Stream Obstruction Removal Guidelines

prepared by

Stream Renovation Guidelines Committee, The Wildlife Society and American Fisheries Society

in cooperation with

INTERNATIONAL ASSOCIATION OF FISH AND WILDLIFE AGENCIES

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These guidelines were prepared by the Stream Renovation Guidelines Committee, a joint committee of The Wildlife Society and the American Fisheries Society. They were prepared at the request of the International Association of Fish and Wildlife Agencies. Committee members who participated in the effort were:

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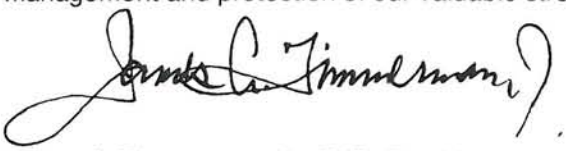
The guidelines were patterned after similar versions that have been used successfully on projects in several states. The Stream Renovation Guidelines Committee revised, reorganized and expanded earlier versions to make them applicable on an international basis.

The International Association of Fish and Wildlife Agencies hopes that these "Stream Obstruction Removal Guidelines" will be appropriately used as guidance by agencies, organizations and landowners in the management and protection of our valuable stream ecosystems.



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Introduction

The intent of these guidelines is to aid in correcting stream flow problems, caused by obstructions, in an environmentally sound manner and to maintain natural stream characteristics. They are a positive alternative, designed to protect natural resources, to be used when a government agency or other interests are considering channelization, clearing and snagging, or other severe stream modifications. The purpose is not to generate projects but to provide a sound alternative that will lessen adverse impacts when a decision has been made to correct stream flow problems.

Many important, interrelated factors that influence streams are not addressed in these guidelines. For example, they do not provide management suggestions for watershed, floodplain or riparian areas, nor do they provide instructions for development of specific instream fish habitat features. Information concerning these aspects is readily available in various publications.

Debris, sediment and channel structure play an important role in maintaining the integrity of aquatic ecosystems but sometimes excessive amounts cause problems that man seeks to correct. In cases where excessive debris and/or fine sediment have no significant impact on societal values, no work need be done. Persons interested in wild natural resources oppose destructive, structural stream modification practices and favor nonstructural measures in most instances. It is recognized, however, that unwise land use and abusive stream use practices often diminish the flow capacities of streams to the extent that corrective action is demanded. Development interests and flood-damaged communities often successfully promote drastic stream modifications to achieve some desired level of water conveyance or flood relief. When planners seek solutions to stream flow problems, nonstructural measures should always be used to correct the problems when practical. In cases where it is inappropriate or infeasible to address flow problems with no action or nonstructural alternatives, the obstruction removal alternative in accordance with these guidelines is recommended as the preferred alternative.

The guidelines shall be applied and monitored by an interdisciplinary team of experts knowledgeable about local conditions. This is essential to successful implementation. The team shall be responsible for classifying the various stream reaches and monitoring ongoing and completed work for compliance.

These guidelines are only applicable to situations where channel blockages result in unacceptable flow problems and where restoration of the natural or former flow capacity of the channel is desired. The combination of obstruction removal and various nonstructural alternatives should be thoroughly examined before it is determined that more drastic channel modification is the only feasible solution. In either case, natural resource agencies may seek mitigation of unavoidable ecological damages.

These guidelines have been designed for broad application and, by necessity, are quite general. Users are encouraged to adapt these concepts to specific local situations.

Application of these guidelines requires the following sequential actions:

1. establish interdisciplinary team of experts,
2. classify stream reaches according to degree of flow problems and biological sensitivity,
3. specify extent and methods of removal for each flow condition,
4. monitor ongoing work to insure compliance, and
5. establish maintenance provisions.

Anyone considering work in streams should be aware that federal and/or state legal requirements may be applicable. In addition, use of guidelines, such as the Channel Modification Guidelines developed jointly by the U.S. Soil Conservation Service and the U.S. Fish and Wildlife Service and some state agency guidelines, may be required.

