UNITED STATES DISTRICT COURT
DISTRICT OF MAINE

FRIENDS OF MERRYMEETING BAY and ENVIRONMENT MAINE, Plaintiffs, v. BROOKFIELD POWER US ASSET MANAGEMENT, LLC, and HYDRO KENNEBEC, LLC, Defendants.	C.A. No. 1:11-cv-00035-GZS

DECLARATION OF RANDY E. BAILEY

I, Randy E. Bailey, declare as follows:

1. I am the owner and principal senior fishery scientist of my own aquatic resource consulting firm, Bailey Environmental. My office is located at 18294 S. Scotts Lane, Oregon City, OR.

Qualifications, Background, and Experience

2. I have 20 years of experience as a fishery biologist in various positions with the federal government, including 9 years as the Chief of the Fisheries Division of the Alaska Regional Office of the U.S. Fish and Wildlife Service. In addition, I have 16 years of fishery biology consulting experience specializing in Endangered Species Act (ESA) issues, where my work has involved the evaluation of the impacts of human development on aquatic ecosystems, and the evaluation of scientific studies, reports, and environmental documents related to ESA compliance.

3. During my years of federal service, I was involved in numerous projects regarding ESA-listed fish species. My work with these projects included evaluating the impacts of resource development on listed species, planning and implementing habitat restoration projects for anadromous salmonids in the western United States, and designing and managing field studies on the life histories of Pacific salmon and other cold water fish species common to the west and Alaska. In my last federal position, I served as the Fish and Wildlife Program Manager for the Portland, Oregon, District of the U.S. Army Corps of Engineers. In this capacity, I was responsible for providing funding and program oversight for fish passage operations, involving numerous ESA-listed fish species, at 11 hydroelectric dams: three main-stem Columbia River dams and eight dams on four tributaries to the Willamette River in Oregon. In this position, I was responsible for the updating and modernization of four fish-trapping facilities on the four Willamette River tributaries and their associated "trap and truck" programs for ESA-listed winter steelhead and spring Chinook salmon. I also was responsible for interagency coordination regarding the development and implementation of an ESA Section 7 consultation for the operation of 8 dams in the Willamette River watershed, including provision for fish passage over the eight dams, and management of six associated genetics conservation hatchery programs.

4. In my consulting business, I have specialized in dealing with issues related to ESA-listed fish species for various clients. I have helped clients with a Section 7 consultation on Southern California steelhead trout; provided technical review of various ESA documents, including biological opinions, recovery plans, and ecosystem restoration programs; provided policy recommendations on ESA issues; assisted in the development of the biological assessment for a consultation on operations of the California State Water Project (SWP) and the federal Central Valley Project (CVP); developed a portion of new water quality standards for the

Sacramento/San Joaquin Delta; and provided technical review of over $500 million of habitat restoration projects for ESA-listed salmon and steelhead in Central California. I have developed or co-developed two ecosystem restoration plans aimed at protecting or improving conditions for listed species: one for two tributary watersheds to the Sacramento River, and one for the impacts of SWP and CVP operations with an estimated cost of approximately $5 billion. I believe that my experience with Pacific salmon and steelhead are directly applicable to Atlantic salmon, since these species have very similar life histories and habitat requirements.

5. I have a B.S. in Natural Resources Management, with an emphasis in Fish and Wildlife Management, from California Polytechnic State University, and an M.S. in Wildlife Management, with an emphasis in Fisheries Science, from Virginia Polytechnic Institute and State University. I am a Fellow Emeritus of the American Institute of Fishery Research Biologists, and am a Life Member of the American Fisheries Society, where I have held various offices and committee memberships over the past 40 years.

Work Done in Preparation for this Declaration

6. I have been retained by the Plaintiffs in this case to evaluate several factual matters raised, and opinions expressed, in Defendants' ("Brookfield's") Motion to Dismiss Or, in the Alternative, to Stay the Case, filed on October 12, 2011, relating to the nature of the Atlantic salmon population in the Kennebec River, to the effect of the Hydro Kennebec dam on that population, to a fish passage study recently performed by Brookfield, and to the Section 7 consultation process.

