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RAPID RIVER FISHERY MANAGEMENT

By David P. Boucher

Caring for Maine's Outdoor Future

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Division of Fisheries and Hatcheries
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Job F-014
Interim Summary Report No. 4 (2007)
Rapid River Fishery Management

SUMMARY

The Rapid River, located in Township C and Upton in Oxford County, has long been noted for its outstanding brook trout population. Brook trout in the Rapid River are sustained entirely by natural reproduction and support a popular, heavily utilized sport fishery of regional and statewide significance. Landlocked salmon are also present and provide an important ancillary fishery. During the 1980's, smallmouth bass were illegally introduced into Umbagog Lake, where they became well established and have since migrated to the Rapid River.

A clerk creel survey was conducted in 2007 to monitor angler use, catch, and harvest subsequent to changes in fishing regulations and flow regimes, and to monitor the impacts of smallmouth bass.

Creel survey data suggested that a decline in brook trout production documented earlier (from 2002 to 2004) was at least partially arrested, and that the vigorous expansion of smallmouth bass numbers slowed or declined by 2007. It's likely that increasingly restrictive fishing regulations, beginning in 2004, were partially responsible for the positive trend. Three consecutive years of unfavorable flows for bass spawning (2005-2007), and the wet, cool conditions that prevailed during those years, were also important factors. By manipulating flows from Middle Dam, we'll maintain a high level of stress to smallmouth bass during their spawning, incubation, and early recruitment periods, and therefore maintain or improve conditions for trout survival.

KEY WORDS:BKT,LLS,SMB,ANGLER SURVEY,FLOW REGIMEN,REGULATIONS

INTRODUCTION AND STUDY AREA

The Rapid River, located in Township C and Upton in Oxford County, is 3.2 miles long from Middle Dam at the outlet of the Richardson Lakes to Umbagog Lake (Figure 1). This water has long been noted for its outstanding brook trout (*Salvelinus fontinalis)* population. Brook trout in the Rapid River are sustained entirely by natural reproduction and support a popular, heavily utilized sport fishery of regional and statewide significance. Landlocked salmon (*Salmo salar*) are also present and provide an important ancillary sport fishery. Salmon were introduced into this drainage during the late 19th century and became naturalized in the Rapid River. The salmon population is still supported by natural reproduction, although hatchery stocks contribute small numbers to the fishery as emigrants from upstream lakes.

Pond in the River (512 acres), located 0.6 miles below Middle Dam, divides the Rapid River into two reaches. Pond in the River has mean and maximum depths of 19 ft and 40 ft, respectively, and is an important habitat feature in the drainage because brook trout from the Rapid utilize it for summer temperature refuge and over-wintering (FPL Energy 2005, Jackson and Zydlewski 2007). Salmon use Pond in the River in similar ways but to a lesser extent.

The Rapid River and Pond in the River drain to 7,850-acre Umbagog Lake, which outlets to the Androscoggin River in New Hampshire. Umbagog Lake is largely homothermous and supports several warmwater fish species, so it provides only marginal habitat for cold water fishes. It does, however, provide important over-wintering habitat for Rapid River brook trout (FPL Energy 2005).

During the 1980's, smallmouth bass (*Micropterus dolomieu*) were illegally introduced into Umbagog Lake. They became well established there and have since migrated to other connecting waters, including the Rapid River and Pond in the River (Boucher 2002). Middle Dam restricts their natural migration into other waters in the Rangeley chain of lakes. Smallmouth bass interactions with brook trout, and strategies to mitigate them, have been extensively examined since 2005. Where pertinent, results of that work (Boucher 2005; Kleinschmidt Associates 2006, 2007, 2008) are summarized in this report.

Flows in the Rapid River are controlled at Middle Dam, located on the outlet of the Richardson Lakes. Middle Dam is one of several large dams controlling water levels on lakes in the upper Androscoggin River drainage. Currently owned by FPL Energy (FPLE), their primary function is to provide guaranteed minimum flows to a variety of downstream industrial and municipal interests. Middle Dam was recently re-licensed by the Federal Energy Regulatory Commission (FERC). Consequently, new summer and winter minimum flows were established for the Rapid River beginning in 2000.

