HOW TO CREATE WOOD TURTLE NESTING AREAS

Richard R. Buech

and

Mark D. Nelson

USDA Forest Service
North Central Forest Experiment Station
1992 Folwell Avenue
St. Paul, MN 55108

Phone: (612) 649-5108

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INTRODUCTION

The wood turtle is distributed in the United States from the Midwest to the Northeast, but it is not abundant. Many states in the Midwest are concerned about a seeming scarcity of wood turtles, including Minnesota and Wisconsin, which list the wood turtle as "threatened". In Minnesota, wood turtles have been found mostly in the northeast and southeast. Only a few scattered records of wood turtles exist elsewhere in Minnesota. Although there is some uncertainty about their habitat requirements, our working hypothesis is that the availability of predator resistant nesting areas currently limits wood turtle populations in Minnesota. This document describes the natural history of wood turtles, summarizes their habitat requirements, describes elements of a suitable wood turtle nesting area, and offers preliminary suggestions on how to create and manage wood turtle nesting areas. The intent in offering these recommendations is to stimulate an interest in establishing pilot projects so that we can evaluate both the efficacy of the guidelines and the validity of our working hypothesis.

WOOD TURTLE NATURAL HISTORY

Historically, wood turtles were found in or near the moving water of medium-sized streams, rivers, and nearby riparian habitats in forested regions. Size of the channel can range from about 2-30 m as long as the bottom substrate is predominately sand or sand and gravel. Thus, they are not likely to be found in very small streams or very large rivers, or where the bottom substrate is predominately clay, silt, or muck. They tend to be associated with clear streams in reaches with intermediate gradients. Thus, they are also not likely to be found in polluted streams or stream reaches dominated by very slow moving water and extensive eutrophic pools, or rock and boulder rapids.

Wood turtles spend most of the year in riverine habitats. During winter, they hibernate on the bottom of streams. Spring and fall, they spend most time in the water, but emerge during the day in warm weather to bask and feed. However, wood turtles may become entirely terrestrial for a period during July and August. During the spring and fall transition periods, we found wood turtles basking near water in mature speckled alder and lowland hardwood floodplains. During the terrestrial period, they used a broad variety of forest and nonforest habitat types near water. They used both conifer (pine, spruce, and balsam fir) and hardwood (aspen, white birch, and lowland hardwood) forest habitats. They also used tall shrub habitats such as willow and mature speckled alder. Wood turtles seem to favor edge situations that have a well developed, but not overly dense ground vegetation layer. Thus, we also found them near the edges of nonforest habitats such as small grass openings, sedge meadows, and sphagnum bogs. Wood turtle use of ecotones between and on the margins of habitat types is probably related to their food habits. They are ominiverous, eating things such as the leaves of forbs, mushrooms, berries (e.g. strawberries, blueberries, raspberries), and invertebrates such as insects and worms. Wood turtles forage in the ground vegetation layer of terrestrial habitats. Some foods such as worms are found under dense canopies of mature lowland hardwoods and speckled alder, but other foods like berries are found where light reaches the ground such as in openings and under sparse tree canopies. There is little information on their food habits relative to aquatic foods.

The requirements of wood turtles for terrestrial habitats are general and most of these habitats are ubiquitous. Their requirements for aquatic resources seem only somewhat specific and constraining. So, what seems to be causing the scarcity of wood turtles? The basic problem seems to be poor recruitment to the population. Wood turtles are very long-lived species. They become sexually mature when about 12-15 years old and many live into their 30's and older. Females produce one clutch of 6-12 eggs annually. Clutches are laid in open sandy or sand-gravel nesting areas with preferably no vegetation. Such nesting areas require considerable disturbance to maintain, which might explain why wood turtles are usually found on medium-sized riverine systems and not on small streams, i.e. small streams don't produce a sufficient volume of water during flood stage to produce the hydraulic forces necessary to create and maintain nesting areas. The incubation period for wood turtle eggs is relatively short compared to other species, about 60 days under laboratory conditions. Because delayed overwinter emergence has not been observed in wood turtles, there may be a selective pressure for wood turtle eggs to hatch before winter. The specific nest site requirements and short incubation period may be a response to this selective pressure. The small clutch size and long life span suggests a life history strategy which has historically experienced difficulty with reproduction, i.e. because probability of survival of a clutch (and probably hatchlings as well) in any given year is low, females must produce many clutches over a long life span to replace themselves.