Definition of Stream Obstruction Conditions

Condition One

These stream segments have acceptable flow and no work would be required. They may contain various amounts of instream debris and fine sediment, such as silt, sand, gravel, rubble, boulders, logs and brush. In certain situations flow may be impeded, but due to stream and land classification or adjacent land-use, this is not a problem.

Condition Two

These stream segments currently have no major flow impediments, but existing conditions are such that obstructions are likely to form in the near future, causing unacceptable problems. This condition is generally characterized by small accumulations of logs and/or other debris which occasionally span the entire stream width. Accumulations are isolated, not massive and do not presently cause upstream ponding damages.

Condition Three

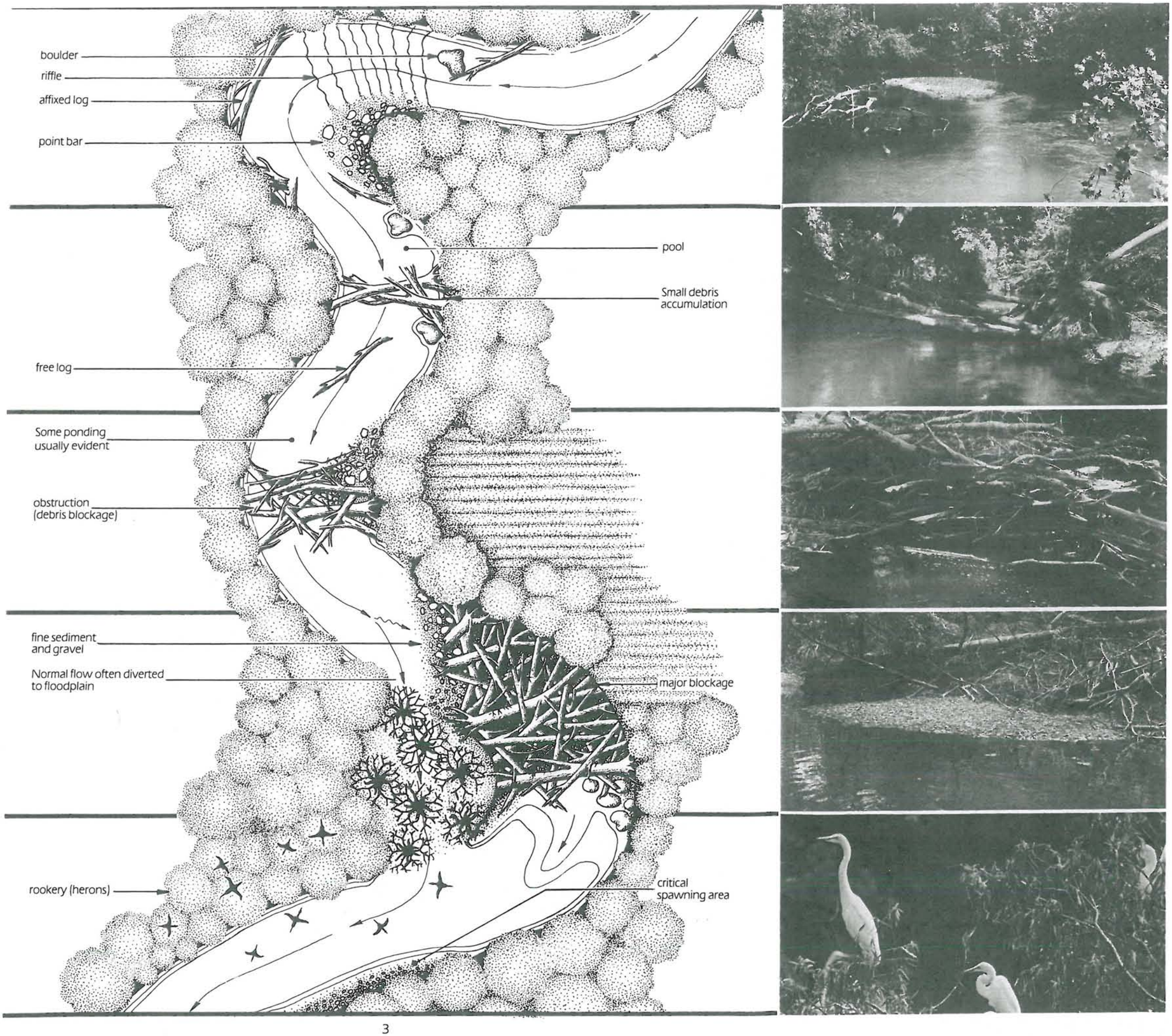
These stream segments have unacceptable flow problems. Obstructions are generally characterized by large accumulations of lodged trees, root wads, and/or other debris that frequently span the entire stream width. Although impeded, some flow moves through the obstruction. Large amounts of fine sediment have not covered or lodged in the obstruction.