7. In preparation for this declaration, I reviewed documents associated with the listing process for the Gulf Of Maine Distinct Population Segment ("GOM DPS") of Atlantic salmon, the past 10 years of the Kennebec Hydro Development Group's annual reports, all of the

individual Kennebec River study reports regarding fish passage systems and associated evaluations, and the draft framework recovery plan for the GOM DPS of Atlantic salmon. I have had several discussions with State of Maine and federal agency biologists regarding the issues associated with Atlantic salmon recovery in the Kennebec River. I also was able to take a helicopter tour of the watershed of the Sandy River (an upstream tributary of the Kennebec) in October 2011, and viewed the main stem Kennebec River downstream from the Sandy River to Merrymeeting Bay. I completed a visit and tour of the Hydro Kennebec Project arranged in connection with this lawsuit, where I was able to view the Project's infrastructure and fish passage systems first-hand; during this tour, Hydro Kennebec staff provided me information in response to specific questions that I asked regarding the type of turbines at the dam, and the flow capacity of the turbines and fish bypass structure. I reviewed various documents from Brookfield, including: the Motion to Dismiss, the affidavit of Mr. Bernier, and several study report transmittal cover letters to the Federal Energy Commission ("FERC"); the 2007, 2008, and 2009 assessments of interim downstream fish passage infrastructure effectiveness, summary and final results from the 2011 Atlantic salmon smolt radio telemetry study, the January 2007 sworn pre-filed direct testimony of Brian R. Stetson and Mr. Bernier (employees of the Hydro Kennebec owners at the time) regarding fish passage and fish passage infrastructure at the Hydro Kennebec Project (Stetson and Bernier 2007), and certain documents recently supplied by Brookfield that are subject to a confidentiality order (although none of these "confidential" documents is the source of any statement I make in this declaration).

8. The conclusions, evaluations, and opinions in this declaration are based on my review of the various documents cited, my conversations with state and federal biologists, my visits to the area and to the dam site, my 35-plus years of experience in dealing with issues associated

with Pacific salmon, steelhead, and associated cold water fish species, and my experience in dealing with issues related to ESA-listed species and species recovery. A bibliography of the specific publications, reports, and other documents cited in this declaration is attached at the end of this declaration.

Atlantic Salmon in the Kennebec River

9. In my opinion, the Kennebec River Atlantic salmon population is at risk of extinction unless significant measures are undertaken immediately to reduce mortality. The current egg planting program being undertaken by the State of Maine (in which, as discussed below, Atlantic salmon eggs are planted in an upstream tributary of the Kennebec) is a good start, but there is a high mortality rate going from eggs in the gravel to smolt-sized fish migrating to the sea. (Smolts are young salmon that have grown to a length of about 7-8 inches and are undergoing physiological changes that make them ready to be able to survive in marine conditions.) Any notion that an Atlantic salmon currently in the Kennebec River (whether of wild origin or hatchery origin) is not important and can be sacrificed is contrary both to good fishery science and to the recovery strategies and goals established by federal and state agencies. Every Atlantic salmon now produced or reared in the Kennebec River is potentially the first generational step towards a returning adult counting towards the recovery goals for Atlantic salmon in the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU). It will be essential to the recovery effort to reduce the mortality rate of Atlantic salmon smolts during their migratory journey from upstream rearing areas down to the Merrymeeting Bay estuary, and to do so as quickly as possible. A significant reduction in mortality at this life stage has the potential to greatly increase adult returns to the river. Overall, increasing the ability of the returning adults to gain access to areas with suitable spawning habitat, and increasing the survival rate of smolts

emigrating to the sea, are key cornerstones of the recovery strategy (National Marine Fisheries Service et al. 2010).

10. I have been asked to evaluate the following statement from page 12 of Brookfield's Motion to Dismiss:

> ***"[It] is the undisputed, regrettable fact that the only Atlantic salmon now to be found in the vicinity of Brookfield's Hydro Kennebec Dam are hatchery-propagated fish or their progeny, released by government agencies at various points upstream."***

For the reasons summarized below, it is my opinion that this assertion is not supported by the published scientific literature and is inconsistent with other available information.

