

TOWN OF WELLFLEET

- Town Map
- Chart of Site Characteristics
- Sites 1 to 6

Town of Wellfleet – Site Characteristics

Site Number	Size of upstream affected area (salt marsh acres / total affected acres)	Is the upstream affected area contiguous to protected open space (ownership)?	Does this tidal channel support a shellfish resource area?	Is the channel or system part of an anadromous fish pathway?	Does the culvert/pipe support an engineered flood control structure?	Is the affected area or site within an ACEC boundary?	Does the affected area include Priority Habitat of Rare Species (PH) or Estimated Habitat of Rare Wildlife (WH)?	Are there any restricted sites upstream of this site (site number)?	Ownership of the site (public vs. private)
WE-1	0.0 / 3.94	YES (federal, private)	YES	NO	NO	NO	YES (PH, WH)	NO	PUBLIC
WE-2	0.55 / 0.55	NO	YES	NO	NO	NO	NO	NO	PUBLIC
WE-3	4.16 / 17.33	YES (federal, private)	YES	NO	NO	NO	YES (PH, WH)	NO ¹	PUBLIC
WE-4	0.0 / 6.69	NO	YES	NO	NO	YES	YES (PH, WH)	NO	PRIVATE
WE-5	0.0 / 19.33	YES (municipal, private)	YES	NO	YES (flapper gate)	YES	NO	NO	PUBLIC
WE-6	0.81 / approximately 1000 acres ²	YES (municipal, state, federal)	YES	YES	YES (2 flapper gates; 1 sluice gate)	YES	YES (PH, WH)	YES ³	PUBLIC

¹ Under the present conditions at site WE-3, upstream site WE-d is not considered tidally restrictive of salt marsh because it is adequately sized to pass the quantity of tidal flow that reaches it (see Appendix B). Should work to improve tidal flow through site WE-3 ever be undertaken, then non-tidally restricted site WE-d should be reevaluated.

² A recently completed study of the Herring River system stated that the diking of the Herring River has resulted in the conversion of hundreds of hectares of original inter-tidal, salt marshes (Spaulding, 2001, p.i). According to the Cape Cod National Seashore the area affected by this restriction is approximately 1000 acres (~ 400 hectares).

³ There are several infrastructure crossings upstream of site WE-6 throughout the Herring River system. High Toss Road is the first infrastructure crossing encountered upstream of Chequesset Neck Road. Because of the nature and magnitude of the restriction at site WE-6, project staff did not attempt to collect or present information on the Herring River's upstream sites.

WELLFLEET

Route 6 restriction of Fresh Brook

Site WE-1

Site Description

Fresh Brook flows in a westerly direction from east of Route 6 and discharges into Wellfleet Harbor. Fresh Brook travels under Route 6 for approximately 120 feet via a 2-foot (approximate) pipe set under a stone head-wall. This culvert is in poor condition. The seaward opening was submerged in murky water during a low, outgoing tide cycle and obscured by a significant volume of trash and debris that collected at the Route 6 berm. Fresh Brook does support shellfish resource areas but does not act as an anadromous fish pathway. The boundary of the Wellfleet Harbor Area of Critical Environmental Concern runs parallel to Route 6 at this site and does not incorporate it or its upstream affected area.

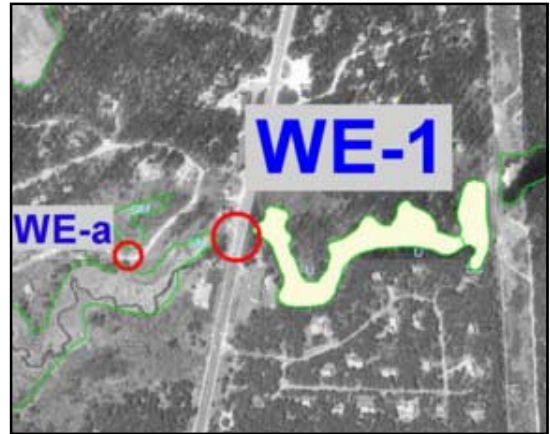
General Information

Seaward of Route 6, Fresh Brook is approximately 20 feet wide, narrowing upstream to approximately 5 to 10 feet. The Wetlands Conservancy Program delineated salt marsh adjacent to the seaward side of the culvert, however within 15 yards of the Route 6 berm the vegetation observed was mainly forest-like. Upstream of the berm, shallow marsh and shrub swamp were delineated. Other visual indicators of restriction include minor scouring and major erosion both seaward and upstream of Route 6. *Phragmites* was not present on the seaward side, however once the upstream channel passes through a forested section it opens into an area with extensive *Phragmites* growth.

