."

Because of the intimate relationship between these aquatic systems and their associated watershed, understanding this interdependence is important to successful river and stream restoration and management.

General guidelines for stream and river restoration

Reasons for restoring river and stream habitats vary among landowners. Most projects share a common goal of enhancing available stream or river habitat. As with any restoration project, advanced planning will save time and money.

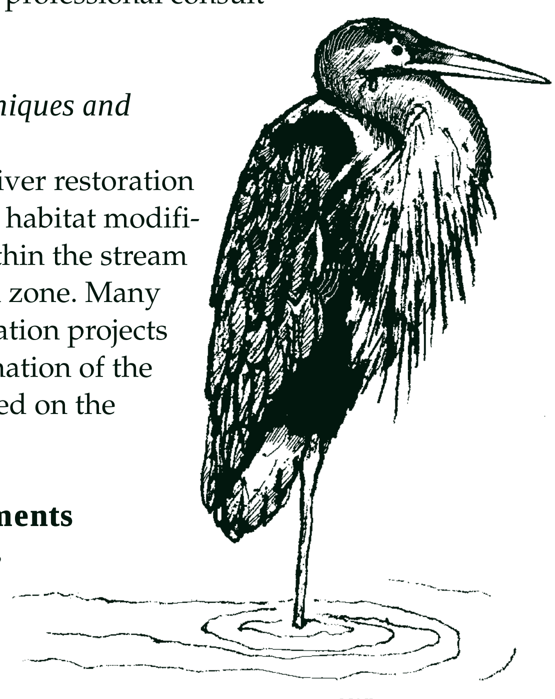
Questions that emerge in the planning process are often complex, requiring expertise from a variety of disciplines. Contact local professionals to determine what (if any) permits are required and to discuss project objectives, site selection, evaluation, and management. Many of these types of questions can be answered during a site evaluation conducted by a public or private professional consultant.

Restoration techniques and methods
Most stream or river restoration projects focus on habitat modifications made within the stream or in the riparian zone. Many successful restoration projects employ a combination of the methods described on the following pages.

Instream treatments
There are dozens of instream treatments appropriate for stream habitat

Many aquatic plants and animals have specific habitat requirements such as water temperature or oxygen levels.

Animals like great blue herons are important members of riparian communities.



Properly placed boulders can restore meanders and pools, improve pool/riffle ratios, protect eroding banks, and improve fish and invertebrate habitat. Granite, quartzite, or limestone boulders are recommended due to their durability.

restoration including trash catchers, pool excavations, and bottom manipulations. Instream treatments are used to improve fish habitat by deepening existing or creating new pools and reducing current speed and changing its direction. The most frequently used are overpour structures (dams and weirs), current deflectors, and boulder placement.

Although commonly used in high gradient streams, dams are not recommended for use in many stream restoration projects. Damming low gradient streams, such as those common throughout Iowa, can damage upstream habitat by slowing water flow and increasing sedimentation. Such stream alteration also often requires a permit.

Consideration of the erodibility of adjacent banks is critical when making any instream alterations. Every effort should be made to prevent stream bank erosion.

Current deflectors

Current deflectors are inexpensive, easy to construct, and appropriate for use in a variety of stream sizes. They are readily adaptable, easy to use with other treatments, and are frequently successful in improving stream habitat.

Strategically placed deflectors will create or protect deep water habitat and reduce bank erosion. Shape, size, materials used, and angle of the deflection, are important current deflector characteristics to consider prior to incorporating them into a restoration project.

Boulder placement

The simplest and most commonly used instream treatment is boulder placement. Boulders can be placed randomly or in clusters during low flow. The subsequent pools and eddies that form behind boulders are important fish habitat. The boulders also provide valuable surfaces to which invertebrates and other organisms can cling.

Recommended boulder size varies with stream size, flow characteristics, and the size of the moving/hauling equipment. As a general rule, select boulders a minimum of 2 feet in diameter. In smaller streams, smaller boulders may be appropriate.

Creating and maintaining diversity in a stream channel will reduce bank erosion, improve water quality, and enhance recreational opportunities such as fishing.

Examples of questions to ask while planning

Modified from Gore, James A. 1985. The restoration of rivers and streams.

Biological

- What plant and animal species are present now?
- What plant and animal species are desired?
- What are the preferred habitat conditions of these species?
- Will revegetation be required?

Technical

- What are the dimensions and the shape of the stream?
- What are the normal and extreme flow patterns of the stream?
- What is the composition of stream bed sediment and stream bank?
- What are the uses of the land adjacent to the stream?

