FPL Energy

ORIGINAL

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October 28, 2005

Ms. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: INDIAN POND PROJECT, FERC NO. 2142
DESKTOP REVIEW FOR FISHERIES ENHANCEMENTS

In compliance with Section 3.3.3.2 of the Indian Pond Settlement Agreement and Article 401 of the new FERC license, please find attached a Report entitled "Desktop Review for Fisheries Enhancement at the Indian Pond Project".

A draft of this report was submitted to the Maine Department of Inland Fisheries and Wildlife (MDIFW), U.S. Fish and Wildlife Service (USFWS), Trout Unlimited (TU), Maine Trout (MT), and the Forks Chamber of Commerce (FCC) on September 16, 2005, for review and comment. A consultation meeting with the above parties was subsequently held on October 20, 2005 to go over the report. Consensus on the report's findings and conclusions was reached during the consultation meeting and the final report incorporates verbal comments from the meeting. The FCC was unable to attend the October 20, 2005 consultation meeting and was subsequently contacted by FPLE via telephone on October 25, 2005. The FCC indicated at that time that it would support the final conclusions in the report based on the October 20, 2005 meeting.

If you have any questions, please contact Bob Richter at (207) 795-1342, Ext 243.

Sincerely,

for

Christopher R. Shaw
General Manager
FPL Energy Maine Generation

ORIGINAL

Desktop Review
for
Fisheries Enhancement
at the
Indian Pond Project
FERC No. 2142

Submitted by:
Robert Richter
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150 Main Street
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Prepared by:
E/PRO Engineering & Environmental Consulting, LLC
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October 28, 2005

CERTIFICATE OF SERVICE

Indian Pond Project, FERC No. 2142

I, Robert C. Richter III, RCR, Senior Environmental Specialist for FPLE, hereby certify that eight (8) copies of the foregoing have been transmitted to the following parties of record on October 28, 2005:

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1.0 INTRODUCTION AND PURPOSE OF STUDY

The license for the Indian Pond Project (FERC No.2142) was issued on January 14, 2004. In part, this license enforces the conditions of the Indian Pond Settlement Agreement, dated July 25, 2001. Section 3.3.3 of this agreement mandates fisheries enhancements for the Indian Pond Project. Based on the prescriptions of the Settlement Agreement and the license, the Desktop Review Study Plan for Fisheries Enhancements at the Indian Pond Project was submitted to the Commission on September 8, 2004 (See Appendix 1). This study plan was approved by FERC via a letter order dated January 28, 2005.

The study plan, as approved, identifies the study area as:

- the main stem of Kennebec River and its tributaries from Harris Dam to the upstream end of Wyman Lake,
- the main stem of Dead River and its tributaries from Grand Falls to The Forks,
- Spencer Stream from Spencer Gut to Dead River, and
- Little Spencer Stream from the outlet of Spencer Lake to Dead River.

The study plan states that desktop review is intended to be performed prior to implementation of field analysis, and is to include collection of most or all of following information:

- watershed history including log-driving, location of driving dams, streamside landings, roads, crossings, cutting history, and old aerial photos;
- existing biological information;
- locations of present-day roads, crossings, and access sites;
- preliminary Level I stream delineations, using methodologies from Applied River Morphology, Second Edition or other methods approved by the Committee;
- drainage features, including known barriers to fish access; and
- stream orders.

E/PRO Engineering & Environmental Consulting, LLC was retained by the licensee, FPL Energy Maine Hydro, LLC, to assist in collection and presentation of the above information. This document presents the information required by the Desktop Review Study Plan for Fisheries Enhancements at the Indian Pond Project, as required by the FERC license and Settlement Agreement.

2.0 WATERSHED OWNERSHIP AND HISTORY

2.1 Introduction

Logging in the Kennebec River Valley became the prevalent industry, beginning in the mid 1800's to early 1900's. Prior to this time, the only human influences in the area had been Native Americans, followed by small subsistence operations after the arrival of Europeans.

Logging in the area was initially conducted by the Kennebec Log Driving Company (KLD), which started in 1834 and was granted a charter by legislature in 1835. KLD continued to command operations until the last Kennebec log drive in 1976. Presently, logging in the area is conducted primarily by International Paper (IP), Plum Creek, and Boise Cascade (formerly Wagner, or Mead).

Logging operations used available waterways to transport lumber to the Kennebec River. This often required some stream alteration for the purpose of facilitating smooth transport of logs without jamming. Alterations may have included such measures as blasting to remove ledge or boulders, damming, constructing sluiceways, or changing the course of segments of stream.

Today, time and nature have obscured many early stream alterations. However, some alterations are still evident. The following narrative discusses those areas of human influence that may still exist. Much of the information herein is gathered from the firsthand observations of Edward Webb whose father, A.E. Webb, was a logging contractor for KLD in the early to mid-1900's. Edward himself worked in his father's camps and participated in logging the area well into the late 1900's.

2.2 Land Ownership

With the exception of lands in the vicinity of the Route 201 corridor and possibly some shoreland areas associated with lakes and ponds, the majority of the lands within the study area are owned and managed by Plum Creek Timber Company, Inc. IP and Boise Cascade also own some lands within the study area. These lands are managed specifically for timber production and are connected via a series of gravel access roads.

2.3 West of the Kennebec, North of the Dead

Today, the area to the west of the Kennebec River is logged by three major entities: Plum Creek, IP, and Boise Cascade. Road crossings over streams are installed and maintained according to best management practices. Likewise, operations occurring in areas near streams are also conducted according to best management practices.

