

A Winter Flounder Habitat Index for Connecticut

By Wayne Castonguay and Timothy C. Visel

The University of Connecticut Sea Grant College Program 1988

**In Cooperation with the University of Connecticut Cooperative
Extension System**

Working Draft #3 – Not Published

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September 1988

Abstract

Young winter flounder, Connecticut's most important salt water finfish, spend the first year of their lives in our shallow estuaries, coves and rivers. Within these areas, they seem to prefer very shallow water (less than four feet), with a flat, hard, and clean bottom protected by waves and currents. It is not clear why they prefer these particular areas, but young flounder will rarely be found within marsh creeks or in areas with mud, rock, or algae.

Each cove and estuary along the Connecticut shoreline from Pawcatuck to Fairfield, and in Greenwich was examined and evaluated for juvenile winter flounder habitat in 1986 and 1987. Very productive areas were found to be near the mouth of the Pawcatuck, Poquonnock, Niantic, and Connecticut Rivers and in Jordan, Morris, and Greenwich Coves.

However, the majority of our estuaries were found to have little or no young flounder habitat. It is obvious that many of these areas once had suitable habitat, but are now unavailable to young flounder due to filling, dredging, and build-up of fine silt and mud. In addition, literally hundreds of acres of otherwise good flounder habitat were covered with sea lettuce, *Ulva lactuca*, which has been found to kill juvenile winter flounder in the laboratory. These algae, which thrive in polluted areas, were especially abundant in the Clinton, Branford, New Haven, and Bridgeport harbors.

There has been a lot of recent discussion about declines in winter flounder abundance. Based on these observations, any serious inquiries into the declines should take into consideration what is being done to our estuaries and how it is affecting juvenile winter flounder habitat.

- 1) Primary Author University of Connecticut graduate student degree program Oceanography Marine Science Department, Avery Point Campus, 1080 Shennecossett Road, Groton, CT 06340
- 2) Associate Author, University of Connecticut, Sea Grant College Program, Avery Point Campus, SGMAP/Corporate Extension Service, Groton, CT 06340, #24 Building.

Winter Flounder Habitat Index By Wayne Castonguay

Before describing each area, I'd like to summarize what I have seen and read pertaining to YOY flounder habitat. I have references for everything stated here.

Simply put, O+ WFL is extremely habitat specific. In general, the YOY prefer very shallow ((6', 1-2' best), low energy, flat, clean areas. Highest densities seem to be found on sand or sand-mud flats with low to moderate tidal amplitude near the opening of an estuary; usually behind a barrier beach or sand spit. O+ are found in these areas because they require salinities below 25o/oo (15-20 preferred), their high degree of photo taxis, and their obvious lack of strong swimming ability. It is not clear why they prefer a hard, sandy or sandy-mud bottom, but presumably it has to do with food habits and an inability to deal with a soft, muddy substrate (which may interfere with respiration, ion-osmoregulation, or sighting food). The young of the year will remain extremely localized (e.g. the same flat) until the cold of winter drives them into deeper areas in or near the estuary. They will tend to remain in these deeper areas throughout their 1+ year because of a photonegative responses and a continued preference for low salinities. The evolutionary "driving force" behind these adaptations seems to reduce interspecific competition. Since it also prefers low salinities and inhabits inshore areas as well, these adaptations would serve to separate age groups.

Obviously, there are no absolutes when dealing with this species. For example, a few O+ can be found on mud, shell, gravel, or outside of estuaries (in L.I.S.). However, these areas must be protected, shallow, and flat as well. Hence these three requirements are obviously the most important. But since densities are many, many, many times greater in the preferred habitat, the other areas are more than likely comparably insignificant producers (in a given estuary area). The big problem here is what if an area doesn't have an area of "good looking" habitat, e.g., the majority of the area between Branford and Saybrook? My impression thus far is that these areas aren't significant producers, although a closer look would be the only way to be sure.

