PROPERTY PLANNING COMMON ELEMENTS

COMPONENTS OF MASTER PLANS

HABITATS AND THEIR MANAGEMENT

In-stream Practices

Description

In-stream practices are used to provide sufficient habitat diversity to support all fish life history stages (carrying capacity, natural reproduction, size structure) and invertebrate production. The challenges facing in-stream habitat include sedimentation, temperature, lack of cover, insufficient water depth, lack of habitat diversity, invasive species, and reduction of stream flow due to water consumption, diversion, and drought.

In-stream enhancements often constitute intensive management, and should be applied only after assessments of instream and riparian habitat conditions and the health of the fishery have been conducted. Some treatments are considered major, ground-disturbing projects that entail careful planning. Water permits and/or hydrologic and hydraulic analyses pursuant to NR 116, Wisconsin Administrative Code, may be required and should be obtained before work begins.

Specific treatments are described below.

The following practices apply to both warmwater and coldwater fisheries:

Hydraulic Connections

Retaining hydraulic connections to backwaters and oxbows helps maintain stream ecology, form, and function. When narrowing or armoring a stream bank, openings connecting wetlands, ponds, backwaters or oxbows can be retained to allow unlimited passage of species such as minnows, reptiles, and amphibians. This promotes biodiversity and contributes to the fish forage base. Where conditions allow, projects managers can construct artificial oxbows or waterfowl scrapes to encourage a wide range of species.

Meander/channel Restoration

Often, streams have been ditched and straightened. Such actions destroy fish habitat and destabilize the streambed, resulting in additional problems downstream. Ditched or straightened channels can be restored by adding meanders, which reintroduce natural stream dynamics that improve channel stability, habitat quality, aesthetics, stream form, and function. Such action requires a high level of engineering to be successful.

Animal Exclusion

Many stream channels have been severely degraded by excessive livestock grazing, which causes stream widening and siltation. Overgrazing can be addressed through total exclusion by fencing, using barbed wire, horse wire, or electric fencing. However, such structures often are damaged by flooding. Proper rotational grazing methods have been proven to be a highly effective alternative. Grazing animals can help control woody encroachment and infestations of non-native invasive plants. Fenced gravel crossings can provide animals access to water without

causing bank damage. Both partial and total exclusion can result in the maintenance of healthy, stable streambeds and banks. Healthy stream banks and nearshore vegetation provide outstanding juvenile fish habitat and terrestrial invertebrate production.

Coarse Wood Habitat Development

Coarse wood habitats such as log-jams and submerged trees are important features for many fish, providing spawning and hiding/resting cover for juvenile and adult fish and substrate for invertebrates. Abundant coarse wood habitat contributes to diverse and abundant fisheries. Coarse wood habitat development can include root wads, half-log or whole-log covers, and tree-drop covers.

- A **root wad** is root and bole of a mature tree placed in the stream with the root planted outward and upstream at an angle. The bole is deeply trenched into the stream bank often using riprap to secure it. The root ball either rests on the bottom of the stream or is submerged slightly elevated in a pool. The root wad should be placed so that debris may pass over it during major flood events.
- **Half-log, whole-log, or tree-drop covers** comprise a variety of customized overhead cover devices constructed from local sources of whole or parts of trees. These are often mid-stream devices placed on the edge of the main channel and parallel to the flow, or installed much like a root wad with the tree top placed in a downstream direction. These devices may be elevated using blocks or boulders and secured with rebar, cable restraints or entrenched into the bank and secured with rip-rap.

The following practices typically apply to coldwater (trout) fisheries:

Incision and Grade Controls

Streams naturally down-cut or adjust to major perturbations in the valley floor from years of sediment deposition. Down-cutting of the stream bed results in the stream incising the valley floor. The incision process creates raw banks that release tons of sediment to the stream bed annually. While this is a natural healing process, it can be accelerated through the installation of grade controls. Grade controls consist of a variety of weirs or sills constructed of logs, boulders and or rock placed across the channel and properly keyed into the bed and banks of the stream. Grade controls resist erosional forces and reduce the upstream energy slope to prevent bed scour. These are often built in combination with plunge pools or spawning riffles.