11. First, hatchery stocking of Atlantic salmon in the Kennebec River is a recent phenomenon. With the exception of one release of salmon fry in 1881 and a short-lived effort to stock adult salmon from 1989-1993 , the current hatchery stocking program is no more than 10 years old [(Fay et al. (2006); Maine Department of Marine Resources (2010)].

12. Second, actively reproducing populations of Atlantic salmon were documented in Togus Stream and Bond Brook, two lower Kennebec River main stem tributaries, downstream from the Edwards Dam (which, prior to its removal, was the lowermost dam on the Kennebec). Atlantic salmon reproduction in these streams was documented as late as 1994-1996 and 1999, *prior* to the removal of the Edwards Dam and *prior* to the initiation of planting of eggs or stocking fry in the Sandy River [U.S. Fish and Wildlife Service, unpublished field data (1995, 1996); Buckley (1999); D. Buckley, U.S. Fish and Wildlife Service, pers. comm. and unpublished data (11/4/11)]. Also, the United States Atlantic Salmon Assessment Committee (USASAC) has documented adult Atlantic salmon returning to the Kennebec River during the period 1975 to 2000, prior to any significant stocking efforts in the Sandy River (USASAC 2011).

13. Third, rigorously reviewed genetic analyses show that the Kennebec River is home to its own distinct population of Atlantic salmon. The National Research Council ("NRC") concluded in 2002 that it was possible to correctly assign fish to the Kennebec River population with a degree of accuracy that was highly statistically significant (NRC (2002). The NRC found that despite hatchery stocking efforts in numerous Maine rivers, there is little evidence to support a conclusion that hatchery stocking has resulted in significant genetic mixing between hatchery and wild stocks of Atlantic salmon.

14. Fourth, since the installation of a fish trapping facility at Lockwood Dam (the lowermost dam on the Kennebec after removal of the Edwards Dam) in 2005, State of Maine personnel have been trapping and transporting all adult Atlantic salmon captured at Lockwood upstream for release in the Sandy River. Each year since 2006, each individual adult fish has been examined and characterized either as derived from known hatchery stock parentage or as a "wild" fish, MDMR & MASC (2007) and MDMR (2008, 2009, 2010, 2011), and it is scientifically unjustified to conclude that all fish trapped at Lockwood are of hatchery origin. See Fay et al. (2006); NMFS (2009); NMFS and USFWS (2009); U.S. Fish and Wildlife Service (2007).

15. I was also asked to evaluate the following statement from page 16 of Brookfield's Motion to Dismiss:

> ***"[I]t cannot be seriously maintained that the long term restoration plan for the species will be prejudiced in any way by the loss of whatever limited number of transplanted and hatchery origin salmon might be injured at dams, or in any other place or manner, in the newly-listed river systems [the Kennebec and the Androscoggin] during the interim migrations. Hundreds of thousands of hatchery salmon have been (and will continue to be) stocked upstream of Hydro Kennebec as eggs or fry."***

For the reasons summarized below, this statement is directly contrary to the current, and in my opinion scientifically valid, recovery philosophy and strategies being employed by state and federal resource agencies in Maine. In my opinion, any suggestion that harm to the transplanted and hatchery origin salmon in the Kennebec does not have a negative impact on restoration efforts, or that there is an inexhaustible supply of such salmon, is simply wrong.

16. The Maine Department of Marine Resources initiated an Atlantic salmon fry stocking program in the Sandy River in 2003, did both egg planting in the gravels and stocking of fry in the Sandy River watershed beginning in 2004, and has done egg planting alone from 2008 to the present (MDMR 2011). Nearly all of the eggs and fry placed in the Sandy River have come from naturally reproducing salmon that returned to the Penobscot River. In addition, beginning in 2006 with the completion of the fish trap at Lockwood Dam, all returning adult Atlantic salmon that are trapped at Lockwood have been trucked upstream to the Sandy River and released to spawn naturally. It should be noted, however, that the number of adult Atlantic salmon captured at the trap and trucked upstream may be only some fraction of all adult salmon now actually returning to the Kennebec from the Atlantic Ocean.