Fishing regulations for brook trout are highly restrictive in the Rapid River and in the adjacent waters utilized by these fish. Improved access, higher angler use, and a decline

in fishing quality for brook trout observed from 1985 to 1995 prompted the Department to impose a catch-and-release regulation on brook trout in 1996. In 1998, a portion of the north basin of Umbagog Lake, where Rapid River brook trout over-winter, was closed to ice fishing after District Wardens reported harvests of significant numbers of large brook trout. In 2004, a 0.5-mile reach of the Rapid River below Pond in the River was closed to fishing after September 15 to eliminate hooking mortalities of pre-spawning brook trout staging in that area. That same year Pond in the River was closed to all fishing in July and August to protect brook trout seeking thermal refuge. Also in 2004, harvest rules on salmon were relaxed to reduce their abundance and minimize competitive interactions with trout. Other special fishing regulations on the Rapid River and Pond in the River include fly-fishing only, the prohibition of barbed hooks, and the harvest of smallmouth bass is unrestricted. Pond in the River is closed to ice fishing.

A clerk creel survey, funded and staffed by FPLE as a condition of FERC re-licensing, was conducted in 2007 to monitor angler use, catch, and harvest subsequent to changes in fishing regulations and flow regime, and to monitor fishery impacts of smallmouth bass. In this report, data from the 2007 survey were compared with similar surveys conducted in 1998-1999 (Boucher 2000) and 2002-2004 (Boucher 2002 and 2005), and with voluntary angler data collected annually since 2000.

METHODS

A creel survey and angler counts were conducted from early May to September 30, 2007 (Table 1). The river was divided into two sections (Figure 1) based on the intensity of angler use observed during previous surveys. The upper section extended from Middle Dam and downstream 1.3 miles to the lower end of Long Pool, excluding Pond in the River. The lower section, about 1.9 miles in length, extended from Long Pool to Umbagog Lake. The surveys were of a stratified random design, with one weekend day and one weekday sampled each week. Each survey day was divided into three time periods of equal length (8AM-12PM; 12PM-4PM; and 4PM-8PM). Time periods were sampled randomly within each survey day with approximately equal coverage given to each period throughout the survey. During each sampling event, clerks made instantaneous counts of anglers fishing each section, excluding those fishing Pond in the River. Standard clerk interviews were conducted at popular fishing spots to collect catch and harvest data. Total fishing effort for each section and the entire reach was estimated from formulae described by Pollack et al. (1994) for a roving survey.

SUMMARY OF FINDINGS

An estimated 3,605±843 angler trips were made on the Rapid River in 2007 (Table 2). Angler use data obtained since 2002 and 2004 indicate a declining trend. The development of excellent salmonid fisheries in nearby, more accessible rivers, such as the Magalloway River and Androscoggin River, may be drawing anglers away from the Rapid River.

The fishery continued to be focused on the upper 1.3-mile reach between Middle Dam and Long Pool (Table 2). In 2007, only about 8% of the total use occurred in the 1.9-mile reach from Long Pool to Umbagog Lake, which is more difficult to access (Figure 1).

The 2007 clerk survey showed the catch rate for brook trout µ12 inches (0.138 fish/hour) approximated that observed since 1998 (range of 0.086 to 0.172), but that the decline in catch rates for these larger trout observed from 2002 to 2004 was reversed (Table 3). The clerk data also showed catch rates of brook trout <12 inches stabilized since 2004 after declining steadily from 1998 to 2003. This statistic strongly suggested that recruitment of young brook trout stabilized after declining for several years.

The catch rate for legal-size salmon (µ12 inches) improved from 0.134 fish/hour in 2004 to 0.259 fish/hour in 2007 (Table 3). The catch rate for sublegal salmon (<12 inches) improved slightly as well. Anglers interviewed by clerks continued to release a high proportion of their legal salmon catch (98%).

