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December 7, 2009

TO: Board Members

FROM: Mary Tomlinson, Registrar/Water Quality Specialist and Gary Fish, Manager, Pesticide Programs

SUBJECT: Water Quality Update

The water quality program continues to collaborate with the Friends of Casco Bay (FOCB) on stormwater sampling for residential pesticides. FOCB took three stormwater samples during the summer of 2009, but the lab analysis has not been completed at this time.

During the summer of 2008 FOCB and BPC Staff took samples from the following sites:

- surface water samples down-stream from two different golf course watershed areas in Falmouth, (see **Tables 1 & 2**),
- surface water samples from stormwater draining out of Cumberland Foreside and Cumberland Center, and (see **Tables 1 & 2**)
- sediment samples from one watershed that drains the downtown residential and commercial area of Falmouth and another watershed which drains major housing developments in Portland (see **Table 3**).

## 2008 Surface Water Samples

The selected sampling sites were all down-stream from golf courses or residential runoff areas. One site was just downstream from The Woodlands Club, two others were downstream from Falmouth Country Club and the other two were from stormwater out falls that drain parts of Cumberland Foreside and Cumberland Center. All of the surface water samples were taken after significant rain events (>0.5 inches). The site descriptions and codes are presented in **Table 1** on the next page.

Of the nine pesticides evaluated, only chlorothalonil was detected in 4 of 8 samples ranging from 0.08 ppb to 0.22 ppb (see **Table 2** next page). These levels do not exceed the aquatic life benchmarks set by EPA, the lowest of which is 0.6 ppb for chronic effects on aquatic invertebrates. Although these levels are well below the aquatic life benchmarks, we consider these detections to be significant, because in previous surface water studies we have detected chlorothalonil above the aquatic life benchmark. In 2004, we found it in surface waters next to blueberry fields treated with Bravo (0.103 – 0.79 ppb) and in a 1998 pilot project, we detected it coming off treated potato fields at very high levels.

Site	Code	Date Sampled	Show in Figure #
Woodlands Club, East Branch of the Piscataqua River	WCEPB1 WCEPB2	7/21/08 8/7/08	1
Falmouth Country Club, East Branch of the Piscataqua River	FCCEBP1 FCCEBP2	7/21/08 8/7/08	2
Falmouth Country Club, Mill Brook	FCCMB1 FCCMB2	7/21/08 8/7/08	3
Cumberland Center, Powell Rd	CCPR	8/6/08	4
Cumberland Foreside, Wildwood Park	CFWP	8/6/08	5