17. The purpose of Maine's salmon restocking and trap and truck programs is to increase the number of adult salmon returning to Lockwood dam in the near future and to subject Atlantic salmon eggs to as many Kennebec River watershed-specific genetic selective pressures (e.g., water temperature regime, sediment levels in the gravel, changes in river flow and channel scour, competition for food and territory, and many others) as possible, regardless of parental origin [Maine Department of Marine Resources, Appendix E (2008); Paul Christman, Maine Department of Marine Resources, Kennebec Atlantic salmon program biologist, pers. comm. (10/20/11)]. Once the number of adults returning to Lockwood reaches a sufficient level, then

the plan is to supplement and further develop a Kennebec River-specific Atlantic salmon stock by using only eggs taken from adults captured at Lockwood (rather than Penobscot River-origin hatchery stock) and potentially using some portion of the adult returns to begin a river-specific genetic conservation hatchery broodstock program to provide additional supplementation to the population. Id. This development of a river-specific genetic stock to support restoration efforts is consistent with the conclusions and recommendations of the National Research Council (2004), Fay et al. (2006), and National Marine Fisheries Service (2010).

18. I am personally aware of two recent situations involving Pacific salmon populations in the western United States that were at low enough levels that extinction was a distinct possibility, in which the implementation of a conservation hatchery program such as the one described above appears to have saved these populations from extinction. The first case involves winter-run Chinook salmon in the Upper Sacramento River in California, where a stocking program eventually increased the salmon run by twenty to fifty-fold within a 10-12 year period (Pacific Fishery Management Council 2011). The second case is that of sockeye salmon native to Redfish Lake in Idaho. Between 1991 and 1998 only sixteen wild sockeye salmon returned to the lake to spawn. A genetics conservation hatchery program based on stocking of smolts was begun and eventually expanded, and run size had exceeded one thousand fish by 2010 (Idaho Department of Fish and Game 2011). These two case studies demonstrate the possibility of bringing very low population levels of salmon species from the brink of extinction up to levels where extinction possibilities are greatly reduced, using a restoration program similar to the one underway on the Kennebec.

19. Nonetheless, time is of the essence with the Kennebec restoration program. For example, loss of a single year class of smolts hinders recovery efforts for decades. Given the age

composition of returning adults at Lockwood, and assuming static survival rates both in freshwater and in the ocean, I estimate that it would take approximately 50-70 years to stabilize the population at about 80% of its former level in the event of the loss of a single year class. Recovery to pre-loss levels would take decades more. Although any mathematical projection of the corresponding setback will necessarily be rough, and the assumptions on which the future year calculations are based will not necessarily apply in all years, this does illustrate the general scale of the problem.

Harm to Atlantic Salmon and Adult Shad from the Operation of Hydro Kennebec Dam

20. I have been asked to evaluate whether the Hydro Kennebec dam is (a) killing Atlantic salmon and/or adult American shad, (b) otherwise harming these fish physically in ways that disrupt their normal behavior patterns, or (c) changing and/or blocking access of Atlantic salmon to their natural habitat in ways that disrupt their normal behavior patterns. I have been asked further whether there are interim measures that could be taken to reduce, eliminate, or ameliorate these effects. In my opinion, as explained below, the answer to each of these questions is yes.

21. **Physical Harm.** When water is flowing through the dam's turbines and some life stage of either of these species is attempting to migrate or move downstream through the dam's infrastructure, mortality – direct and indirect, immediate and delayed – will be caused to some percentage of these fish by passage through the dam's turbines, by passage through the dam's fish bypass structure, and by attempts to pass over the dam's spillway. Some percentage of the fish will be directly and immediately killed. Some of the rest will be injured and/or disoriented, and will thus be at a greater risk of indirect mortality through predation (that is, of being eaten by predators such as birds or larger fish), and some percentage will die in this manner. Finally, it is

also likely that physical harm caused by these passage routes disrupts the normal behavior of some percentage of the fish that are not directly or indirectly killed. (It must be remembered that there are three other dams on the Kennebec downstream of the Sandy River. Although I have not been asked in this declaration to evaluate cumulative harms to migrating salmon from their interaction with these other dams, I note that focusing on the effects of Hydro Kennebec alone is likely to understate the overall impacts on a salmon travelling down the river.)