Smallmouth bass numbers, as indicated by clerk catch rate statistics (Table 3), increased dramatically in the Rapid River from 2002 (0.011 fish per hour) to 2007 (0.182 fish/hour).

Catch statistics provided by volunteers from 2001 to 2007 (Table 4) were largely consistent with those from the clerk surveys. Catch rates for brook trout µ12 inches declined after 2002 before stabilizing in 2006 and 2007, albeit at a lower level. Catch rates for young trout (<12 inches) reported by volunteers were variable from 2001 to 2007, but indicated no upward or downward trend after 2002. However, catch/hour for trout <12 inches from volunteers was generally lower than during the 1998-2001 period.

Volunteer catch rates for legal-size salmon (µ12 inches) improved markedly from 2004 to 2007; sublegal catch rates were relatively stable during the same period. Voluntary anglers also released most of their catch of legal salmon (96-99% since 2005), despite more liberal harvest rules and active promotion of increased salmon harvest by Department staff and others.

Volunteers reported declining catch rates for smallmouth bass after 2005 (Table 4), which was inconsistent with the clerk data (Table 3). Had clerk surveys been conducted in 2005 and 2006, when volunteers began to report lower bass catch rates, it's possible that trends from the two data sources would have been more synchronized.

Average size of brook trout reported by volunteers (Table 4) ranged from 14.5 to 16.3 inches from 2001 to 2007, but showed no clear trend. The average size of salmon µ12 inches improved somewhat in 2007 to 14.9 inches. Average smallmouth bass sizes reported by volunteers have ranged from 5.5 to 7.8 in since 2001, suggesting this newly established riverine population was composed primarily of young fish.

DISCUSSION

Creel survey data collected from 2002 to 2004 suggested that recruitment and survival of brook trout, and of salmon to a lesser degree, deteriorated during that period. Probable causal factors, as reported by Boucher (2005), included increased cannibalism by adult brook trout, the colonization of smallmouth bass, an altered flow regime after 2000, and severe drought conditions that prevailed from 2001 to 2003. Beginning in 2003, several recommendations were made to provide additional protection to brook trout and their critical habitats, to reduce the abundance of brook trout competitors (including salmon), and to carefully assess the feasibility of using flow manipulations to reduce smallmouth bass production in the free-flowing reaches of the Rapid River system.

Most of the recommendations were implemented by 2007; these included a) certain brook trout habitats were closed to fishing during critical time periods, as described earlier; b) length and bag limits for salmon were relaxed and their harvest was encouraged; and c) studies were completed to determine if pulsing flows during key smallmouth bass life history events could reduce their production.

Creel survey data collected from 2005 to 2007 suggest that the decline in brook trout production documented earlier was at least partially arrested, and that the vigorous expansion of smallmouth bass numbers may have slowed or declined. It's likely that increasingly restrictive fishing regulations, beginning in 2004, were at least partially responsible for the positive trend. In particular, the fall-season closure below Lower Dam, where most adult brook trout stage for spawning, should have eliminated most hooking mortalities of gravid fish after 2003. Although hooking mortalities are believed to be low in the Rapid River, including during the early fall season, many individual brook trout are commonly hooked and handled repeatedly (evidenced by a high degree of facial scars). Heavily scarred fish often exhibit reduced growth and body condition (Boucher and Warner 2006, Bonney 2006), and they may be particularly vulnerable to the additional stress imposed by hooking, playing, and landing. The relaxed salmon regulations appeared to have little effect in reducing their abundance, as most anglers continued to release most of their catch.