If an area meets the requirements of the fish, that area may hold flounder - other factors could determine if the fish will actually be there. However, from what I have seen, an identifiable "flounder spot" usually has fish. At this point, I am confident areas that aren't at least shallow, flat and protected will hold any flounder whatsoever. In addition, areas that do not have a hard, clean bottom can be considered insignificant. I would recommend searching a given area (first with a map then visually) for potential habitat, and quantifying that while ignoring other

habitat. To determine how productive the area is, would require sampling of the potential habitat, at least initially. This sounds like a lot of work, but very little potential habitat usually exists within an estuary.

Poquonnock River

I have covered every inch of this estuary and believe it to be a very large producer of flounder-potentially the larges of my sites. Proportionately, much of the bottom (up to 40%) ranges from good to excellent habitat. The entire lower third of the river is flat, firm, shallow, with a maximum 2' tide. The entire flat inside Bush Point beach is a high-density area. In addition, the west side of the river from the park's parking lot to the mouth has moderate densities. The upper and middle-east side of the river is muddy or deep and is insignificant flounder habitat. All potential habitat is seinable. I am currently sampling behind the beach near the outflow of the salt pond. Access via dir road to within 100' of the lower river high density area is possible with DEP permission-otherwise, a 2-3 mile walk from the parking lot is necessary. I am currently taking a boat across from Project O. 1+ blackfish have been captured in the deeper areas, otherwise just the "usuals" (usuals from here on refer to mummi's, killi's pipefish, stickleback's, tomcod, and silversides).

Jordan Cove

Although one area of this estuary is extremely productive, I feel this area is only a moderate producer overall (for it's size). The entire cove beyond the bridge has been examined closely. Much of the western half of the cove outside the bridge is sandflat, while the eastern half is silty mud. Flounder inhabit only the western half of the cove. In this part of the cove, the only high-density area is within the tide pool just east of the entrance channel and inside the sand spit (a sandbottom area 75' X 10' - closed off at low tide). Otherwise, a few fish are scattered on the sand and mud flats near the entrance, but are limited in habitat by heavy channelization and currents through and over the flats. The pool is the only easily seinable area. Just the usually species have been caught. Access to the pool is a short walk along the beach (that creates the cove) from a road just south of the boat launch on Dock Road.

Griswold Point

The sand flat behind the barrier beach at Griswold Point has, by far, the highest density of my sites (probably the state and even the world!) I have only examined the area near the outflow of the pond behind the beach, but expect similar densities to be found along the approximate mile stretch to the CT River. If this is so, this would probably make this area one of the major producer's in the state. This stretch is entirely seinable. The shoreline across the channel and within the marsh further up the Black Hall could also be important, but has not been looked

at, although areas within marshes (i.e. rivers and creeks) are usually uninhabited by YOY flounder. Besides the usual species, the deeper water at the edge of my site is loaded with 1+ flounder, as well as small fluke (approx. 150mm in June and July). Access is a 2-mile walk from the Old Lyme town beach (Hawk's Nest?).

Clinton Harbor

The majority of the harbor (from the point the Hammonasset River turns into the harbor area, to the sand flats at the outer harbor) has been examined closely. The large spring rec. fishery here suggests the harbor is a major spawning area. Although several areas appear to be good to excellent habitat, YOY flounder have been found only at the area adjacent to the south side of Clinton town beach. This area is quite unique when compared to my other sites. This area is a very shallow ((1' at low tide), sandy-mud eelgrass bed. Although the density of fish here is moderate at best, the most fish seem to be along the edge of the grass. Other species include the usuals and an occasional small fluke. Access is a 200' walk from the beach lot. The habitat, but has been found to be nearly devoid of fish. I suspect there is too much wave and current action at high tide. On the other hand, the entire north shore inner harbor area is either marina or shallow "black mayonnaise" - hence also devoid of flounder. Otherwise, the North Shore of Cedar Island, a 3/4 mile sand/gravel flat is typical of other highly productive areas. However, sampling has turned up nothing (except a clogged net!). I am convinced the worst-ever algae bloom; currently clogging the entire harbor (except Clinton beach) has killed or driven the flounder out of this area. I'm confident this particular area is important in non-bloom years. Access to Cedar Island is a 2 - miles walk from Hammonasset.

