



# Dolphin Club



## Tides, Currents and Row Planning

### Definitions:

**TIDE:** The **HEIGHT** of the surface of the water.

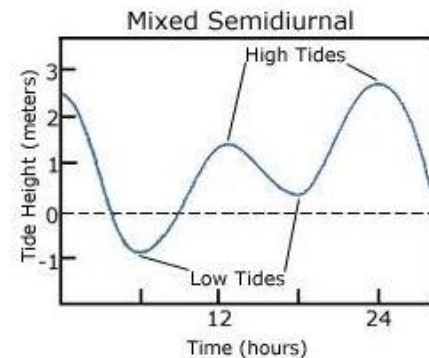
**CURRENT:** The **FLOW** of water into and out of the bay

### *The Daily Tidal Cycle – “twice a day”*

Two high-tides and two low-tides each day

One high-tide is higher and one low tide is lower.

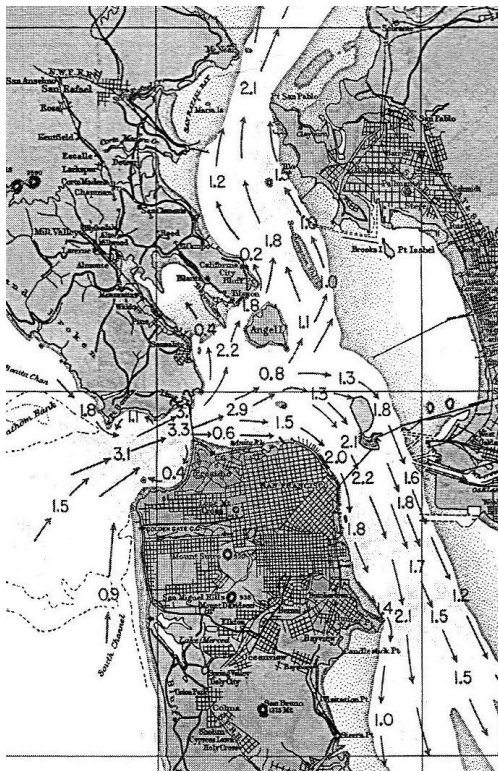
The lowest tides will be below the datum level, and are expressed as negative numbers or “**minus tides**”.



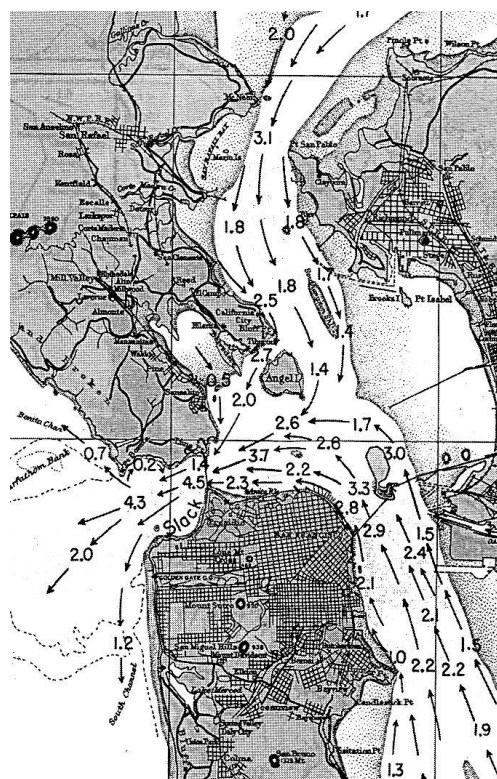
### *Tidal Currents – Flood and Ebb*

- Water flowing *into* the bay is a **Flood** Current. Near the club a flood flows west to east, but in much of the bay a flood flows north or towards south.
- Water going *out* of the bay is an **Ebb** Current. Near the club an ebb flows east to west, but also flows north or south in other parts of the bay