Channel Constriction

Unlike bank sloping which helps reduce sediment delivery from eroding stream banks, channel constriction facilitates silt removal. Streams that have become wide and sluggish with in-stream substrate dominated by sand and silt can be narrowed to increase velocity, expose coarse substrate for spawning and aquatic insect production, improve average depth, and reduce surface area. This deepening and narrowing will help retain groundwater temperatures conducive to long-term trout survival and reproduction, and limit exposure to hot and cold air temperature variations over the seasons. Wide, sluggish channels are often narrowed using standard bank sloping, grading, and rip-rapping at the water-land interface. Local stream segments in good shape can be used as guides for how much narrowing needs to occur. Caution is needed when narrowing small streams to prevent watercress or reed canary grass infestation, as this may lead to channel braiding and fishability concerns.

Deflectors and Stream Barbs

These devices are triangular structures placed along the bank and constructed of rock, logs, or a combination of the two. The primary purpose is to deflect the current away from the bank, which makes the stream narrower and deeper near the outer edge. This creates deep-water habitat and/or scours fine sediment, which improves coarse substrate and invertebrate and spawning habitat. These structures can be used in combination with boulders and root wads to improve adult trout cover.

Brush Bundles

In low-gradient streams with high sand and silt loads, brush bundles can be installed and staked into place as an alternative to using bank sloping and rip-rap to narrow streams. Brush bundles are placed in slow-moving areas along the banks and allowed to silt in, eventually becoming established vegetation. If placed as a deflector, sediment may accumulate downstream of the feature.

Shade

Trout have specific temperature requirements needed to carry out their life cycle. Both woodland and prairie streams support outstanding trout fisheries. Streams that suffer from thermal stress will benefit from stream narrowing, increased depth, and shade, whether provided by prairie grasses or suitable woody tree and shrub species. If woody vegetation is planted, species less likely to attract beaver are recommended.

Trout Cover

Trout cover comes in several forms: overhead cover, broken water, and depth. In each case cover provides protection from overhead predation and provides safe feeding lies. The physical or mechanical installation or manipulation of the in-stream cover can improve trout density and size structure. In many cases we attempt to mimic natural woody habitat using local sources of wood. The most common types of overhead cover used to restore trout streams in Wisconsin include:

- **Root wads** (see above)
- **Log or tree-drop covers** (see above)
- **Boom covers:** artificial devices designed to mimic a natural undercut bank. These are often placed on deeper inside bends of eroded stream banks and covered with rock and soil, then re-vegetated to appear as a natural undercut bank. Three types – Lunker, Sky Hook, and Jetted boom covers – are used in Wisconsin. Their use is dependent on stream gradient and substrate type. Such structures, placed properly in the stream, will last indefinitely. Caution is required in the presence of both brook and brown trout, as brown trout tend to dominate native brook trout in this type of habitat.
- **Boulder retard:** a large boulder (2-4 ft. in diameter) or cluster of boulders placed in runs or pools to create side cover, travel lanes and channel breaks. Boulders often are placed in conjunction with other habitat features to improve in-stream cover diversity.
- **Weirs, vanes, and plunge pools:** these structures create areas of deeper water in streams, with low current velocity where trout can avoid overhead predation and find secure overwinter cover. Depth of a suitable pool may vary based on species and stream width. Most pools are less than six feet deep. Large deep areas sometimes promote rough fish abundance over desirable coldwater species. Pools may be excavated or natural pools may be enhanced. Usually, some form of hydraulic lift and plunge is needed to maintain and

sustain pool creation or enhancement. This is accomplished using rock and/or log weirs and vanes. A large rock or log is placed across the entire stream width and keyed into the bank so that the base flow is directed away from the banks. The bed of the stream is raised slightly to create head. The plunging action of water flowing over the vane or weir creates or maintains a scour hole. Such pools may be enhanced by the addition of root wads, boulder clusters or bank covers.

Considerations

- Application of these techniques may differ depending on location in the state, type of stream, and target species.