Although the habitat requirements of wood turtles are generally broad, two factors seem to limit their distribution and abundance where human caused mortality is minimal: availability of nesting areas and nesting success. Natural nesting areas used by females include sandy beaches on islands and main shoreline areas, sandbars, and cutbanks. However, females also nest in gravel and borrow pits and on highway and railroad banks near stream or river crossings. Although this has probably enhanced the availability of nesting areas, there is also a down side; the traffic produces adult mortality. Other direct negative effects of human activity on nesting areas include loss of nesting areas to impoundment, channelization, and bank restoration projects, and recreational use of sandy areas by swimmers, boaters, and canoeists. Human activity has also indirectly affected the nesting success of wood turtles. The expansion of the human population into forested regions brought an expansion of the range of skunks and raccoons into portions of the range of wood turtles where they did not historically exist. These species are very efficient predators of wood turtle eggs. Thus in addition to fox, wood turtles now cope with two more important egg predators. The cultural activities of man have negatively impacted wood turtles in other ways. For example, factors such as pollution, land use changes in the riparian zone (urbanization and agriculture), siltation, and collection for the pet trade have probably negatively affected wood turtle populations in many areas. As a result of these cultural influences, the current distribution of wood turtles differs from their historical distribution.

DESCRIPTION OF WOOD TURTLE NESTING AREAS

So far as we have determined, a good wood turtle nesting area has the following elements:

Location: In or near riverine habitat of medium sized streams in which pollution and siltation is low. Probably found historically in stream segments with high sinuosity and sand and gravel substrate. Presence of nesting areas created by human cultural activity can produce suitable habitat on smaller sized streams or where soil conditions would not otherwise be suitable, were it not for human activity.

Site factors: Nesting area in an opening with full exposure to the sun on the south in a 180 degree arc from east to west. The ratio of the radius (R) of the opening to the height (H) of the surrounding woody vegetation (R:H ratio) should be about 0.5-1.5 to maximize heat accumulation for egg incubation, taking into account the probable height of the surrounding tree canopy when mature. Proximity to backwater areas off the main channel provides an opportunity for females to accelerate egg development in spring. An ideal situation would be on an island in the middle of a backwater area or pond adjacent to river channel.

Substrate: Size of nesting area about 20 feet or more with an elevation of 3 feet or more above summer water levels. Substrate preferably washed sand to retard colonization by vegetation. Average sand or gravel is also acceptable, but more maintenance may be required to control vegetation. Exposure to sun is predominately southern. Ground vegetation is absent or very sparse.

Miscellaneous: The following factors are also desirable. Isolated in some manner from egg predators such as skunk, fox, and raccoon (remote from land use changes that would tend to increase abundance of egg predators or enhance access to nesting areas). Isolated from human disturbance factors such as vehicle traffic, recreational activity (camping and picnic sites, canoe landings, ORV activity), or stream management projects that would degrade or eliminate nesting areas (rip-rap or revegetation of nesting areas). Spaced at one, but no more than two or three mile intervals.

Examples: Wood turtles have been observed nesting on sand bars, sand points, cutbanks, gravel and borrow pits, road cuts and shoulders, railroad and highway bridge crossings, clearcuts, utility rights of way, and yards and gardens of riparian zone dwellings.

HOW TO CREATE WOOD TURTLE NESTING AREAS

Several ideas for creating nesting areas for wood turtles are given in the attached figures. The suggestions are based on an understanding of wood turtle behavior and not actual experience in creating nesting areas. Thus, the suggestions should be considered preliminary until experience validates their efficacy.

Figure 1: This suggestion seems most promising. It consists of a body of water connected or adjacent to a riverine system. The body of water could be a backwater or slough, oxbow, natural pond, excavated pond, or borrow pit. As a first choice, the nesting area would be placed in the center (to reduce the chance that an egg predator would detect a nest and swim out to the island). If the nesting area must be situated close to shore, it might help to situate the nesting area on the prevaling windward side of the pond. This location maximizes the downwind distance across water, thereby reducing the chance of an egg predator detecting nests through olfaction. If connected to shore, fencing might help deflect potential egg predators away from the area. The nest site should be fully exposed to the sun. As a rule of thumb, if the site is bounded on the south by forest, use a buffer of nonforest whose width is 0.5-1.5 times the height (preferably at maturity) of the surrounding trees. The nest island could be constructed when ponds or borrow pits are created, or in existing bodies of water with the use of bulldozers, front-end loaders, and backhoes during summer or on the ice in winter. Hydraulic pumps may be an option if the equipment is available and conditions are suitable.

Figure 2: On a smaller scale, small pools could be excavated off the side of the river channel to create a backwater area. Excavated material would be placed on a berm on the upstream side to protect the nest substrate during flood stage. Topsoil excavated from below the nest substrate is placed on top of the berm and sand nest substrate is situated adjacent to the excavated pool. Fencing is placed around the nest substrate, including in the water where the bottom of the fence is situated below water, but not extending to the bottom so as to allow access by turtles. As an option, the top of the nest substrate could also be fenced so as to further increase the effectiveness of the fence for excluding egg predators.

Figure 3: A variation of the above suggestions is to place small nest islands in backwater or sidewater areas; situated away from the hydraulic forces of flood stage. If exposed to current, the nest island could be rip-rapped or the sand could be contained within a log or rock crib.

