

TOWN OF TRURO

- Town Map
- Chart of Site Characteristics
- Sites 1 to 7

TOWN OF TRURO









Location of Selected Salt Marsh Restrictions

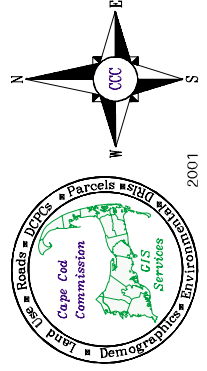
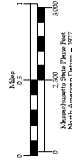
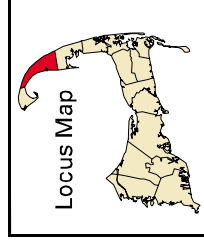
This map was produced by the Cape Cod Commission Geographic Information System office, with digital data from MassGIS and the Cape Cod Commission, 2001.

The information depicted on this map is for planning purposes only. It is not intended to constitute any definition, regulatory interpretation, or parcel level analysis.

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TR-1 Restriction Site

-  Wetland
-  Ocean
-  Pond or Lake
-  CC National Seashore
-  Local Road
-  Major Route
-  Stream
-  Railroad



Town of Truro – 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)
TR-1	0.0 / 16.19	YES (federal)	YES	NO	NO	NO	NO	NO	PUBLIC
TR-2	0.0 / 13.13	NO	YES	NO	NO	NO	YES (PH)	NO	PUBLIC
TR-3	0.0 / 152.38	YES (federal)	YES	YES*	YES (tide gate)	NO	NO	YES (TR-4)	PUBLIC
TR-4	0.0 / 152.38	YES (federal)	YES	YES*	NO	NO	NO	NO	PUBLIC
TR-5	1.55 / 1.55	NO	YES	NO	NO	NO	NO	NO	PRIVATE
TR-6	0.0 / 322.05	YES (federal)	NO	YES	YES (tide gates)	NO	YES (PH, WH)	YES** (TR-7)	PUBLIC
TR-7	0.0 / 322.05	YES (federal)	NO	YES	YES (weir; stoplogs)	NO	YES (PH, WH)	YES**	PUBLIC

* The Pamet River is stocked with sea-run brook trout by the Massachusetts Department of Fish and Wildlife. It is known that these fish do migrate through the Pamet River system. However, the potential of the river system under present conditions to support an active and productive migratory fish population is limited.

** Upstream of Pilgrim Lake exists what was once a vast intertidal salt marsh system known as Salt Meadow, or Head of the Meadow, that is now delineated by the Wetlands Conservancy Program as 94.52 acres of shrub swamp and 50.94 acres of shallow marsh. In addition to sites TR-6 and TR-7 that restrict tidal flow into Pilgrim Lake, Salt Meadow is further restricted by two infrastructure crossings. First, by the extension of High Head Road that serves as a jeep trail to the beach, and second by a dike lying to the east of the jeep trail (see Appendix B, sites TR-d and TR-e). According to the Cape Cod National Seashore, if tidal flow is restored to the Pilgrim Lake system, most intertidal wetland benefits would be realized in the Salt Meadow wetland. Therefore, these two upstream crossings should be included in any remediation discussions.

TRURO

Old County Road restriction of Eagle Neck Creek

Site TR-1

Site Description

Eagle Neck Creek flows under Old County Road via a 2-foot corrugated plastic pipe. The pipe was only visible on the upstream side of the road and is in need of immediate repair – rocks are visibly clogging the opening. Eagle Neck Creek is connected to tidal flow in Cape Cod Bay through Pamet Harbor. An abandoned, breached railroad bed running through the Harbor and its surrounding marshes lies seaward of this crossing. Storm tides eroded the bed that was partially breached in the late 1980s and finally by the no-name storm in 1990. While Eagle Neck Creek itself does not appear to support shellfish resource areas, Pamet Harbor supports areas that are open seasonally to shellfishing. The upstream affected area of this site is within the Cape Cod National Seashore.