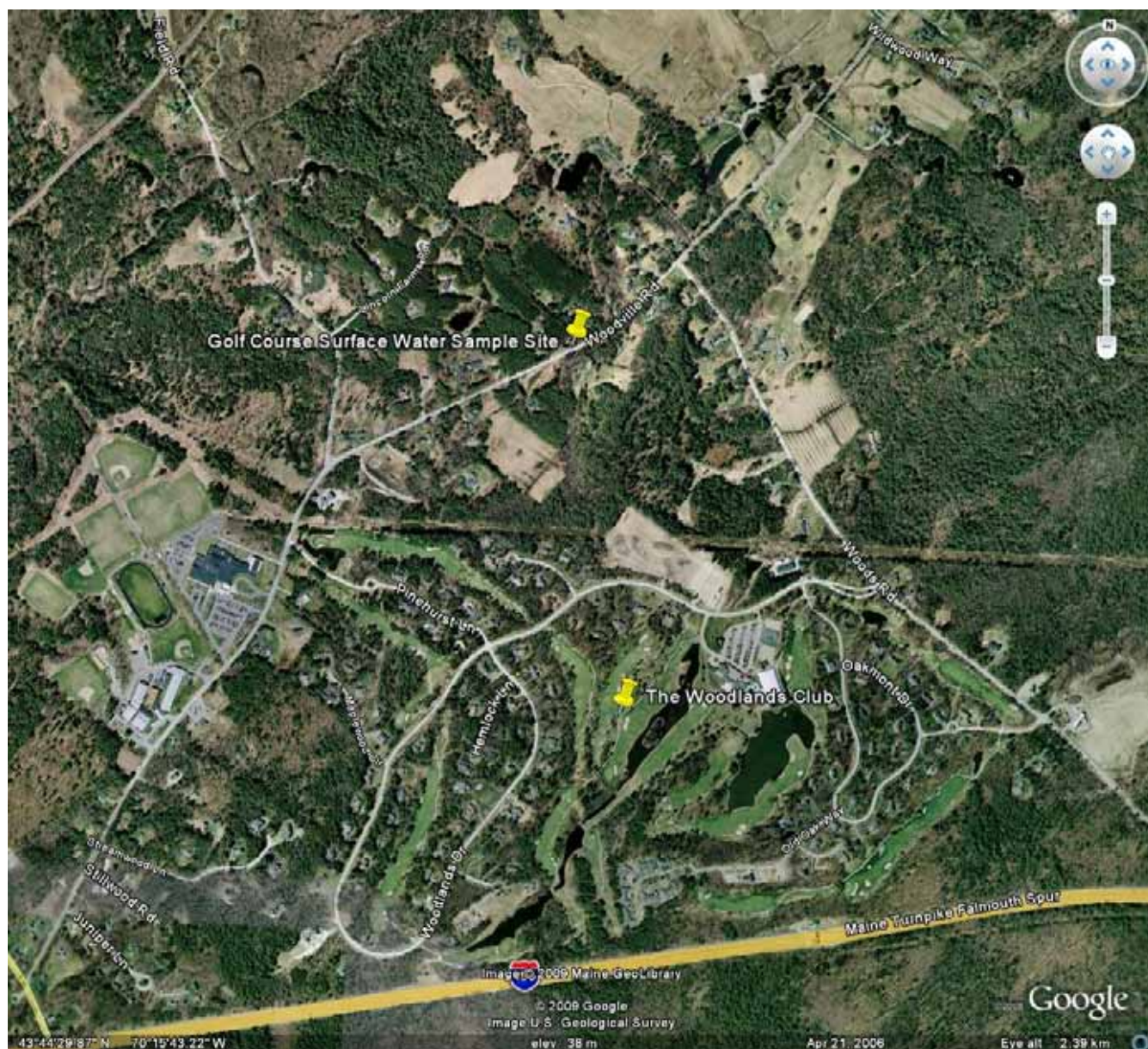
The WIN-PST database indicates chlorothalonil has an intermediate surface runoff potential and a high level of toxicity to fish and aquatic invertebrates. Chlorothalonil is also used at relatively high application rates (6 -10 pounds per acre) on turf and agricultural fields. Therefore, we should consider future surface water studies targeting chlorothalonil, especially in areas downstream from golf courses where the application rates are highest.

Sample site	Dicamba ug/L or ppb	Thiophanate ug/L or ppb	Bifenthrin ug/L or ppb	Chlorothalonil ug/L or ppb	Fludoxanil ug/L or ppb	Cyfluthrin ug/L or ppb	Pendamehalin ug/L or ppb	Chlorpyrifos ug/L or ppb	Trifluralin ug/L or ppb
WCEBP1	nd	nd	nd	nd	nd	nd	nd	nd	nd
WCEBP2	nd	nd	nd	0.08	nd	nd	nd	nd	nd
FCCMB1	nd	nd	nd	nd	nd	nd	nd	nd	nd
FCCMB2	nd	nd	nd	0.22	nd	nd	nd	nd	nd
FCCEBP1	nd	nd	nd	nd	nd	nd	nd	nd	nd
FCCEBP2	nd	nd	nd	0.08	nd	nd	nd	nd	nd
CCPR	nd	nd	nd	0.085	nd	nd	nd	nd	nd
CFWP	nd	nd	nd	nd	nd	nd	nd	nd	nd
Limit of Detection	0.1	0.01	0.01	0.01	0.01	0.1	0.01	0.01	0.01

The application records from Falmouth Country Club show 41 pounds of chlorothalonil active ingredient were applied just two days before sample FCCMB2 was taken. According to application records from The Woodlands Club and Falmouth Country Club, the other positive samples from the Falmouth area were taken at least 12 days following the last application of chlorothalonil.

