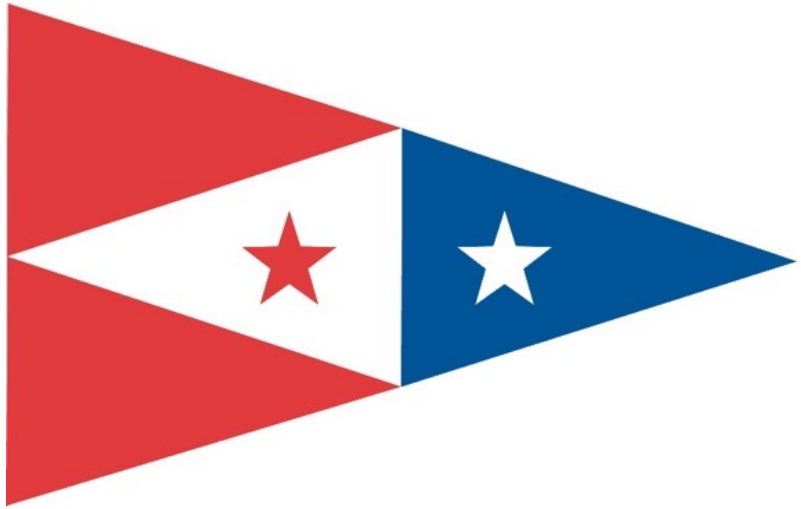


Anticipate. Act. Adapt.

The San Francisco Yacht Club
Sea Level Planning
Member Town Hall
September 29, 2026

Speakers



Stephen Fentress
Vice Commodore



Rich Bergsund
Strategic Advisory Chair



S/C Bill Melbostad
Harbor Committee Chair



Director Rich Pearce
Facilities Committee Chair



Mat Lundberg
House Committee Chair

December 25, 1921 – sea level planning is not a new topic…



- Your Operating Committees – Harbor, Facilities, House, Historical -- have been working on sea level related projects for years
  - Long-term capital planning
  - Storm protocols
- Strategic Advisory is helping to coordinate a Club-wide approach

Agenda

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What we're trying to protect…