Figures 4 and 5: For more natural and dispersed applications, wing deflectors (figure 4) and gambions (figure 5) could be installed to augment or create new nesting areas, using the natural hydraulic forces of flood stage. These methods best mimic historic nesting areas, but are probably more vulnerable to egg predators.

Figure 6: The purpose of this suggestion is to enhance nesting success. Fencing is placed so as to deflect predators away from existing nesting areas such as sandbars and cutbanks. Fencing is extended into the water. The strategy is to deflect egg predator travel away from the nesting area. Pragmatically, one could expect a reduction, but probably not an elimination of egg predation.

Realistically, because of economic considerations, the ideas for creating predator resistant nesting areas are best incorporated into other work projects, e.g. wetland mitigation, stream habitat improvement, road construction and maintenance, sand and gravel pit operations, .. any project which uses heavy equipment near suitable streams and rivers. Furthermore, depending on the nature of the project, site factors, and land owner policy,

project approval may be necessary from several government agencies. For example, the project may have to be approved by zoning regulators, state DNRs, and/or the Army Corps of Engineers.

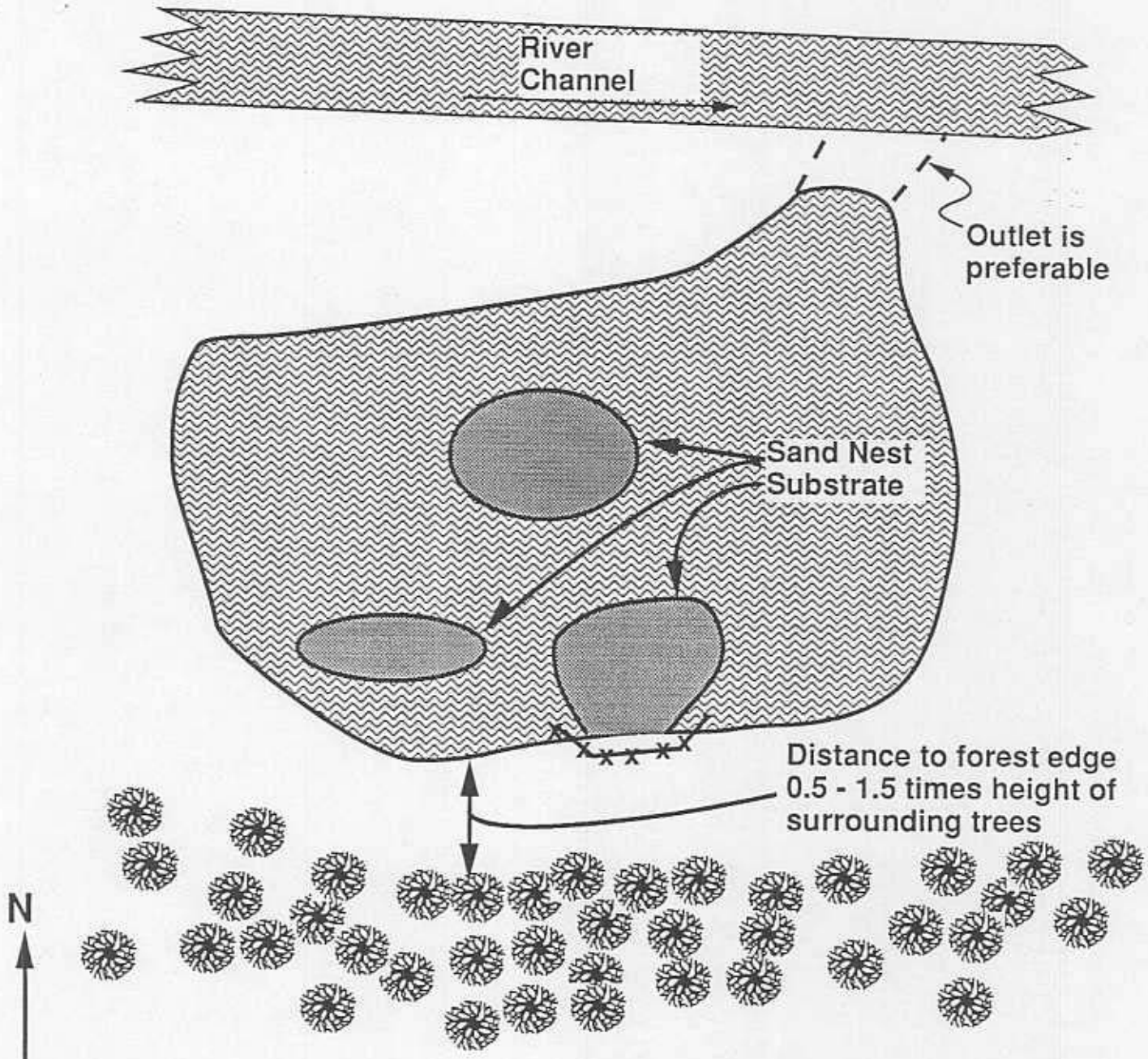
SUBSEQUENT MANAGEMENT

The creation of nesting areas is only the first step. Establishing use by wood turtles may take time. Although use of nesting areas by females tends to be traditional (females tend to return to the same nesting areas) there is some variation in this behavior. So, new nesting areas could be expected to receive eventual use if they are within a few miles of wood turtles. The alternative to waiting for natural emmigration is to accelerate establishment of nesting by translocating females to the nesting area (with approval of the state DNR). This alternative is probably better for situations in which nesting areas are created in stream segments not occupied by wood turtles. However, there is no experience to suggest an appropriate time to translocate females. I would suggest that first one try translocating females a few days prior to egg laying, i.e. any time eggs can be palpated in the body cavity anterior to the hing legs.

Once use is established, the next concern is maintenance, especially nesting areas containing structures illustrated in figures 1-3, and 6. Periodic inspections would be necessary to assure that structures and fencing are still performing as intended. It is also likely that vegetation would have to be periodically controlled on the nest substrate.

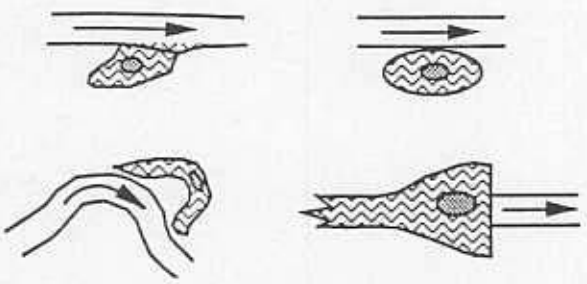
For the continuing management of wood turtles, all nesting areas should be located and recorded so that managers can determine whether any given project has the potential of impacting a wood turtle nesting area or other riparian or aquatic habitat important to a local population. Finally, it would be desirable to monitor use and nesting success at nesting areas as well as the abundance of wood turtles to assure that management plans are effective.

Figure 1



Pool could be:

- Natural backwater or slough
- Natural pond or oxbow
- Excavated pond in gravel pit
- Borrow pit
- Waterfowl impoundment



Sand Island created by:

- Bulldozer when pond created
- Front-end loader or backhoe existing pond, both summer and winter
- Trucked in during winter
- Hydraulic pump

