

**A Guideline to Restore Anadromous Fish Runs in
Selected Tributaries of the NY/NJ Harbor Watershed**

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All tables and maps were created by the author.

All photographs were taken by the author, with the exception of photograph 8.

EXECUTIVE SUMMARY

The obstacles to the spawning success of anadromous fish which were documented in a preceding report, Impediments to the Spawning Success of Anadromous Fish in Tributaries of the NY/NJ Harbor Watershed [American Littoral Society, September 1992], have been reviewed. The tributaries most conducive to supporting anadromous fish spawning have been selected on the basis of examining the parameters which affect spawning success, including seasonal temperature, salinity, pH, dissolved oxygen, presence of pollution and debris, bottom consistency, and the current support or history of supporting a run. This supplementary management guideline gives outlined plans to restore anadromous spawning runs to nine Harbor tributaries.

On each of the nine tributaries selected for anadromous run restoration, the main factor which adversely affects anadromous spawning has been identified as the problem to be resolved, and the most effective solution and method needed to restore a run has been matched. The agenda needed to ensure run restoration differs for each tributary system, due to the variation in conditions. For each system, a series of necessary steps lead up to an ultimate goal, resulting in the restoration of an anadromous fish spawning run.

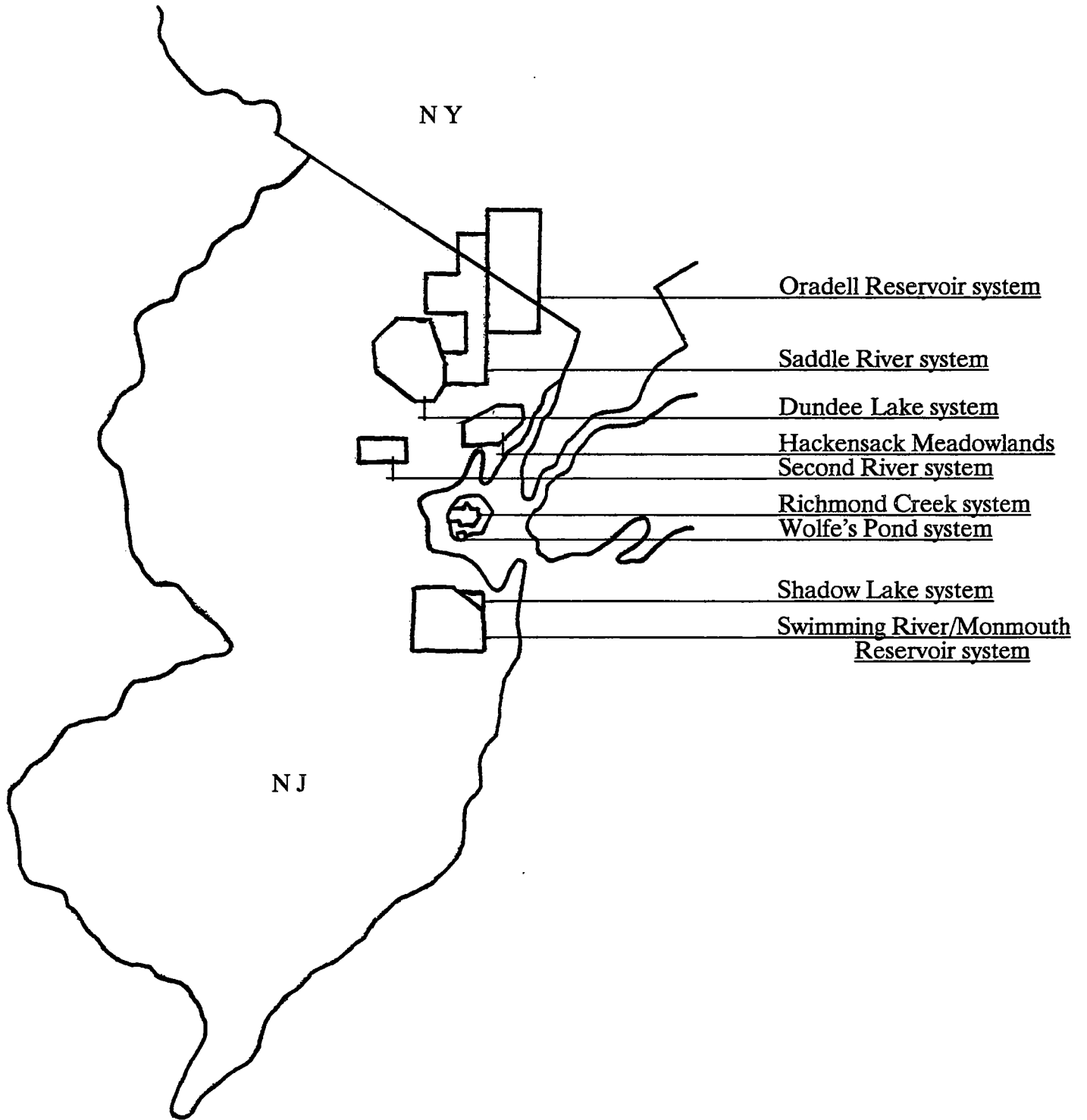
The map on the opposite page delineates the New York/New Jersey Harbor systems for which restoration is planned. Beginning at the southern edge of the study area and moving clockwise: Swimming River/Monmouth Reservoir and Shadow Lake drain to the Navesink River; Second River, Dundee Lake, and Saddle River are in the Passaic River network; the Hackensack Meadowlands and Oradell Reservoir are part of the Hackensack River; and Richmond Creek and Wolfe's Pond are located on Staten Island.