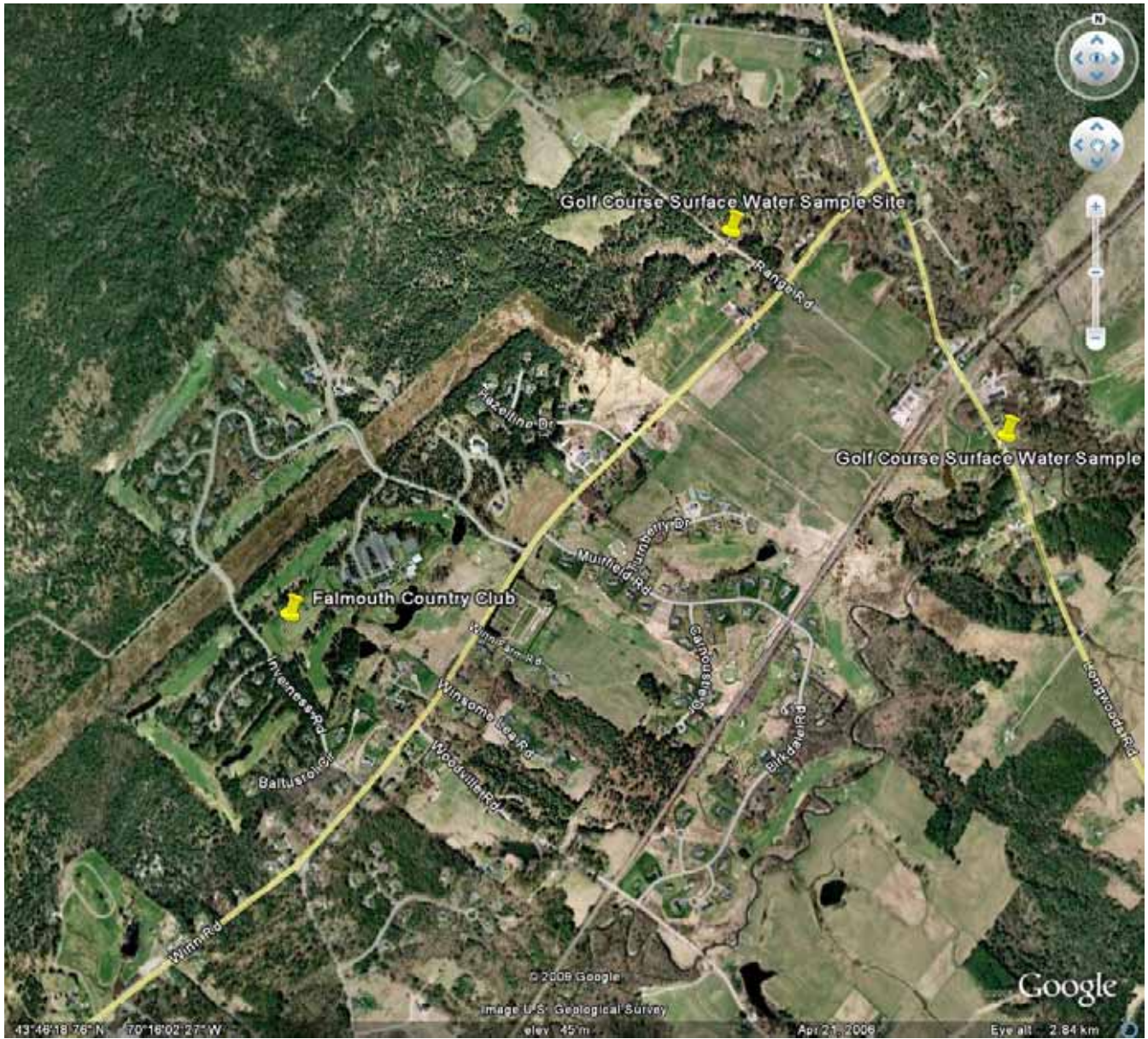
Although the samples taken in Cumberland were meant to detect runoff from lawns, the positive detection for chlorothalonil from the Powell Road stormwater outfall in Cumberland Center is interesting. Lawn care company application records rarely, if ever, indicate application of

chlorothalonil on home or commercial lawns. The chlorothalonil could be the result of treatments made by Val Halla Golf Course, which is about three miles from the collection site as the crow flies. We have not asked for the application records from Val Halla at this time. The other Cumberland sites were non-detects for all the analytes (see **Table 2** previous page).