Spencer Stream

Two dams were installed on Spencer Stream (the west branch, or "big" Spencer) circa 1900. One was associated with a driving camp and was located at Spencer Gut (roughly 1 mile upstream from convergence with the east branch); the other was located roughly 2 to 3 miles upstream from the dam at Spencer Gut (see Map 1C). These structures are no longer functioning, but some remnants may still exist.

In 1907, a dam was installed at the mouth of Spencer Lake (at the head of Little Spencer Stream). This dam is still partially intact, but is derelict and no longer functioning to hold a head of water. The dam is apparently still functional as a barrier to smallmouth bass passage, though salmon and brook trout may be able to pass upstream during high water levels.

An old road (currently maintained by IP) abuts Spencer Stream on each side, where it converges with the Dead River, but it does not cross the stream. In 2002, a snowmobile bridge was installed over the stream at this location.

Alder Pond Brook

Around 1955, A.E. Webb operated his last set of driving camps just to the north of Alder Pond. Logs from these camps were driven to the Dead River via Alder Pond Brook. To Edward Webb's recollection, no dams or major alterations were associated with this brook (Webb 2005).

The Lower Enchanted Road crosses Alder Pond Brook on a timber bridge roughly 1.5 miles above its convergence with the Dead River (see Map 1C). This road, which is currently maintained by IP, is the major access road to the boat put-in at the mouth of Spencer Stream.

Stony Brook

In the early 1900's, Bill Morris was harvesting cedar from large swamps located above Stony Brook. Morris operated a camp and sawmill just above Stony Brook Pond. Here, cedar was milled into railroad ties which were then driven down Stony Brook and into the Dead River. The ties then followed the Kennebec to Bingham to be used in construction of the Somerset Railroad, which ran from Bingham to Moosehead Lake. As part of his driving efforts, Morris straightened a section of Stony Brook (See Map 1A). A small storage dam (1-2' head) was built at the base of this straightened section of river: this dam is no longer in place, but remnants may exist.

In 1952, A.E. Webb began operating a set of logging camps just to the northeast of Call Pond (See Map 1A and 1C).

The Lower Enchanted Road, which is currently maintained by IP, crosses Stony Brook on a timber bridge just above Call Pond. Another road was installed by IP around 1980; it crosses Stony Brook just to the north of Morris' driving camp and mill. This road also crosses a small tributary to Redmond Pond, as well as nearby Toby Brook (See Map 1C).

Approximately 1.5 miles down the Dead River from the mouth of Stony Brook, and on the south side of the Dead, a set of logging camps called "Stony Brook Camp" once existed (see Map 1C). Just upstream from this location, Edward Webb noted an arrangement of stones along the south bank of the Dead River that may have been placed to harbor bateaus associated with these camps.

Enchanted Stream

In the late 1800's and early 1900's, Henry McKenney used Enchanted Stream as a shortcut to avoid driving his lumber via Moosehead Lake. This route posed several obstacles. After having a huge log jam on his first attempt to drive down the stream from Enchanted Pond, McKenney installed a 1.25 mile-long sluice which bypassed the stream. This sluice ran from a sizeable dam at the mouth of Enchanted Pond to a small dam at the stream's junction with its east branch. A set of stone jetties called "the catch" were constructed at the lower end of this sluice to redirect the incoming logs. A sawmill was also associated with this location. (See Map 1A). Also during this period, a small storage dam was installed on the east branch of Enchanted Stream, above the catch. Remnants of these dams still exist on the banks of the stream.

Enchanted Stream was also dammed in two other locations: one roughly a mile above, and one just below the mouth of Toby Brook. These dams are no longer maintained, but remnants may still exist (See Map 1A).

The Lower Enchanted Road crosses Enchanted Stream on a timber bridge just below the mouth of Toby Brook. The historic dam site is just below the road crossing (See Map 1A). Other logging roads in the area cross several locations on the stream's headwaters.

In about 1950, A.E. Webb was operating a logging camp at the base of Enchanted Stream, near its confluence with the Dead River. A large sluice (about 500 feet-long) was constructed at the confluence, remnants of which may still exist (See Map 1C).

Gulf Stream

The Lower Enchanted Road crosses Gulf Stream approximately 2.5 miles above its confluence with the Dead River, with a culvert (see Map 1A). Historical use and impacts to this stream are not known.

Salmon Stream

In the early to mid-1900's, a small dam existed at the junction of the east and west branches of Salmon Stream. This dam is no longer in place, but some remnants may exist.

The Lower Enchanted Road crossed Salmon Stream on a timber bridge just over 2 miles upstream from its confluence with the Dead River. The east and west branches of Salmon Stream are crossed in several locations by logging roads that are currently maintained by Boise Cascade (See Map 1A). Salmon Stream is also crossed by the Dead River Road just above its confluence with the Dead River (see Map 1C).

In 1960, a bridge was constructed across the Dead River, just upstream from the mouth of Salmon Stream (see Map 1C). This bridge across the Dead River no longer exists.

Durgin Brook

Route 201 crosses Durgin Brook by a large (10'±) culvert approximately 1 mile to the west of the Route 201 bridge over the Kennebec River. The Dead River Road also crosses the stream by a culver between the mouth of the stream and the crossing of route 201 (see Map 1D).

A logging road crosses Durgin Brook by a culvert about 1 mile upstream from the crossing of Route 201, and another logging road (to Wilson Hill) also crosses the brook's headwaters by a culvert (see Map 1B).