Flows At **Max Flood** at Golden Gate



Flows at **Max Ebb** At Golden Gate

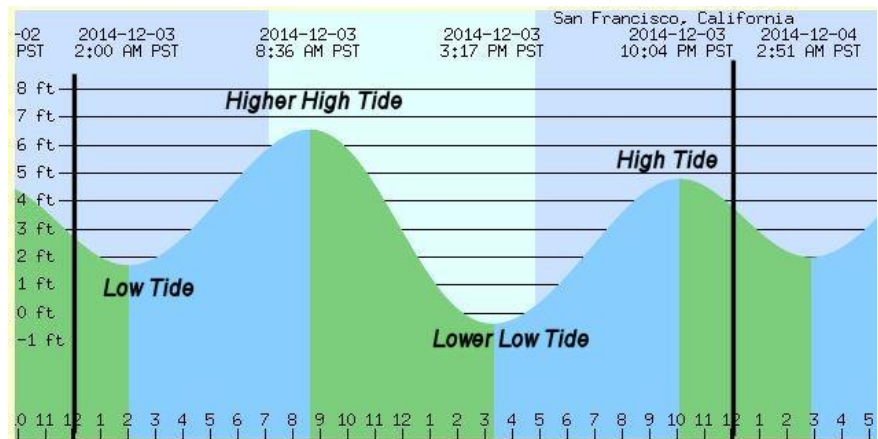


## Predicting the Tides and Currents

### Tide “Events”

The tide level rises and falls in smooth curves but we can pinpoint the moment of max or minimum height:

- ⤴ **Two High Tides** (one higher than the other)
- ⤴ **Two Low Tides** (one lower than the other)



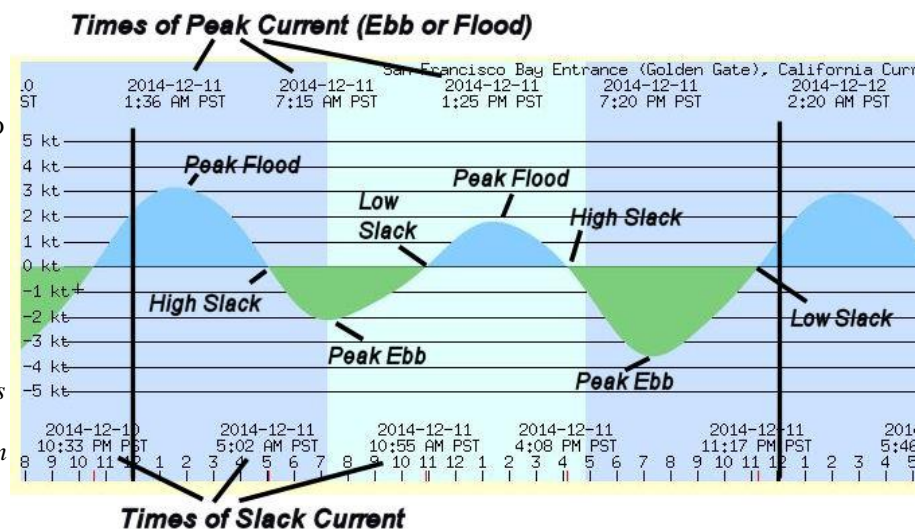
### Tidal Current “Events”

Currents also grow faster and slower in smooth curves, but we can identify times of peak flow (speed) and slack water between.

The graph at right shows current speed in knots. Speed above zero (in this graph) is flooding and below zero is ebbing.