22. **Turbine Passage.** In general, some percentage of fish passing through a turbine are killed (usually from being struck by a rotating turbine blade) or suffer a serious injury that will either result in death at a later time or render the fish incapable of avoiding predators downstream of the turbine (Robson et al. 2011). The percentage of mortality that occurs depends on the type of turbine, the number and shape of blades in the turbine, the speed with which the blades spin (rpm), the amount of hydraulic head (which relates to changes in water pressure), and the length of the fish. For low-head dams on the Kennebec River such as Hydro Kennebec, I believe the major factor in estimating potential turbine mortality is the type of turbine in use.

23. The Hydro Kennebec facility contains two Kaplan turbines. Some published values for mortality caused by passing through a Kaplan turbine include:

- 5-20% for juvenile salmonids (Robson et al. 2011).
- 33% immediate mortality for Atlantic salmon kelts at Lockwood Dam, ME (Normandeau Associates, Inc. and FPL Energy Maine Hydro, LLC. 2008).
- 16% for Atlantic salmon smolts at Lockwood Dam, ME (Normandeau Associates, Inc. and FPL Energy Maine Hydro, LLC. 2008).
- 30% immediate mortality for American shad at Lockwood Dam, ME (Normandeau Associates, Inc. and FPL Energy Maine Hydro, LLC. 2008).
- Generally <10% for American shad and river herring juveniles (Stone and Webster Environmental Services 1992).
- Range of 9-16% for juvenile salmonids (Stone and Webster Environmental Services 1992).
- 11-14% for Atlantic salmon smolts (Stone and Webster Environmental Services 1992).

- 24-25% for adult eels (roughly equivalent in length to salmon kelts) (incomplete cites in: Normandeau Associates, Inc. and NextEra™ Energy Maine Operating Services, LLC. 2009).

These studies – including those conducted at nearby Lockwood Dam that demonstrate direct fish mortality for the same species and sizes of fish that would be expected to pass through the Hydro Kennebec turbines – clearly indicate direct mortality occurs in a certain percentage of the fish passing through a Kaplan turbine. Based on these studies, mortality for American shad ranges from about 5-30% depending on fish size and river flow conditions, with adults being at the higher end of the mortality range. Based on these studies, a reasonably expected direct mortality rate ranges from about 10-20% for Atlantic salmon smolts, and from about 25-33% for post-spawning Atlantic salmon kelts. The higher direct mortality rate for adults is expected, since the probability of blade strike increases as the length of the fish increases (kelts are approximately four times the length of smolts).

24. Studies conducted at Hydro Kennebec show that downstream migrating fish do in fact move through the dam's turbines. A study conducted in 2008 used tagged Atlantic salmon smolts to evaluate the effectiveness of a fish boom (a fabric wall approximately 10' deep and 160' long placed diagonally in the turbine forebay to "guide" fish towards the fish bypass opening). The results showed 46% of the fish went into the bypass and 54% went either through the turbines or over the spillway or spillway gates (Madison Paper Industries 2009). A 2009 study, essentially a repeat of the 2008 study protocols in a non-spill condition, showed that 39% of the tagged fish were detected in the fish bypass system (Madison Paper Industries 2010). In a 2011 study, Atlantic salmon smolts were implanted with radio transmitters and released upstream of the Hydro Kennebec dam. While most fish went over the spillway (as it was a period of high river flow), of the 30 fish that did not 53% passed through the turbines and 47%

through the bypass (Normandeau Assocs. 2011). These site-specific data suggest that approximately 50% of the fish passing the project under "no spill" conditions (i.e., all the river flow passing through the turbines or fish bypass) would pass via the turbines and suffer *direct* mortality rates similar to those presented above. An additional percentage of fish would be expected to suffer *indirect* mortality (such as increased rates of predation by birds or larger fish) as a result of disorientation or injury caused by turbine passage.