Condition Four

These stream segments are characterized by major blockages causing unacceptable flow problems. Obstructions consist of compacted debris and/or sediment that severely restricts flow.

Condition Five

These stream segments possess unique, sensitive, or especially valuable biotic resources and should be dealt with on a case-by-case basis. Examples include, but are not limited to: Areas harboring rare or endangered species, shellfish beds, fish spawning and rearing areas, and rookeries.


boulder
riffle
affixed log
point bar
pool
Small debris accumulation
free log
Some ponding usually evident
obstruction (debris blockage)
fine sediment and gravel
Normal flow often diverted to floodplain
major blockage
rookery (herons)
critical spawning area

Materials That May Be Removed

Fine Sediment

Only those fine sediment accumulations that are obstructing flows to a degree that results in unacceptable flow problems may be removed (Figure 1). Small accumulations of fine sediment generally do not cause problems and should be left undisturbed (Figure 2).

Debris Blockages

Only those debris accumulations that are obstructing flows to a degree that results in unacceptable flow problems, or are likely to cause problems in the near future, may be removed (Figure 3). Small accumulations of debris generally do not cause problems and should be left undisturbed (Figure 4).

Affixed logs that are crossways in the channel that are causing problems or are likely to cause problems in the near future should be moved to a more parallel orientation or may be removed (Figure 5). Isolated or single logs shall not be disturbed if they are embedded, lodged, or rooted in the channel and are not causing flow problems (Figure 6). Generally, embedded logs that do not span the channel are not considered to cause problems and should not be removed.

Free logs that are not rooted, embedded, or lodged should be left, repositioned, affixed, or may be removed (Figure 7).

Gravel, rubble, and boulders in isolated accumulations normally do not cause flow problems and should not be removed (Figure 8). Accumulations that are causing flow problems should be repositioned or may be removed.

Rooted Trees

Rooted trees (alive or dead) may be cut and repositioned or removed if they are likely to cause problems in the near future or if their removal is required to secure access and provide for practical operation of equipment (Figures 9, 10). Tree stumps with roots should be left in place to prevent bank erosion (Figure 11).

Figure 1. **Fine sediments (silt and sand) have completely filled this stream segment. About 98 percent of the stream water now flows across the floodplain on both sides of the stream and cannot be seen in this photograph. Such accumulations may be removed.**

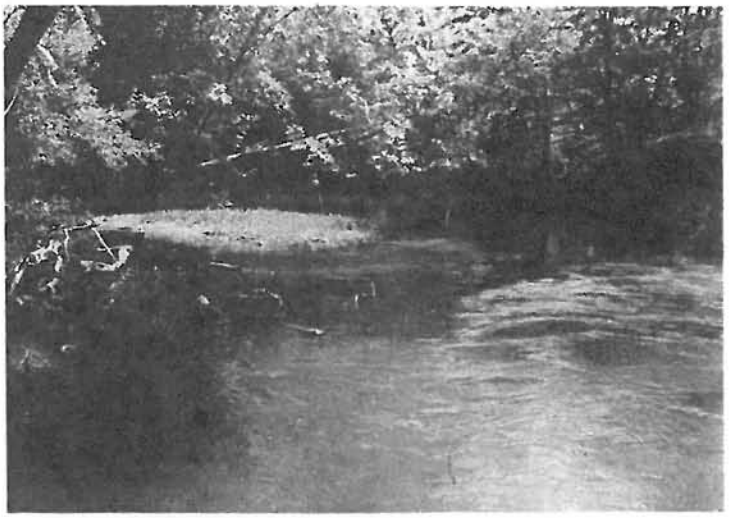


Figure 2. **Small accumulation of silt, sand and gravel should be left undisturbed. It is not obstructing flow and it provides beneficial habitat for fish and other aquatic life.**