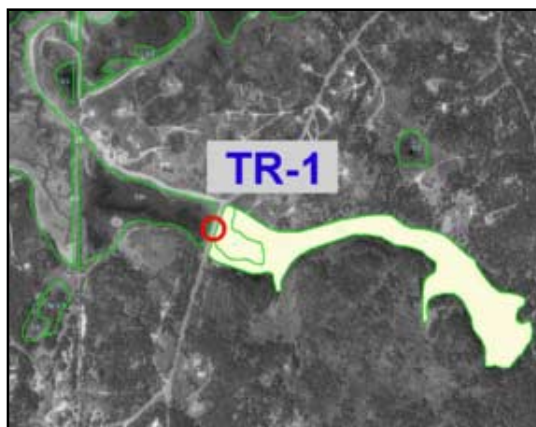
General Information

The seaward creek channel is approximately 5 feet wide, widening to 10 feet upstream of Old County Road. Seaward of this site, visual indicators of restriction are many and include major scouring and vegetation die off, significant ponding, minor bank erosion and marsh slumping, and the minor presence of *Phragmites*. Upstream of this site, visual indicators of a restriction include major scouring, significant ponding, and minor bank erosion.

- Restriction width – 2 feet
- Restriction length – 40 feet
- Upstream salt marsh – none

Comments

Upon its breach, the town decided to leave the railroad dike open to tidal flow (see site TR-b, Appendix B), a decision that immediately changed the tidal range reaching this Old County Road culvert and over time has slightly changed the associated vegetation. However, the existing pipe is too small to enable salt marsh restoration upstream of this site. Originally, after the breach the town replaced the Old County Road culvert with two, side by side, 3-foot culverts. Because the supporting soils were peat, the road subsided and crushed the pipes. They were then replaced with one smaller 2-foot pipe. According to the Truro Department of Public Works, this replacement was intended to be a temporary measure however it still exists today.



Upstream Affected Area (acres): SS – 14.47; M – 1.72.



The seaward marsh area is degraded, displaying vegetation die off, ponded water, and a major scouring basin.



The berm of Old County Road partially dams Eagle Neck Creek. The upstream pipe is visible in this pool and is blocked by rocks – further restricting tidal flow.

TRURO

Mill Pond Road restriction of channel to Mill Pond

Site TR-2

Site Description

Mill Pond Road crosses the tidal channel that connects flow from the Pamet Harbor to Mill Pond. The channel flows under the road via a 3-foot corrugated plastic pipe. Both seaward and upstream openings are submerged at mean high tide. An abandoned, breached railroad bed running through the Harbor and its surrounding marshes lies seaward of this crossing. Storm tides eroded the bed that was partially breached in the late 1980s and finally by the no-name storm in 1991. While Mill Pond itself does not appear to support shellfish resource areas, Pamet Harbor supports areas that are open seasonally to shellfishing.

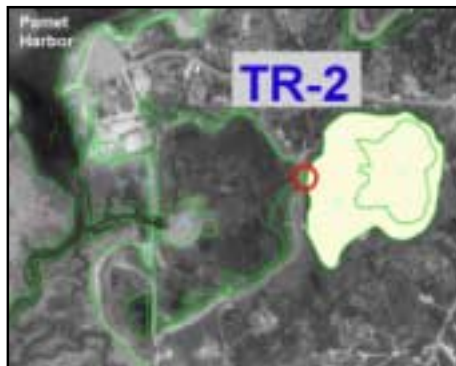
General Information

Seaward of the restriction the channel running to Mill Pond is approximately 10 feet wide, widening upstream to approximately 15 feet before flowing into the pond. Visual indicators of a restriction include major scouring basins and erosion both seaward and upstream. Vegetation is dying off both seaward and upstream of the site, however in this location it is caused by the reintroduction of saltwater flow rather than its absence – the vegetation observed dying off is not saltwater tolerant. Although saltwater has been reintroduced here by the breach in the railroad bed, there is evidence of flow restricted by Mill Pond Road.