Figure 2

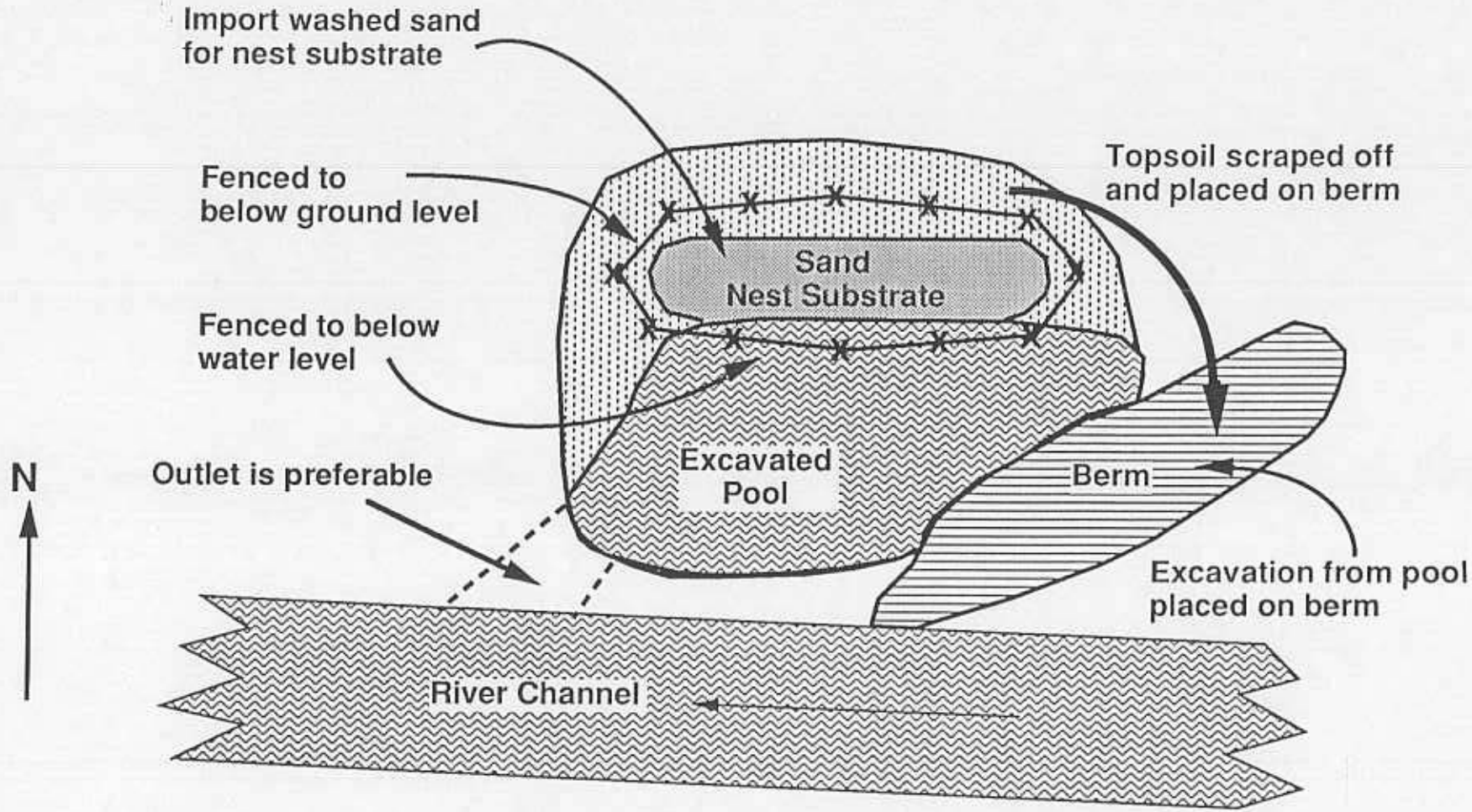

Import washed sand
for nest substrate
Fenced to
below ground level
Fenced to below
water level
Topsoil scraped off
and placed on berm
Sand
Nest Substrate
Excavated