Cold Stream

At least two dams were confirmed by Ed Webb (2005) as constructed on Cold Stream in the early 1900's: one was located just above the Capitol Road crossing, and the other (which was also associated with a logging camp) was located roughly 1.5 miles further upstream. Neither of these dams is presently in place, but some remnants may still exist. Another possible dam location is near an historical road crossing (discussed below) just above the mouth of Tomhegan Stream. Little remnants of this dam exist.

The Capitol Road crosses Cold Stream roughly 1 mile east of Rt. 201, just beyond the Marshall Yard (See Map 1B). This road is currently maintained by Plum Creek. There is also an historical road crossing of Cold Stream just above the mouth of Tomhegan Stream. This site formerly was the site of a bridge which is no longer present. Currently an ATV trail fords the stream at this location. This road originates at Route 201 and is signed as "Lower Cold Stream Road". Portions of this road also cross tributaries to Cold Stream. Route 201 also crosses some headwater tributaries to Cold Stream.

Tomhegan Stream

The headwaters of Tomhegan Stream are crossed in several locations by Plum Creek's logging roads. A crossing also exists roughly three-quarters of a mile above its confluence with Cold Stream (See Map 1B).

Dead Stream

A small dam was placed at the outlet of Dead Stream Pond around 1950 (see Map 1B). This dam is not currently present.

Several small roads cross the headwaters of Dead Stream, particularly near Ellis Pond and Round Pond. One of Plum Creek's logging roads crosses just below the mouth of Dead Stream Pond.

Chase Stream

Remnants of an old dam, known as "Lanagan Dam", are visible (when leaves are down) from the Capitol Road, where it crosses the headwaters of Chase Stream (see Map 1B).

Two other dams were installed on Chase Stream around 1925. One was located just upstream from its confluence with the Kennebec River, and the other roughly 1.5 miles upstream. A Plum Creek logging road crosses Chase Stream near the upper dam site: this road also crosses headwater tributaries to the stream.

2.4 West of the Kennebec, South of the Dead

In the 1960's, Wallingford constructed a series of roads in the area just west of the Kennebec River and south of the Dead River (see Maps 1C and 1D). These roads were accessed via a bridge (no longer existent) over the Dead River near the mouth of Salmon Stream. The roads ended above Pierce Pond Stream. The roads crossed several area streams, including Mink Brook, Gilroy Brook, Moose Pond Stream, and Otter Pond Stream. Most of these roads are no longer maintained or passable. One road still exists, which accesses the Otter Ponds from the south: this road crosses Otter Pond Stream and Pierce Pond Stream. It is not known to what extent (if any) these streams have been altered by man.

The only known dam in the area is located at the mouth of Pierce Pond: it is still intact and functional.

2.5 East of the Kennebec, South of the Moxie Road

Route 201 parallels the east side of the Kennebec River until it crosses, just above the confluence with the Dead River, and angles north-northwest. Route 201 crosses several streams on the east side of the Kennebec including Pleasant Pond Stream, Holly Brook,

Kelly Brook, and Crusher Brook (see Map 1D). Some existing logging roads also cross the headwaters of Kelly and Holly Brooks; these roads are privately owned and are maintained by an association of landowners.

A small dam exists at the mouth of Pleasant Pond: this dam is still intact and functional.

2.6 East of the Kennebec, North of the Moxie Road

The Moxie road is a paved road that departs Route 201 on the east end of the bridge over the Kennebec River (see Map 1B). The road then travels roughly eastward, crossing Mile Brook and some small tributaries to Moxie Stream; the road terminates at the north end of Lake Moxie, where it abuts the Harris road. The town of The Forks and Somerset County share maintenance of the Moxie road; maintenance is currently performed by MacDonald Construction under a contract from these entities.

The Harris Road is a gravel road that travels roughly northward from Lake Moxie to Indian Pond. It crosses tributaries to Lake Moxie, Black Brook Pond, and Carry Brook. The Harris road is privately owned, but is maintained by FPL Energy based on an indenture dated in 1952. The VIP Road (an extension of the Harris Road) crosses tributaries to Indian Pond.

Numerous roads exist in the area between the Harris Road and the Kennebec River, to the west. These roads include crossings at Fish Pond Stream. A crossing once existed on Moxie Stream, but is no longer existent. Many of the roads in this area are privately owned: the same 1952 indenture that gives FPL Energy the right to maintain the Harris Road states that each entity (including camp owners) has the right but not the obligation to maintain these roads. In general, maintenance is minimal to non-existent on many of these roads.

One dam is known to have existed in the area east of the Kennebec and north of the Moxie Road: it was located at the mouth of Black Brook Pond. Remnants of this dam may still exist.

3.0 EXISTING BIOLOGICAL INFORMATION FOR UPPER KENNEBEC TRIBUTARIES

3.1 Summary of Fish Species Identified in Tributaries to the Kennebec and Dead Rivers

As part of the recent relicensing of the Indian Pond Hydroelectric Project, FPL Energy and their consultants conducted numerous fisheries studies in 1999 and 2000. These studies included radio telemetry tracking of salmonids, as well as sampling (via electro-shocking) along the tributaries to the Kennebec and Dead Rivers. In addition, MDIFW has also performed sampling (via electro-shocking) in several of these tributaries in recent years. The cumulative results of these studies are considered herein (E/PRO 2000).

During telemetry studies, several tagged salmonids were documented moving into, and out of, Kennebec and Dead River tributaries (i.e., Cold Stream, Spencer Stream, Little Spencer Stream, Enchanted Stream, and Salmon Stream). Some of the salmonids that were tagged in the Kennebec River made movements into the Dead River, suggesting a possible life cycle connection within the watershed.