Tributaries physically blocked by dam impediments require bypass; this can best be achieved through the installation, maintenance, and operation of a fish bypass structure. Bypass through the use of a fish ladder is recommended for the large structural impediments known as Swimming River/Monmouth Reservoir Dam, Shadow Lake Dam, Dundee Dam, and Oradell Reservoir Dam. Bypass using a small fish bypass structure is suggested for the smaller impediments known as Richmond Creek Dam and Wolfe's Pond Dam.

On other waterways, such as the Second River and Saddle River tributaries and the section of the Hackensack River which is located in the Hackensack Meadowlands, unique programs have been created to optimize the present or future habitat to support anadromous fish spawning.

The purpose of this report is to unite the agencies, dam owners, and other important parties, to become cooperatively involved in anadromous fish run restoration. The exact steps needed have been created and are included in this report to hasten the process.

Map 1: Tributary systems for which anadromous fish run restoration is planned



INTRODUCTION

Locations on New York/New Jersey Harbor tributaries where anadromous fish spawning runs are adversely affected were presented in Impediments to the Spawning Success of Anadromous Fish in Tributaries of the NY/NJ Harbor Watershed, published by the American Littoral Society in September 1992. Tributaries which could best support an anadromous fish run have been chosen from those documented in the report, and plans to restore anadromous fish have been drafted for the systems. This report, A Guideline to Restore Anadromous Fish Runs to Selected Tributaries of the NY/NJ Harbor, offers management solutions which will result in the restoration of anadromous fish runs through the implementation of its plans.

The nine sites of restoration in this report are presented using descriptive sections. These sections and the purpose for including them in the report are described below. Additional sections may also appear in the report, which pertain only to particular systems.

Maps

At the beginning of each section, state maps are used to delineate the area of interest on a small scale; larger scale maps show the labeled tributary system, including the bodies of water connected to the tributary system being focused on, or those found between the primary and a secondary impediment, as specified. These system maps are presented with a compass and approximate scale. The drainage patterns and the stream and river names are compiled from United States Geological Survey (USGS) 7.5-minute topographic quadrangles and Hagstrom road maps. Drainage paths have been adjusted to depict the discrepancies found during field research.

Other miscellaneous maps found within the text are not accompanied by a scale because they are field sketches, included to show important areas in greater detail.

The primary impediment / main concern to anadromous fish migration

A primary impediment is the first blockage encountered by anadromous fish when migrating upstream during the spring spawning season, while a main concern is a factor which adversely affects anadromous fish spawning over a distance. Both represent the main problem to be addressed at the area of interest, and are solved within the restoration management guideline.

Other known obstacles / impediments

These have been found through field research; they are evaluated, and some are suggested for removal as part of the restoration plan for the tributary.