25. **Passage Through the Fish Bypass.** Numerous studies have evaluated fish mortality associated with fish passage through bypass systems and via project spill (e.g., Stone and Webster Environmental Services 1992). Fish can be injured or killed in bypass systems due to the way the water entering the bypass system strikes hard objects in the bypass such as the walls or any associated infrastructure. Flow hydraulics in a bypass can also cause fish to be essentially trapped in the bypass or to become disoriented because of turbulent flow; such disorientation changes their behavior, and can attract predators that would not normally be attracted. From my personal observations of Hydro Kennebec's fish bypass, I noted at least three points at which physical impacts or disorientation could occur: (a) where a highly turbulent discharge flows from the bypass opening against a concrete wall in the bypass spill chamber; (b) at a rock ledge alongside the fast-flowing narrow channel at the end of the bypass system; and (c) upon metal posts and hardware standing in the flow stream from the fish bypass.

26. **Spill Passage.** Fish passing via spill, either through the spillway gates or over the crest of the dam (with or without flashboards installed), can be killed, injured, or disoriented by striking project infrastructure (particularly glancing blows), striking the sill at the bottom of the dam on the downstream side, or by turbulence created by the amount of flow and the configuration of the downstream spillway. From my personal observation, it appears that fish

passing by spill at Hydro Kennebec fall approximately 30-40 feet. In addition, juvenile fish may become entrained at specific locations where water is leaking through the dam's infrastructure. Two instances of such leaking were observed during my recent visit to the Hydro Kennebec dam.

27. Although Mr. Bernier states in his declaration (at page 4, paragraph 15) that the 2011 smolt passage study (discussed above) showed that "95 out of 98 [tagged fish] passed the Project, consistent with normal *survival rates* of smolt in the river,…" (emphasis mine), it is important to note that this study *did not examine* the (immediate or delayed) rate of survival of these 95 fish, The fate (dead, injured, or alive and healthy) of these radio tagged fish was not part of the data to be collected according the study plan protocol (Brookfield Renewable Power, Inc. 2011), nor are any data on the fate of individual fish contained in the Normandeau and Associates (2011) summary of results or the Great Lakes Hydro America (2011) final report. In my opinion, under high flow conditions such as were present during this study, fish that were dead or injured could have been transported to Lockwood by river currents and would have been detected by the antennas located there the same as a live fish. Given the data available, any conclusion regarding the survival rate of fish passing Hydro Kennebec in this study would not be scientifically credible. Similarly, although Brookfield's predecessors performed certain observational studies at Hydro Kennebec in 2001-2003 (Madison Paper Industries 2009), it does not appear that they were conducted according to a scientifically credible methodology for detecting and documenting fish injury or mortality. Quantitative studies to assess indirect mortality rates have not been conducted at the Hydro Kennebec facility.

28. **Disrupting Normal Behavior Patterns through Changes to Habitat.** The Hydro Kennebec dam alters the behavior of fish moving downstream when they encounter the low velocity water associated with the 2 to 3 mile long impoundment upstream of the dam. Atlantic

salmon smolts are adapted to moving downstream to the sea via a flowing river channel. Smolts encountering a "reservoir" can exhibit behavioral changes, such as slowing their rate of downstream movement. This is significant, as spending more time en route usually subjects them to greater predation rates (Holbrook 2011). In addition, reservoirs change the location and amount of "hiding cover" in the water column, which can lead smolts to move their migratory path closer to the shore, where more hiding and escape cover is present. As a result, these smolts are at a greater risk of predation, because predators such as smallmouth bass are also more likely to frequent the shoreline. Further, the interaction between the slow-moving reservoir and the dam itself provides a well-known opportunity for predators, to wait for the salmon near the dam's spillway or fish bypass. Some of the salmon lose their lives in this manner. Also, some smolts will feel compelled to actively swim downstream through the slow-moving reservoir water (rather than moving at their own pace), in order to meet their need to reach the estuary when growth and survival conditions are optimum. This additional physical demand can reduce their energy reserves below what would normally be expected, meaning that they reach the estuary in a less fit condition to begin the transition to salt water.