Studies conducted by Kleinschmidt Associates (2006, 2007, 2008) documented that flow pulses from Middle Dam can negatively affect smallmouth bass reproduction in the Rapid River. In 2006 and 2007, short-term (±12-hour) flow releases of 1,200 cubic feet/second during the bass spawning period (late June to early July) were effective in destroying production of fry in at least 50% of studied nests. The data strongly suggested a negative correlation between high, erratic flows during the bass nesting period and juvenile bass recruitment. A similar pattern of high, fluctuating flows occurred naturally during the 2005 bass spawning period. We believe that three consecutive years of unfavorable flows during bass spawning, and the wetter conditions that prevailed during all three years, were at least partially responsible for the decline in bass recruitment and the stabilization of brook trout recruitment observed during the latest creel surveys. In

light of this, we have worked closely with FPLE to schedule annual pulsing flows from Middle Dam, insofar as hydrologic conditions permit, during the late June-early July period (Appendix A). This should maintain a high level of stress to smallmouth bass during their spawning, incubation, and early recruitment periods, and therefore maintain or improve conditions for trout survival. A detailed monitoring plan has been designed to provide a long-term assessment of this strategy.

RECOMMENDATIONS

1. Continue to collaborate with other fishery professionals, FPLE, FERC, and the public to determine the long-term effectiveness of the flow manipulation strategy in reducing smallmouth bass production. If possible, seek adjustments in the river's licensed flow regime to accommodate the late-June/early July releases during as many years as possible.

2. Maintain the current suite of fishing regulations, and continue to promote the increased harvest of landlocked salmon to lessen competitive interaction with brook trout.

3. Continue to closely monitor trends in spawning and recruitment success, age and growth, size structure, and sport fisheries for brook trout, landlocked salmon, and smallmouth bass.

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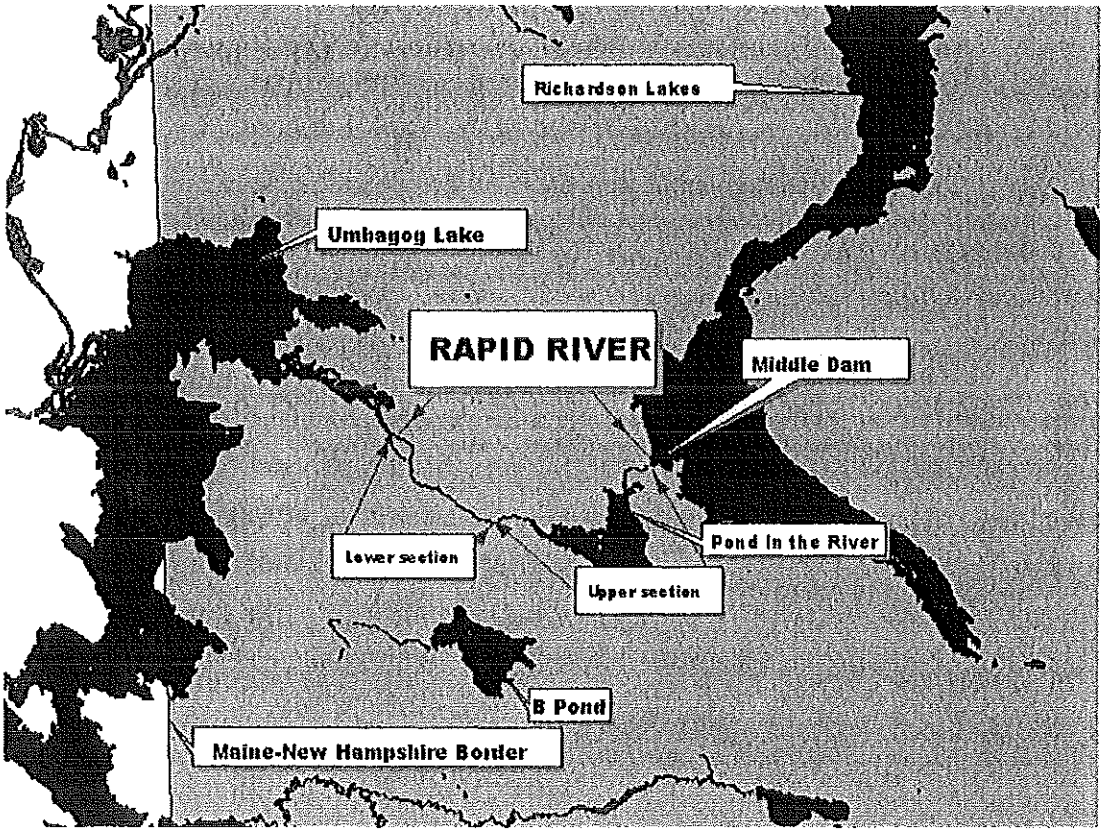
Figure 1. Site location map for Rapid River creel surveys, 1998-2007.



