

Atlantic salmon EFH

The proposed EFH designation for Atlantic salmon includes the rivers, estuaries, and bays that are listed in Table 31 and shown in Map 105, which exhibit the environmental conditions defined in the text descriptions. Smaller tributaries not shown on the map are also EFH for one or more life stage as long as they conform to the proposed habitat descriptions. All EFH river systems form a direct connection to the sea, but EFH would not include portions of rivers above naturally occurring barriers to upstream migration or land-locked lakes and ponds. The oceanic component of EFH is to a distance of three miles from the mouth of each river.

The new designation includes six new drainage systems not included in the original list of 26 rivers that were designated in 1998. All of them are in the Maine coastal sub-region (Chandler, Indian, Pleasant, St. George, Medomak, and Pemaquid rivers). All told, 30 river systems in nine New England sub-regions are designated for Atlantic salmon EFH. The new map includes a more continuous series of bays and areas adjacent to river mouths that are within three miles of the coast. Designated EFH in Long Island Sound has been reduced to small areas where the Connecticut and Pawcatuck Rivers empty into the sound, rather than taking up the entire sound. Also, there are a number of improvements in the text descriptions which make the habitat requirements for each life stage more specific and applicable to three separate juvenile life stages (fry, parr, and smolts).

Text descriptions:

Essential fish habitat for Atlantic salmon (*Salmo salar*) is designated as the rivers, estuaries, and bays that are listed in Table 31 and shown in Map 105. Supplementary habitat-related information, including prey, for each life stage is summarized in Appendix B to Omnibus EFH Amendment 2.¹ The designated rivers and streams form a direct connection to the sea. Essential fish habitat for the freshwater life history stages of Atlantic salmon includes all rivers, streams, lakes, and ponds in each designated drainage system that exhibit the environmental conditions identified in the following essential fish habitat text descriptions. Smaller order tributaries that could meet the EFH requirements defined in the text descriptions are not shown in the map.

Fresh Water Spawning and Rearing Habitats - Riffle and run habitats in shallow, well-oxygenated, fresh water streams with gravel/rocky substrates, as well as pools and vegetated riverine areas of lower velocity. These habitats occur in a range from 1st order streams (headwaters) to some 3rd or 4th order streams with low temperatures within the watersheds of the rivers listed in Table 31 and shown in Map 105. All six life stages of Atlantic salmon utilize fresh water habitats either exclusively or at some point during their life history – eggs, larvae (alevins), recently-hatched juveniles (fry), older juveniles (parr and smolts), and spawning adults. Intra-gravel habitat in the stream bed is essential for Atlantic salmon eggs and alevins, whereas essential fish habitat for the juveniles and spawning adults is the stream itself. Only parr and smolts utilize non-riffle and run habitats. The following conditions generally apply where essential fish habitat for these six life stages is found.

¹ See https://s3.amazonaws.com/nefmc.org/Appendix_B_SuppTables_Prey_Spawning_Revised_160127.pdf

Eggs: Grain size diameters of 2-64 mm, water depths of 17-76 cm, water temperatures of 0-16°C (6-7 optimal), intra-gravel water velocities above 20 cm/sec (53 optimal), dissolved oxygen concentrations above 3 mg/l (7 optimal), and pH above 4.0 (5.5 optimal). Eggs are deposited in nests (redds) in late October-November and are buried in the substrate to depths of 10-25 cm where they remain for 175-195 days before hatching.

Larvae: Grain size diameters of 2-64 mm, water depths of 17-76 cm, water temperatures of 0-16°C, intra-gravel water velocities above 20 cm/sec (53 optimal), and dissolved oxygen concentrations above 3 mg/l (7 optimal). Larvae remain in the substrate for about six weeks before emerging as fry in the spring.

Juveniles (fry, <5 cm TL): Grain size diameters of 15-64 mm and, for emerging fry, stream flow velocities below 20 cm/sec. Essential fish habitat conditions of depth and temperature for small, emerging fry are generally the same as for eggs and larvae, but larger fry disperse up to 5 km from redd sites and may be exposed to a wider range of habitat conditions.

Juveniles (parr, 5-10 cm TL): Water depths of 10-15 cm for parr <7 cm TL and 30-60 cm for larger parr, temperatures of 7-25°C, dissolved oxygen concentrations above 5 mg/l, and water velocities of 30-92 cm/sec.

Juveniles (smolts, 10-20 cm TL): Juveniles begin metamorphosis into smolts while still in fresh water, in preparation for downstream migration into brackish and fully saline seawater in the spring. The timing of downstream migration depends on a variety of factors, including temperature, salinity, and the physiological adaptations that make it possible for the smolts to tolerate higher salinity.