Figure 3. **Debris accumulation obstructing flow and is likely to cause additional problems. Such accumulations may be removed.**

Figure 4. **Small accumulation of debris on the inside of the stream channel bend is causing no flow problems. Such material is beneficial to fish and other aquatic life and should be left undisturbed. As a preventative measure, some of the debris could be cut above the water to keep other debris from becoming lodged.**

Figure 5. Log crossways of stream channel, trapping additional debris and restricting flow. Flow problems are likely to increase in the near future. Such accumulations may be removed.

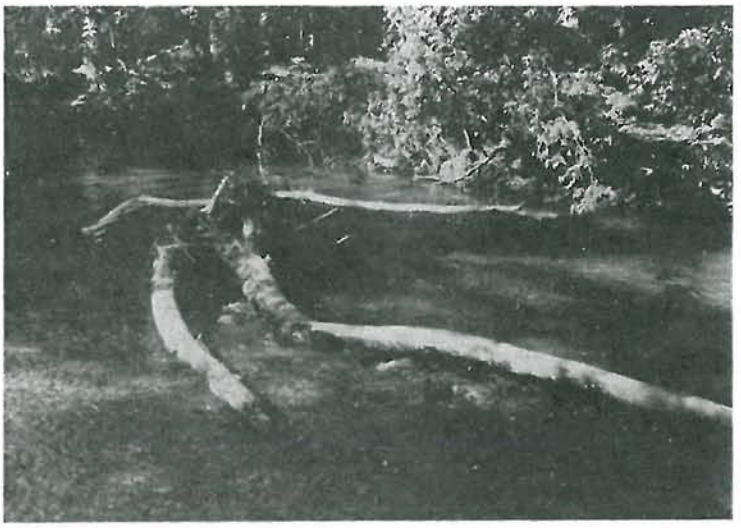


Figure 7. Free log in stream channel currently causing no flow problems. Such logs should be left, repositioned, affixed, or may be removed.

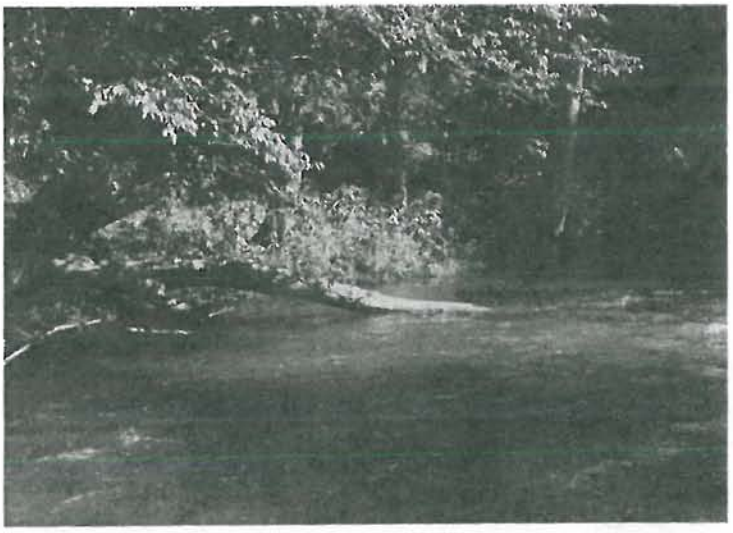


Figure 6. Single log with one end lodged on stream bank and the other embedded in the stream bottom. If no flow problems are associated with such logs they should be left in place.