- Restriction width – 3 feet
- Restriction length – 55 feet
- Upstream salt marsh – none



Dead shrubs comprise much of the vegetation currently observed in the upstream affected area – a symbol of the reintroduction of tidal flow and associated slow changes in vegetation.



Upstream Affected Area (acres): SS – 8.35; M – 4.78.



This 3-foot culvert passes tidal flow under Mill Pond Road, here water is seen rushing seaward on an outgoing tide.

Comments

The town decided to leave the railroad dikes open to tidal flow (see site TR-c, Appendix B), a decision that immediately changed the tidal range reaching the Mill Pond Road culvert and over time changed the associated vegetation and ecosystems. Because flow reaching the road increased and overwashed Mill Pond Road, the breached railroad necessitated the replacement of the culvert (involving a slight raise of the roadway) in 1991 to the conditions that exist there today. The natural restoration and reversion to salt marsh is a slow process and visual conditions in Mill Pond are unfavorable – with dead and dying vegetation and exposed mud flats, which appears to local residents as blighted and unsightly. A natural side effect of the tidal inflow was that saltwater killed what had become a well-developed community of freshwater wetland shrubs and herbs. This caused unpleasing odors and spurred complaints from local residents.¹ However today, the odors have ceased and new saltwater plant communities are beginning to take hold.

¹Portnoy, 2002, p. 5.

TRURO

Restrictions of the Pamet River by:

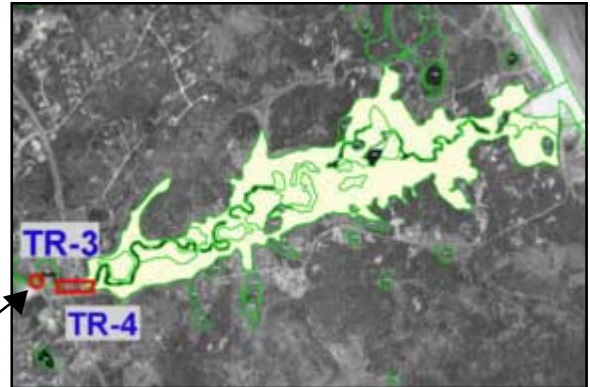
Truro Center Road/Route 6A (Wilder Dike)

Site TR-3

and

Route 6

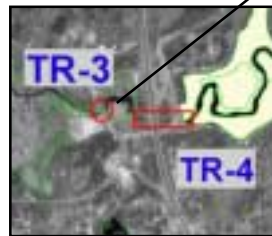
Site TR-4



Upstream Affected Area (acres): SS – 119.72; M – 32.66.

Site Descriptions

The Pamet River runs east/west, its eastern end and non-tidal headwaters originating behind coastal bank on the Atlantic Ocean near Ballston Beach. It flows across the Cape, discharging through Pamet Harbor into Cape Cod



Bay. The river and its associated wetlands effectively split Cape Cod into north and south sections. The river is divided into two hydrologically different sections, one estuarine and one freshwater river system, by two tidal restrictions that occur approximately half way along its length. Site TR-3, the seaward lying restriction, occurs at the Wilder Dike that supports Truro Center Road/Route 6A. The dike is fitted with a clapper valve (tide gate) at the seaward end of a 3-foot metal pipe. Site TR-4 lies just upstream of TR-3 where a 4-foot concrete culvert conveys the Pamet River under Route 6.



The 3-foot metal pipe and clapper gate set within this headwall (visible below the water line) pass only the seaward flow of the Pamet River under Wilder Dike (Truro Center Road/Route 6A).

The total upstream affected marsh area totals 152.38 acres, delineated by the Wetlands Conservancy Program as 32.66 acres of shallow marsh and 119.72 acres of shrub swamp. Pamet Harbor supports shellfish resource areas that are open seasonally to shellfishing. This system does support a limited population of anadromous fish. Most of the upstream affected area of the Pamet River system is within the Cape Cod National Seashore.