Spawning adults: Grain size diameters of 2-64 mm, water depths of 17-76 cm, and temperatures of 4-14°C. Spawning in U.S. waters generally occurs during late October through November. Essential fish habitat for spawning adult salmon also includes coastal marine, estuarine, lacustrine, and riverine habitats used during upstream migration (see below).²

Emigration-Immigration Habitats – A variety of riverine, lacustrine, estuarine, and coastal marine habitats used by older juvenile Atlantic salmon (smolts, >10 cm TL) during their downstream migration to the sea, by mature adult salmon during their upstream spawning migration, and by spent adults (kelts) following spawning, before they return to the ocean. Essential fish habitat for migrating smolts and kelts includes streams, rivers, and estuaries from 1st to 5th order, as well as lakes, ponds, and impoundments, within the watersheds of the rivers listed in Table 31 and shown in Map 105. Essential fish habitat for all three life stages is generally characterized by salinities below 25 ppt. Transit habitats utilized during upstream and downstream migration include streams, rivers, and estuaries from 1st to 5th order, as well as coastal marine areas adjacent to the mouths of designated rivers and estuaries within state waters (3 miles).

² All spawning females are sea-run salmon, but spawning males include some sea-run salmon and some juveniles that mature in fresh water before ever migrating to the ocean.

Table 31 –New England rivers, streams, and estuaries (bays) designated as EFH for Atlantic salmon, based on documented presence of adults during 2004-2013, geographic location as part of the Gulf of Maine Distinct Population Segment (DPS), or as a river that was designated in 1998 (a Status Quo river) and is not regularly monitored.

Sub-region, hydrologic unit code, and drainage	Rivers and indices	Bay designation	Years present	DPS?	SQ?
St John, 0101, St John	Aroostook River (1), Little Madawaska River (2), Big Machias River (3), Mooseleuk Stream (4), Presque Isle Stream (5), St Croix Stream (6). Meduxnekeag River (7), N Branch Meduxnekeag River (8)	Bay of Fundy	No data	No	Yes
Maine Coastal, 0105, St Croix	St Croix River (9), Tomah Stream (10)	Passamaquoddy Bay	1996-2005, every year; no data after 2005	No	Yes
Maine Coastal, 0105, Boyden	Boyden Stream (11)	Cobscook Bay	No data	No	Yes
Maine Coastal, 105, Dennys	Dennys River (12), Cathance Stream (13)	Cobscook Bay	13 yrs during 1996-2011	Yes	Yes
Maine Coastal, 105, Hobart	Hobart Stream (14), Orange River (15)	Cobscook Bay	No data	Yes	Yes
Maine Coastal, 105, East Machias	East Machias River (16)	Machias Bay	1967-1995; no data after 1995	Yes	Yes
Maine Coastal, 105, Machias	Machias River (18), Mopang Stream (19), Old Stream (17)	Machias Bay	1967-1995; no data after 1995	Yes	Yes
Maine Coastal, 105, Chandler	Chandler River (20)	Englishman, Chandler Bays	No data	Yes	Yes
Maine Coastal, 105, Indian	Indian River (21)	Western Bay	No data	Yes	Yes
Maine Coastal, 105, Pleasant	Pleasant River (22)	Narraguagas, Pleasant Bays	1967-1995, 7 yrs 1996-2013	Yes	Yes
Maine Coastal, 105, Narraguagus	Narraguagus River (23), West Branch Narraguagus River (24)	Narraguagas, Pleasant Bays	1996-2013, every year	Yes	Yes
Maine Coastal, 105, Tunk	Tunk Stream (25)	Gouldsboro Bay	No data	Yes	Yes
Maine Coastal, 105, Union	Union River (26), West Branch Union River (27)	Blue Hill Bay	8 yrs during 1996-2005; 1 return in 2013	Yes	Yes
Penobscot, 102, Orland	Orland River (28)	Penobscot Bay	No data	Yes	Yes
Penobscot, 102, Penobscot	Penobscot River (29), Cove Brook (30), East Branch Mattawamkeag River (31), East Branch Penobscot R (32), East Branch Pleasant R (33), Eaton Brook (34), Felts Brook (35), Kenduskeag Stream (36), Marsh Stream (37), Mattawamkeag River (38), Millinocket Stream (39), Molunkus Stream (40), Nesowadnehunk Stream (41), North Branch Marsh Stream (42), North Branch Penobscot R (43), Passadumkeag River (44), Pine Stream (45), Piscataquis River (46), Russell Stream (47), Salmon Stream (48), Seboeis River	Penobscot Bay	Every year 1996-2013	Yes	Yes