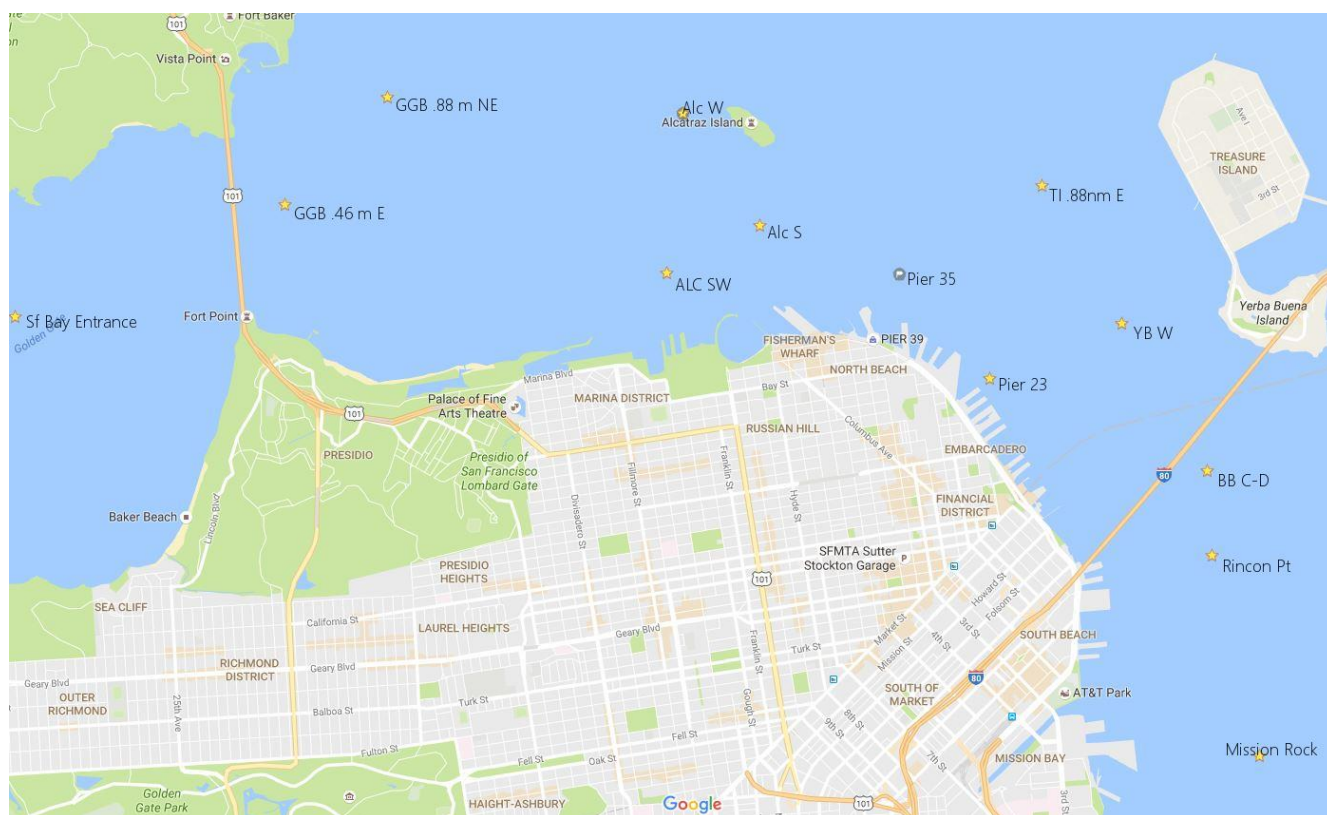
- ⤴ Two times of **peak flood** speed
- ⤴ Two times of **peak ebb** speed
- ⤴ Four times of “**slack**” between those currents

*Slack is not a time of calm water. Perhaps the better term would be “turn-around” as the bay reverses flow direction and can be quite rough.*



## The Importance of Location

- The tide is a *wave* that progresses into and throughout the bay.
- Times of high and low tide and peak current happen at different times at different places.
- Current peak speeds also vary by location
- NOAA tide predictions are provided for many “stations” in the bay.
- Tide books give us standard “differences” to use as corrections. (Pages 6 and 9)



**NOAA Current Predictions Stations:** The map above shows the locations of some of the local current predictions stations reported by NOAA. The Dolphin Club tide books report the predictions for “GGB .88 miles NE” and “ALC SW”. The Alcatraz SW station is the best to use to predict currents near Aquatic Park.