New Haven Harbor - Morris Cove

Nearly every area within the harbor and its two tributaries (that I would consider potential YOY habitat) has been examined. As a result, I feel the New Haven harbor is a minor producer for an area of that size. Although many acres of bottom appear very promising, substantial numbers of flounder (2 per haul) have only been located within Morris Cove. These highly promising areas include both sides of a mile long spit jutting out from the new sewage plant, much of the western shoreline, and the area between the power plant and coast guard station. Other (less promising areas) examined include the area between Long Wharf and the old sewage plant, the West River and within the Quinnipiac. All of these areas are covered with ulva and may explain the lack of fish (ulva has been found to kill juv. Wfl in the lab). On the other hand, Morris Cove is relatively free of ulva. Moderate densities may be found along the southern beachfront nearest the New Haven Yacht Club. The remainder of the cove is an otherwise low-density area, probably because it's unprotected from the prevailing winds. Since this site is a beachfront, several species other than the usuals have been seen. These include YOY blackfish,

fluke, spot, snappers, and 1+ flounder. Access via a beach maintenance entrance just before the yacht club to within 100' of the sample area.

Lewis gut

The entire south shore of the gut - from the Stratford town beach to the bridge in Bridgeport has been sampled. While the extreme eastern end is soft and muddy, the substrate is progressively harder and sandier towards the bridge. Potential flounder habitat extends from about 1/2 the length of this shoreline (about 3/4 mile). However, the only areas to produce (moderate densities) seems to be the sandy stretch nearest the pilings. This is the only area lacking massive beds of ulva on the substrate - I can't help but think the ulva is responsible for the lack of fish in the other areas. Since the fish are found in decent numbers in areas without ulva, I feel this area would be much more important without the algae. Access to this area is the road leading to the houses from Pleasure Beach Park. Several areas on the opposite (north) shore of the gut also appear promising, although access may be a problem. In addition to the usuals, substantial amounts of 1+ wfl and small fluke (150mm) were caught in June.

Greenwich - Greenwich Point Park

This site is a sandy "basin" just north of the bell tower at the northwestern corner of the park. The basin is formed by an island and blue mussel beds adjacent to the point. Densities are moderate. Seining is possible only on the island side of the basin. The sandy-shell shallow area just west of the mussel beds is also fairly productive habitat. Flounder were not found in other areas within the park. Access (only at low tide) is a 100' walk from the small parking lot at the bell tower. This particular area also seems to be important 1+ wfl and bkf habitat. Although the only areas sampled were within the park, the overall Greenwich - Captains Harbor area is probably an important nursery area. Large expanses are protected, sandy, shallow and flat. There is also a surprising lack of macro algae in this area.

Comments on other areas

Stonington - The entire shoreline of Fisher's Island sound from the state line to the mouth of the Mystic River is important habitat. This area is characterized by shallow, sandy areas protected by large rocks, eelgrass beds, and small enclaves in the otherwise bedrock shoreline. The inlet's and coves of this area, especially Little Narraganset Bay, Quaumbog Cove and the Mystic River have large areas of nursery habitat.

New London - Obviously, the Thames River must produce a lot of fish. However, the location of nursery areas is difficult to pinpoint. The several private beaches along the west side of the river along Pequot Avenue are good candidates. Some

YOY flounder have also been found in the sandy areas just inside the entrance to Alewife Cove.

CT River. The Lieutenant River, South Cove and the west bank of the river was sampled with the shad trawl in 1986. All of these areas have a soft bottom and are likely insignificant nursery areas (very few YOY were caught and only at the west bank site), young fluke, on the other hand (20 mm) were common in these areas. I suspect the majority of nursery habitat within the river is south of the railroad bridge since many years of sampling at an otherwise good location just upstream of the 95 bridge has never turned up a YOY flounder. The flats along the eastern shoreline south of the railroad bridge may be a nursery area.

