

## Blaine Harbor Area Circulation Study – September 9, 2002

This circulation study was performed by Puget Sound Restoration Fund (PSRF) with support from Ami Stillings, Whatcom County Water Resources Shellfish Coordinator. It was funded by Whatcom County under an ongoing contract with PSRF for focused projects to support the Community Oyster Farm project and shellfish restoration efforts in Drayton Harbor.

### Methods and Materials

Numbered grapefruits and custom-made surface floats, were deployed in several locations in and around the Blaine Harbor at the beginning of an ebb tide on September 9, 2002. Small gill net floats were modified by piercing a wire flag through the center and suspending 16 ounce weighted lead in order to submerge the top of the float just to the water's surface. Each of these was identified by a numbered small (3"x3") nylon flag attached to the top of the wire. One float and two grapefruits were released at each of seven locations and checked regularly for the duration of the ebb tide (1:45pm) for all floats and for the first hour of the flood tide (3pm) for those floats released outside of the marina area. Floats were deployed at the following locations in Drayton Harbor: DOH ambient stations 15 and 8 and inside of the Blaine Harbor at POB sites A, C, D, H, and I. Floats were tracked using the Community Oyster Farm skiff.

### Conditions during the Study

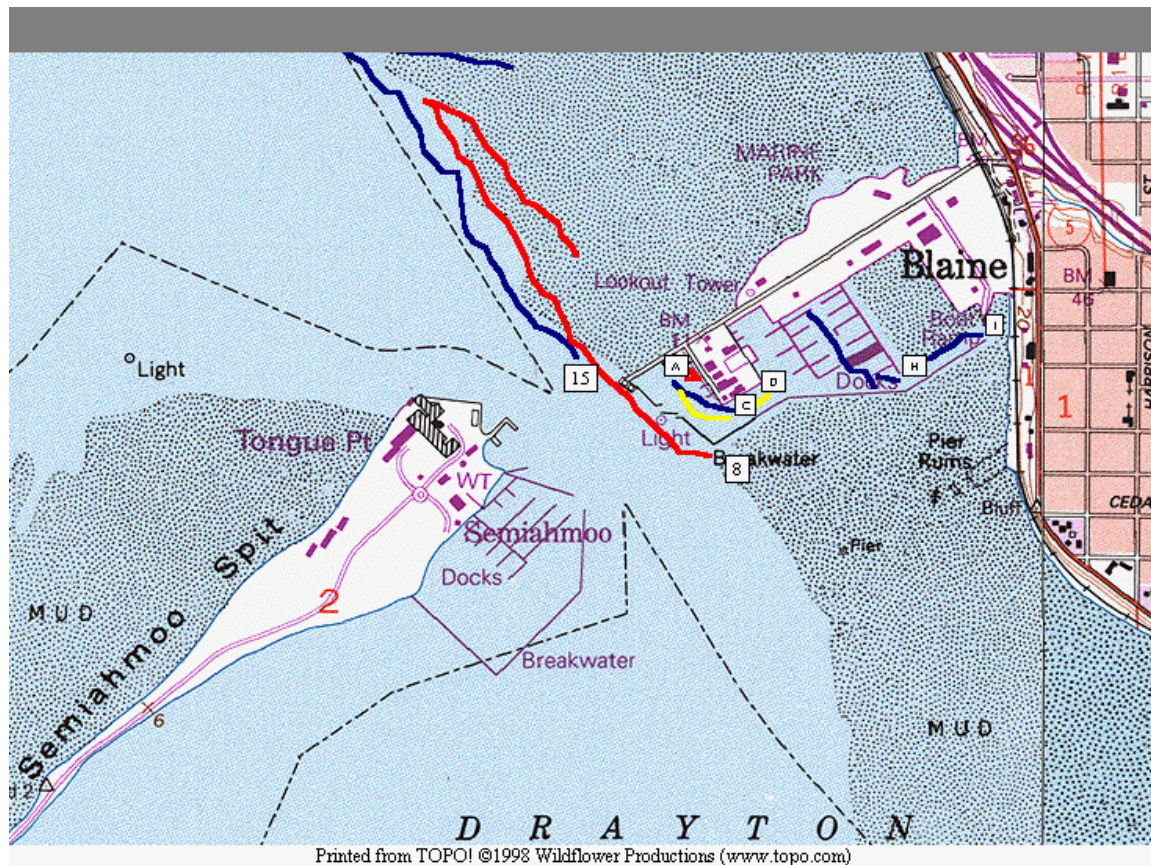
High tide was at approximately 0730, with elevation of +7.7 ft.. The low tide was at 1345, with elevation of +0.9 ft. There was very little wind during this study; conditions were calm and ideal.