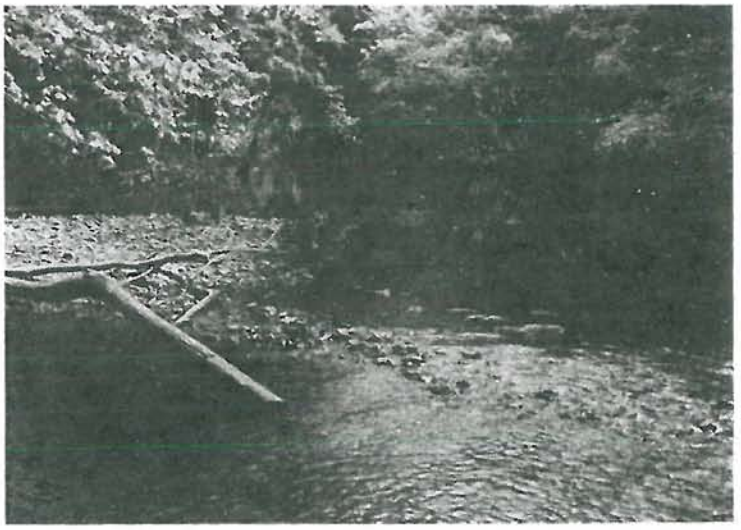


Figure 8. Isolated accumulation of gravel and rubble causing no flow problems. Such accumulations should be left in place. These areas are essential for some forms of aquatic life.

Figure 9. Dead tree leaning across stream is likely to fall in the near future and may be cut.

Figure 10. Cut tree repositioned along stream bank to aid in preventing bank erosion and to provide fish habitat.

Figure 11. Tree stump with roots left in place to prevent bank erosion. Valuable fish habitat was also salvaged.

General Criteria

No stream work, including bank clearing, repositioning, or removal of material, should be allowed except at specific locations where unacceptable flow problems occur or may occur in the near future. Where stream work is needed, access routes for equipment should be selected to minimize disturbance to the floodplain and riparian areas (Figure 12). Channel excavation and debris removal also should be accomplished in a manner that minimizes clearing of vegetation. The smallest equipment feasible should be used. If tributaries or distributaries must be disturbed by the project, they shall be restored when the work is completed. All disturbed areas shall be reseeded or replanted with plant species which will stabilize soils and benefit fish and wildlife.

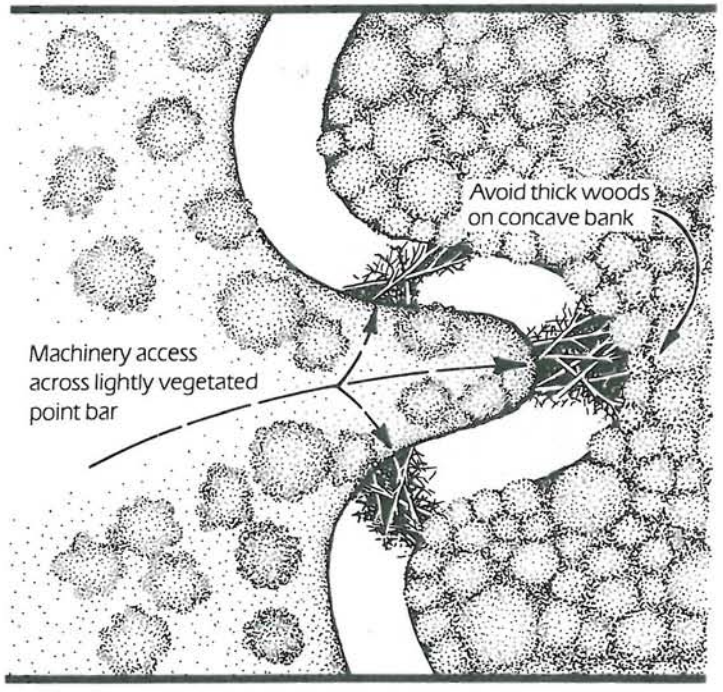


Figure 12. **Schematic plan for machinery access to selected debris blockages designed to protect stream bank vegetation.**

Specific Criteria

Condition One Segments. No work shall be conducted in Condition One Segments.