General observations

The information presented in these sections has also been compiled through field research. The tables and descriptive comments give information such as the type of land through which the tributaries flow, the volume of water in a stream, the speed of flow, the type of stream bed, an estimate of stream health, measure of debris, presence and extent of concrete bed, and other notable comments and observations.

Description of / accessibility to the area of interest

In these sections, the degree of accessibility to the location which is the focus of the management plan is outlined, including parking, footpaths, and whether the area is private or public property.

Fishing

The extent of use by fishermen is expressed for each area of interest.

If a license is needed to fish on any section of the tributary system being focused on, the requirement is stated. However, to avoid any possible misinformation, the areas for which a license is required and seasonal restrictions should be verified by the New Jersey State Department of Environmental Protection and Energy Division of Fish, Game and Wildlife (NJ DEPE DFGW) or the New York State Department of Environmental Conservation (NY DEC), respective to the state in which the water body is located.

The NJ DEPE DFGW Bureau of Freshwater Fisheries has compiled a list of areas which are open to public angling, and has rated them for fishing quality; this information has been included for the areas of interest to portray the productivity of the waters, and to list the specific species of fish which are present, along with an estimate of the size of the population.

The fishing section is further complemented by the stocking section, which immediately follows.

Stocking

Stocking an area above a primary impediment by state agencies proves the suitability of the water as fish habitat; this is the same area which will become accessible following the bypass of the primary impediment. It also shows that the waters are used by fishermen, and have a value as productive fishing grounds. The restoration of anadromous fish spawning to the areas above the primary impediments will increase its fishing value and biological productivity.

The information on the ranges, locations, and amounts of fish stocked have been provided by the NJ DEPE DFGW for New Jersey waters, and the NY DEC for New York waters. At some locations, the stocking of gravid anadromous adults may be necessary.

The stocking figures for 1991 in New Jersey are the raw data, and the 1992 and 1993 data are taken from planned, preliminary schedules. 1990, 1991, and 1993 New York data have been estimated from the 1992 figures, with the permission of the NY DEC Region 3 Fisheries Management Unit.

History of the tributary as an anadromous fish spawning run and Current anadromous fish spawning run conditions up to the primary impediment

Primary impediments which impound a great volume of healthy water were chosen for bypass. The presence of a run up to the base of a dam, and a history of a run on the tributary give additional support for the final choices. Spawning below the primary impediment indicates that anadromous fish are interested in the bypass of the impediment, and indicates that a fish ladder will be successful at the site.

Anadromous fish species of the New York/New Jersey Harbor area include Alewife (*Alosa pseudoharengus*), Blueback Herring (*Alosa aestivalis*), American Shad (*Alosa sapidissima*), and Striped Bass (*Morone saxatilis*). The spawning reports have been taken from Zich [1977] and Byrne [1986].

Use of the tributary by catadromous species

Catadromous species are born in saltwater, returning to freshwater to live as adults until spawning. Juvenile American Eels (*Anguilla rostrata*) have been reported to crawl over some of the dams included in this report. However, these same dams are impassable to migrating adult anadromous fish, who are significantly larger in size, and much less agile.

The use of the area above an impediment by catadromous species proves that the freshwater of the area is suitable for species with the type of life cycle which requires freshwater for a portion of life and saltwater for the other portion. The use of an area by catadromous species is difficult to determine, and usage may not be reported for some freshwater areas which may be used.

Significance of impediment bypass

Many primary impediments are located on migratory fish runways, and the installation of a fish ladder is required by New Jersey state law. New Jersey Statutory Annotated (N. J. S. A.) 23:5-29.1 states that "It is unlawful to construct a dam in any water of this state which is a runway for migratory fish without installing a fish ladder or other contrivance to permit the fish to pass over the dam in either direction ..." If a dam owner does not wish to comply with these conditions, enforcement of the requirement through legal action will be considered.

The gain of the bypass of an impediment, and also the resultant increase in the spawning output of the tributary, are both directly proportional to the volume of productive water above a primary impediment. Thus, the bypass of the dams chosen for fish ladder installation is of special importance.

Guideline to restore an anadromous run

At each site, a chronological series of steps has been developed to achieve the goal of restoring an anadromous fish run, including tasks for both the periods prior to and following the restoration of a run.