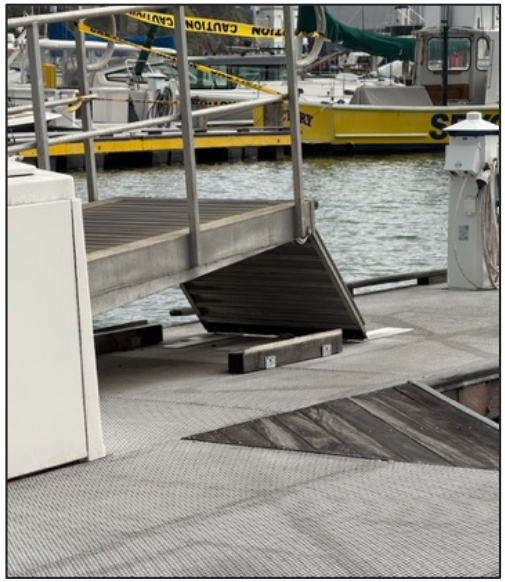
January 3, 2026: Wakeup Call











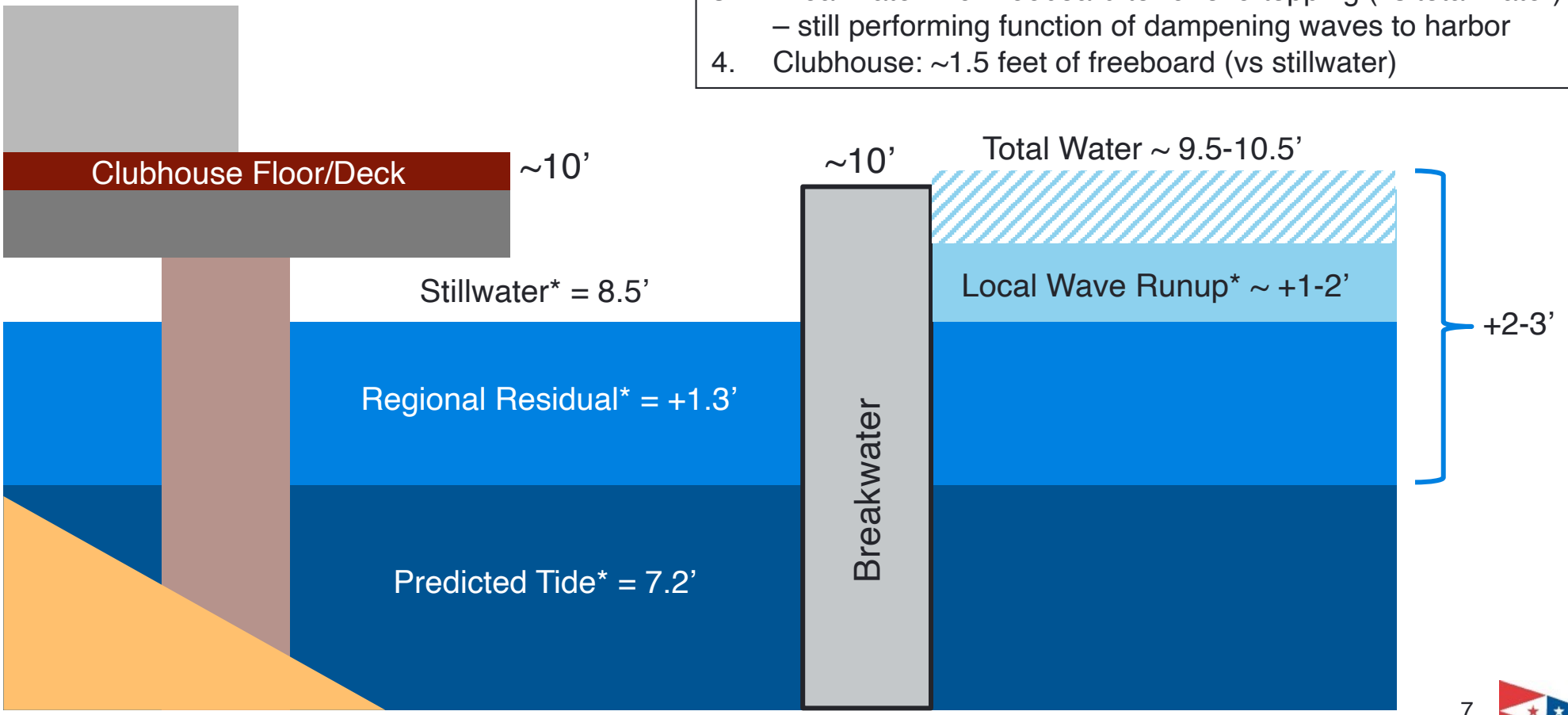
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Jan 3, 2026: Freeboard Estimates