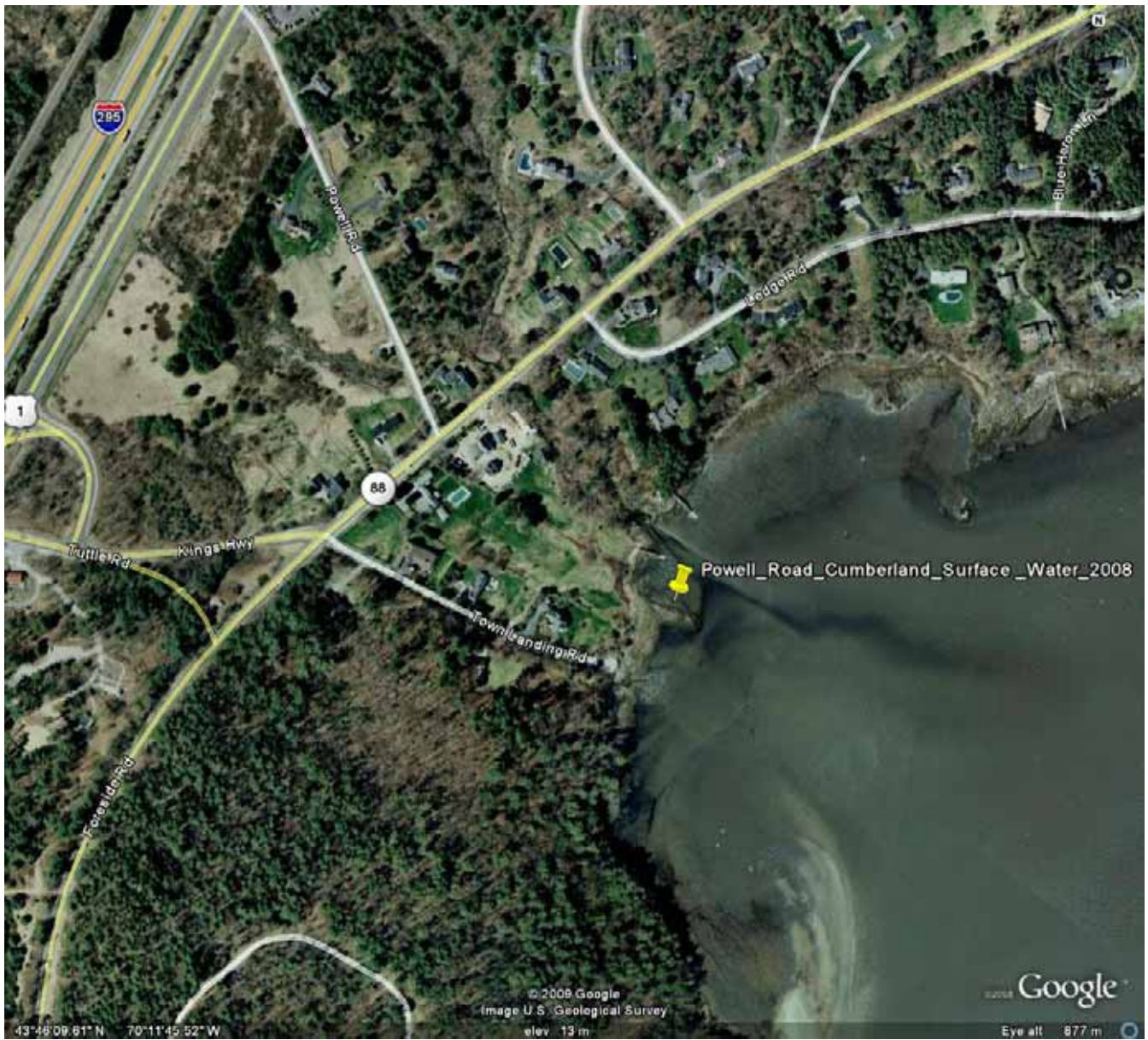


**Figure 1**

Site WCEBP on the East Branch of the Piscataqua River downstream from The Woodlands Club in Falmouth; sampled after at least 0.5 inches of rain on July 21 and August 7, 2008.