- Restriction width – 2 feet (approximate)
- Restriction length – 120 feet (approximate)
- Upstream salt marsh – 0.0 acres

Comments

Upstream of this site Fresh Brook passes under the Cape Cod Rail Trail. (The railroad right-of-way is visible to the left of the highlighted affected area in the GIS image above/to the right.) According to the Cape Cod National Seashore, the brook passes under the Rail Trail via an 8-inch culvert that is reportedly collapsed, resulting in the development of a freshwater wetland system upstream of the railroad bed. Work on this culvert will not be undertaken until the blockage of Fresh Brook by the restricted Route 6 culvert is addressed.



Upstream Affected Area (acres): SS – 0.87; M – 3.07.



A large quantity of debris has collected near this seaward headwall and partially blocks the pipe, which is submerged beneath the brown murky water and located just to the left of a Route 6 drainage pipe (clearly visible here to the right of the stone headwall).



The upstream area is forested near the Route 6 berm, however a large area of *Phragmites* is visible a short distance from the culvert.

WELLFLEET

Route 6 restriction of unnamed channel south of Blackfish Creek

Site WE-2

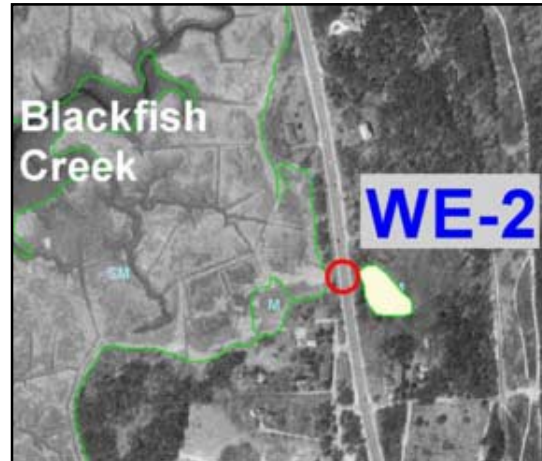
Site Description

South of Blackfish Creek and to the west of Route 6 lies an extensive salt marsh known as the Blackfish Creek Marshes. One channel traverses this marsh area to the south of Blackfish Creek and passes under Route 6 via a 2-foot concrete culvert. This restricted culvert is submerged at mean high tide and appears to be in good condition. While it does not appear to be broken, it is visibly clogged by sand and debris. Blackfish Creek, with which this unnamed channel shares its discharge area, supports productive shellfish resources and is not believed to be an active anadromous fishway. The boundary of the Wellfleet Harbor Area of Critical Environmental Concern runs parallel to Route 6 at this site and does not incorporate it or its upstream affected area.

General Information

The seaward channel is approximately 2 feet wide, narrowing to approximately 1-foot upstream. Flow appeared to be minimal in both channels. A large sand bar has formed near the upstream culvert opening. Visual indicators of restriction include minor scouring both seaward and upstream and a minor amount of vegetation die off along the seaward channel banks. The Wetlands Conservancy Program delineated salt marsh adjacent to the seaward side of Route 6 and 0.55 acres of salt marsh upstream. There was no *Phragmites* observed in the upstream affected area, however a minor amount was visible along the edge of the marsh lying seaward of Route 6.

- Restriction width – 2 feet
- Restriction length – 150 feet (estimate)
- Upstream salt marsh – 0.55 acres



Upstream Affected Area (acres): SM – 0.55.



This 2-foot diameter concrete culvert passes tidal flow under Route 6, but it first must pass through the seaward channel that is clogged with dead grasses.



Upstream of Route 6, channel width is reduced to approximately 1-foot. A large sand bar has formed near this opening and silt and sand partially clog the culvert.