Informative contacts will be needed for the technicalities involved with fish ladders, including funding, design, construction, and installation aspects. The American Littoral Society Baykeeper will be seeking guidance from the United States Fish and Wildlife Service (US FWS), and the NJ DEPE DFGW Bureau of Marine Fisheries and Bureau of Coastal Engineering.

Potential volunteers

Restoration plans will be implemented most quickly through volunteer help. The volunteer groups listed have either expressed an interest in helping to implement restoration, or have been suggested as potential volunteers by various sources, due to the goals and interests of the group. All individuals and groups interested in volunteering for the program are urged to contact the office of the American Littoral Society Baykeeper.

Equipment needed to implement restoration

This section lists the items which are necessary to implement the restoration plans, including such activities as stream clean-ups and herring heaves.

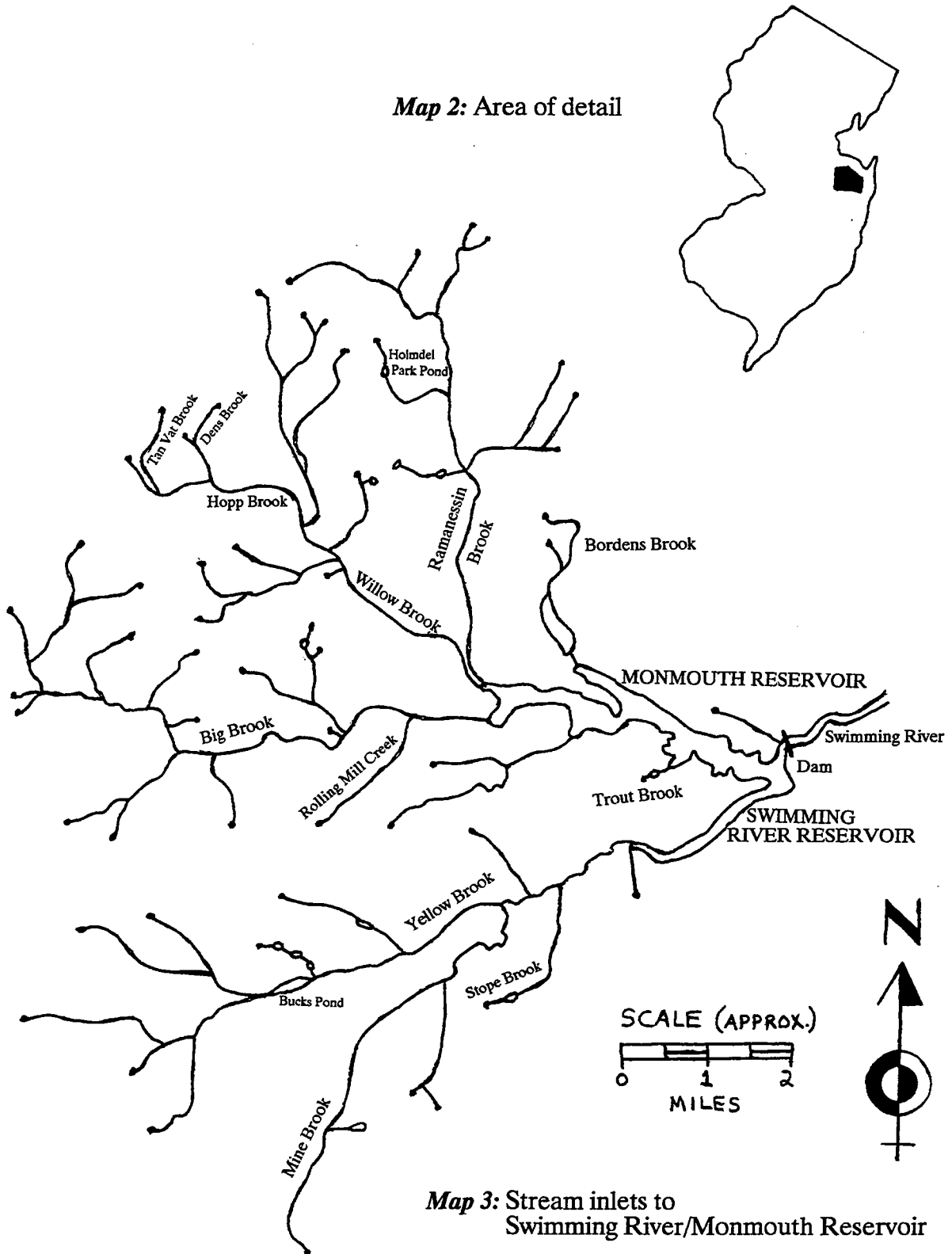
Suggested impediment removals

Impediments suggested for removal have been selected on the basis of the following rationale: small size; no longer being functional; no longer serving the original purpose; expiration or absence of a permit filed to obstruct a waterway; and the amount or quality of habitat above the impediment, which would become available following its removal. Some impediments which impound only a minimal amount of water are suggested for removal due to lack of a legitimate purpose.

