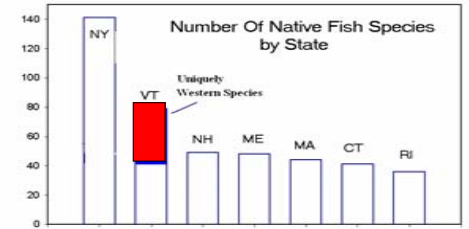


Origin of New England's Fish Species

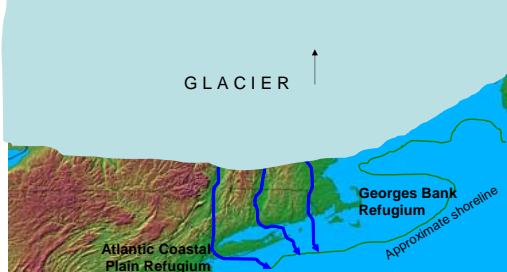
Richard Langdon, Vermont Department of Environmental Conservation

Most of New England's native fishes recolonized from unglaciated areas to the east and south, known collectively as the Atlantic Coast Refugia - here referred to as "eastern". The waters of the Champlain valley of Vermont were also recolonized by "western" species from the rich Mississippian Refugium, located in the mid and upper Mississippi River Valley. In New England, only the Champlain Valley of Vermont and perhaps northern-most sections of Maine were naturally populated by western species. Western fishes such as small and largemouth bass, northern pike, rock bass and some minnow species have been purposely introduced outside their native ranges into eastern Vermont and the rest of New England.



Northeastern states with native fishes from both refugia boast more native species.

Formation of glacial ice up to a mile thick consumed enough ocean water to draw sea level down some 300-400 feet, exposing areas now off the coast over the Georges, Grand and Sable Island Banks. These low swampy refugia supported aquatic and terrestrial animals during the glacial advance and early retreat. Another eastern refugium was the Atlantic Coastal Plain situated along what now is mid Atlantic states.



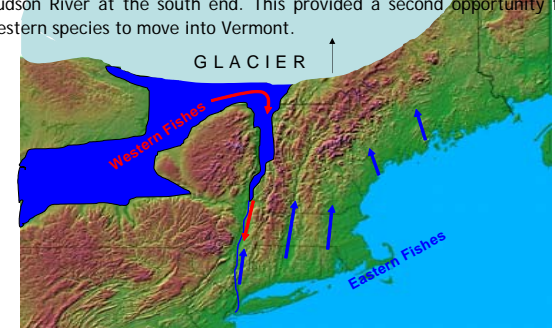
1. About 15,000 years ago

In the Connecticut Valley, the north-south-oriented Lake Hitchcock, at it's most developed stage, presented over 200 miles of flat, open water for northward-migrating fishes. As with Lake Hitchcock, Lake Vermont in the Champlain Valley, grew larger as the glacier melted. For a period of about 1,500 years meltwater from the glacial Great Lakes emptied into the Mohawk Valley of New York and into the Hudson River carrying with it many western species.



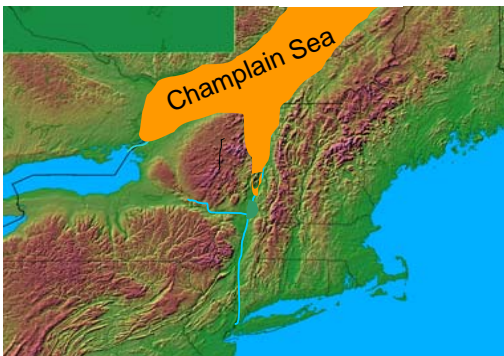
2. About 13,000 years ago

About 12,000 years ago, the Great Lakes outlet shifted into the St. Lawrence Valley. For a about 500 years the ice mass, then situated north of the Vermont border, acted as a dam, diverting river flow south into Lake Vermont in the Champlain Valley and ultimately into the glacial Hudson River at the south end. This provided a second opportunity for western species to move into Vermont.



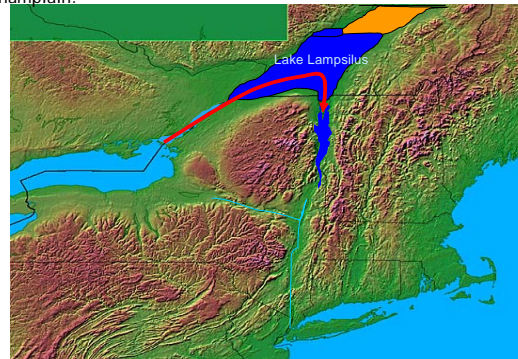
3. About 11,500 years ago

Eventually the ice dam in the St. Lawrence holding back the rising ocean broke allowing the Atlantic to quickly fill the Champlain Valley. The Champlain Sea persisted for 1,500 to 2000 years. Only landlocked anadromous species (sea lamprey, Atlantic salmon and rainbow smelt) migrated into Vermont during that time.



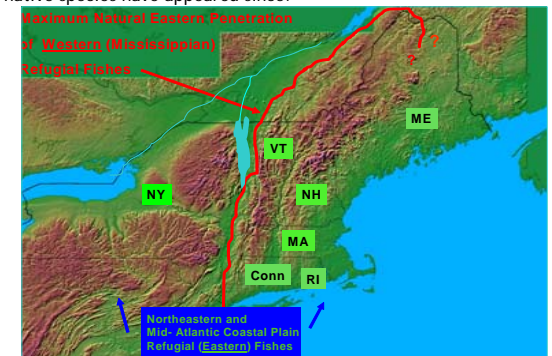
4. About 10,000 years ago

With the land mass gradually rebounding from the weight of the glacier, the Champlain Sea was pushed out by an freshening St. Lawrence River and Lake Champlain. Lake Lampsilus was formed in both valleys, once again connecting the Champlain Valley with western refugial species. For about 1,000 to 2,000 years western species migrated into Lake Champlain.



5. About 9,000 years ago

Sometime around 6-8,000 years ago, flowing water in the Lake Champlain outlet eroded out a series of falls which eventually created barriers to all further upstream movement of western fishes into New England. From that time on, the native species template was set, and while some could have been lost to extinction, no new native species have appeared since.



6. About 8,000 years ago to today