Pool
Berm
Excavation from pool
placed on berm
N
Outlet is preferable
River Channel

Figure 3

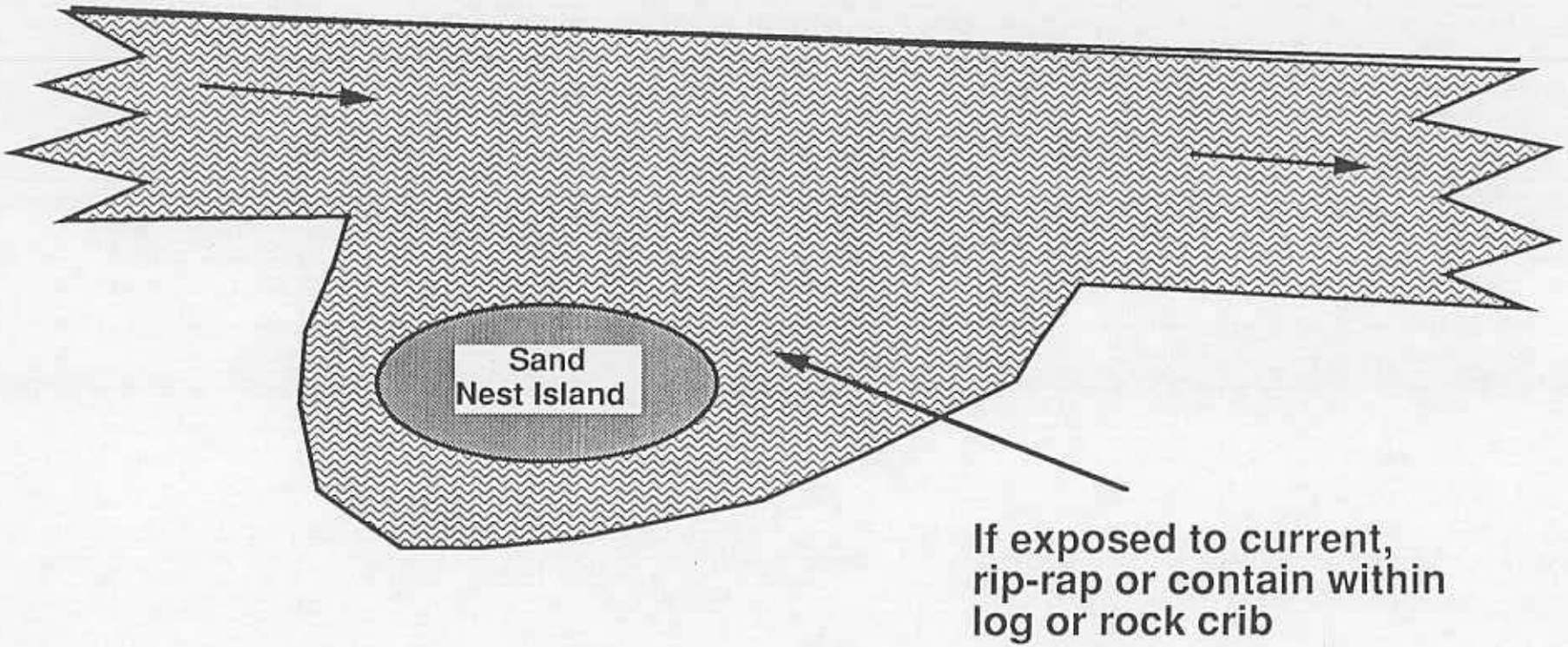

Sand
Nest Island
If exposed to current,
rip-rap or contain within
log or rock crib