A total of fourteen species of fish were found during electro-shocking studies that were conducted in the tributaries to the Kennebec and Dead Rivers. The results of this sampling demonstrated that the different tributaries have diverse species assemblages. Brook trout were found in all of the tributaries that were sampled except for Black Brook. Landlocked salmon were found only in Moxie Stream, Spencer Stream and Little Spencer Stream. Brown trout were only found in Chase Stream and Salmon Stream. Rainbow trout were found only in Durgin Stream. Table 1 lists the species and age classes of salmonids found in each of the Kennebec and Dead River tributaries that were sampled; it also lists other species captured during electro-shocking events. Note that only those tributaries that were sampled are listed below: there are no fisheries data available for some of the streams mentioned in section 1.

3.2 Radio Telemetry Studies

During 1999 and 2000, as part of relicensing studies, a total of 152 fish were tagged in the Kennebec River/lower Dead River watershed. Of this total, 76 were landlocked salmon (*Salmo salar*) and 66 were brook trout (*Salvelinus fontinalis*). In addition, two rainbow trout (*Oncorhynchus mykiss*), one smallmouth bass (*Micropterus dolomieu*), three brown trout (*Salmo trutta*), one lake trout (*Salvelinus namaycush*), and three splake (*Salvelinus namaycush* X *Salvelinus fontinalis*) also were tagged. Fish were monitored at flows ranging from 140 cfs to 8,500 cfs.

Table 1: Fish species (and salmonid age classes) found in tributaries to the Kennebec and Dead Rivers by electro-fishing

Tributary	Salmonids/Age Class			Other Species Present
	0+	*1+*	*Over 1+*	
Kennebec River Tributaries				
Chase Stream	BKT	BKT	BKT, BNT	WS, CC, BD
Dead Stream	BKT	BKT	BKT	CC, BD
Black Brook	(none)	(none)	(none)	CS, PD, BD
Fish Pond Stream	BKT	BKT	(none)	(none)
Cold Stream	BKT	BKT	BKT	BD, SS
Moxie Stream	BKT	BKT, LLS	(none)	CS, PD, BD, CC
Mile and 1/4 Stream	BKT	BKT	(none)	(none)
Marshall Stream	BKT	(none)	(none)	(none)
Mink Brook	BKT	BKT	(none)	(none)
Kelly Brook	(none)	(none)	BKT	BD, NS
Moose Pond Stream	BKT	BKT, LLS	BKT	(none)
Wilderness Brook	BKT	(none)	(none)	(none)
Holly Brook	BKT	BKT	BKT	BD, SS
Pleasant Pond Stream	(none)	(none)	BKT	(none)
Dead River Tributaries				
Little Spencer Stream	LLS	BKT, LLS	BKT	FA, CC, BD, SMB, SS, WS
Spencer Stream	LLS	BKT, LLS	(none)	LNS, WS, SS, BD, CC
Stony Brook	BKT	(none)	(none)	WS, BD, CC, CS
Enchanted Stream	BKT	BKT	(none)	SS, BD
Salmon Stream	(none)	BKT, BNT	BKT, BNT	SS, BD
Durgin Brook	BKT, RBT	BKT, RBT	(none)	(none)

BKT: Brook Trout
LLS: Landlocked Salmon
BNT: Brown Trout
RBT: Rainbow Trout
BD: Blacknose Dace
SS: Slimy Sculpin
NS: Ninespine Stickleback
CS: Common Shiner
PD: Pearl Dace
CC: Creek Chub
WS: White Sucker
LNS: Long Nose Sucker
FA: Fallfish
SMB: Smallmouth Bass

The radio telemetry data collected during the four-month study period in 1999 and the three-month study period in 2000 revealed that tagged landlocked salmon remained in the main stem Kennebec River and brook trout utilized cooler water in the tributaries. As water temperatures dropped throughout the fall, spawning movements for both species were documented in late October and November. Brook trout were observed moving into Cold Stream and landlocked salmon were documented moving from the Kennebec River into the Dead River. Aerial monitoring done through the winter (November 1999 to May 2000) revealed that out of 23 landlocked salmon tagged, at least 15 left the Kennebec River and moved into Wyman Lake to over-winter. Of the five tagged brook trout, one moved into Wyman Lake for the winter. In May, a landlocked salmon was tracked moving upstream out of Wyman and back into the river. One brook trout that was tagged at Harris Station tailrace on December 1, 1999 moved into Wyman Lake over the winter and was caught 22 river miles upstream at Grand Falls on the Dead River on July 8, 2000. Including the move from Harris Station to Wyman Lake, the brook trout traveled at least 40 miles over the span of seven months.

Seventeen (17) of the 40 brook trout that were tagged remained in the main stem of the Kennebec River throughout the 2000 study period. Nine (9) of the 40 tagged brook trout moved into the Dead River drainage for at least part of the study period. Specifically, some moved upstream as far as Grand Falls and several moved into the Dead River tributaries. Several individuals moved a distance of over 20 river miles. Most of these fish did not remain stationary in the Dead River. They moved throughout the drainage, swimming in and out of tributaries to the Dead River and even back into the main stem of the Kennebec River. Three (3) of the 40 brook trout tagged moved into Cold Stream for part of the study period, and were located as far as 6 miles upstream from the confluence with the Kennebec. One (1) of the 40 tagged brook trout moved into Moxie Stream to the base of Moxie Falls, a natural obstruction to fish passage. One (1) of the 40 tagged brook trout moved into Pleasant Pond Stream for part of the study period. This fish spent the remainder of the study period in Wyman Lake.