Saybrook to New Haven - The Oyster River, Westbrook harbor, creeks at Webster Point and Seaview Beach (Madison), East River at Grass Island, Joshua Cove and Morris Creek have been looked at. I feel these areas are unimportant, even as a whole, since each of these areas contains little, if any identifiable nursery habitat. The sandy area outside of the Mud creek (Saybrook) and Branford harbor offers the best potential outside of Clinton Harbor in this section of the state, although neither area has been looked at.

Fairfield/Bridgeport - Although it hasn't been looked at, the area off Fairfield Beach and along the sand spit to Penfield Reef is more than likely a major nursery area. It is characterized by many acres of shallow sand, well protected from the prevailing winds by the spit and rocks near Penfield reef. Very high densities of it have been documented by the lobster crew just offshore of this area.

Associations of Flounder and Oyster Habitat

Timothy C. Visel, SGMAP/Cooperative Extension Service 1988

To begin with I was very fortunate to meet and talk with many oystermen including JR Nelson of Long Island Oyster Farms, George McNeil of McNeil Oyster Company, Clint Hammond on Cape Cod and Al Hufferton of Warren Oyster Company in Rhode Island. Included in my Sea Grant research were dozens of smaller oyster producers and seed oystermen (natural growers). My own experiences include some modest oyster culture and seed oystering here in Connecticut.

During my employment at three Universities I came to the conclusion that close habitat relationship exists between oyster natural/cultivated habitat and flounder populations. Not much is written about it however, Paul Galtsof (1964 American Oyster) was the first to mention it, he did a lot of fieldwork on the issue out of Woods Hole. It would be interesting to see flounder catch statistics against oyster production, say 1880 to 1960 for Connecticut and perhaps Rhode Island.

What I have found is that the statements are all so familiar that one could believe its more than a coincidence and that both juvenile and adult flounder sought out this habitat. What I'm not certain about is that did we create more flounder habitat by building more seed oyster beds? I have noticed flounder in the area when I seed oystered in the early 1970's. We would get large flounder in our seed oyster dredges while working in the East and Hammonasset Rivers. Some of the comments below are generalized but reflect the same association, flounder and oyster beds. Some video filming I did with the Under Sea Research Program in the lower East River did show many small flounder but I left Sea Grant without a follow up study. Copies of the underwater dive reports and videos survey showing juvenile flounder returning to the East River were submitted to the New England Office – Army Corps of Engineers.

Some Histories – summarized conversations

George McNeil - owner operator McNeil Oyster New Haven and Clinton, CT (1970's)

1) New Haven - Oyster Beds (Private)

We used to get about 5 to 10 bushel of adult flounder each day in the dredges, they were large and given to the crew, spring started showing in New Haven the first or second week of March - Then by fall we would see small ones. People would fish (with poles) when we dredged - we would see them catch flounder and sometimes we had to chase them off because they were in the way.

2) Clinton (McNeil) – continued 1980's

Located business to the mouth of the Indian/Hammonasset River, Clinton Harbor - clean water. George told me the "Indian" river supported a fyke net fishery for flounder - very large. Over the natural oyster beds in the Indian River and harbor. People would spear flounder at low tide, always near the oyster beds. When we harvested oysters we always caught flounder in the dredges.

3) J. R. Nelson - Long Island Oyster Farm (1972 about) -

We had a dredge boat for drills - called the Quinnipiac - suction dredges to pick up drills and starfish - flounder became a problem, also window (pane) flounder, crew kept them (to eat) small ones just got buried in the pile of starfish and lime water (the lime water would kill the starfish). Some days we would get hundreds of flounder, some much more off the seeds beds. Sometimes so much we just moved off it for awhile so as not to kill them (small flounders).

4) Albert Hufferton - Warren Oyster Co. (1980)

When the Connecticut oyster companies started planting seed oysters, the flounder came. The bottom was often soft, sticky - you couldn't stand in it but the companies in Wickford hardened the bottom with shell - then the oysters on top. Wow we had flounder! I mean in places - no fish, we had fish! (Flounder) lot's of small ones also - sometimes so thick we would catch them in the dredges.