**Currents for Jan. 7 2017:** Note the variation in peak speed and time at different places.

Station	Peak Flood Speed	Peak Flood Time		Slack Time		Peak Ebb Speed	Peak Ebb Time
SF Entrance (outside bridge)	2.3 kt	4:48		7:18		3.4 kt	10:54
GGB .8 nm NE (North shipping channel)	3.2 kt	4:54		8:00		2.2 kt	11:06
Alcatraz 0.5 m N	1.9 kt	4:54		8:00		2.0 kt	10:48
Alcatraz 0.3 m S (near Alc)	1.6 kt	4:51		8:07		2.6 kt	11:08
Alcatraz 0.9 nm SW (near Ft Mason)	1.7 kt	3:48		7:00		1.9 kt	10:12
Pier 35	2.6 kt	3:48		6:58		2.5 kt	9:54
Pt. Richmond	0.9 kt	4:49		8:46		1.0 kt	11:42
Pt. San Pedro (near China Camp)	2.4 kt	5:12		9:15		3.1 kt	12:24

Notes:

- Many stations are based on a specific “basis” station. Since 2016 the basis station for this area is “Golden Gate Bridge” (0.8 miles NE). This station is well east of the actual bridge, in the north shipping channel. Use the published differences to get predictions for other locations.



- Alcatraz SW is a new station that is just east of Fort Mason, very close to our cove. This is the best station to use for row planning. Our club tide books list both GGB and Alcatraz SW stations.
- Currents start near shore and build into center of bay. Current switches direction at the cove an hour before the center of the bay!
- Floods can be very strong in the center of the bay, ebbs can be strong on the shore.

### Get tides and currents from tide books

The Dolphin Club tide books provide tide and current predictions for two locations or “stations”. Tides (height of the water) is reported for Golden Gate (the CG station at the far end of Chrissy Field) and Alcatraz. Currents are reported for a spot .88 nm northeast of the Golden Gate Bridge, and a spot known as “Alcatraz SW” which is near Fort Mason, close to Aquatic Park (see map above). Use the Alcatraz pages to get the tides and currents close to our cove.

## JANUARY TIDES AT ALCATRAZ ISLAND, CALIFORNIA – 2017

Heights in feet

Pacific Standard Time

Moon	Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
		HIGH		LOW		HIGH		LOW	
N	1 Sun	0220	4.9	0706	2.9	1259	5.7	1943	-0.5
	2 Mon	0258	5.0	0756	2.8	1344	5.4	2024	-0.2
	3 Tue	0339	5.1	0855	2.6	1438	4.9	2109	0.2
E	4 Wed	0422	5.3	1004	2.3	1545	4.5	2200	0.7
☉	5 Thr	0509	5.5	1120	1.9	1709	4.1	2256	1.2
	6 Fri	0557	5.8	1232	1.3	1842	4.0	2358	1.6
E	7 Sat	0646	6.1	1335	0.6	2009	4.2		
		LOW		HIGH		LOW		HIGH	
	8 Sun	0101	2.0	0736	6.5	1431	-0.1	2121	4.5
P	9 Mon	0201	2.3	0826	6.7	1523	-0.7	2221	4.8
	10 Tue	0259	2.4	0916	6.9	1611	-1.1	2314	5.1
N	11 Wed	0354	2.4	1005	7.0	1658	-1.3		
		HIGH		LOW		HIGH		LOW	
○	12 Thu	0003	5.3	0447	2.4	1054	6.9	1743	-1.3
	13 Fri	0048	5.4	0540	2.4	1142	6.7	1827	-1.2
	14 Sat	0132	5.5	0632	2.3	1230	6.3	1910	-0.9
	15 Sun	0215	5.5	0726	2.3	1318	5.8	1952	-0.4

On Jan 7 the first high tide is at 6:46 am and the height is 6.1 feet above the zero line or “datum”. The next low tide is at 1:35pm, just 0.6 feet above zero. Note how by the 11<sup>th</sup>, as the moon becomes full (left edge of page) the tide range is over seven feet! Sometimes the difference between high and low tides is just two feet.