Sub-region, hydrologic unit code, and drainage	Rivers and indices	Bay designation	Years present	DPS?	SQ?
	(49), South Branch Penobscot River (50), Souadabscook Stream (51), Sunkhaze Stream (52), Wassataquoik Stream (53), West Branch Mattawamkeag River (54), West Branch Penobscot R (55), West Branch Pleasant River (56), West Branch Souadabscook Stream (57)				
Maine Coastal, 105, Passagassawakeag	Passagassawakeag River (58), Little River (59)	Penobscot Bay	No data	Yes	Yes
Maine Coastal, 105, Ducktrap	Ducktrap River (60)	Penobscot Bay	1985-1995; no data after 1995	Yes	Yes
Maine Coastal, 105, St George	St George River (61)	Muscongus Bay	No data	Yes	Yes
Maine Coastal, 105, Medomak	Medomak River (62)	Muscongus Bay	No data	Yes	Yes
Maine Coastal, 105, Pemaquid	Pemaquid River (63)	Johns Bay	No data	Yes	Yes
Maine Coastal, 105, Sheepscot	Sheepscot River (64), West Branch Sheepscot River (65)	Sheepscot Bay	1967-1997; no data after 1997	Yes	Yes
Kennebec, 103, Kennebec	Kennebec River (66), Carrabassett River (67), Carrabassett Stream (68), Craigin Brook (69), Dead River (70), East Branch Wesserunsett Stream (71), Eastern River (72), Messalonskee Stream (73), Sandy River (74), Seabastcook River (75), Togus Stream (76), Wesserunsett Stream (77), West Branch Wesserunsett Stream (78)	Local Estuary	2006-2013; no data 1996-2005	Yes	Yes
Androscoggin, 104, Androscoggin	Androscoggin River (79), Little Androscoggin River (80), Nezinscot River (81), Webb River (82)	Local Estuary	1996-2013, every year	Yes	Yes
Saco, 106, Presumpscot	Presumpscot River (83), Mill Brook (84), Piscataqua River (85)	Casco Bay	No data	No	Yes
Saco, 106, Saco	Saco River (86), Breakneck Brook (87), Ellis River (88), Hancock Brook (89), Josies Brook (90), Little Ossipee River (91), Ossipee River (92), Shepards River (93), Swan Pond Brook (94)	Saco Bay	1996-2013 every year	No	Yes
Saco, 106, Cocheco	Cocheco River (95)	Great Bay	4 yrs during 1996-2003; no data after 2003	No	Yes
Saco, 106, Lamprey	Lamprey River (96)	Great Bay	4 yrs during 1996-2003; no data after 2003	No	Yes
Merrimack, 107, Merrimack	Merrimack River (97), Amey Brook (98), Assabet River (99), Baboosic Brook (100), Baker River (101), Bartemus Brook (123), Beaver Brook (102), Blackwater River (103), Bog Brook (104), Cockermouth River (105), Cohas Brook (106), Concord River (107), Contoocook River (108), E Branch Pemigewasset R (109), Eastman Brook (110), Glover Brook (111), Golden Brook (112), Hubbard Brook (113), Jackman Brook (114), Mad	Ipswich Bay	1996-2013, every year	No	Yes

Sub-region, hydrologic unit code, and drainage	Rivers and indices	Bay designation	Years present	DPS?	SQ?
	River (115), Mill Brook (116), Moosilauke Brook (117), Nashua River (118), Nissitissit River (119), Pemigewasset River (120), Pennichuck Brook (121), Piscataquog River (124), Powwow River (125), Pulpit Brook (126) Shawseen River (127), Smith River (128), Souhegan River (129), South Branch Baker River (130), S Branch Piscataquog R (131), Spicket River (132), Squannacook River (133), Stony Brook (134), Sudbury River (135) Suncook River (136), Warner River (137) West Branch Brook (138), Witches Brook (122)				
MA-RI Coastal, 109, Pawcatuck	Pawcatuck River (139), Beaver River (140), Wood River (141)	Long Island Sound	13 yrs during 1996-2013	No	Yes
Connecticut, 108, Connecticut	Connecticut River (142), Ammonoosuc River (143), Ashuelot River (144), Black River (145), Blackledge River (146), Bloods Brook (147), Chicopee River (148), Cold River (149), Deerfield River (150), East Branch Farmington R (151), East Branch Salmon Brook (152), Eight Mile River (153), Fall River (154), Farmington River (155), Fort River (156), Four Mile Brook (157) Green River (158), Israel River (159), Johns River (160), Little Sugar River (161), Manhan River (162), Mascoma River (163), Mill Brook (165), Mill River (Hatfield) (166), Mill River (Northampton) (167), Millers River (168), Mohawk River (169), Nepaug River (170), North Branch Manhan R (164), Nulhegan River (171), Ompompanoosuc River (172), Ottauquechee River (173), Passumpsic River (174), Paul Stream (175) Pequabuck River (176), Salmon Brook (177), Salmon River (178), Sawmill River (179), Saxtons River (180), Stevens River (181), Sugar River (182) Upper Ammonoosuc River (183), Waits River (184), Wells River (185), West Branch Farmington R (186), West River (187), Westfield River (188), White River (189), Williams River (190)	Long Island Sound	1996-2013, every year	No	Yes

^a EFH does not include Canadian waters in the Bay of Fundy or Passamaquoddy Bay.

Map 105 – Atlantic salmon EFH, all lifestages.