29. **Disrupting Normal Behavior Patterns by Blocking Access to Habitat.** The Hydro Kennebec dam has no upstream fish passage facilities and therefore completely blocks adult fish returning to spawn. As a result, Atlantic salmon that are captured at the Lockwood fish trap cannot be placed immediately back into the river upstream of Lockwood Dam; instead, they must be trucked upstream past the Hydro Kennebec Project. Such "passage" around Hydro Kennebec is certainly not the normal behavior for an upstream migrating adult Atlantic salmon. The rate, location, and timing of when a normally migrating adult would reach its summer

holding areas or fall spawning areas can be considerably different from the timing and location of the trucking program.

30. In my previous experience as Fish and Wildlife Program Manager with the U.S. Army Corps of Engineers (the "Corps") in Oregon, I was responsible for managing four trap and truck programs on four watershed tributaries to the Willamette River. My direct experience with trap and truck programs has led me to conclude that they should be avoided unless they are absolutely necessary. Trap and truck programs add an undefined level of mortality, stress, and overall fitness declines that can have significant impacts on adult spawning success. In my opinion, allowing adult fish to migrate upstream, even through man-made fishways, at their own rates and at their own choice of when and where to spend the summer before spawning in the fall, is the optimum situation for salmonids. This is particularly true for fall migrating fish (including some Atlantic salmon in the Kennebec), which do not have the long lead time before spawning that spring migrating adults do and may therefore be even more adversely affected.

31. **Short-Term, Interim Relief Measures to Help Ameliorate these Effects.** I believe there are a number of measures that could be implemented that would improve the conditions for fish migrating downstream past the Hydro Kennebec Project and returning upstream via the trap and truck program at the Lockwood Project. Subject to a more thorough investigation (which could be easily done), a preliminary list of potential measures includes:

- Shutting down the turbines and bypassing all river flow during Atlantic smolt emigration periods and those periods when Atlantic salmon kelts are moving downstream post-spawning;

- Reducing the percentage of river flow passing through the turbines during downstream migration periods or only operating a single turbine during these times;

- Replacing the relatively ineffective "fish boom" system with an electrical fish guidance system (e.g., to guide the fish away from the turbines). These systems have proven to be highly effective in providing fish guidance or barriers in situations similar to Hydro

Kennebec. This technology can also be used to keep larger predators away while smaller juveniles pass.

- Optimizing the fish bypass flow during critical migration periods, subject to a well-conducted evaluation of injury and mortality associated with the current physical configuration of the bypass spill chamber;

- Potentially, increasing the flow capacity of the bypass by creating a larger opening from the forebay, although this would be subject to the outcome of a well-conducted evaluation of injury and mortality associated with the current physical configuration of the bypass spill chamber, and to appropriate engineering considerations;

- Increasing the height of the weir at the downstream end of the plunge pool in the fish bypass system to increase the water depth and "step down" the flow out of the plunge pool chamber to the tailrace downstream. The side wall on the west side of the plunge pool may need to be increased in height to accommodate the increased water depth in the plunge pool.

- Giving priority to concentrating spill flows though the existing spillway gates, with priority given to the gate nearest the fish bypass and increasing the water depth of any spill (to more effectively "compete" with turbine flows in attracting fish passage through the project);

- Providing additional downstream passage ways at two other locations along the spillway crest, with the objective of increasing the number of locations where downstream migrating fish can detect a concentration of flow moving over the dam. One passage way could be placed on the west side of the spillway and a second could be placed at or near the upstream apex of the spillway, near the middle of the river channel.