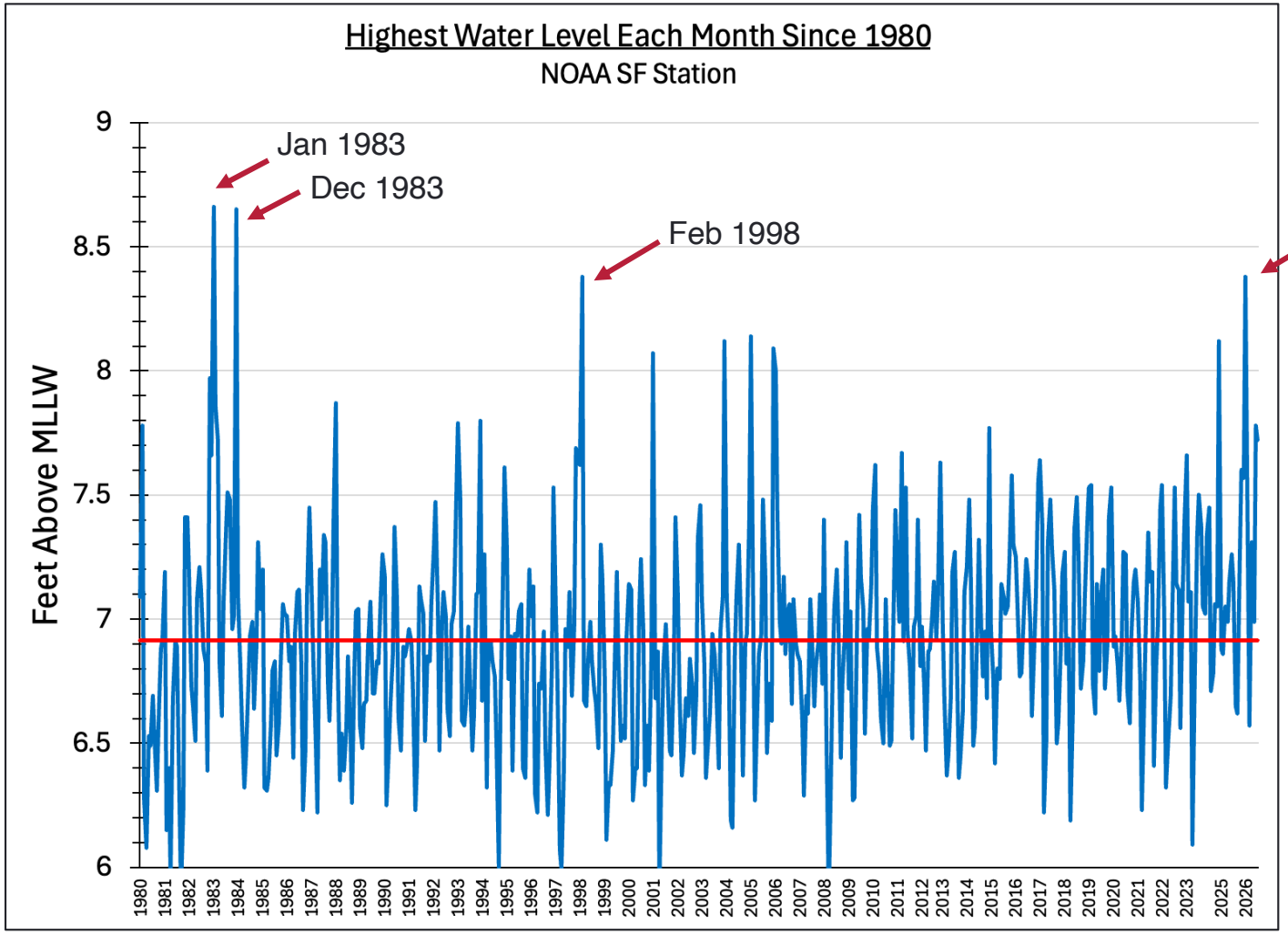
Club Assets, Ranked by Exposure:

1. Gangways inverted, parking flooded at these stillwater levels
2. Shortest pilings ~1 foot clearance
3. Breakwater: +6” freeboard to -6” overtopping (vs total water) – still performing function of dampening waves to harbor
4. Clubhouse: ~1.5 feet of freeboard (vs stillwater)



*Source: NOAA (MLLW), averages of SF and Richmond Stations. Local wave runup estimated from breakwater pictures & videos.

Historical context – only 3 months since 1980 have had higher stillwater than Jan 2026…



