

# WAUSAU KAYAK COURSE FLOWS

## Summary

Water for the kayak races comes from existing river flow by routing a portion down the east channel course. It is not necessary to raise river flow for the races.

## Background

The development of a world class whitewater kayak course in downtown Wausau from a little used channel around one side of an island is an example of a recreational benefit derived from the river under the multiple use concept. It demonstrates cooperation among separate interest, i.e. a utility using river power to generate electricity, a community interested in benefiting from its natural attractions and a recreation group seeing potential for new uses of an existing but unused portion of a natural resource.

Several years ago, the east channel around Clarks Island in Wausau was modified to accommodate the kayak course. The course begins at a guard lock section at the upstream end and continues down the east channel to the point where the island ends and the east and west channels converge below the Wausau dam. The east channel normally passes just enough flow to maintain the aquatic resources in the channel. It was designed to pass high flows during floods or, in spring, to move ice around the main hydroelectric dam to protect the structure. The west channel contains the hydroelectric plant and is the channel through which most of the river normally flows.

## Understanding Hydro-Electric Generation

To understand how water is made available to the kayak course, it is necessary to understand river flow mechanics at the Wausau dam site. The dam is owned and operated by Wisconsin Public Service Corp. (WPS). The dam creates a 304-acre impoundment or lake upstream. The lake level is held constant to capture the full force of the water falling through the dam. While the hydropond level stays the same, the flow through the dam, something not readily seen or noticed, changes seasonally and sometimes daily.

The falling water's hydraulic force is directed against turbine blades in the powerhouse, located in the west channel. The turbines convert the water's power to mechanical energy through their connection to electric generators. As the turbines spin, the generators turn and produce energy. The Wausau dam has the capacity to produce 5,400 kilowatts of electricity using a maximum river flow of 3,500 cubic feet per second (cfs). During normal river flow conditions, the Wausau hydroelectric plant produces enough electricity to meet the residential needs of about 11,000 people.

When river flow rises about 3,500 cfs, gates in the dam structure next to the powerhouse are opened to spill the excess water so as to maintain a constant hydropond level. This situation often occurs in spring when the snow melts and rain falls and heavy runoff from the river's drainage basin creates high flows. These are also the times when the east channel may be used to divert excess flow around Clarks Island.

## Kayakers' Use of River Flow

To pass water down the east channel for the kayak races, a specially designed overflow gate in the guard lock section is lowered. The volume can be controlled by the gate operation. On average, the course uses 600 cfs depending on the level and type of race competition being conducted.

Water released into the east channel for the kayak course comes from the existing flow in the river at the time of the event. Water is not added to increase the flow by opening dam gates on the 20 upstream reservoirs operated

by Wisconsin Valley Improvement Company. The existing flow at Wausau is instead shared by the Wausau dam powerhouse and the kayak course.

It helps to use an example to explain how this is accomplished. To start, let's say the total flow at the Wausau dam is 2,000 cfs. Since the powerhouse has the capacity to use all of that flow (up to and including 3,500 cfs), all the flow is directed through the turbines and discharged below the powerhouse to continue on downstream. The east channel guard lock gates are closed.

On the day the kayak course is to be used, WPS personnel lower the special east channel guard lock gate and a flow of 600 cfs beings down the kayak course.

With the 600 cfs going down the east channel, 1,400 cfs is left to go through the powerhouse. Wicket gates on the turbines are closed so that only 1,400 cfs passes through the powerhouse. The net result is that the total flow through Wausau remains 2,000 cfs. Since these gate and turbine changes are all made at the Wasusau dam, the flow through the east channel can be easily adjusted for short periods of time without disrupting upstream and downstream river flow.

For its part, WPS gives up the 600-cfs portion of the low and electric generation is reduced. Through an agreement with the kayak race organization, WPS donates a portion of the flow, and for the remainder, charges a fee equal to the value of the lost generation.

If WPS did not share the existing flow between the two channels in this simple fashion, a more complex approach would be required, one that would negatively affect the coordinated management of the entire Wisconsin River system.

### Conclusion

The Wausau kayak course is an example of multiple use of a river resource, the periodic sharing of the river flow by a utility and a recreation group. Because of the river's configuration, a portion of existing river flow on the day of the kayak races can be diverted around an island and down a little-used channel, which has been modified into a world-class course. This cooperative approach takes advantage of the resource "as is" and doesn't disrupt the coordinated operation of the river system which relies on uniform flows to serve all interests, both public and private, upstream and downstream.