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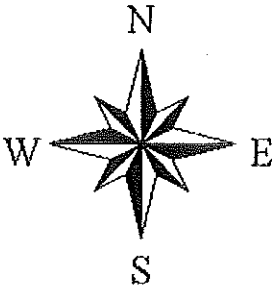

Table 1. Description of Rapid River clerk creel surveys.

Year	Date	No. days surveyed	No. days in season
1998	May 11–September 30	31	183
1999	May 14–September 30	28	183
2002	May 14–September 30	43	183
2003	May 3–September 30	49	183
2004	May 1–September 30	45	183
2007	May 1–September 30	48	183

Table 2. Angler effort estimates for the Rapid River, 1998-2007. Confidence limits (95%) are in parenthesis.

	Upper reach (1.3 miles)		Lower reach (1.9 miles)		Both reaches (3.2 miles)	
Year	Trips	Trips/mile	Trips	Trips/mile	Trips	Trips/mile
1998	6,471 (2,099)	4,978 (1,615)	677 (477)	356 (251)	**7,035 (2,208)**	**2,198 (690)**
1999	8,317 (2,025)	6,398 (1,558)	760 (626)	400 (329)	**8,728 (2,133)**	**2,728 (667)**
2002	4,446 (1,275)	3,420 (981)	531 (324)	279 (171)	**4,926 (1,358)**	**1,539 (424)**
2003	5,255 (1,252)	4,042 (963)	180 (131)	95 (69)	**5,435 (1,298)**	**1,698 (406)**
2004	4,686 (1,265)	3,605 (973)	425 (285)	223 (150)	**5,101 (1,366)**	**1,594 (427)**
2007	3,341 (815)	2,570 (627)	270 (143)	142 (75)	**3,605 (843)**	**1,126 (263)**

Table 3. Summary statistics for Rapid River clerk creel surveys, 1998-2007[1].

Parameter	Species	Survey year 1998	1999	2002	2003	2004	2007
No. anglers surveyed		210	158	357	721	689	363
No. hours surveyed		882	1,004	1,391	2,545	2,554	1,374
No. (%) successful anglers	Brook trout	49 (23)	39 (25)	72 (20)	169 (23)	131 (19)	81 (22)
	Salmon	83 (40)	66 (42)	77 (22)	161 (22)	179 (26)	127 (35)
	Smallmouth bass	0	2 (1)	6 (2)	26 (4)	50 (7)	48 (13)
No. legals caught[2]	Brook trout	176	83	155	366	226	169
	Salmon	244	138	190	279	318	323
	Smallmouth bass	0	6	13	68	135	141
No. (%) legals released	Brook trout	176 (100)	83 (100)	155 (100)	366 (100)	226 (100)	169 (100)
	Salmon	242 (99)	135 (98)	190 (100)	278 (99)	315 (99)	318 (98)
	Smallmouth bass	0	6 (100)	8 (62)	17 (25)	7 (5)	9 (6)
No. (%) sublegals	Brook trout	221 (56)	186 (69)	144 (48)	143 (28)	173 (43)	109 (39)
	Salmon	215 (47)	158 (53)	413 (68)	631 (69)	320 (50)	199 (38)
	Smallmouth bass	0	0	*	*	*	*
Catch/hour (legals)	Brook trout	0.172	0.104	0.152	0.130	0.086	0.138
	Salmon	0.321	0.160	0.154	0.114	0.134	0.259
	Smallmouth bass	0	0.009	0.011	0.050	0.065	0.182
Catch/hour (sublegals)	Brook trout	0.307	0.219	0.128	0.061	0.080	0.104
	Salmon	0.330	0.191	0.389	0.269	0.147	0.187
	Smallmouth bass	0	0	*	*	*	*
Estimated no. legals caught[3]	Brook trout	5,909±1,855	4,626±1,130	2,119±584	2,772±662	1,673±448	1,680±393
	Salmon	8,161±2,561	7,593±1,856	2,611±720	2,120±507	2,357±631	3,209±751
	Smallmouth bass	0	349±85	197±54	489±117	1,000±268	1,399±327