Radio telemetry revealed that the study population had wide-ranging movement within the watershed. This demonstrates that the fish are not wholly dependent on the main stem of the Kennebec River for habitat, forage base, or spawning. The most notable tributary to the Kennebec River that was utilized was Cold Stream. In addition to the Kennebec River, tagged fish utilized the Dead River and its tributaries. The most notable of those tributaries were Spencer and Little Spencer streams. Both of these streams were used by a large number of the study fish. The extensive use of tributaries as revealed by the telemetry data suggests that tributaries are an important habitat utilized by the fish in the upper Kennebec/lower Dead River watershed.

Both juvenile (age 1+) and adult (age 2+ and over) brook trout have been documented in the main stem Kennebec River. However, no brook trout redds or young-of-year (age 0+) were documented during this particular study. Brook trout redds and young-of-year have been documented in tributaries to the Kennebec and Dead Rivers.

4.0 MAPPING

4.1 Roads and Road Crossings

Roads and road crossings in the upper Kennebec and Dead River watersheds, as depicted on Map 1 (Appendix 2) of this report, were extrapolated from USGS 7 ½' quad topographical maps (See Appendix 3). Road and crossings shown on Map 1 (Appendix 2) include primary and secondary roads as well as logging and woods roads, some of which are no longer maintained or passable. Road crossings that are no longer extant are included herein due to possible remnant impacts. Roads that are no longer maintained may provide seasonal or foot access to some areas.

Currently maintained and passable roads are depicted with fair accuracy in the DeLorme Atlas and Gazetteer of Maine, which is copyrighted, produced and updated annually by the DeLorme Company of Yarmouth, Maine (www.delorme.com).

4.2 Drainage Features

Drainage features of the upper Kennebec and Dead River watersheds, are depicted on Maps 1 and 2 (Appendix 2) of this report. Stream, river and pond data are from USGS 7 ½' quad topographical maps (See Appendix 3). Watershed data was obtained from Maine Office of GIS and MDIFW: watershed boundaries of streams of interest are depicted on Map 2.

4.3 Stream Order

Stream order can be defined as a relative measure of the position of a stream in the hierarchy of tributaries. Stream order classification for the tributaries of the Kennebec and Dead Rivers was performed based on protocol described by A. N. Strahler (1952, 1964). Stream order allows us to rank the size and potential power of streams. Stream order can also be used to explain stream morphology, (e.g., pool depths, sedimentation, etc.), however for the purposes of this study we are not going to that level of analysis.

Small streams with no branches are 1st Order streams. As two 1st Order streams come together, they form a 2nd Order stream. Two 2nd Order streams converging form a 3rd Order stream. When streams of lower order join a higher order stream, they do not change the order of the higher. Stream orders range up to streams the size of the Mississippi River, which is a 10th Order.

Tributaries to the Kennebec and Dead River in the study area range up to a 5th Order, which is Spencer Stream. Most of the streams that are being considered for potential enhancement projects are 1st, 2nd, and 3rd Order, indicating most are streams that are

relatively small. Resultant classifications are depicted on Map 2 (Appendix 2) of this report.

5.0 ROSGEN CLASSIFICATION

For the purposes of this report, relevant tributaries were assessed using Rosgen Level I geomorphic characterization methodology (Rosgen, 1996). This assessment was performed by Gary Emond, E/PRO, who has been trained and certified in Rosgen stream characterization.

In general, Rosgen Level I stream characterization draws on numerous physical characteristics (such as channel slope, shape and patterns) to assign an alpha numeric classification code (Aa-G) to a stream. The following are very general descriptions of Level I stream types; these descriptions are adapted directly from Rosgen (1996), and from associated web sites (http://www.fgmorph.com/menu.php, http://www.fgmorph.com/fg_5_1.php). Results of desktop Rosgen Level I stream classification are presented on Maps 3A-3D (Appendix 2). A Rosgen Level II stream survey has been completed for Cold Stream by MDIFW and these classifications have been included on these maps (Bonney 2005).

Aa

Aa streams are generally very steep, very straight, and deeply entrenched. These are torrent and cascading streams with prevalent waterfalls and chutes. Type Aa streams are excessively high energy and are capable of excessive debris transport.

A

Type A streams are generally very steep, very straight, and deeply entrenched. They tend to be cascading with step/pool sequences. Type A streams are high energy and are capable of debris transport. Stability is dependent on bed and bank material.

B

Type B streams have moderate gradients with moderate entrenchment. They are characterized by riffles and infrequently spaced pools. The bed and banks of type B streams are stable.

C

Type C streams are low gradient, meandering streams characterized by point bars and riffle/pool sequences. These streams tend to have alluvial channels and broad floodplains.

D

Type D streams have wide, shallow, low gradient, braided channels with longitudinal and traverse bars. Type D streams often have eroding banks: channels are optimal for transporting relatively coarse sediment and bedload. Islands may form as central bars during flood flows.

DA
Type DA streams are low gradient with anastomosing channels. Channels are braided, narrow and deep. Braids and anastomosing channels occur in a wide channel with longitudinal and traverse bars. Relief is very gentle with highly variable sinuosities and width/depth ratios. Type DA streams often have extensive, well vegetated wetland floodplain and associated wetlands. These streams typically have stable banks.

It should be noted that type DA streams have similar sinuosity and islands as D streams, but are relatively narrow and deep compared to the wide and shallow D. Type DA streams are more optimal for transporting relatively fine suspended sediment.

E
Type E streams are meandering riffle/pool streams. They have a low gradient with a low width/depth ratio, and a high meander/width ratio. Type E streams are very stable and efficient and have little deposition.