WELLFLEET

Route 6 restriction of Blackfish Creek

Site WE-3

Site Description

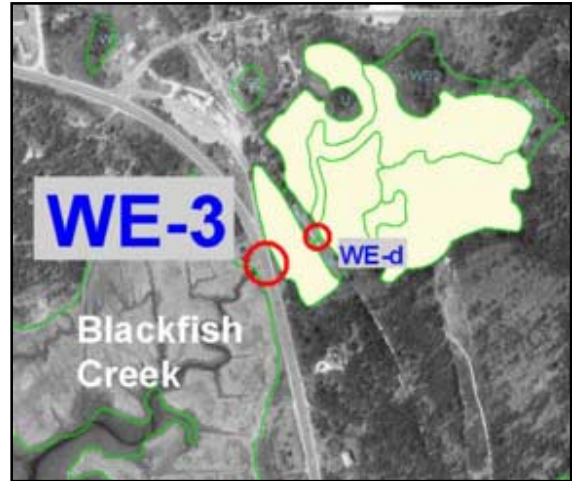
Blackfish Creek flows in a southwesterly direction from east of the Cape Cod Rail Trail, with its headwaters on lands located within the boundaries of the Cape Cod National Seashore. The creek flows under the Rail Trail (see Appendix B, site WE-d) and under Route 6, discharging into Wellfleet Harbor to the east of Drummer Cove. Blackfish Creek passes under Route 6 via a 2-foot diameter metal pipe set under a stone slab headwall. The pipe appears to be in fair condition and is not visibly clogged by debris. Blackfish Creek supports productive shellfish resources and is not believed to be an active anadromous fishway. The boundary of the Wellfleet Harbor Area of Critical Environmental Concern runs parallel to Route 6 at this site and does not incorporate it or its upstream affected area.

General Information

The seaward channel is approximately 15 to 25 feet wide, narrowing upstream to approximately 5 to 10 feet. This site is severely degraded and visual indicators of a restriction were numerous. On both sides of Route 6 scouring, erosion, and vegetation die off are major. Marsh slumping is major on the seaward side and minor within the upstream affected area. There was no *Phragmites* observed. 4.16 acres of salt marsh lie upstream of this site, with 1.96 acres found between Route 6 and upstream site WE-d and 2.20 acres upstream of site WE-d.

- Restriction width – 2 feet
- Restriction length – 125 feet (estimate)
- Upstream salt marsh – 4.16 acres

(continued on page W6)



Upstream Affected Area (acres): SM – 4.16; SS – 8.14; M – 5.03.



This stone headwall houses the 2-foot metal pipe that conveys Blackfish Creek under Route 6. Erosion of the roadway berm is seen above and around this seaward headwall.

**Route 6 restriction of
Blackfish Creek
Site WE-3**

Comments

Under the present conditions at site WE-3, upstream site WE-d is not considered tidally restrictive of salt marsh (see Appendix B) because it is adequately sized to pass the quantity of tidal flow that reaches it. Should work to improve tidal flow through site WE-3 ever be undertaken, then the size of the opening of WE-d should be reevaluated. It is likely that the two, 4-foot culverts that are in place would be adequate.



When standing on Route 6, looking into the 1.96 acres of salt marsh that lie between it and the Rail Trail, the view is dominated by these badly degraded channel banks and marsh surface. Circled in the rear of this photo are the 2 culverts (site WE-d) that pass the flow of Blackfish Creek under the trail.



Looking from the culvert into the seaward salt marsh area several visual indicators of a restriction dominate the view, including vegetation die off, scouring, erosion, and marsh slumping.

WELLFLEET

Earthen dike restriction of channel within the Indian Neck Marshes

Site WE-4

Site Descriptions

The Indian Neck Marshes lie to the south of Pilgrim Spring Road and to the east of Indian Neck. At the northern side of that marsh area an earthen dike segregates 6.69 acres of shrub swamp from the extensive salt marsh on the dike's seaward side. This site and its upstream affected area are within the Wellfleet Harbor Area of Critical Environmental Concern. Tidal flow passes under the dike via a 1-foot diameter corrugated metal pipe, which is in fair condition. A segment of pipe on the seaward side, which was exposed through erosion, has broken off and a large piece sits in the channel bed. Visual indicators suggest that the seaward opening is submerged at mean high tide. The upstream side appears to have a culvert invert problem, which would limit tidal flushing. The dike itself is severely eroding. Shellfish resources are present in the Indian Neck Marshes.