Practical

- What are the monetary and labor constraints associated with the project?
- What materials are available at the site?
- How is the site accessible?
- Does the project require any permits?

Streamside modifications

There are numerous riparian habitat treatments proven to improve stream quality including livestock exclusion, riparian buffer strips, and stream bank protection.

Livestock exclusion

Limiting livestock access to streams is important to streambank protection, decreases soil erosion, and improves environmental quality. The livestock's water source and the stream's integrity are protected by using a combination of fencing, off-stream watering, and fenced livestock crossings.

Riparian buffer strips

Comprised of a variety of grasses, shrubs, and trees, streamside buffer strips filter sediment, nutrients, and pesticides from runoff before it enters an adjacent stream or river. In addition to protecting waterways, riparian buffer strips enhance visual appeal and wildlife habitat.

Stream bank stabilization

Stream bank stabilization techniques are critical for steep or poorly vegetated banks, in areas where buffer strips cannot be planted. Stream bank stabilization techniques include installing riprap or tire and wire/rock gabions. Because of their visual appeal, planting grasses or plugging willow cuttings is often preferred.

Riprap

One of the most common and effective methods of controlling stream bank erosion is placing a layer of various-sized rocks, called riprap. In addition to the easy installation and low maintenance upkeep, riprap readily settles into the bank's shape, assuming a fairly natural appearance.

Reslope the bank on a 1–3 percent slope before placing the riprap. Broken pieces of limestone, dolomite, or quartzite (available at most quarries in various sizes as "Class V Revetment Stone"), are suitable for use as riprap in most stream restoration projects.

Using a variety of shapes and sizes helps the rocks form a tight, dense barrier and protects the bank prone to erosion.

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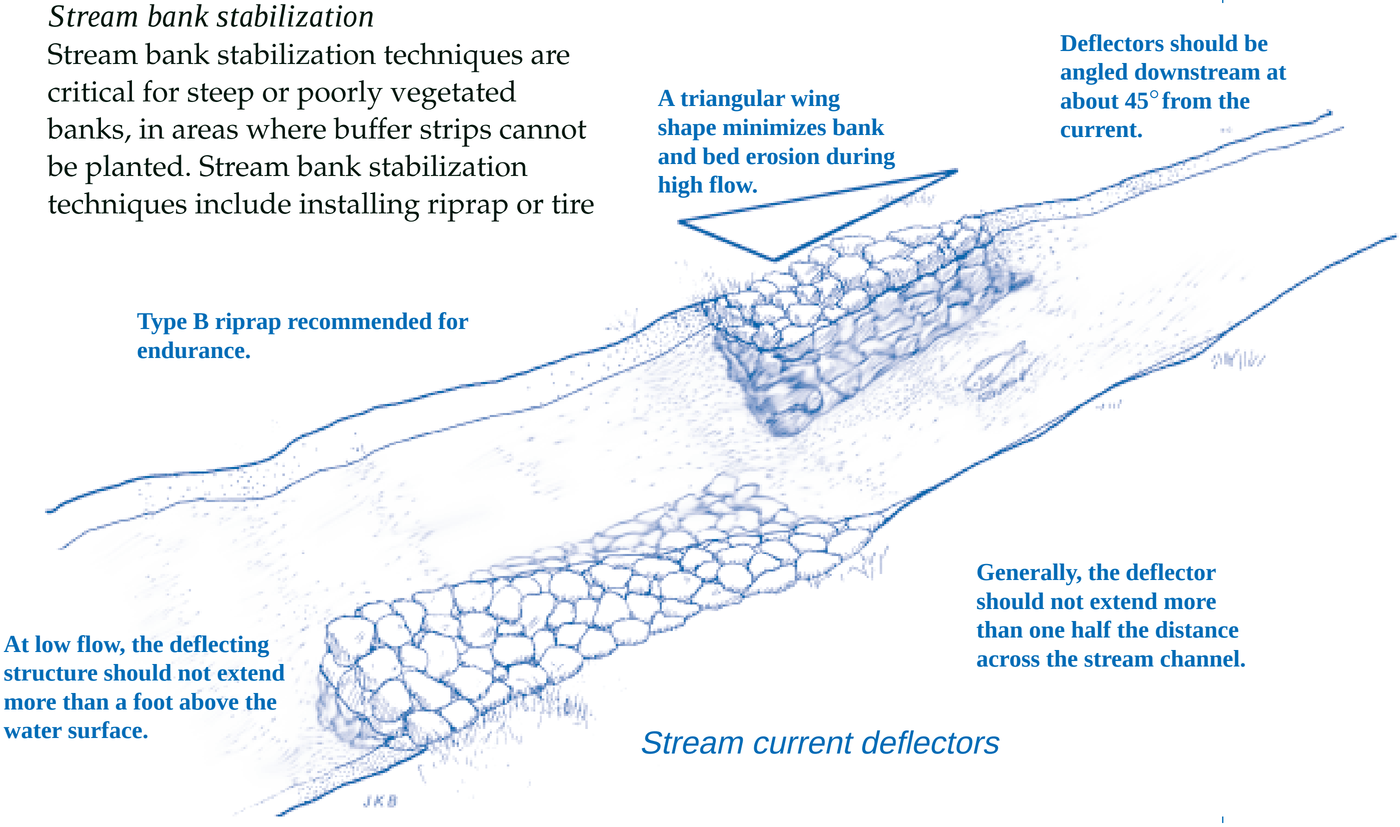