F
Type F streams are entrenched, meandering, streams with riffle pool sequences. They have low gradients and a high width/depth ratio.

G
Type G streams are deeply entrenched with gullies and step/pool complexes. They have a moderate gradient, with a low width/depth ratio.

5.1 Summary of Findings

Based on our Rosgen Level I analysis, most stream reaches in the upper Kennebec and Dead River drainages classify as A, B, C, or E stream types, indicating that most of the streams are likely stable. Type A streams are typically headwater stream reaches, which are steep and have high energy. These stream reaches can have high erosion potential, however most bank materials in this area are rocky so most are likely fairly stable. Type B stream reaches are typically lower in the watershed and have lesser gradient than Type A stream reaches, and both the bed and banks are typically stable. Type C and E stream reaches are low gradient and tend to be very stable.

The Level I analysis did identify a few reaches that are potentially degraded. These reaches are Type D, F, and G, all of which indicate potentially unstable streams. In addition, although they tend to be typically stable, Type B streams identified through Level I analysis can be indicative of degraded stream reaches. Type D stream reaches exhibit braided channels and active lateral movement and eroded banks. This problematic stream type was found in the lower reaches of Holly Brook and Kelly Brook below Route 201. Type F and G stream reaches are both entrenched, but vary in gradient. Type F reaches are low gradient and can exhibit high bank erosion. This type is found on the lowest reach of Cold Stream (field verified by the MDIFW Level II survey (Bonney 2005)). A Type G stream reach is an entrenched "gully" channel that is

typically unstable with grade control problems and high rates of bank erosion. This stream type is found at the mouth of Moxie Stream. Either F or G type streams can be found at the mouth of Pleasant Pond Stream, Durgin Brook, Alder Pond Stream, and just upstream from the Type D type reach on Holly Brook. Field analysis of some of the potential stream enhancement sites may reveal these stream types at other locations.

6.0 CONCLUSION

Based on the biological and physical characteristic data presented herein, it is possible to draw some objective conclusions regarding each stream's potential for successful habitat enhancement efforts. Previous consultations with Forrest Bonney (MDIFW) have pointed towards an initial concept that streams that offer the highest feasibility for enhancement are those that possess the following attributes:

- appropriate road access to areas cited for modification
- water temperatures that are suitable for brook trout
- lack of invasive smallmouth bass
- physical barriers that will likely preclude future invasion of smallmouth bass
- connectivity to main stem of the Kennebec and Dead Rivers
- stream order
- stream length
- drainage area

Those streams that have no road access have been assigned a "none" feasibility rating regardless of other attributes. This is due to the fact that road access is imperative for construction equipment to reach possible enhancement sites.

In addition, based on their limited work to date, MDIFW has suggested that certain stream length and drainage area parameters will be of relevance when selecting potential sites for enhancements. MDIFW has recommended that stream lengths of about 5 miles from the headwaters with a drainage area of about 20 square miles would be a reasonable maximum cutoff when considering potential sites. The exceptions to this recommendation are Enchanted Stream and Cold Stream. Although both streams have total drainage areas that exceed 20 square miles, there may be potential enhancement sites in the upper to middle portions of each stream at which drainage area has not yet reached the 20 square mile threshold.

Larger watersheds have typically been more difficult to work with, especially with enhancement construction projects. This parameter combined with some of the others eliminates the mainstem segments of the Kennebec and Dead Rivers from future habitat restoration activities. This issue was discussed during the October 20, 2005 Indian Pond Desktop Review Fisheries Enhancement consultation meeting and the fisheries committee agreed to not consider mainstem sites for any future enhancement work.

Several streams have poor upstream passage due to natural or man-made barriers close to the confluence with the main stem. Those with natural barriers (vertical falls) include Chase Stream, Dead Stream, Carry Brook, Black Brook, and Moose Pond Stream. Marshall Stream has a man-made barrier, a hanging culvert at Route 201, at its confluence with the Kennebec River. These streams have been given a "low" feasibility rating due to the lack of upstream connectivity. Two other streams, Holly Brook and Kelly Brook, typically dry up in their lower most reach during the summer months,

precluding movement of fish into and out of the main stem of the Kennebec River during a critical time for cold water fish. These streams have been given a "fair" upstream passage rating and a "low" feasibility rating. Finally, Durgin Brook also has a barrier to upstream fish movement, a hanging culvert at Route 201. This barrier however does not adversely affect the feasibility rating as the culvert is located approximately 1,600 feet from the brook's confluence with the Dead River and a substantial stretch of this stream is available to fish moving upstream.

Table 2 illustrates which of the Kennebec River and Dead River tributaries may be most feasible for enhancement measures based on the above bulleted parameters. These conclusions are based primarily on the desktop review of available data and consultation during the October 20, 2005 fisheries committee meeting. These conclusions may be refined after completion of the future field studies.

Based on Table 2 parameters, the fisheries committee identified eight streams with potentially degraded habitat that were ranked as having a moderate to high feasibility for potential future fish habitat enhancements. They include Fish Pond Stream, Cold Stream, Salmon Stream, Alder Pond Stream, Durgin Brook, Tomhegan Stream, Enchanted Stream, and Stony Brook. These eight streams will be the focus of activities as described in Sections 3.3.3.3 and 3.3.3.4 of the Settlement Agreement.

A preliminary site visit to these eight streams was performed on September 8 and 9, 2005. The site visits focused on areas of those streams that are accessible and had potential problem sites such as road crossings and old log driving dams. During the site visit to the eight streams, there were no obvious signs of degraded habitat except for specific locations at Durgin Brook, Fish Pond Stream and Cold Stream.