Figure 4

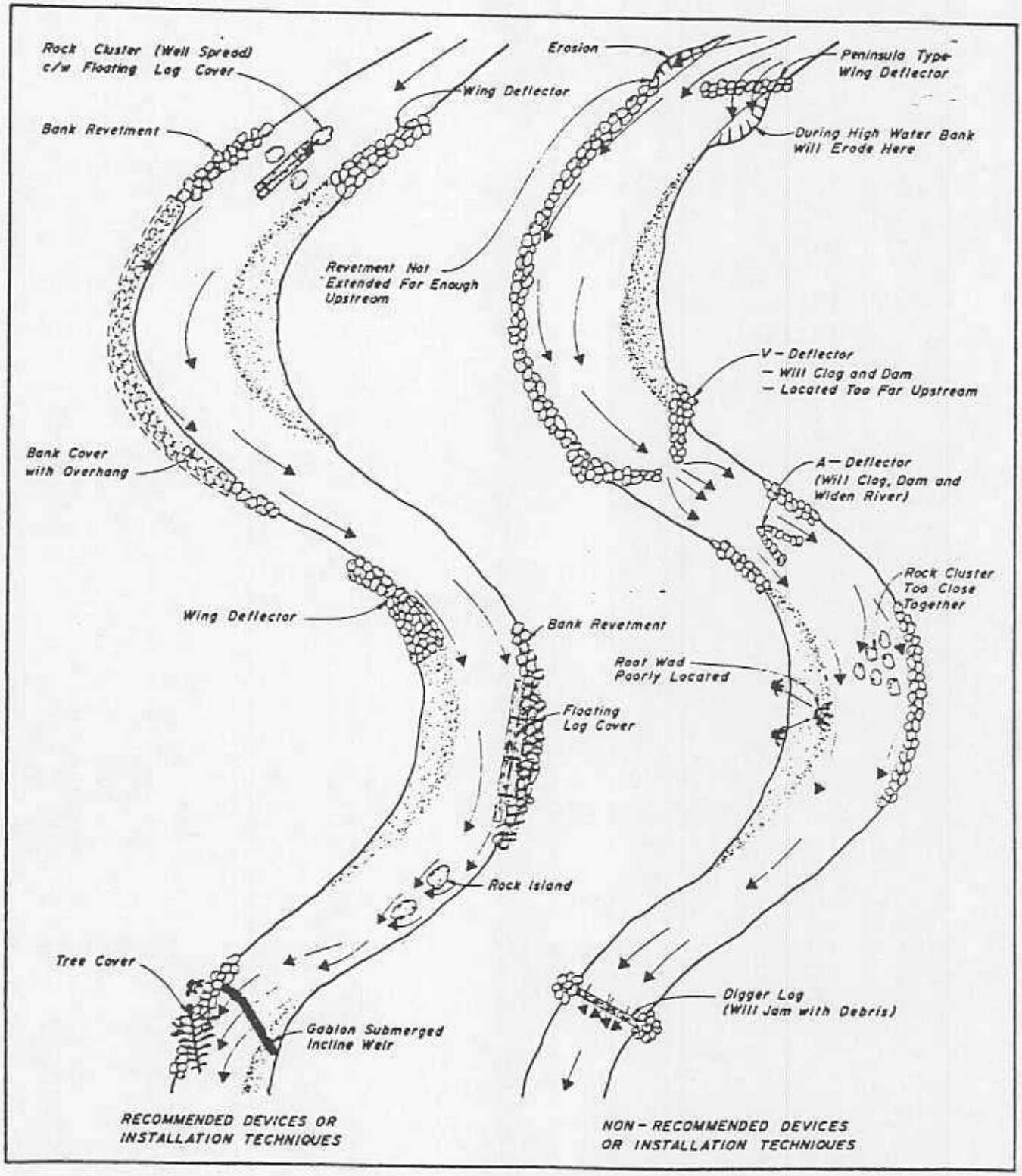
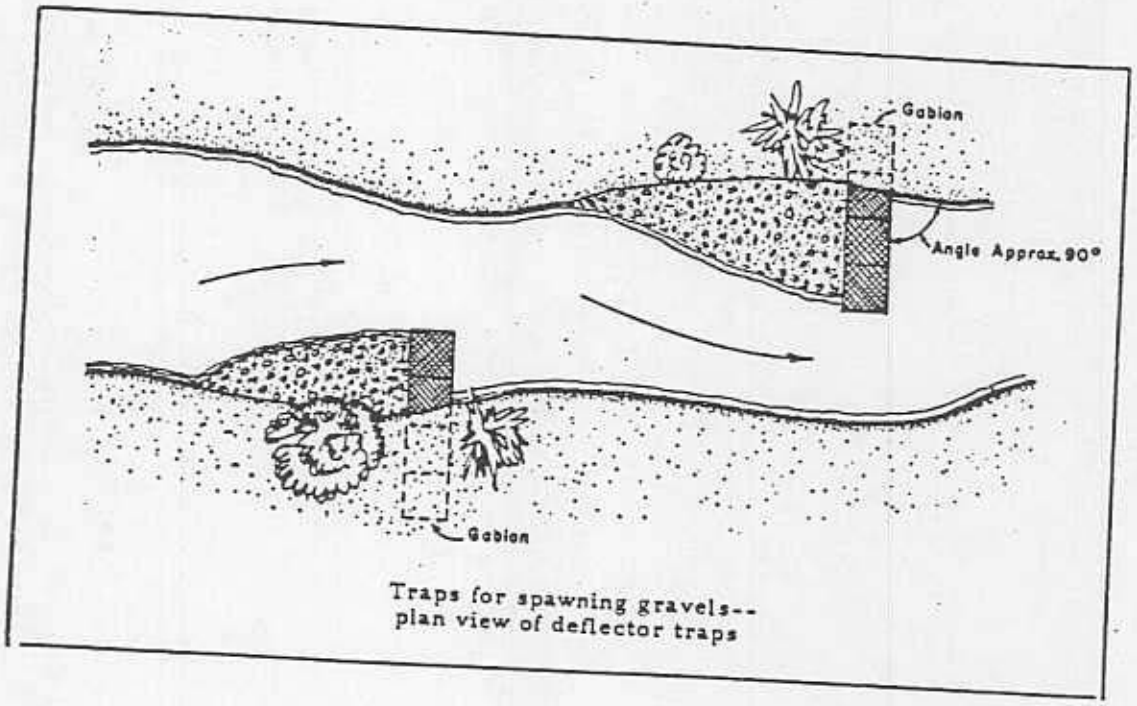