General Information

Both the seaward and upstream channels are approximately 2 feet wide. Visual indicators of restriction include significant scouring and erosion both seaward and upstream of the dike, with conditions slightly more degraded on the upstream side. The vegetation change is dramatic when crossing the dike – changing from seaward salt marsh to upstream shrub swamp with significant *Phragmites* growth.

- Restriction width – 1 foot
- Restriction length – 30 feet
- Upstream salt marsh – 0 acres



Upstream Affected Area (acres): SS – 6.69.



The vegetation changes dramatically from the seaward side (left), where salt marsh dominates the view, to the upstream side (right), where shrub swamp and *Phragmites* dominate the view.



This 1-foot pipe passes tidal flow through the berm, which has suffered from major erosion on this upstream side. This pipe appears to be set too high in the dike to pass the full tidal range.

WELLFLEET

Commercial Street restriction of Mayo Creek

Site WE-5

Site Description

Mayo Creek flows southeasterly from north of Chequessett Neck Road, under Commercial Street discharging into Duck Creek Harbor. The discharge pipe is located under the Commercial Street berm just north of the parking area on Shirttail Point and the town pier. Mayo Creek flows under Commercial Street for 90 feet via a 30-inch diameter corrugated metal pipe. A flapper gate on the seaward opening prevents tidal flow from entering the Mayo Creek system. The seaward opening is submerged at mean high tide. The upstream opening was submerged during a low, outgoing tide cycle and was buried by a pile of dead reeds. Duck Creek supports shellfish resources that are subject to seasonal closures. This site and its upstream affected area are within the Wellfleet Harbor Area of Critical Environmental Concern.

General Information

Mayo Creek is approximately 10 feet wide upstream of Commercial Street. Visual indicators of a restriction include the flapper gate on the seaward opening and significant scouring and erosion near the upstream opening. The portion of Commercial Street that abuts Duck Creek Harbor is armored by large boulders – therefore no scouring or erosion were visible near the seaward pipe opening. *Phragmites* dominated the upstream affected area.

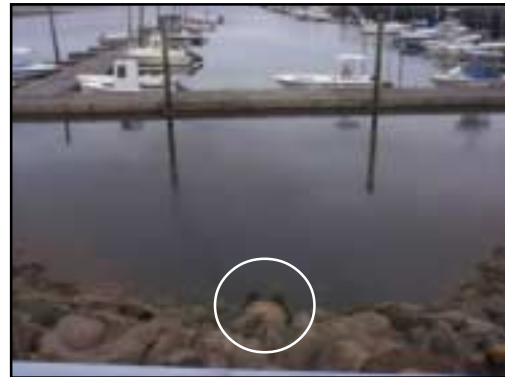
- Restriction width – 30 inches (flapper gate)
- Restriction length – 90 feet
- Upstream salt marsh – 0 acres

Comments

The upstream affected area, as defined by this Atlas, totals 19.33 acres of shallow marsh. Note however that the affected floodplain extends upstream of Chequessett Neck Road onto Wellfleet Conservation Trust land.



Upstream Affected Area (acres): M – 19.33.



When standing on Commercial Street above the culvert, the view is of town pier and Duck Creek Harbor. The tide gate and pipe are visible in the foreground below the rock wall.



Phragmites dominates the upstream affected area. Dead reeds and debris have collected near the upstream opening, obscuring the pipe from view.

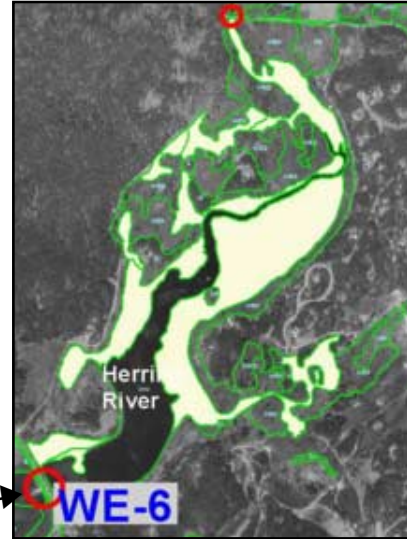
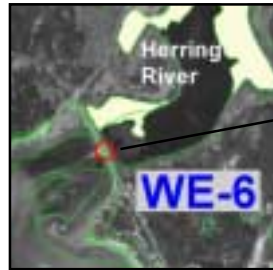
WELLFLEET