The lower most stretch of Durgin Brook, below the Dead River Road, is relatively straight, and appears to be somewhat entrenched. At the confluence with the Dead River, the mouth of the brook is braided, flowing over a pile of cobble that may present a problem for fish movement at low flows. Durgin Brook crosses under Route 201 via a very large culvert. This very large culvert is hanging approximately 6 feet above the brook and precludes upstream fish passage through the culvert to the headwaters of the brook. Additionally, a large plunge pool armored with large boulders is located immediately below the outlet of this culvert and the large boulders appear to create another barrier to upstream fish movements at certain stream flows. This plunge pool contained approximately 10 brook trout in the 8-inch to 12-inch size range. Anecdotal information from a local well known fisherman indicates that Durgin Brook presently and historically contains some good numbers of trout. This fisherman went on to say that some large trout are captured in the spring in the lower section of the brook and that there are a few pools located above Route 201, near the headwaters of the brook that also contain good numbers of trout. The fisheries committee agreed that the hanging culvert is really a Maine Department of Transportation (MDOT) issue. Therefore, this issue would not be addressed as part of the Indian Pond Fisheries Enhancement activities.

Table 2: Feasibility Ratings of Potential Brook Trout Habitat Enhancement Streams

Tributary	Construction Access	Suitable Temperature for Salmonids (Y/N)	Bass Present (Y/N)	Barrier to Bass (Y/N)	Man-made Barrier (Y/N)	Upstream passage from Main Stems	Stream Order	Stream Length (miles)	Drainage Area (square miles)	Feasibility Rating (none - high)
Kennebec River Tributaries										
Chase Stream	Y	Y	N	Y	N	Poor	2	6.20	18.80	Low
Dead Stream	Y	Y	N	Y	N	Poor	3	1.20	8.04	Low
Carry Brook	Y	Y	N	Y	N	Poor	2	3.80	3.45	Low
Black Brook	N	N	N	Y	N	Poor	2	0.77	0.37	Low
Fish Pond Stream	Y	Y	N	N	N	Good	2	1.03	1.58	Moderate - High
Tomhegan Stream	Y	Y	?	?	?	Good	3	4.80	10.50	Moderate
Cold Stream	Y	Y	N	N	N	Good	4	18.80	46.80	Moderate-High
Moxie Stream	N	Y	Y	Y	N	Fair	4	5.67	93.40	None
Mile and 1/4 Stream	N	Y	N	N	N	Good	1	0.99	0.60	None
Marshall Stream	N	Y	N	Y	Y	Poor	1	0.25	0.29	None
Mink Brook	N	Y	N	N	N	Good	2	1.74	1.06	None
Kelly Brook	Y	Y	N	N	N	Fair	2	2.99	5.14	Low
Moose Pond Stream	Y	Y	N	Y	N	Poor	2	3.97	4.22	Low
Wilderness Brook	N	Y	N	N	N	Good	1	0.87	2.23	None
Holly Brook	Y	Y	N	N	N	Fair	1	4.07	5.00	Low
Pleasant Pond Stream	Y	Y	N	N	N	Good	3	3.67	17.99	Low
Dead River Tributaries										
Little Spencer Stream	N	Y	Y	N	N	Good	4	2.40	62.00	None
Spencer Stream	Y	Y	N	(?)	N	Good	5	22.20	194.00	Low
AlderPond Stream	Y	Y	?	(?)	N	Good	1	2.20	4.84	Moderate
Stony Brook	N	Y	N	N	N	Good	3	6.00	16.28	Moderate
Enchanted Stream	Y	Y	N	(?)	N	Good	4	8.80	30.28	Moderate
Gulf Stream	N	?	?	?	N	Good	2	3.70	4.50	Low
Salmon Stream	Y	Y	N	?	N	Good	3	10.80	25.49	Moderate
Durgin Brook	Y	Y	N	Y	Y	Good	2	4.00	4.13	Moderate

At Fish Pond Stream, an old road runs parallel to a short section of the stream. The stream bank has eroded to the point where a substantial portion of the flow is running down the old road bed, away from the stream and toward the Kennebec River. Impacts from this erosion include the loss of water volume from the stream, and sedimentation from the old roadbed that makes its way into the Kennebec River during high stream flow events.

At lower Cold Stream below the Capital Road, there is an old road crossing and former site of a small log-driving dam. This area appears to be relatively strait, over widened, shallow and devoid of boulder substrate. Further upstream in the drainage just above the Capitol Road crossing, is another site of an old road crossing and log-driving dam. The banks appear stable at this site, but the stream appears somewhat straightened, over widened and is devoid of boulder substrate.

Some of the other streams in Table 2 were also visited on September 8 and 9, 2005. These included Kelly Brook, Holly Brook, Pleasant Pond Stream and Gulf Stream. Based on Table 2 parameters, the fisheries committee gave these waters a low feasibility rating for enhancement opportunities.

The site visit revealed that Kelly Brook has a braided channel and is highly eroded in several areas downstream from Route 201. The Level I classification indicates this stream reach is a stream type D, which typically has braided channels and eroded banks. Several bank areas are actively being undercut, dropping trees into the streambed. The stream also appears to be entrenched. As described previously, the lower reaches of the stream generally dry up in the summer month.

Holly Brook also has eroding banks, and the stream has undercut many trees below Route 201. A large delta of cobble and gravel is located where the stream flows into the Kennebec River. Level I classification also found this stream reach to be a type D like Kelly Brook, though this stream appears to be entrenched with grade control problems and high rates of bank erosion. As described previously, the lower reaches of the stream generally dry up in the summer month.

