

Ch 2 HMP – Climate change

Climate change, due to global warming, is a well established fact. All the evidence – and common sense – indicates that the effects will more consequential over the next years.

Wellfleet Harbor will see a number of consequences:

- > Sea Level Rise
- > Increase winds and storms
- > Increased rainfalls
- > Warmer harbor waters
- > More acidic harbor waters

The consequences of warmer and more acidic harbor waters are mostly felt by the shellfishing community. These are discussed in a separate chapter.

Sea Level Rise

Sea level rise will increase tidal flooding of the salt marshes of the harbor. Salt marshes are critical sources of nutrients and life for the harbor, so any loss of marshes or their efficiency would be a major concern for Wellfleet Harbor.

Normally, salt marshes maintain their elevation above sea level by retaining silt and other sediments carried by flood tides as shown by the classic work of J. Teal (ref). Existing salt marshes have, of course, been able to keep pace with historical sea level rise by migrating inland.

The prediction and understanding of the effects of sea level rise on salt marshes is an active area of research. Techniques from sophisticated modelling to field science, such as the use of lead isotopes to measure the historical rates of salt marsh elevations. (ref: Waquoit Bay)

There is important local research laboratories (see references, S.Smith at CCNS). This includes methods for monitoring marsh elevation changes and consequences as a marsh meets adjoining inland dunes. The work has been tested on marshes owned by the Cape Cod National Seashore, such as Middle Meadow. This monitoring should be extended to north and east side Wellfleet harbor marshes, such as Duck Creek and Blackfish Creek.

An initial judgement from this research is that marshes bordered by gradual dunes will be able to maintain much of their active area. There are several specific concerns:

- > As we have already seen around Wellfleet Harbor, shore line armoring by revetments prevents this. However, thus far, shore lines with gradual slopes have been mostly left in a natural state. The Conservation Commission is evaluating changes in regulations that will help preserve all these shorelines. These regulations deserve Town support.

> It is also important to consider restoration of the upland reaches of some salt estuaries, even if the area is small. These would provide additional expansion space for the harborside estuaries and marshes. Two possibilities are Blackfish Creek, east of Route 6, and Trout Brook (which, as named, has been the home to Sea Trout breeding ground).

> Salt marshes in the south of the harbor, such as on Lt Island, lack dune backing and are also more open to shoreline erosion. Actual marsh protection using low lying breakwaters or oyster reefs to help protect against wind shoreline erosion should be kept in mind. Local examples are Provincetown and Winthrop.

> A further remediation strategy requires using harbor or other sediments to replenish or accelerate the raising of salt marsh elevations to keep pace with sea level rise. This topic directly relates to a long term dredging strategy and is discussed in that chapter.

Finally, Wellfleet has about 1250 acres of salt marshes. Restoration of the Herring River and Mayo Creek will add dike protected 1100 acres to this. In a sense we have an insurance policy. However, a major change in the balance between south and north harbor may produce consequences that are hard to predict.

Wind and Storms

Increasing global temperatures will lead to increases in wind energy and velocity. This may manifest itself particularly in increased storm frequency and intensity. For the harbor, the main consequence will likely be increased marsh and shoreline erosion. The risk would be greatest near the south end of the harbor, such as Lt. Island and Jeremy Point.

A program to monitor at these locations for wind and wave energy is warranted.

Precipitation Increase

The predictions for New England are a climate change driven increase of about 10% in precipitation, primarily as rain. There are two consequences.

First, there will be an increase in fresh water flow into the harbor from all upland sources, tending to decrease harbor salinity. Second, ground water levels in the aquifers under Wellfleet will rise. Operations of septic systems will be adversely affected, leading to potentially greater nitrogen flows into harbor waters. This issue is under consideration by the Town Health Board.