Chequessett Neck Road restriction of the Herring River

Site WE-6

Site Descriptions

In 1908 a dike, now supporting Chequessett Neck Road, was constructed across the entrance to the Herring River and its associated marsh system. Three box culverts measuring 6, 7, and 7 feet wide, were placed to enable limited salt and fresh water exchange between the river and harbor. The two 7-foot culverts have flapper-type tidal gates and the 6-foot culvert supports an adjustable sluice gate. Historically, the Herring River and its upstream river systems were directly connected to tidal flow in Cape Cod Bay at both Duck Harbor and Bound Brook by Ryder Beach. The barrier beaches between these rivers and the Bay have since closed off and eliminated those estuaries, leaving the only option for a tidal connection at the Chequessett Neck Road dike. The Herring River and Wellfleet Harbor support vast shellfish resource areas. The Herring River is an active anadromous fishway. Both the river and its associated marsh system are located within the Wellfleet Harbor Area of Critical Environmental Concern.



This image shows the upstream affected area (as it is defined for this Atlas) between Chequessett Neck Road and High Toss Road. Note that the total affected area is approximately 1000 acres. Upstream Affected Area (acres): SM – 0.81; SS – 57.71; M – 7.07.²



These 3 box culverts viewed from the seaward side of Chequessett Neck Road, two fitted with flapper gates and one with a sluice gate, control the exchange of salt and fresh water between the Herring River and Wellfleet Harbor.

General Information

The Wetlands Conservancy Program delineated salt marsh adjacent to the seaward side of the Herring River dike. A 0.81 acre patch was the only salt marsh delineated upstream of the dike. According to a recent study, “[t]he restriction in flow imposed by the hydraulic control structures has resulted in the conversion of hundreds of hectares of the original inter-tidal, salt marshes into upland vegetation eliminating habitat for estuarine plants and animals, including fish and shellfish. In addition it has resulted in adverse impacts on water quality including acidification of river waters, leaching of metals from the sediments and episodic anoxia. It has also resulted

in subsidence of the wetlands.”¹ Analysis showed that site WE-6 “reduced the mean tidal range from 2.53 meters in the bay to 0.56 meters in the river.

(continued on page W10)

¹ Spaulding, 2001, p.i.

² Spaulding’s study indicate that hundreds of hectares of the original inter-tidal, salt marshes have been affected by the restriction at site WE-6 (Spaulding, 2001, p.1).

**Chequessett Neck Road restriction
of the Herring River
Site WE-6**

This is a reduction of a factor of 4.52 in the tidal range across the dike.”³ *Phragmites* growth was significant upstream of the dike and fringed most of the visible marsh area.

- Restriction width – two 7-foot culverts with flapper gates; one 6-foot culvert with sluice gate
- Restriction length – 44 feet
- Upstream salt marsh – 0.81 acres



Looking upstream from Chequessett Neck Road a small patch of salt marsh is visible, along with Phragmites that lines the Herring River banks.

Comments

A recent study points out that “[a]lthough approximately 80% of the flood plain directly affected by [site WE-6] is within Cape Cod National Seashore boundaries, and nearly all of this land is federally owned, two homes, a golf course, and the dike at the entrance to the system are outside National Park Service’s control.”⁴ This fact presents serious, though hopefully not insurmountable, management issues for the Herring River system.

Restoration of the Herring River’s natural free-flowing system has been discussed for years. The most recent study done on this system concluded that, “[r]estoration of pre-existing conditions in Herring River, defined as similar tidal ranges up and downstream of the dike, will require increasing the width of the opening to at least 30 meters.”⁵ According to the National Seashore, a 30-meter opening could equate to approximately 600 acres of potentially restored area.

³ Spaulding, 2001, p.i.

⁴ *id.*, p.1.

⁵ *id.*, p.42.