

## **CHURCHILL WOODS DAM MODIFICATION AND CHANNEL RESTORATION**

The Churchill Woods project is a cooperative project involving the DRSCWG, DuPage County Stormwater Management and the Forest Preserve District of DuPage County. The proposed project involves the removal of what is commonly known as the Churchill Woods Dam, the placement of two upstream riffles, and the restoration of approximately 13 acres of wetland plant communities and approximately 1 acre of mesic prairie.

The purpose of the Churchill Woods dam modification and wetland restoration project is to improve the ecological health of the East Branch by altering the existing dam. Project goals include elevating dissolved oxygen levels and minimizing diurnal fluctuations; restoring native wetland plant communities and their related ecological functions; eliminating the upstream impoundment where sediment is trapped, higher water temperatures occur, and excessive algal biomass is produced; improving sediment transport within the river segment and eliminating barriers to fish and mussel dispersion.

The project will remove the Churchill Woods Dam and install a reinforced riffle to control the water surface elevation (WSE) upstream of Crescent Boulevard. The two rock riffles will be installed approximately 2,000 ft upstream of the dam. Each riffle will have a top of rock elevation below the existing normal water level in the impoundment. The southern riffle will also be designed with a thirty-foot wide low flow notch to maintain a defined baseflow path. The riffles have been designed to avoid any temporary or permanent direct impacts to the adjacent wetlands.

The result of the dam modification will be a smaller impoundment downstream of the riffles. Upstream of the proposed riffles, the normal water level will be reduced, exposing some areas that are currently submerged. Approximately 9 acres along the north and south banks of the East Branch downstream of the proposed riffles will be exposed. These banks will be stabilized with native vegetation to prevent bank erosion. The lower reaches of the existing impoundment (downstream of the riffles) will remain a pooled area, preserving the existing islands.

All areas with less than 6 inches of water depth at base flow will be planted with various types of wetland vegetation to prevent bank erosion. Work is due to begin on the project in 2010.

## DAM FACT SHEET: Effects on Stream Quality

### Illinois Department of Natural Resources

There are currently over 1200 regulated dams on Illinois rivers and streams. While many of these dams are useful for water supply, navigation, recreation, power generation, and flood control, many others no longer serve their original function, and may present safety problems in some cases resulting in loss of life. Regardless of the purpose, all dams have significant negative effects on stream systems. As a result, evaluations of dam projects must consider not only the benefits of a dam, but also the substantial ecological and economic costs of dams.

#### Effects of Dams in Illinois

DNR studies indicate that dams affect all aspects of stream ecosystems, causing severe local impacts on upstream aquatic communities. Stream quality is determined by evaluating the fish community using a rating system ranging from "A" (highest rating) to "E" (lowest rating). Studies of 19 different dams have shown that the areas directly above dams consistently rate in the "D" range. Although dams of all sizes present problems, smaller, low head (<25 feet in height) dams are a primary management concern and have been the focus of recent studies:

#### Dams Degrade Water Quality

The slow moving water upstream of a dam provides favourable conditions for algae. Algal blooms cause dissolved oxygen and water clarity problems, which can continue downstream. During summer months, oxygen levels above low head dams often fall below IEPA water quality standards. Water temperature is often elevated above dams.

#### Dams Degrade Habitat

Reduced flow above the dam also causes deposition of sediments and organic material which covers existing rock and gravel substrate. This results in poor habitat for fish and bottom-dwelling organisms, which are key components of the aquatic food-chain. Natural features such as riffles and current breaks are also submerged.

#### Dams Effect Local Fish Communities

Poor habitat and water quality upstream of the dam favors more tolerant fish species. Typically, the pooled areas contain only about one-half the number of species found in free-flowing sections. Sport fish populations are also significantly lower in the upstream pools.

#### Dams Block Fish and Mussel Migration

In addition to local effects, dams block fish migration, affecting entire river systems. DNR studies have found that dams on small tributaries block spawning migrations of sensitive sucker species and sport fish such as smallmouth bass and channel catfish. Dams also prevent recolonization of fish and mussels (which "hitch a ride" on fish during the larval stage) following natural events such as floods and droughts or human disturbances.