Condition Two Segments. Equipment that will cause the least damage to the environment shall be selected for performing the work. First consideration will be given to the use of hand operated equipment such as axes, chain saws, and winches to remove accumulations (Figure 13). Boats with motors may be used where needed (Figure 14). When the use of hand operated equipment is not feasible, heavier equipment may be used. Examples include: small tractors, backhoes, bulldozers, log skidders, and low PSI equipment (Figure 15). Equipment shall be operated in a manner that results in the least damage to vegetation and soils of the project area. In some cases explosives may be used resulting in less damage. Debris designated for removal from the stream or floodway should be removed or secured in such a manner as to restrict its re-entry into the channel. Generally, it should be positioned so as to reduce flood flow impediment.

Condition Three Segments. Equipment limitations will be the same as for condition two segments. Work shall be accomplished within the channel or from one side of the channel where possible (Figure 16). Selective tree clearing shall be limited to the minimum clearing necessary for equipment access and efficient operation of equipment on the worked side of the channel. Disposal of material may be accomplished by removing it from the floodplain or by burning, burying, or piling, as appropriate, with the minimum amount of disturbance to vegetation. Piled debris shall be gapped at frequent intervals and at all tributaries and distributaries.

Condition Four Segments. Blockage removal may employ any equipment necessary to accomplish the work in the least damaging manner (Figure 17). Work should be accomplished from one side of the channel, where practical. Material shall be disposed in accordance with guidelines presented above for condition three segments (Figure 18). Spoil piles should be constructed as high as sediment properties allow. The placement of spoil around the bases of mature trees should be avoided.

Condition Five Segments. Special provisions for protecting unique, sensitive, or productive biotic resources shall be developed by appropriate professionals on a case by case basis.

Subsequent Maintenance

Stream conditions shall be monitored on a regular basis and maintenance work shall be conducted in accordance with the guidance contained herein.

Figure 13. **Chainsaw being used to cut log so that it can be pulled with small hand winch and repositioned along stream bank.**

Figure 14. Hand labor crew in boat hooking cable to log. The small crawler tractor with winch will pull the log from the stream. Small equipment can be carefully maneuvered through the floodplain forest causing little damage.

Figure 17. Dragline being used to remove compacted debris and sediment at major blockage (Condition Four).

Figure 15. Hand labor crew hooking cable to log to be pulled from stream by small crawler tractor with winch. Only a narrow work zone along the stream was disturbed because of the small equipment. Note stump left in place to stabilize bank.

Figure 18. Large dead tree removed from stream, pulled onto the floodplain and positioned to prevent its re-entry into the channel.

Figure 16. Debris and sediment removal was accomplished by working from one side of the stream. Selected trees were cleared to allow equipment access and operation. Trees have now grown back on the cleared side.

Glossary

blockage Organic and inorganic materials which completely span or fill the channel causing water to pond or to be diverted onto the floodplain.

debris Includes gravel, cobble, rubble, and boulder-sized sediments as well as trees and other organic material.

distributary Any channel or outlet that conveys water away from a stream.

fine sediment Silt and sand-sized materials.

floodplain A plain along a stream that is covered by water when the stream overflows its bank.

flow impediment Any material in a channel which reduces the velocity of and retards flow, i.e. an obstruction.

interdisciplinary team A group of persons having expert knowledge in various disciplines including fish, wildlife, engineering, hydrology, and geomorphology.

low PSI equipment Equipment with wide tracks or large inflatable tires that lower the ratio of equipment weight to track surface. (PSI = pounds per square inch)

nonstructural measures Measures that reduce flood damages without altering the stream or its overflow characteristics. Nonstructural measures may include, but are not limited to:Land-use regulation, land acquisition, providing for the maintenance of aquatic areas, floodplain zoning, flood-proofing existing buildings, flood forecasting, flood warning, providing flood hazard information, flood insurance, tax adjustments, emergency assistance, and relocation of properties and people.

obstruction Any material which hinders the progress of stream flow, i.e. a flow impediment.