[1] Mean catch/ hour computed from both complete and incomplete trips. Confidence limits (±), where reported, are at 95%.
[2] For the purpose of this summary trout 12 inches and longer were considered legal fish during all years. Legal salmon were 14 inches prior to 2004 and 12 inches thereafter.
[3] Total catch estimated from catch/angler trip (total ratio estimator).

Table 4. Summary statistics for Rapid River voluntary surveys, 2001-2007

Parameter	Species	Survey year 2001	2002	2003	2004	2005	2006	2007
No. anglers surveyed		161	167	151	155	148	120	137
No. hours surveyed		521	521	494	504	574	516	684
No. (%) successful anglers	Brook trout	51 (32)	79 (47)	50 (33)	59 (38)	35 (24)	30 (25)	51 (37)
	Salmon	63 (28)	42 (25)	47 (31)	68 (44)	59 (40)	68 (57)	72 (53)
	Smallmouth bass	4 (2)	19 (11)	14 (9)	29 (19)	61 (41)	29 (24)	39 (29)
No. legals caught[4]	Brook trout	96	112	98	88	42	44	106
	Salmon	94	132	94	134	135	185	195
	Smallmouth bass	15	28	40	88	264	93	95
No. (%) legals released	Brook trout	96 (100)	112 (100)	98 (100)	88 (100)	42 (100)	44 (100)	106 (100)
	Salmon	92 (98)	131 (99)	94 (100)	120 (90)	134 (99)	180 (97)	187 (96)
	Smallmouth bass	0 (0)	3 (11)	12 (30)	31 (35)	107 (41)	12 (13)	14 (15)
No. (%) sublegals	Brook trout	112 (54)	69 (35)	24 (20)	50 (36)	31 (43)	19 (30)	37 (26)
	Salmon	157 (63)	138 (55)	101 (52)	108 (45)	164 (55)	92 (33)	63 (24)
	Smallmouth bass	*	*	*	*	*	*	*
Catch/hour (legals)	Brook trout	0.312	0.324	0.222	0.187	0.128	0.203	0.192
	Salmon	0.197	0.259	0.212	0.278	0.296	0.478	0.463
	Smallmouth bass	0.033	0.052	0.109	0.196	0.766	0.421	0.366
Catch/hour (sublegals)	Brook trout	0.594	0.168	0.090	0.183	0.102	0.054	0.164
	Salmon	0.616	0.397	0.258	0.256	0.429	0.236	0.214
	Smallmouth bass	*	*	*	*	*	*	*
Mean length (inches) of fish reported ±SE	Brook trout	15.0±0.3	16.0±0.2	15.8±0.3	15.2±0.2	14.5±0.4	16.3±0.6	15.7±0.3
	Salmon	15.7±0.2	16.2±0.2	16.4±0.2	14.2±0.2	13.5±0.2	13.8±0.2	14.9±0.2
	Smallmouth bass	7.8±1.2	7.4±0.5	7.6±0.5	5.5±0.3	5.9±0.2	5.9±0.3	6.9±0.6

[4] For the purpose of this summary trout 12 inches and longer were considered legal fish during all years. Legal salmon were 14 inches prior to 2004 and 12 inches thereafter..