General Information

Wilder Dike was built in 1869 to replace a bridge and was fitted with the culvert and clapper valve. This profoundly changed the upstream salt-tolerant vegetation. Further alterations to the water management system in the Pamet River came in 1952 when Route 6 was built. The 4-foot culvert quickly showed signs of inadequacy, though it still remains today.¹



The 3-foot pipe opening is visible here upstream of Wilder Dike.

¹Portnoy, 2002, p. 3.

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Restrictions of the Pamet River by:

**Truro Center Road/Route 6A
(Wilder Dike)**

Site TR-3

and

Route 6

Site TR-4



Once upstream of both restrictions the banks of the Pamet River take on a freshwater, riverine appearance.

The Pamet River channel is approximately 20 feet wide seaward of Wilder Dike and 30 feet wide upstream of Route 6. Visual indicators of a restriction at site TR-3 and TR-4 include minor bank erosion. *Phragmites* growth is significant seaward of site TR-3. *Phragmites* and cattails dominate the marsh area between TR-3 and TR-4, delineated as 2.55 acres of shrub swamp.

Site TR-3

- Restriction width – 3 feet (with clapper valve)
- Restriction length – 60 feet
- Upstream salt marsh – none

Site TR-4

- Restriction width – 4 feet
- Restriction length – 375 feet
- Upstream salt marsh – none



After crossing underground for approximately 375 feet the Pamet River emerges upstream of Route 6 through this 4-foot opening in the concrete headwall.

Comments

Storm surges have overwashed the barrier dune system at Ballston Beach inundating the freshwater portion of the Pamet River system with saltwater three times in recent decades. Salt water can be retained in the upstream system for days because the large volume of overwash water can only exit the system during a low tide due to the pressure on the clapper valve and is further restricted by the size of the culvert under Route 6.² Because the retention of storm tides has the potential for serious disturbance of both ecological and social values in the flood plain, removal of the tidal restrictions at sites TR-3 and TR-4 is being considered.

In 1996 the Cape Cod National Seashore and the Town of Truro initiated a study, conducted by the Cape Cod Commission (CCC) and the Army Corps of Engineers (ACOE). The ACOE determined that enlarged culverts (6 by 16 feet) at Route 6 and Wilder Dike could provide sufficient cross-sectional area to allow overwash water to exit the upper Pamet in less than two days. This resizing and removal of the tide gate would also allow enough regular seawater flooding to cause salt marsh restoration through much, but not all, of the upper Pamet.³ The CCC Water Resources Office evaluated the potential groundwater impacts associated with removal of the clapper valve at Wilder Dike (site TR-3). One primary concern of removal is the potential impact on private wells and septic systems in the upper Pamet River valley. The CCC study concluded that, with removal, the tidal ranges within the river will have minimal effect on groundwater levels in the river valley and that saltwater flow from the river into the surrounding groundwater lenses will be prevented, indicating that wells and septic systems will not be adversely impacted.⁴

² ACOE, 1998, p. ii.

³ *id.* pp. ii-iii.

⁴ Cape Cod Commission, 1997, pp. E-2 and 36-37.