4) Anthony Ronzo - Old Saybrook, CT (1982)

Note Seagrass Oyster River restoration project - cleaned three feet of black mayonnaise off oyster shell base - put down clean clutch. Comments of an Oyster River neighbor - Almost immediately I started catching flounder again where you cleaned, the bottom was shells and small oysters. The last time we caught flounder here was when I fished after the war (WWII) we used to catch flounders on the oyster tongs when we tonged oysters in the river - you could feel them when the tines hit them. If you kept the tongs closed you could spear them, sometimes we caught more flounder than oysters.

6) Clint Hammond Oyster River Chatham Mass 1982

We purchased seed oysters (bedding stock) from Connecticut to plant. We cleared the bottom and planted the seed. This soon became a problem people started flounder fishing over the bed and dragging oysters with anchors. They would make a mess of the oyster bed with anchors - we asked them to stop but they would say this is where they big flounder are - and they were right! The flounders were just over the bed, what could we do, we let them fish.

7) Charles Beebe - East River, Madison (1975)

The river to oystering has been closed for awhile - the oyster beds are covered with leaves and the flounder spot is gone. We used to catch big flounder by the railroad bridge on the oysters. We would rake up some oysters and then fish the spot -

sometimes we would smash the oyster and chum them with the oysters pieces, some days we would catch a 12 or more big ones that way. We can't do that (catch oysters) because the river is closed. We used to catch flounders in our seed dredges but that was in 1960's. There hasn't been any river flounder up at the bridge since then.

7) Norm Bender, Sea Grant Education Project

Tim Visel Norwalk Harbor (1986)
Project Oceanology Cruise Micky Weiss Captain
Thaxter Tewksbury crew

We were trawling 30 foot Wilcox flat net on sand near the channel. After 10 minutes we would catch 30 to 40 small flounder 2 to 3 inches in length. Micky was doing some population study so we were trying to come up with some size ranges. I noticed one of Bloom's oyster boats and Dave Hopp was on board. I asked if we could tow close to his seed bed - he called Hillard and said yes - it is was a short tow. We went inside of the bamboo oyster flags and made a four or five minute tow. The group started hauling - but we needed everyone - a big cod end, we finally got it in - all mostly small flounder 2 inches and up - 5 gallon pails at first but then started to throw as many as we could back overboard, I estimated 2,000 or more. We stopped measuring because it was just too much! Hillard (after) the boat returned asked that not to mention this - he had known that the seed beds had flounder in them - but even was amazed at how many.

9) Louis Bayer - Quiambaug Cove Stonington 1988

We used to catch flounder here by the barrels we have reports that fykes were used here. I used to catch them (flounder) here along time ago. But the bottom is muck the oysters are gone, the clams are gone, it's smells bad, and no flounder in the cove. I gave up trying. The bottom in front of me (home) is soft muck now it used to be shells and sand.

10) Mr. Manwaring Pattagansett River, East Lyme 1988

Tim, we used to fish here (his property abuts the river) and now it is all muck. We would haul seine flounder at night and spear them also - catch them on worms incoming tide. But the river is filled with muck - the oysters are buried. You can find the oyster bed its near the railroad causeway (the Pattagansett was once 1,800 foot wide) it's all muck there now - if you fall overboard you would know. That is where we could catch flounders, over the oysters but you can't do that anymore, I haven't seen a flounder here since the 1950's. It's all soft muck over the oysters now.

11) Larry Malloy - Oyster Company New London 1988 - Thames River

We could catch oysters and flounder together, they would come in to spawn. I think the dredging released food - they were here alright sometimes 2 or 3 in each oyster dredge - big ones! The oyster bed was alive with flounder, and sometimes we could dredge shell (buried shell for building a shell base) and get little ones. They were dead and we could watch the sea gulls get them when they went over.