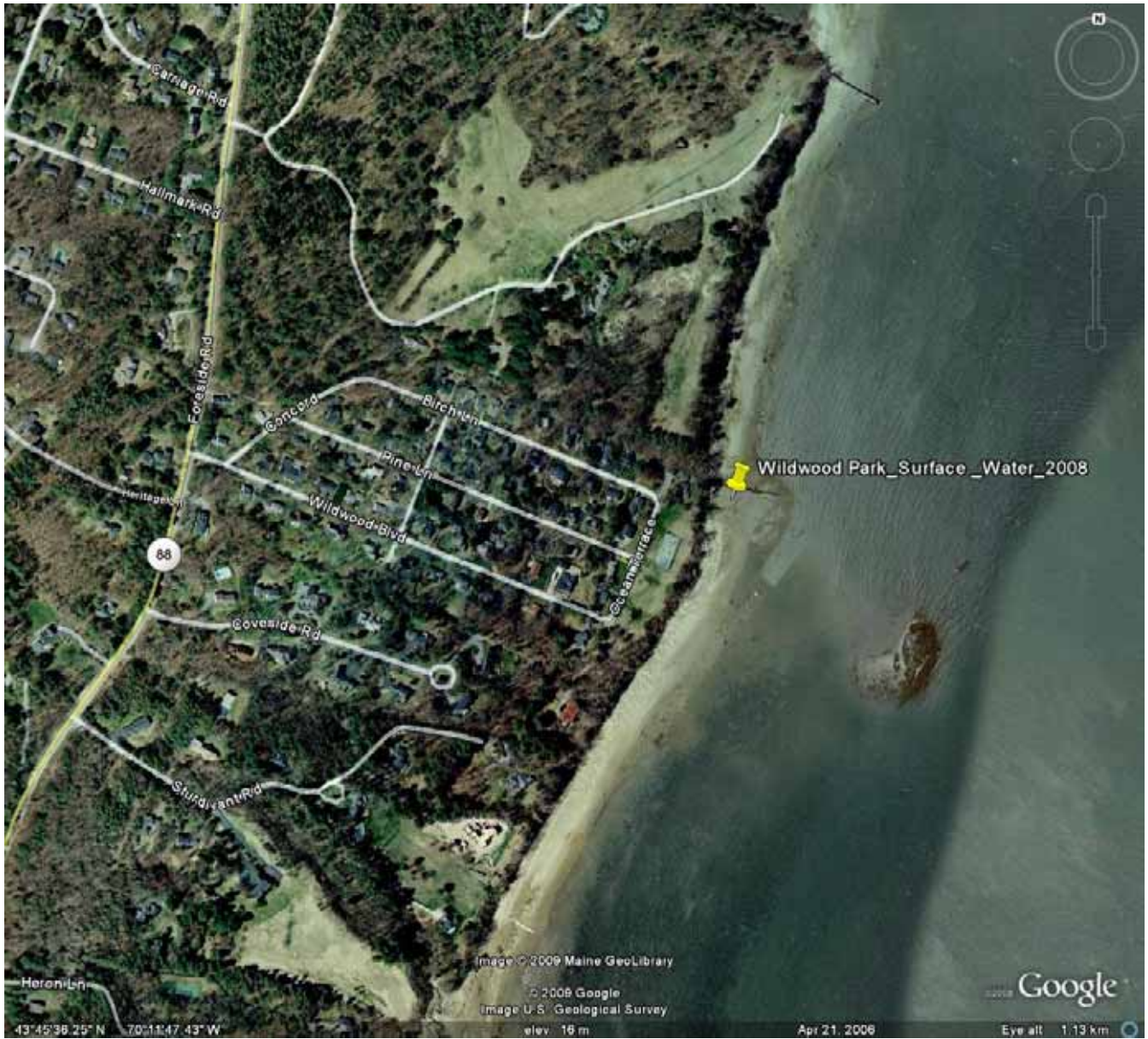


**Figure 2**  
Site FFCMB on Mill Brook and site FFCEBP on the East Branch of the Piscataqua River downstream from Falmouth Country Club in Falmouth; sampled after at least 0.5 inches of rain on July 21 and August 7, 2008.



**Figure 3**

Site CCPR at the stormwater outfall off of Powell Road in Cumberland Center; sampled after at least 0.5 inches of rain on August 6, 2008.



**Figure 4**  
Site CFWP at the stormwater outfall off Wildwood Park in Cumberland Foreside; sampled after at least 0.5 inches of rain on August 6, 2008.

## 2008 Sediment Samples

During the summer of 2008, sediment samples were taken from one site at Mussel Cove (upper and lower tidal) which is at the mouth of Mill Stream in Falmouth (**Figure 5**) and at Payson Park Creek and the Back Cove Pumping Station in Portland (**Figure 6**). Five to seven scoops were taken from the top one centimeter of fine sediments at each site.

This is the second time we have taken sediment samples from the Back Cove area. The first set of samples, taken in 2007 were non-detect, but the sampling protocol was flawed as we took a mixture of fine and coarse sediments and sediments that were deeper than one to two centimeters.

In the 2008 sediment samples of the five synthetic pyrethroids analyzed, only bifenthrin was detected and it was detected in all four samples (see **Table 3** below). The detections ranged from 0.48 to 16.8 ppb. Two of the samples may have exceeded at least one aquatic life benchmark. Because the benchmarks that have been set in California are based on the proportion of bifenthrin in relation to organic carbon and not gross sediments, it is hard to compare our results with the California results. According to Larry Leblanc, Research Scientist at the University of Maine, if we were to reduce our samples down to the organic carbon fraction, our bifenthrin concentrations would far exceed California's aquatic life benchmarks.