Appendix A. Flow regime for Rapid River smallmouth bass control. [5]

This proposed flow schedule is designed to maximize negative impacts to smallmouth bass spawning and recruitment processes in the Rapid River, and is based on the findings of in situ observations made in 2006 and 2007 (Kleinschmidt Associates, 2007 and 2008), and on a thorough review of the scientific literature. These findings include:

- The timing of bass spawning, incubation, and hatching to the most vulnerable life stages occurs in the Rapid River with some degree of inter-annual predictability.
- In the Rapid River, more nests are constructed in "flow-vulnerable" locations when discharge during the mid to late June period is maintained at 400-800 cubic feet/second (cfs) rather than at +1,000 cfs.
- Smallmouth bass black fry are most vulnerable to flow pulses during the last week of June and the first week of July.
- Bass spawn in successive cohorts, therefore multiple pulses are required
- Multiple pulses of 1,200 cfs for at least 10 hours per pulse appear to be effective
- Bass fry rise from the nests at night and therefore nocturnal pulsing is probably more effective than daytime pulsing
- Nocturnal pulsing is less disruptive to angling activities
- By late June, brook trout fry are sufficiently mobile (>50mm) and are able to seek velocity refuge, and so are not negatively impacted by temporary increases in flow rate.
- Overwinter survival of first-year smallmouth bass can be negatively impacted by erratic flows during their initial growth stanza, and late during their first winter at large.

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[5] MDIFW proposes to alter the license provision (article 402) designed to limit lake trout spawning success in Richardson Lake, as follows: ***"After October 15, drop the water at least 5 feet below the October 1 level..." to "After October 15, drop the water level to lake elevation 1,442 feet msl to preclude lake trout spawning...".*** Reference DIFW letter dated August 31, 2006 for supporting data and discussion in support of this change.

Appendix A (cont'). Flow regime for Rapid River smallmouth bass control.

Date	Discharge	Duration	Time of day
June 15 to June 25	Maintain at 400-800 cfs, when compatible with upstream and downstream license requirements.		
June 27	1,200 cfs	10-12 hours	8PM-8AM
June 30	1,200 cfs	10-12 hours	8PM-8AM
July 3	1,200 cfs	10-12 hours	8PM-8AM
July 6	1,200 cfs	10-12 hours	8PM-8AM
3rd weekend in July	1,300-1,800 cfs	Whitewater boating flow	Per license
4th weekend in July	1,300-1,800 cfs	Whitewater boating flow	Per license
1st weekend in August	1,300	Whitewater boating flow	Per license
2nd weekend in August	1,300-1,800 cfs	Whitewater boating flow	Per license
March 15-30	As much as possible	As long as possible	No restrictions

Note: Annual implementation of these flows will be contingent upon the ability of the licensee to provide them within the context of FERC requirements elsewhere in the drainage.

COOPERATIVE

STATE SPORT FISH RESTORATION FEDERAL

PROJECT

This report has been funded in part by the Federal Aid in Sport Fish Restoration Program. This is a cooperative effort involving federal and state government agencies. The program is designed to increase sport fishing and boating opportunities through the wise investment of anglers' and boaters' tax dollars in state sport fishery projects. This program which was funded in 1950 was named the Dingell-Johnson Act in recognition of the congressmen who spearheaded this effort. In 1984 this act was amended through the Wallop-Breaux Amendment (also named for the congressional sponsors) and provided a threefold increase in Federal monies for sportfish restoration, aquatic education and motorboat access.

The Program is an outstanding example of a "user pays-user benefits", or "user fee" program. In this case, anglers and boaters are the users. Briefly, anglers and boaters are responsible for payment of fishing tackle excise taxes, motorboat fuel taxes, and import duties on tackle and boats. These monies are collected by the sport fishing industry, deposited in the Department of Treasury, and are allocated the year following collection to state fishery agencies for sport fisheries and boating access projects. Generally, each project must be evaluated and approved by the U.S. Fish and Wildlife Service (USFWS). The benefits provided by these projects to users complete the cycle between "user pays — user benefits".

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