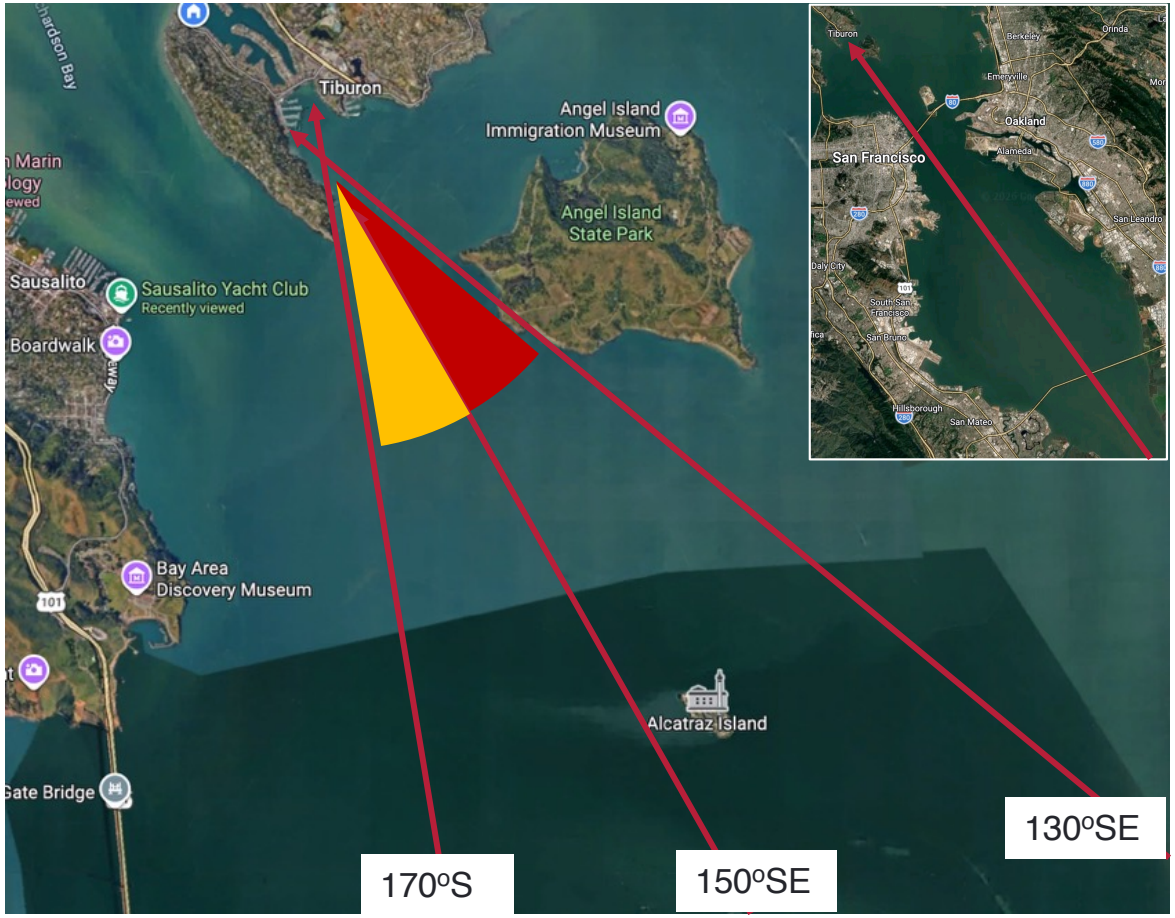
Avg Monthly High:
6.91

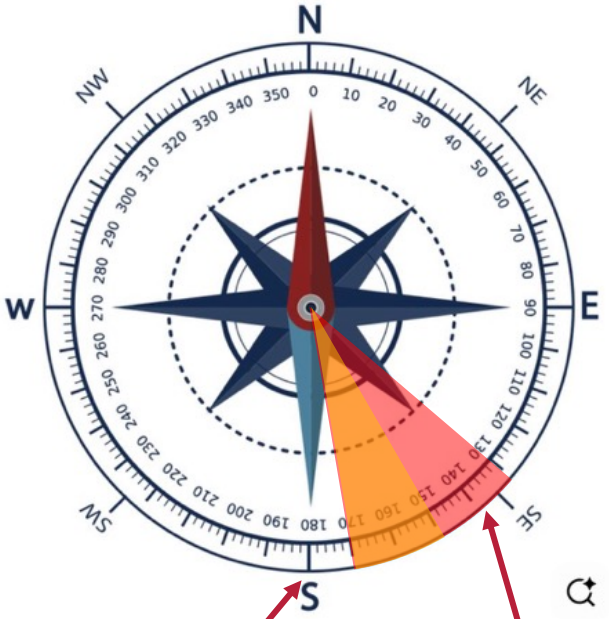
That said, Jan 3 could have been worse if combined with a record storm plus El Niño…