Stream current deflectors

Streamside vegetation provides valuable habitat for more than 100 different bird and small mammal species.

Vegetation

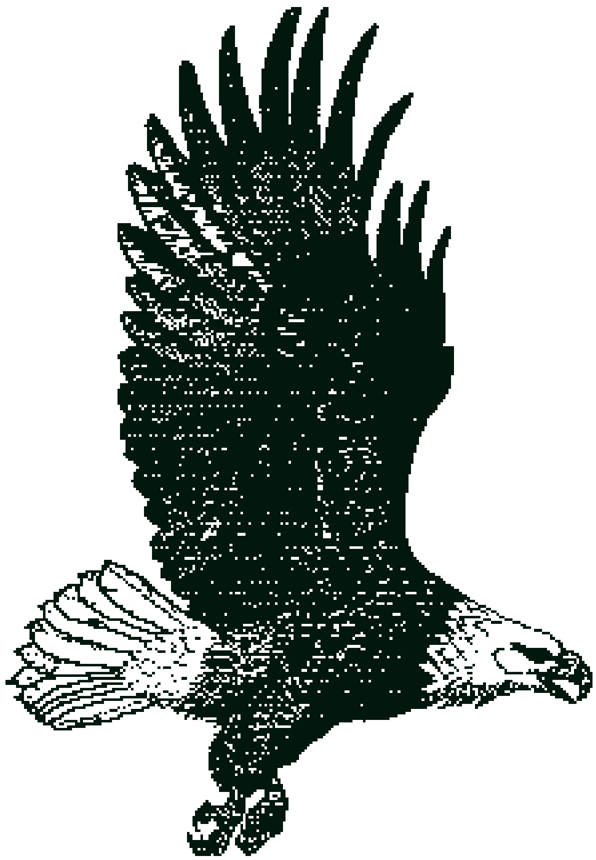
The natural appearance of vegetation enhances the visual appeal of stream and river habitats. In areas that are not subjected to strong currents, or pastured, grass seeding is effective. Another plant shown effective in bank stabilization is willow. When pounded into a stream bank, 3-inch diameter by 3 foot long willow cuttings rigorously establish a stabilizing root network. Implementation of these practices enhances habitat not only for aquatic species but riparian and upland wildlife as well.

Monitoring and management

Although it could take several years, possibly decades, to glean all the benefits of a successful restoration project, studies indicate aquatic plants and animals are quick to respond to simple stream habitat improvements.

In order to assess the success of the restoration project, consider monitoring the stream. Stream monitoring can be as simple as recording stream velocities, visually assessing water clarity, or collecting data on water chemistry, observed plants and animals species, and their abundance changes over time. Iowa has a network of volunteer water quality monitoring projects. Contact the Iowa DNR for more details.

In addition to assessing success, monitoring stream improvement will guide future management planning. The benefits of these restoration projects will magnify as people work to improve stream and river habitat on their land.



Sources for additional information and technical support

Iowa Department of Natural Resources, Wallace Building, Des Moines, IA 50319
515/281-5145

County Conservation Boards – Listed under the "Government-County" section of your local phone book.

Natural Resource Conservation Service—County offices listed under "Government—Federal, USDA" section of your local phone book.

Soil Conservation District—Listed under the "Government-County" section of your local phone book.

Iowa State University Extension—County offices listed under the "Government-County" section of your local phone book.

Other Iowa State University Extension publications useful in restoring linear habitats

IAN-103	Iowa Water Pollution
IAN-201	Iowa's Biological Communities
IAN-307	Iowa's Shrubs and Vines
IAN-407	Iowa Biodiversity
IAN-408	Adapting to Iowa
IAN-605	Iowa Fish
Pm-1351b	Managing Iowa Habitats: Wildlife Needs That Dead Tree

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File: Wildlife 2

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