Tides below zero are called “minus tides”. Minus tides and those over six feet are bolded in the tide books. The full daily cycle averages 24 hours and 50 min, since it is tied to the motion of the moon, so some days only three tides fit into a 24 day. This also means that the tides cycle one phase each seven-day week.

Sunday Jan 1: **Low** tide at 7:06 am; Sunday Jan 8: **High** tide at 7:36 am; Sunday Jan 15: **Low** tide at 7:26 am

# JANUARY

## CURRENTS AT ALCATRAZ ISLAND - 2017

Currents in Knots							Pacific Standard Time							
		MAX Current			MAX Current			MAX Current			MAX Current			
Day	Slack	Time H.M.	Vel Knots	Slack	Time H.M.	Vel Knots	Slack	Time H.M.	Vel Knots	Slack	Time H.M.	Vel Knots	Slack	
1 Sun	0236	0500	1.3E	0800	1036	1.5F	1318	1648	2.3E	2106	2348	1.6F		
2 Mon	0312	0542	1.4E	0848	1130	1.4F	1412	1736	2.2E	2142				
3 Tue		0030	1.6F	0354	0624	1.4E	0942	1224	1.2F	1506	1830	2.0E	2224	
4 Wed		0112	1.6F	0436	0712	1.5E	1100	1324	1.1F	1612	1930	1.8E	2312	
5 Thr		0200	1.6F	0524	0806	1.6E	1224	1436	0.9F	1736	2030	1.6E		
6 Fri		0006	0254	1.6F	0612	0912	1.7E	1342	1606	1.0F	1900	2142	1.4E	
7 Sat		0100	0348	1.7F	0700	1012	1.9E	1448	1742	1.2F	2018	2248	1.4E	
8 Sun	0154	0442	1.8F	0754	1112	2.2E	1548	1854	1.4F	2130	2348	1.4E		
9 Mon	0248	0530	1.8F	0848	1212	2.4E	1648	1954	1.7F	2230				
10 Tue		0048	1.4E	0342	0624	1.8F	0936	1300	2.5E	1736	2042	1.9F	2324	
11 Wed		0142	1.5E	0436	0718	1.8F	1030	1354	2.6E	1824	2130	2.0F		
12 Thu		0012	0236	1.6E	0536	0812	1.8F	1118	1448	2.6E	1906	2218	2.1F	
13 Fri		0100	0324	1.7E	0630	0906	1.8F	1212	1530	2.6E	1948	2300	2.1F	
14 Sat		0148	0412	1.7E	0724	0954	1.7F	1300	1618	2.5E	2030	2336	2.0F	
15 Sun	0230	0500	1.7E	0818	1042	1.5F	1348	1706	2.3E	2106				

Despite the heading on the page, these are the predicted currents for “Alcatraz SW” which is much closer to Ft. Mason than Alcatraz. Note the predictions for **Jan 7<sup>th</sup>** (as included in the table above). Reading across from left...

- Slack Current @ **1:00 am**
- At **3:48 am** a peak flood current of 1.7 knots
- Another slack at **7:00 am**
- At **10:12 am** a peak ebb current of 1.9 knots
- Slack again at **2:48 pm**

...and so on

**Correct for Current Time:**

You know the time of peak flow or slack water, but may not be rowing at that time. *Estimate current right now*

- Approx 3 hrs between peak and slack
  - ✧ On Jan 7<sup>th</sup> (above) if departing **at 8:30 am**
  - ✧ Slack current @ 7 am; Peak Ebb of 1.9 kt @ 10:12 am
  - ✧ Current 1.5 hrs after slack (½ way to peak): About 0.9 kt and rising.
  - ✧ On this morning you would plan for ebb current throughout your row