On larger rivers, studies have shown dams block migration to critical spawning and over-wintering areas. Severe water quality problems have lead to the disappearance of many fish and mussel species. Numerous dams prevent migration back into historically degraded sections of the Fox, Des Plaines and DuPage Rivers, despite recent improvements in water quality. As a result, dams present a major impediment to aquatic ecosystem restoration efforts in these and other watersheds.

#### What Can Be Done?

In recent years, dam removal has become a commonly used restoration tool. American Rivers has reported 465 successful dam removals across the country. In Wisconsin more than 70 dams have been removed. Their studies have shown that dam removal is one of the most cost-effective stream restoration techniques and is almost always cheaper than repair or rebuilding options. Many local residents who were initially opposed to dam removal found that restored rivers added significant value to their communities.

Management of sediment accumulated behind a dam is often the most critical issue. Release of large amounts of fine sediment is not desirable and could affect downstream areas. Extreme care must be taken if sediments are contaminated. Rivers routinely move large amounts of sediment during high flow periods; therefore, some release of dam sediments may be acceptable. Typically, the long term benefits of dam removal outweigh the short term impacts.

As an alternative to removal, other solutions have been used to address dam problems. Fish passage structures have been used with some success, but do not address the habitat and water quality problems upstream of the dam. Other alternatives such as bypass channels, roughened ramps, dam lowering, and/or combinations of these techniques have been used. These solutions are typically more expensive and less effective for restoration than removal, but allow maintenance of useful dams and may help retain accumulated sediment.

#### What is happening in Illinois?

Dam issues are just beginning to be addressed on Illinois rivers and streams. One dam has been removed on a small Fox River tributary and other removals are in the planning stages. Alternatives are also being evaluated on a number of dams. Obviously, not all dams can, or should, be removed. However, as part of DNR's ecosystem management approach, we are beginning to consider the significant impacts dams have on our river resources and are evaluating alternatives to address these problems.

- There are more than 1200 dams on Illinois Rivers and Streams.
- Dams can be a safety hazard and may cause drowning.
- Dams severely impact rivers, degrading water and habitat.
- Fish communities are very poor in the area upstream of a dam.
- Dams inhibit fish and mussel migration and can severely limit watershed restoration.
- Most small dams have no flood control benefit and affect water level for a short distance upstream.
- Removal of a dam does not "dry up" the river.
- Dam removal or modification is a very cost- effective river restoration tool.

## **The following is a summary outline of benefits at the Preserves**

### **Ecological Goals and Benefits Targeted**

- ❖ To improve water quality parameters
- ❖ Restore to a free-flowing river segment
- ❖ Create diverse in-stream structure
- ❖ Provide habitat for a variety of aquatic communities
- ❖ Naturalization of the stream corridor.

### **Physical benefits** of dam removal:

- ❖ Restoring connectivity to river channel and floodplain
- ❖ Restoring hydraulic conditions with a more dynamic channel
- ❖ Restoring sediment and nutrient transport systems
- ❖ Increase Dissolved Oxygen (DO) and remove EPA impairment classification
- ❖ Decrease stream temperature
- ❖ Restore high and low flows that influence in shaping aquatic communities
  - Cleaning silt and sediments from gravels
  - Creating deposits of gravel for spawning

### **Biological benefits** of dam removal:

- ❖ Transporting food into the stream from terrestrial ecosystems
- ❖ Providing floodplain / wetland habitats for a diversity of wildlife
- ❖ Provide greater temporary flood storage during high water events and provide an increase capacity to hold water
- ❖ Increase the diversity of native vegetation within the stream and floodplain communities
- ❖ Increase fish migration capability
- ❖ Improve and restore spawning and rearing habitats throughout the reach
- ❖ Key links in life history of species can be dispersed for freshwater mussels
- ❖ Increase aquatic biodiversity of macroinvertebrate species within the stream
- ❖ Decrease sedimentation which reduces aquatic habitat

### **Economic benefits** of dam removal:

- ❖ Decreased liability exposure
- ❖ Decreased maintenance
- ❖ Increased safety for river users
- ❖ Regulatory requirements of the Illinois Dam Safety Program no longer apply

### **Recreation benefits** of dam removal:

- ❖ Increased fishing / access to river
- ❖ Increased wildlife viewing/ aesthetic pleasure
- ❖ Increase in future nature educational components