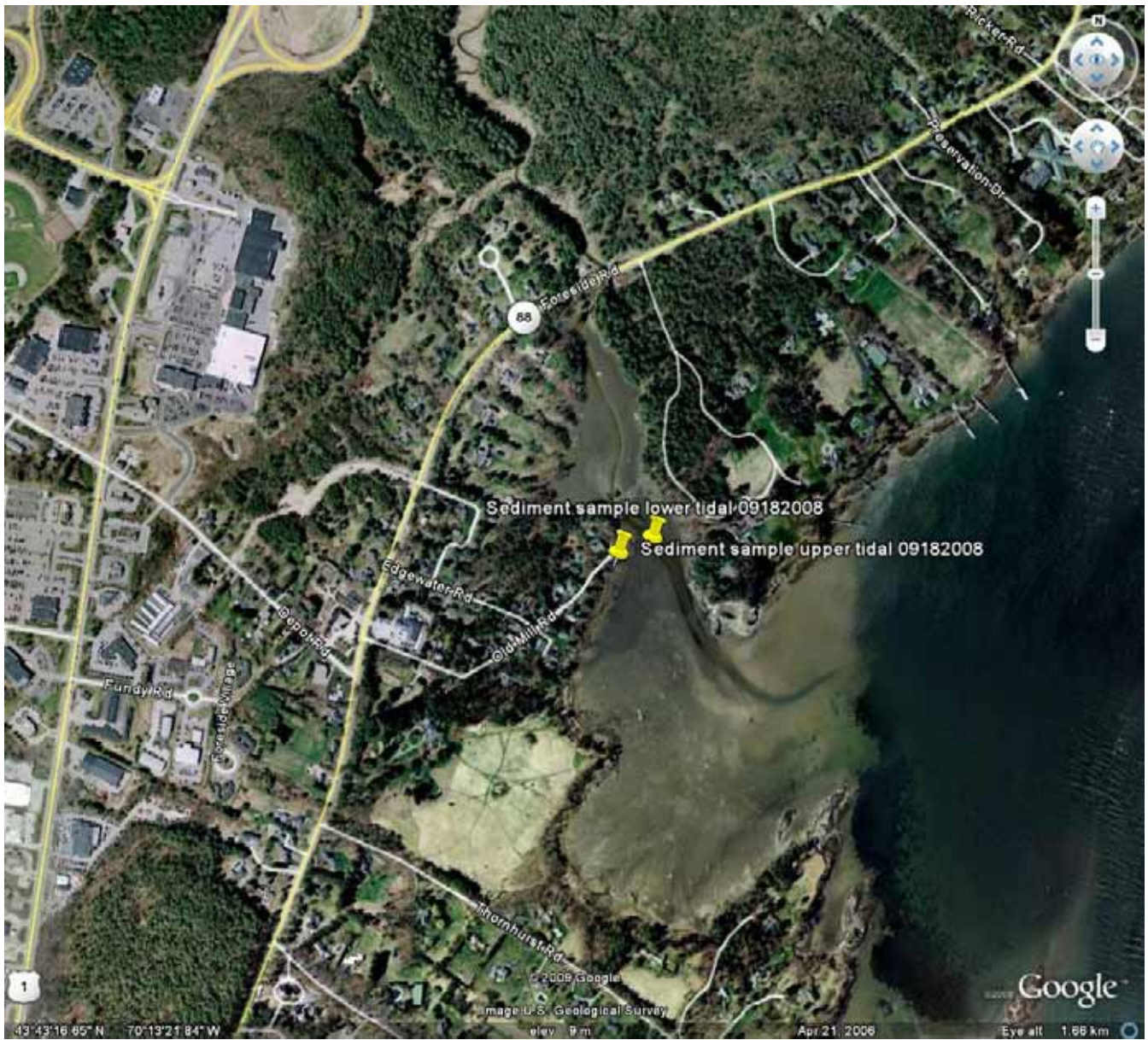
We plan to take six to eight sediment samples in December 2009. The Back Cove sites will be re-sampled and potential new sites have been identified in Portland (Capisic Brook area and additional Back Cove site) and South Portland (Trout Brook and Long Creek areas).

<b>Table 3, 2008 Sediment Sample Results</b>				
	Mussel Cove Lower Tidal		Mussel Cove Upper Tidal	
	Mean	Std Dev	Mean	Std Dev
	ng/g or ppb	ng/g or ppb	ng/g or ppb	ng/g or ppb
bifenthrin	1.35	1.43	1.26	0.48
λ-Cyhalothrin	ND	ND	ND	ND
Sum Permethrin	ND	ND	ND	ND
Sum cyfluthrin	ND	ND	ND	ND
Sum cypermethrin	ND	ND	ND	ND
	Payson Park		Pumping Station	
	Mean	Std Dev	Mean	Std Dev
	ng/g or ppb	ng/g or ppb	ng/g or ppb	ng/g or ppb
bifenthrin	16.68	9.13	7.16	1.18
λ -Cyhalothrin	ND	ND	ND	ND
Sum Permethrin <sup>1</sup>	ND	ND	ND	ND
Sum cyfluthrin <sup>2</sup>	ND	ND	ND	ND
Sum cypermethrin <sup>3</sup>	ND	ND	ND	ND