## Planning Where to Row:

- The rule of thumb is... “do the hard part first”
- Row up-current (into the current) - Ride the current home to the club

## An Example:

Rowing the boat at 3.5 knots, in a 1.5 knot *ebb*,

### The right way:

- Row *east* making 2 knots net speed (3.5 knots rowing minus 1.5 knot of current).
- Get to Ferry Building (2 nm) in one hour.
- Return at 5 knots, getting safely to DC in 25 minutes

### The wrong way:

- Row *west* making 5+ knots net speed
- Get to far end of Crissy Field in only 25 min.
- Turn into current (stronger close to GGB) and make less than 2 knot net speed toward home.
- Stagger back to DC in 1.5 hours or more.

## “Big Ebbs” – Watch out!

In SF Bay the ebb current is generally more challenging than the flood:

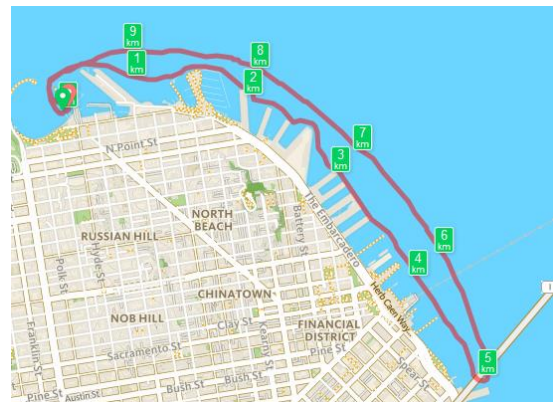
1. Ebbs are stronger. More water leaves the bay than comes in
2. Ebbs generate more rough water and tidal rips and often oppose the wind, further increasing the waves
3. Ebbs become faster and more violent as they approach the constriction at the GG Bridge
4. Ebbs are carrying you out to the ocean
5. Spring rains and snow melt can add to ebb current strength

Be wary of strongest ebb currents. Plan carefully!

## Managing the Current

*Stay Close* to shore against the current and hide behind obstacles, like piers, that block the current.

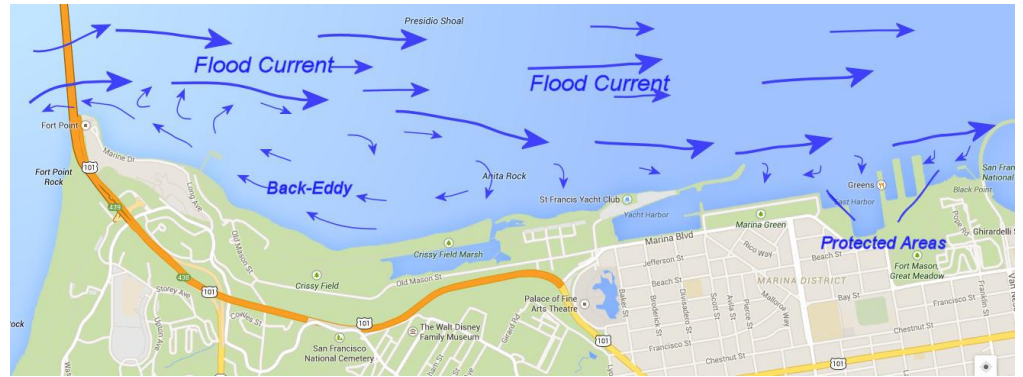
- This is GPS track of a row to Bay Bridge in an ebb current
- The outbound track hugs the piers
- Return took exactly half the time of the outbound leg



*Exploit Local Variations:*

A strong flood current creates a “back-eddy” near Crissy Field

Smart rowers stay **close to shore** to get help from the **back eddies** when heading against the flood.



*Angle into a current when rowing across the flow:*

- Point your boat **into the current** to keep your actual track headed where you want to go.
- Don't let a current push you below (down current) from your goal. Hard rowing getting back upstream!