NAVESINK RIVER

SWIMMING RIVER/MONMOUTH RESERVOIR

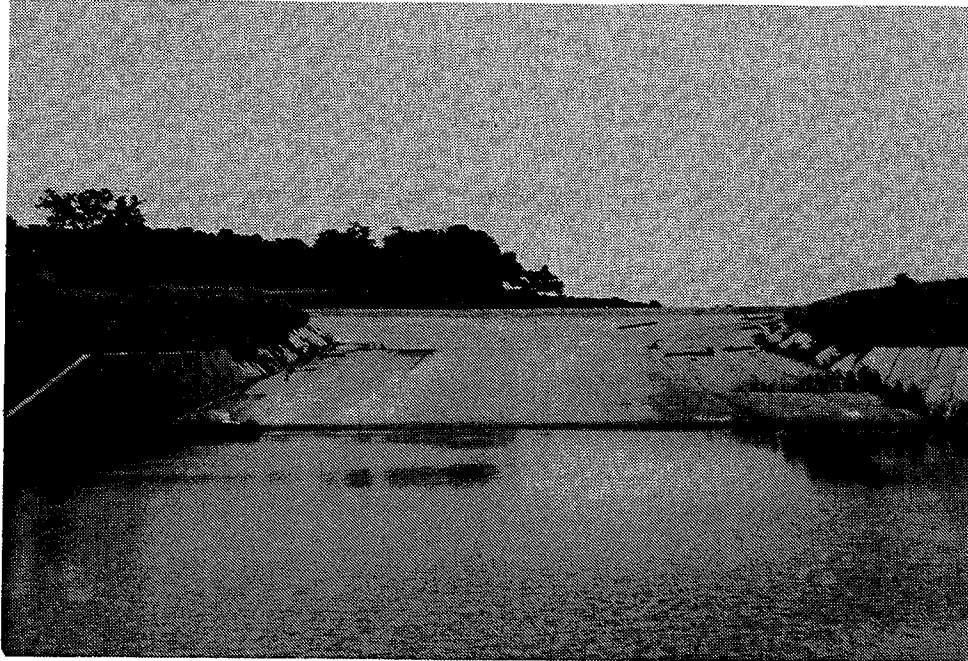
Map 2: Area of detail



Map 3: Stream inlets to
Swimming River/Monmouth Reservoir

The primary impediment to anadromous fish migration

Swimming River/Monmouth Reservoir is impounded by a concrete dam, which is the first blockage met when travelling upstream the Swimming River tributary of the Navesink River; there are no known blockages to fish passage downstream of this point.



Photograph 2: Swimming River/Monmouth Reservoir Dam

Owner: New Jersey-American Water Company

Location: Upstream of Swimming River Road, Lincroft
Monmouth County, New Jersey

Hydraulic height: 43 feet

Width: 400 feet

Constructed: 1901

Impoundment area: 557 acres

Impoundment volume: 8000 acre-feet

Spillway: uncontrolled

History and description of the dam area

Originally, Swimming River flowed through this area, and no lake was present. To create a drinking water reservoir, a high earthen bank was placed to stop the natural flow of the river. Eventually, a concrete dam was needed to further impound the extensive freshwater lake which formed.

Map 4: Swimming River/Monmouth Reservoir Dam area