- Developing and funding, in cooperation with other KHDG partners, a conservation hatchery facility in the Sandy River/Kennebec watershed for Atlantic salmon (this is mentioned in the KHDG Agreement and will certainly become part of the recovery strategy for Atlantic salmon; starting now will aid in the development of a river-specific stock as the first step in meeting the recovery goals);

- Removing the wooden flashboards and all associated hardware along the crest of the spillway west of the spill gates, allow water to naturally spill over the ogee lip of the spillway;

- Evaluating and, if engineering and dam safety considerations are favorable, reconfiguring the downstream lip of the spillway and spillway gates to make them more fish friendly;

- Installing a more effective fish guidance boom in the turbine forebay (such as by increasing the depth and type of material used in the boom);

- Documenting and improving the hydraulic conditions in the existing fish bypass plunge pool;

- Removing or replacing the remnants of the now abandoned structure that was intended to prevent flow from the fish bypass from passing over the turbine tailrace top deck;

- Adding a fish cover structure to the reservoir upstream of the dam, to provide additional hiding and escape cover for juvenile Atlantic salmon;

- Beginning the design of permanent upstream and downstream fish passage facilities at Hydro Kennebec immediately (as it is apparent that safe fish passage and habitat connectivity are going to be major components of any recovery plan developed for Atlantic salmon, and the impacts of Hydro Kennebec operations could be reduced much sooner if a proactive approach is taken);

- Immediately funding the collection and analysis of genetic samples taken from all adult Atlantic salmon captured at Lockwood.

32. It is my opinion, based on my review of the available documents regarding Atlantic salmon life history in the Kennebec River, review of the documents associated with the ESA listing process and that evaluate the factors that influence and limit Atlantic salmon populations from recovering, and discussion with several agency staff about the direction of the recovery planning effort, that none of the measures suggested above is inconsistent with what will become the approved final recovery program for Atlantic salmon in the Kennebec River. In fact, I believe many of these measures, if implemented, will actually facilitate the ultimate implementation of recovery plan actions.

<u>The Section 7 Consultation Process</u>

33. Finally, I have been asked to evaluate the following statement made on page 5, paragraph 16, of Mr. Bernier's declaration:

> ***[W]e expect to complete the preliminary draft Biological Assessment and submit it to NMFS by November 2011. NMFS will then make comments, and we expect to file the draft Biological Assessment with FERC by January 2012. FERC will forward the draft Biological Assessment to NMFS to initiate formal consultation, and we expect that NMFS will file its Biological Opinion with FERC and Brookfield in the spring of 2012.***

34. Based on my experience with the Section 7 consultation process, I would be surprised if the biological opinion were issued within this timeframe. During my tenure as Fish and Wildlife Program Manager with the U.S. Army Corps of Engineers in Oregon, I was responsible for updating the Corps' biological opinion regarding spring Chinook salmon and winter steelhead trout for several hydroelectric and flood control dams. After having met monthly with the Services and the Oregon Department of Fish and Wildlife for four years to discuss the biological studies and data needs for the re-initiation of consultation, and having spent over $600,000 per year collecting data and funding studies that all of the agencies had agreed were needed to provide the data for a longer-term biological opinion, the Corps initiated Section 7 consultation in early 2005 and began the process of providing the resource agencies with all applicable data. The Corps actively participated in developing a strategy to provide updated fish capture facilities and to look at providing downstream fish passage for the dams in question. Even with the active, positive cooperation of the Corps, and several years of preparation before the consultation process was begun, a biological opinion was not issued until July of 2008, over three years after initiation of the formal process.

35. Based on my experience of being a willing applicant and my knowledge of the normal consultation and coordination process with NMFS and USFWS, I believe the time schedule suggested in Mr. Bernier's Declaration is overly optimistic. Further, the Corps of Engineers dams with which I was involved did not have FERC licenses, and thus there was no participation by FERC in our consultation process, as there is in the Brookfield consultation.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge, information, and belief.

Executed in Oregon City, Oregon on this 30th day of November, 2011.

Randy Bailey

Randy E. Bailey

List of Information Sources Cited in this Declaration

Brookfield Renewable Power, Inc. 2011. FERC Project No. 2611 – Hydro Kennebec Project; interim downstream fish passage 2011 study plan. Letter to FERC conveying agency comments and final study plan for the 2011 season.

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