Pleasant Pond Stream is a very steep gradient, high-energy stream that has flooding and erosion issues that are generally being addresses by MDOT. Gulf Stream is a very small stream with limited access.

Based on the site visits, there were some specific locations that appear to warrant further consideration for potential licensee funded restoration projects as described in section 3.3.7 of the Settlement Agreement. These sites were discovered on Cold Stream and Salmon Stream.

At lower Cold Stream, there is an old road crossing and former site of a small log-driving dam. An ATV crossing is located in this rea and is causing some erosion into the stream.

At Salmon Stream, near the confluence with the Dead River, there is an ATV crossing upstream of the new timber bridge. This ATV crossing is causing some erosion into the stream.

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APPENDIX 1
Study Plan

FPL Energy

Desktop Review Study Plan For Fisheries Enhancements At The Indian Pond Project

(FERC NO. 2142-031)

Prepared By:
FPL Energy

September 8, 2004

1.0 INTRODUCTION:

This plan describes the desktop review plan of the fisheries enhancement projects pursuant to Section 3.3.3.1 of the Indian Pond Project Settlement Offer dated July 25, 2001. The license for the Indian Pond Project was issued on January 14, 2004 and requires a final desktop review plan be submitted to FERC by September 14, 2004.

2.0 BACKGROUND:

Study Area
The study area includes:
The main stem of the Kennebec River and all tributaries entering the Kennebec from Harris Dam to the upstream end of Wyman Lake;
The main stem of the Dead River and all tributaries entering the Dead River from Grand Falls to The Forks;
Spencer Stream from Spencer Gut to the Dead River; and
Little Spencer Stream from the outlet of Spencer Lake to the Dead River.

3. PURPOSE:

Section 3.3.2.1 of the Indian Pond Settlement Offer reads as follows:
A. *"In consultation with other members of the Committee, Licensee shall develop a study plan for a desktop review of the Selected Area consistent with the criteria outlined in the Proposed Assessment and Monitoring Schedule Kennebec/Dead Rivers. The purpose of the desktop review is to identify and geomorphically characterize those tributaries or mainstem segments within the Selected Area that may contain degraded habitat. The study plan shall identify methodologies, techniques, tasks, and manpower requirements (from Licensee and other members of the Committee) needed to complete the desktop review."*

B. *"Licensee shall file the study plan with FERC, for its approval, within six months of issuance of an Acceptable New License for the Project. In the event that the Committee did not reach consensus on the study plan as set forth in Appendix I, Licensee shall include in the filing with FERC the comments of other Committee members and Licensee's responses to those comments and an explanation why Licensee did not incorporate those comments in the study plan."*

4. TECHNIQUES:

Develop Study Plan For A Desktop Review of the Study Area

- A "desktop review", conducted prior to the implementation of field analysis, should include most or all of the following information:

1) Watershed history including log-driving history, location of driving dams, streamside landings (staging areas), roads and crossings (including history of maintenance), cutting history, and old aerial photos. Existing information will be provided by FPLE and MDIFW. Additional information will be obtained from commercial paper companies, historical societies, and interviews with residents with extensive local and historical knowledge. (Ed Webb and Olen Wing.)

2) Existing biological information (from Strong office, IF&W and FPLE).

3) Location of present-day roads, crossings, and access sites (updated maps).

4) Preliminary Level I stream type delineation from topo maps and aerial photos. Level I methodologies will follow the steps outlined in the text *Applied River Morphology –Dave Rosgen -second edition* or other acceptable methods as approved by the Committee. Level I

delineations will be conducted by individuals with *Recsgen level I* training or equivalent (to be conducted by MDIFW and FPLE).

5) Drainage features including area, length, relief ratio, surface storage, density, shape, main channel slope and known barriers to fish access (to be conducted by MDIFW and FPLE).

6) Stream order (from topos by FPLE and MDIFW).

5. MANPOWER:

The primary tasks (1-6), of the desktop review will be conducted by FPLE and their consultants with assistance and oversight from MDIFW. The manpower needs for the initial mapping and data gathering will be the responsibility of FPLE and MDIFW. Mitigation funds will not be used for these tasks.

Once all of the initial data is gathered, the Committee may chose to use mitigation funds to develop an expanded database and produce additional mapping capabilities (i.e. GIS). This will be decided after consultation with all Committee members.

6. CONSULTATION:

A consultation meeting to discuss and develop the plan was held on August 26, 2004. All committee members were represented.

Members present:

FPL Energy (FPLE)
Maine Trout (ME Trout)
The Forks
US Fish and Wildlife Service (USFWS)
Maine Department of Inland Fisheries and Wildlife (MDIFW)
Trout Unlimited (TU)

7. REPORTING:

The Committees' comments have been addressed, and a final study plan is to be filed with FERC by September 14, 2004. Upon approval from FERC of the study plan the Licensee shall, in consultation with all other Committee members, conduct the desktop review.

APPENDIX 2
Maps

LARGE-FORMAT IMAGES

One or more large-format images (over 8½" X 11") go here. These images are available in E-Library at:

For Large-Format(s):
Accession No.: 20051103-0007

Security/Availability:

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File Date: OCT 31.05 Docket No.: P2142

Parent Accession No.: 20051103-0006

Set No.: 1 of 1

Number of page(s) in set: 9

APPENDIX 3
USGS Topographical Maps

LARGE-FORMAT IMAGES

One or more large-format images (over 8½" X 11") go here. These images are available in E-Library at:

For Large-Format(s):
Accession No.: 20051103-0008

Security/Availability:

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File Date: 10/31/05 Docket No.: P2142

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