	NOAA SF/Richmond Average*	**Jan 3, '26 (Record Tide)**	**Feb 6, '98 (Record Residual)**	**Worst Case Scenario (Historical)**
Water	Predicted Tide	7.2	6.1	7.2
	Observed Water Level	8.5	8.5	9.6
	Regional Residual	1.3	2.4	2.4
Weather	Atmospheric Pressure	1010 mb	995 mb	995 mb
	Wind Speed	10-20 kts	10-65 kts	10-65 kts
	Wind Direction	S	SSE	SSE
	El Niño Effect	No	Yes	Yes
SFYC Impact	SFYC Stillwater	8.5	8.5	9.6
	SFYC Total Water	9.5-10.5'	9.5-10.5'	10.6-11.6'
	Breakwater Freeboard (Total Water)	+.5' to -.5'	+.5' to -.5'	Overtopped by .6-1.6'
	Clubhouse Freeboard (Stillwater)	+1.5'	+1.5'	.4' clearance, some flooding likely with wave action in harbor

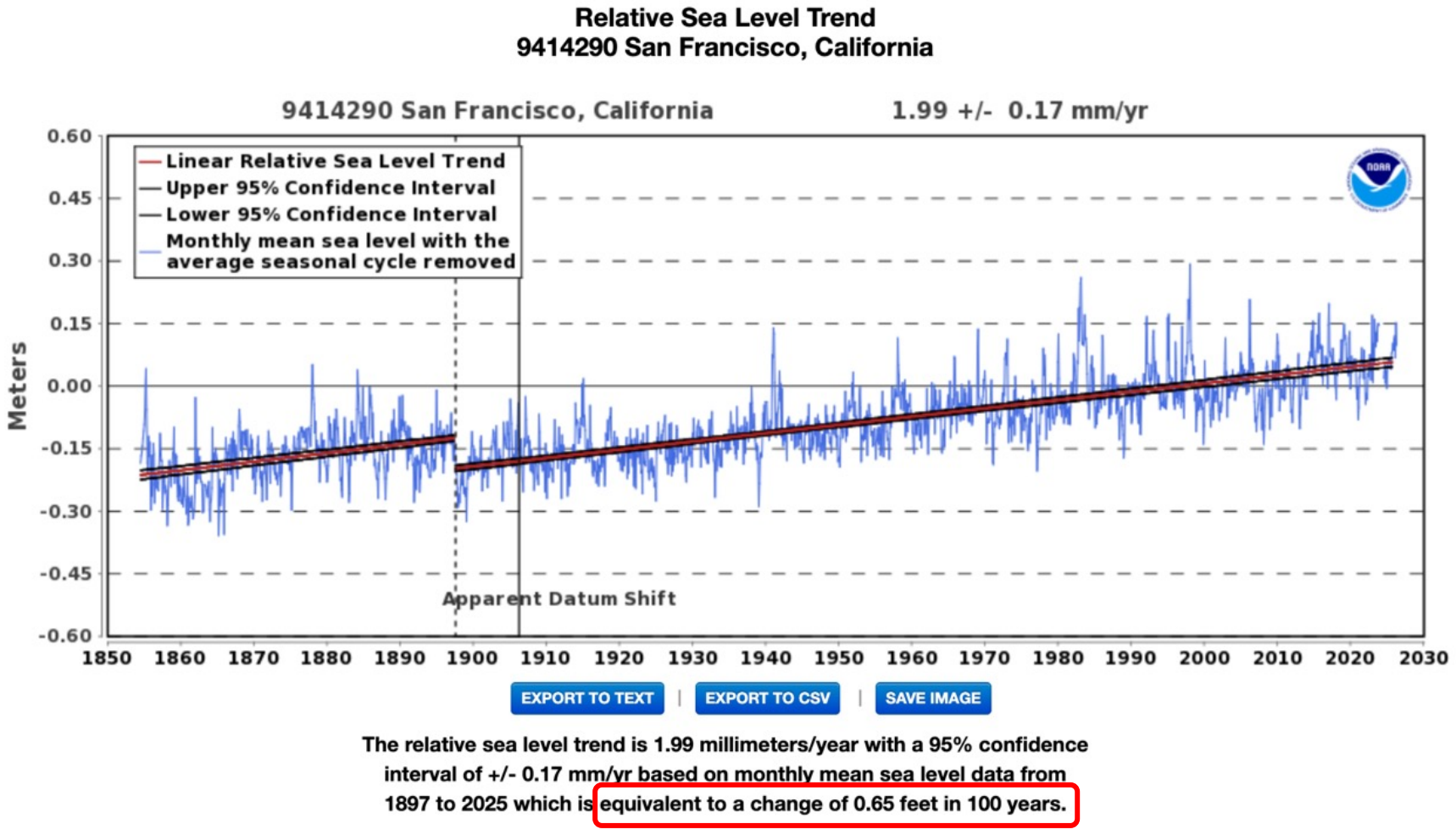
Source: NOAA (MLLW), averages of SF and Richmond Stations. Local Wave Runup assumed at ~1-2'. Breakwater and Clubhouse assumed at ~10' MLLW.