TRURO

Dirt berm crossing of unnamed channel in the Pamet Marshes

Site TR-5

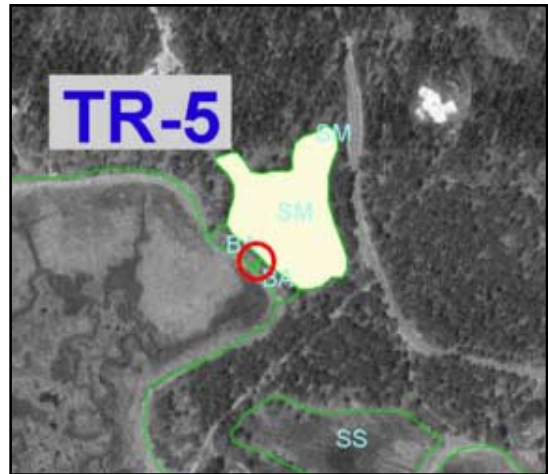
Site Description

A contiguous 154.04 acres of salt marsh lies along the north bank of the Pamet River. A small piece of this salt marsh area (1.55 acres) is separated from the whole by a dirt berm. Access to the berm is off of Castle Road via a driveway leading to two private homes on Cat Island. Tidal flow under the dirt berm is via a 10-inch square cement culvert that appears to be encased in wooden boards. The pipe is in serious disrepair and is submerged at mean high tide. While this small salt marsh area does not support shellfish resources Pamet Harbor, which lies upstream, does and has resources that are open seasonally to shell-fishing.

General Information

The channel seaward of the restriction varies between approximately 5 and 15 feet. Upstream of the berm it dramatically shrinks to about 2 feet. Visual indicators of a restriction on the seaward side include major scouring and erosion, and significant vegetation die off. Upstream of the berm scouring is reduced, likely due to a lack of flow. However, major back erosion has occurred. There is no *Phragmites* present in the upstream affected area.

- Restriction width – 10 inches
- Restriction length – 35 feet
- Upstream salt marsh – 1.55 acres



Upstream Affected Area (acres): SM – 1.55.



The small concrete, wooden-framed pipe that conveys flow under the berm is visible in the foreground. The seaward marsh area exhibits vegetation die off and major erosion.



Major bank erosion occurs around the upstream side of this small pipe – a 10-inch opening framed by wooden boards and a retaining wall.

TRURO

Restrictions of Pilgrim Lake by:

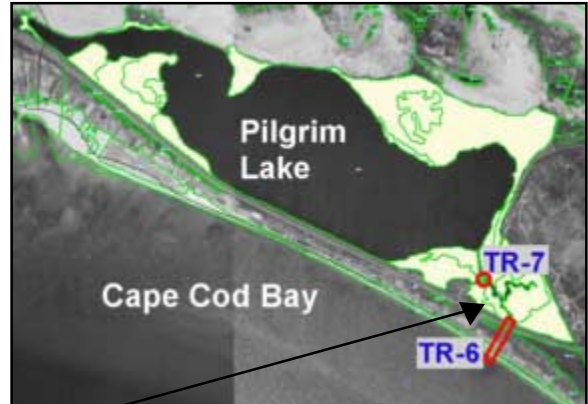
Route 6A and Route 6

Site TR-6

and

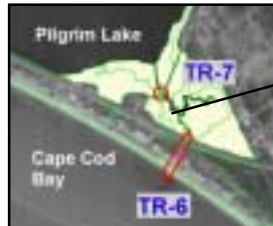
High Head Road

Site TR-7



Site Descriptions

A small channel located at the southeast corner of Pilgrim Lake is the lake's only tidal connection to Cape Cod Bay. This channel and its flow are controlled by various engineering structures that serve as the lake's present water control system. There are two restriction sites between the Bay and lake. The seaward site, site TR-6, consists of a culvert with two clapper valves (located in linear series) that extends along Beach Point from Cape Cod Bay under Route 6A and Route 6. Upstream site TR-7 has a weir and box culvert constructed under High Head Road. Upstream of Pilgrim Lake are two further restrictions that affect flow into Salt Meadow/Head of the Meadow (see Appendix B, sites TR-d and TR-e). Pilgrim Lake suffers from eutrophication, and does not support any known shellfish resources. Anadromous fish use Pilgrim Lake. The lake and all upstream affected areas are within the Cape Cod National Seashore, but Truro owns and manages the channel.



Total Upstream Affected Area (acres): SS – 221.32;
M – 100.73.



Set far below the roadway of Route 6, this concrete headwall marks the upstream opening of the pipe conveying flow from Cape Cod Bay all the way under Routes 6A and 6 – crossing length estimated at one-eighth of a mile. The pipes' opening is submerged beneath stagnant water and obscured by dead reeds.