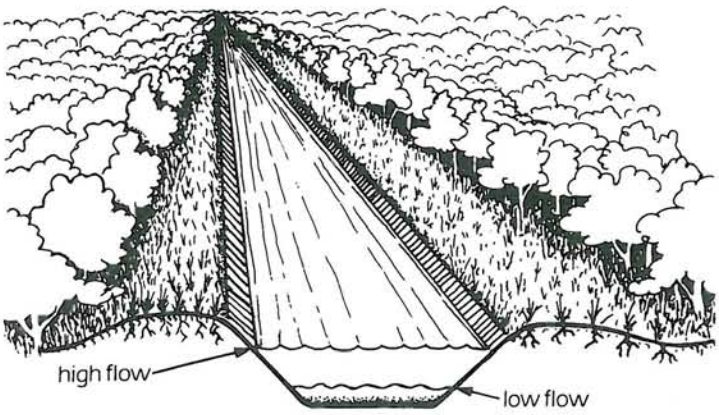
ponding An increase in water surface elevation upstream of a blockage or an obstruction.

riparian Relating to or living on or near the bank of a watercourse. These zones range in width from narrow bands in desert or mountainous areas to wide bands which occur in the piedmont and gulf states.

structural measures Artificial measures designed to reduce flood damages by altering the stream and/or its overflow characteristics. Examples include: channelization, reservoirs, floodways, dikes, levees, floodwalls, pumping plants, and diversions.

tributary Any channel or inlet that conveys water into a stream.

Some Effects of Stream Modification



Channelized stream -

Water velocity and substrate uniform in channel and unsuitable for many forms of aquatic life.

No shrubs or trees near channel to provide shade, nutrient input or deep growing root structures to control bank erosion.

Little habitat diversity and thus fewer kinds and amounts of fish and other aquatic life.

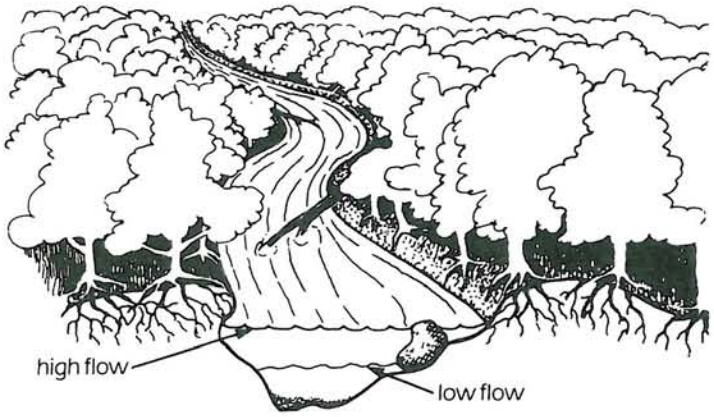
During dry seasons and low flows, insufficient water depths support fewer aquatic life forms.

Aid in drainage of wetlands and lowering of water tables.

Encourages unwise development in frequently flooded areas of the floodplain.

May provide higher degree of flood relief in immediate area but peak flows surge downstream increasing flooding.

Tends to degrade water quality.



Obstruction removal from stream -

Water velocity and substrate diversified due to varied channel depths, meanders and instream features.

Trees and shrubs near channel provide shade which maintains suitable water temperature and provides wildlife habitat.

Leaves, wood and insects drop into stream providing nutrients for aquatic life.

Instream rocks and logs and bank undercuts provide cover.

Trees and shrubs have deep roots that curtail stream bank erosion.

Habitat diversity formed by pools, riffles and debris provides for numerous kinds and amounts of fish and other aquatic life.

During dry periods and low flows, sufficient water depth is maintained to support stream life.

Natural streams replenish water tables and aid in maintaining wetlands and bottomland forests.

May provide less flood relief in immediate area but retards increased flooding downstream due to slower water flow and temporary water storage in the floodplain.

Tends to preserve water quality.