The crew contracting with the Port to replace the breakwater at the Blaine Harbor entrance had placed a large barge inside the marina entrance, but it appeared unlikely that this had a significant effect on the routes taken by the floats deployed inside of the marina.

### Results

The table below shows the deployment and retrieval times for each float that was placed out along with general comments about the course that each one followed. Float movement is also illustrated in the attached map.

<u>Release site</u>	<u>Float #</u>	<u>Deployment time</u>	<u>Retrieval Time</u>	<u>General Comments on Tracking</u>
DOH 15	15	0934	1455	Northwesterly course past International boundary marker in Semiahmoo Bay. Easterly course on flood.
DOH 8	8	0930	1500	Northwesterly course to south of International boundary marker in Semiahmoo Bay. Southeasterly course on returning flood tide
POB A	A	0927	1210	Stayed in corner near Star Fish and Sea K for entire period.
POB C	C	0925	1210	Moved NW and was trapped in log booms west of Star Fish. Never left marina entrance
POB D	D	0911	1200	Moved NW off Blaine Crab docks to Star Fish. Never left marina entrance.
POB H	H	0905	1110	Moved NW getting trapped in slips N12, then along O dock to Pump Out near Gate 3.
POB I	I	0900	1200	Moved NW getting regularly trapped in slips along G float



### Results continued

As the above map shows, none of the floats or grapefruits deployed within Blaine Harbor exited into Drayton Harbor and Semiahmoo Bay. They moved in a northwesterly direction towards Marine Drive. There does appear to be a current on the ebb tide, which runs westward along the breakwater towards the entrance, but it is not strong enough to pull any of the floats out of the marina. At 1215, Towards the end of the ebb tide, we placed several grapefruits in the Blaine Harbor entrance, assuming they would travel northwesterly towards Semiahmoo Bay. These floats were pulled back into Blaine Harbor and were removed near site A at 1315.

The float and fruit deployed at station 15 took a fairly direct northwesterly path to the International tower and had actually passed the tower by 1140. On the return flood, it took a more easterly route back towards Drayton Harbor, appearing to be forced more into shallow waters. The grapefruit and manufactured float stayed very close together for the duration of this study. The float was removed at 1455 in 2.5 feet of water, approximately 500 yards southeast of the tower. The floats deployed at Station 8 followed a very similar path to within 100 yards and southeast of the International tower. It travelled a more direct route back towards Drayton Harbor and was retrieved at 1500 hours when it was about 500 yards northwest of the end of Marine Drive.

### Discussion

At the start of this study, the back cut behind the breakwater had already gone dry. This indicates that there is very little opportunity for mixing between Blaine Harbor and Drayton Harbor via this small channel. It was the intent of this study to see if floats placed near the boat ramp might move out through this cut but the tide had probably been on the ebb for 30 minutes or so prior to our start. This can be further studied after a higher flood (>+ 9.0 ft.) if it seems necessary.

Under these calm conditions, the manufactured floats performed very similar to the grapefruits for the most part. They have the advantage of being spotted from a distance due to the attached red flag.

This study supports observations and comments from seafood processors that there is very poor circulation of surface water inside of Blaine Harbor. Based on these two initial studies as well as the one conducted by DOH in the mid 1990s, it appears unlikely that contaminated surface water within Blaine Harbor is likely to have a significant impact on surface water over the commercial oyster beds.

Attempts will be made to track the deeper water (5 ft, 15 ft?) flow from Blaine Harbor late in an ebb tide and well into a flood tide but this will be based on further discussion with DOH personnel.