General Information

The marsh area that exists between sites TR-6 and TR-7 was delineated by the Wetlands Conservancy Program as shallow marsh and shrub swamp. When observed during fieldwork a dominant monoculture of *Phragmites* with scattered shrubs was visible. Upstream of site TR-7 the vegetation changes to also include cattails. Other usual visual indicators of a restriction are not present at either TR-6 (upstream) or TR-7, such as scour, erosion, and vegetation die off. The 3-foot opening in the headwall on the upstream side of TR-6 was submerged, though measurable through the water. Dead reeds and other debris were collecting at this opening. The weir, located on the upstream side of TR-7, was submerged and not visible through the murky water. The water-tight stoplogs are not in place today, however the lake does not drain.

(continued on page T9)



A weir controlling the flow under High Head Road is protected from possible vandalism by this chain link fence.

(continued from page T8)

Restrictions of Pilgrim Lake by:

Route 6A and Route 6

Site TR-6

and

High Head Road

Site TR-7



These photos reveal the monoculture of *Phragmites* that grows in the affected marsh area upstream of site TR-6 (photo on left) and seaward of High Head Road and site TR-7 (photo on right).

Site TR-6

- Restriction width – seaward is inaccessible; upstream is 3 feet (two tide gates)
- Restriction length – one-eighth of a mile (approximate)
- Upstream salt marsh – none

Site TR-7

- Restriction width – 10 feet (weir with water-tight stoplogs)
- Restriction length – 30 feet
- Upstream salt marsh – none

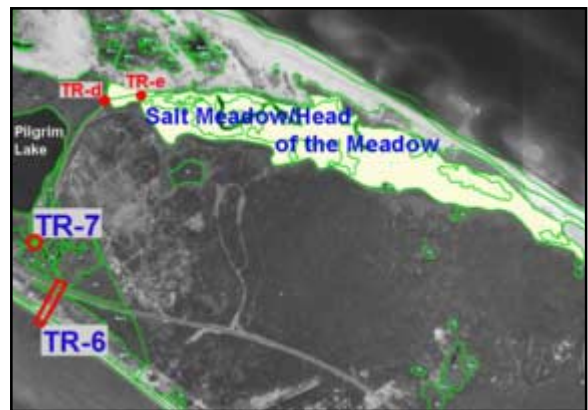
Comments

Pilgrim Lake was historically not a lake, but an embayment called East Harbor that was connected to Cape Cod Bay by a tidal inlet. It was deep enough to serve as the winter quarters for the Provincetown fishing fleet. However, in 1868 the embayment was effectively cut off from tidal flow and Pilgrim Lake was formed when a dike was constructed across the inlet.¹

¹Lum, 2001.

In 1956 the state installed the lake's present water control system – the culvert with two clapper valves (site TR-6) and the upstream weir and box culvert (site TR-7). The Cape Cod National Seashore is faced with an enormous management issue regarding Pilgrim Lake – while the Seashore has responsibility for the lake and its associated wetland areas, they do not have control over the inlet and tidal flow.

From the northeast corner of Pilgrim Lake a channel flows into a wetland area known as Salt Meadow, or Head of the Meadow. As was the lake, this wetland area was historically connected to tidal flow in Cape Cod Bay and was a vast intertidal salt marsh system. However, today it is comprised of 94.52 acres of shrub swamp and 50.94 acres of shallow marsh. Salt Meadow is severed by infrastructure in two places – first by the extension of High Head Road that serves as a jeep trail to the beach, and second by a dike lying to the east of the jeep trail (see Appendix B, sites TR-d and TR-e). These culverts were not accessible during fieldwork. According to the Cape Cod National Seashore, if tidal flow was restored the Pilgrim Lake system would realize most of its intertidal wetland benefits in the Salt Meadow area. Therefore, these two infrastructure crossings (identified in the image below) should be included in any remediation discussions.



Salt Meadow/Head of the Meadow Upstream Affected Area (acres): SS – 94.52; M – 50.94.