Figure 1-1. Recommended and nonrecommended stream improvement techniques.

Source: White and Bryunildson 1967

In: USDA FS Wildlife and Fisheries Habitat Improvement Handbook, 1988, p. 8:

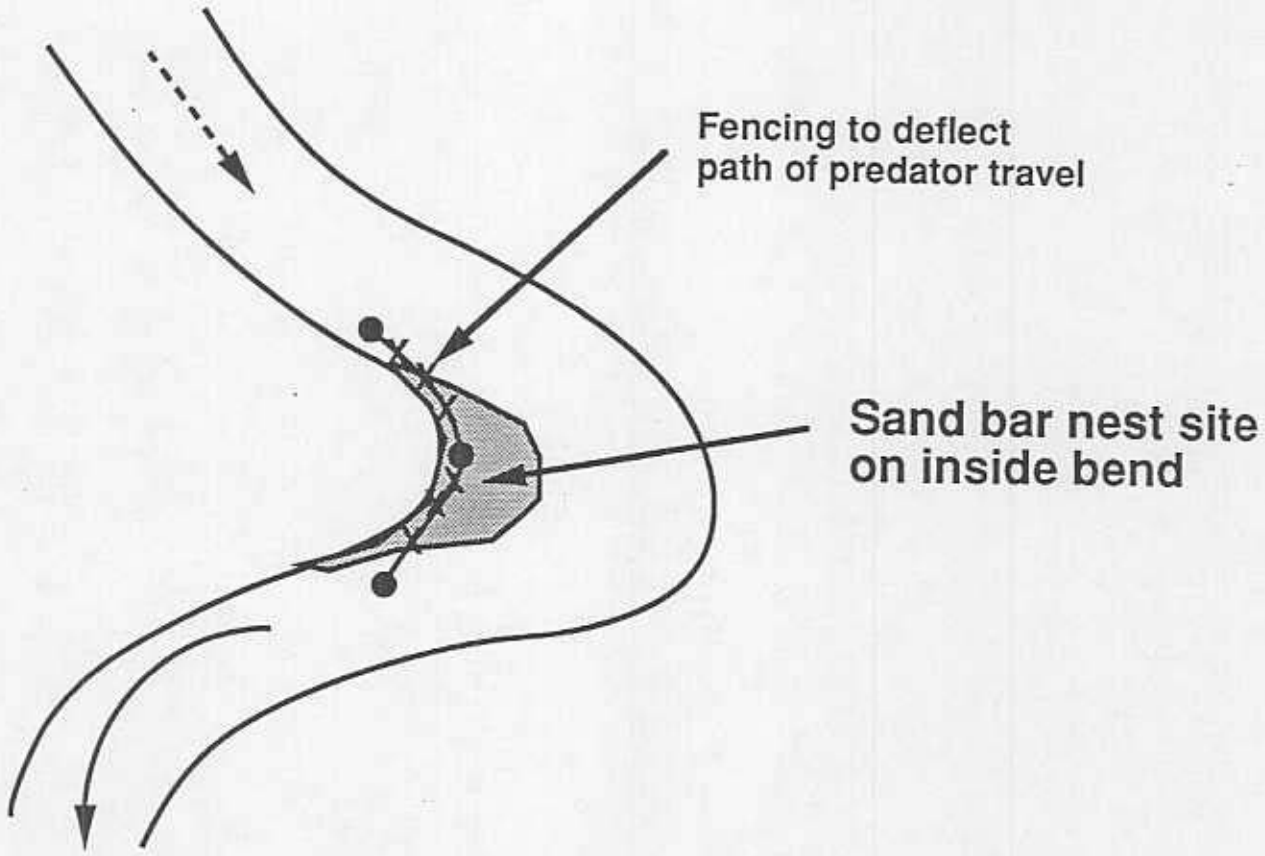
Figure 51

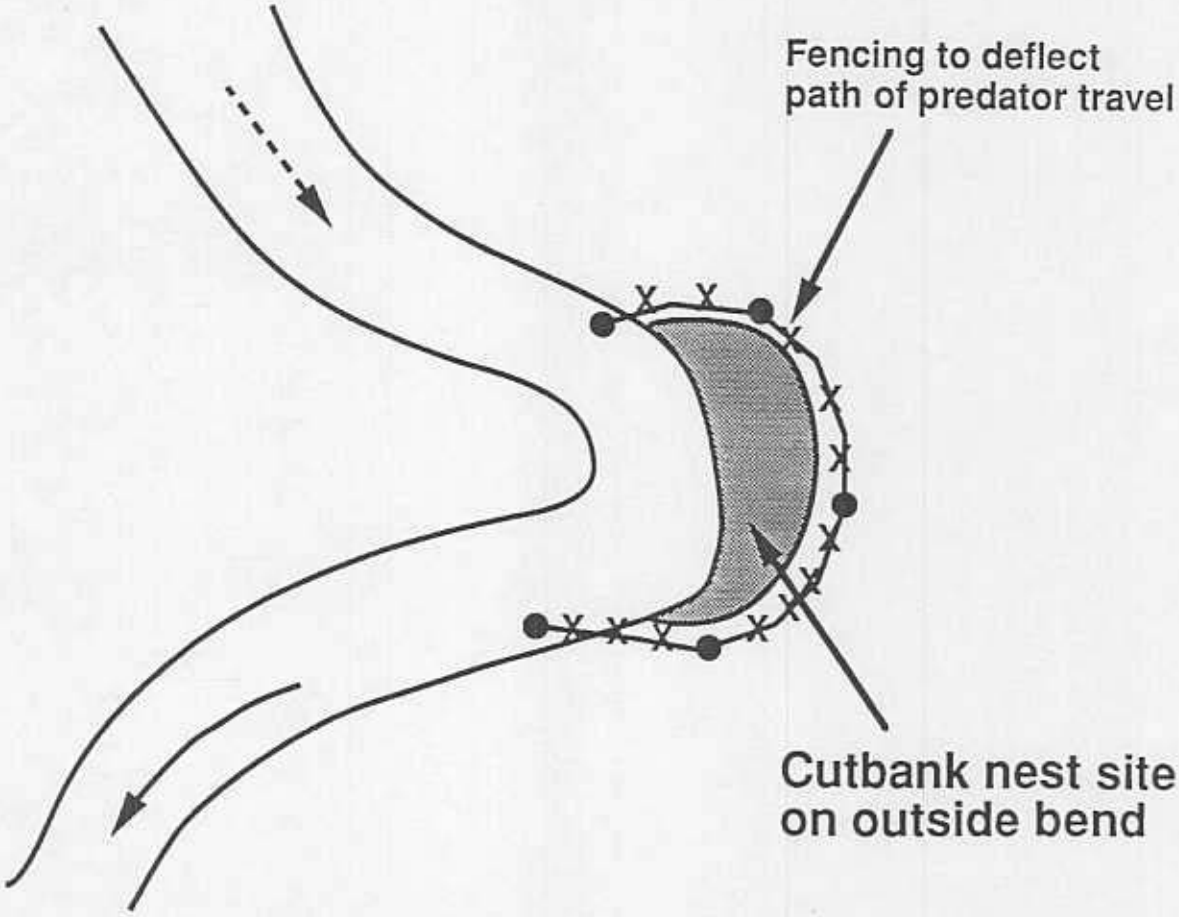


Traps for spawning gravels--
plan view of deflector traps

In: USDA, FS Wildlife and Fisheries Habitat Improvement Handbook, 1988, p. 60.

Figure 6.


Fencing to deflect
path of predator travel
Sand bar nest site
on inside bend


Fencing to deflect
path of predator travel
Cutbank nest site
on outside bend