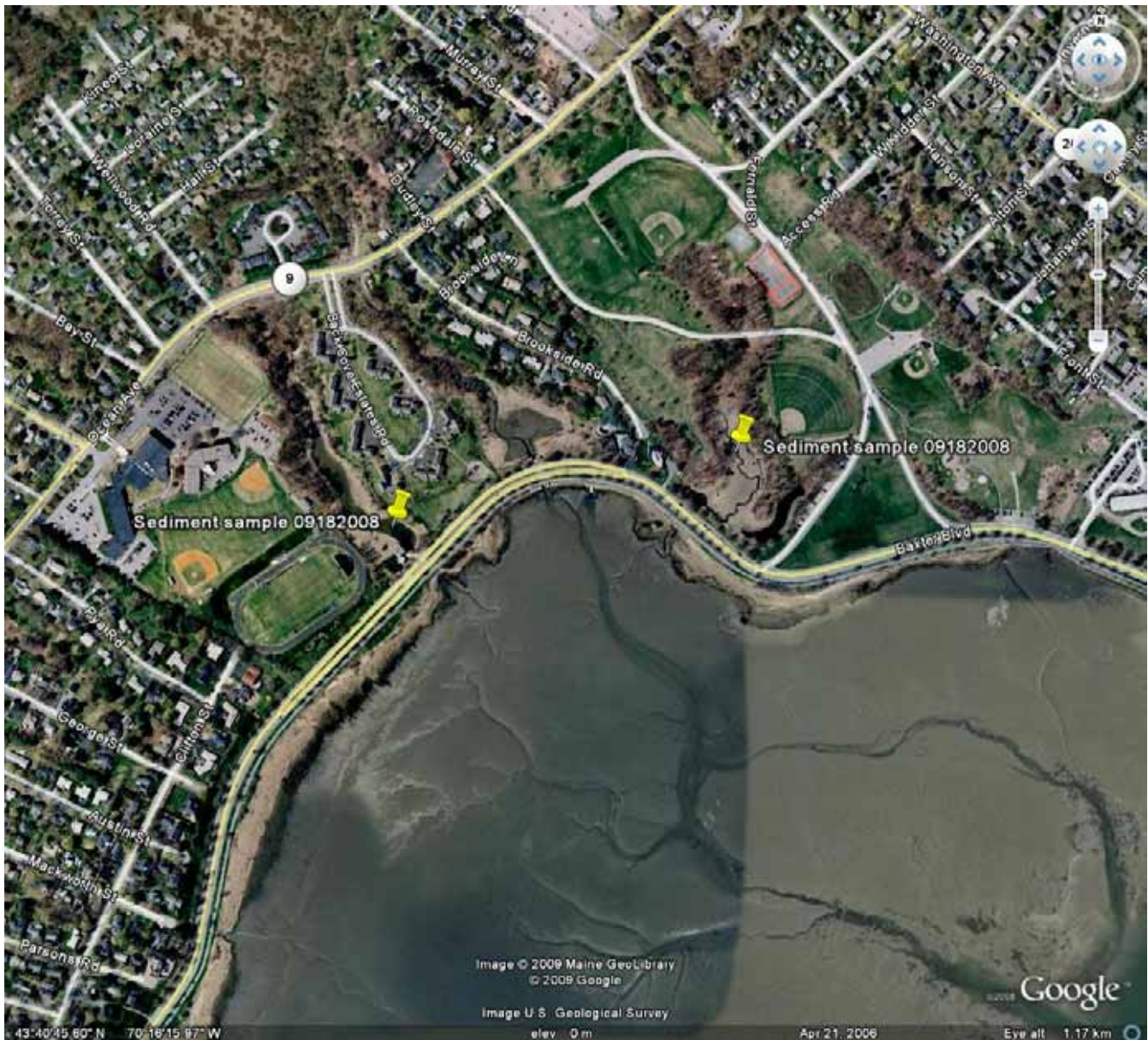
<sup>1</sup>Permethrin contains two isomers, completely resolvable, which are quantitated separately and then summed

<sup>2</sup>Cyfluthrin contains four isomers, partially resolved, which are quantitated separately and then summed.

<sup>3</sup>Cypermethrin contains four isomers, partially resolved, which are quantitated separately and then summed.



**Figure 5**  
The Mussel Cove sites in Falmouth; samples were taken at each site on September 18, 2008.



**Figure 6**

The Back Cove sites in Portland; samples were taken at each site on September 18, 2008.

In conclusion, without the availability of a Water Quality Specialist, the sampling program has been greatly reduced, but the results continue to indicate a need for additional sample programs. With a half-time Registrar and half time Water Quality Specialist, we should be able to get back on track with our sampling programs and prepare to repeat the periodic ground water monitoring study that is due this coming field season.

If you have any questions, please contact Mary or Gary.