Local Wave Runup: Due to fetch angles and distances, SFYC is most vulnerable between 130º and 150º SE. Jan 3, 2026 was relatively mild vs Feb 6,1998…





What about long-term sea level rise? Looking backwards = +8” in the last 100 years…



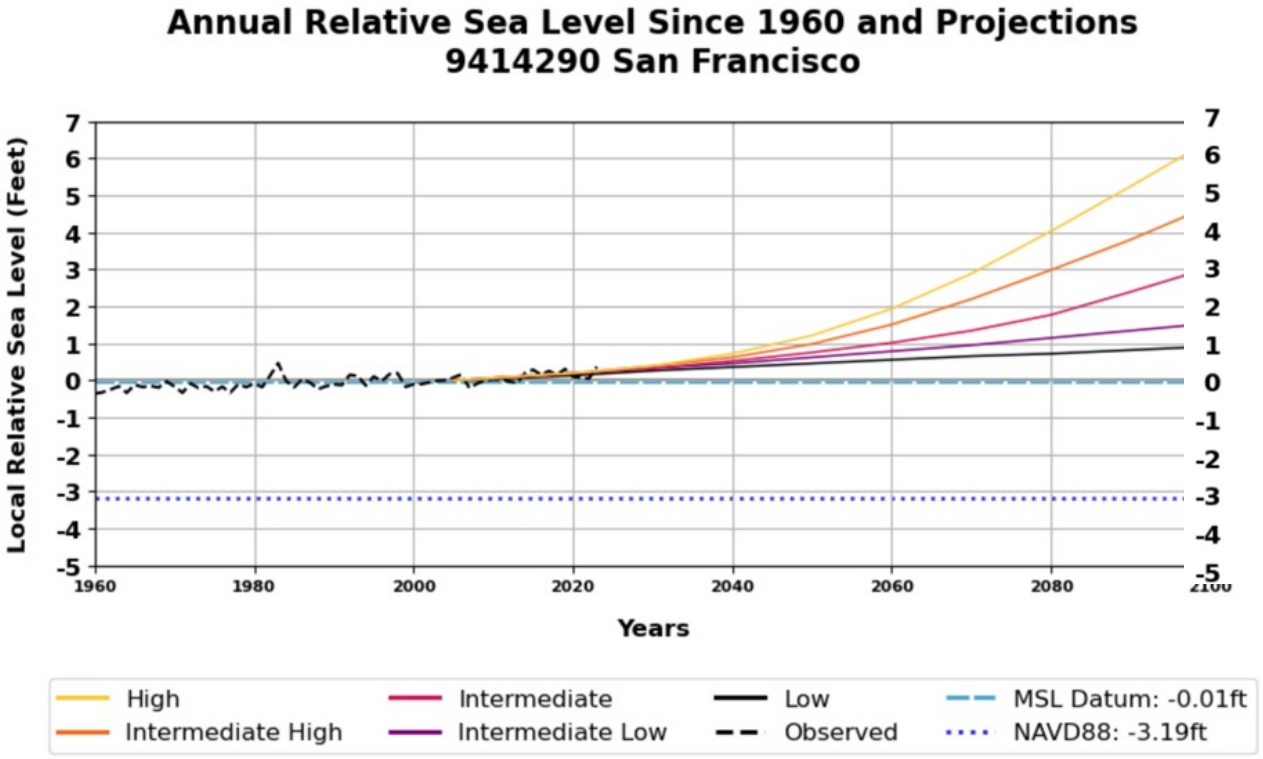
The relative sea level trend is 1.99 millimeters/year with a 95% confidence interval of +/- 0.17 mm/yr based on monthly mean sea level data from 1897 to 2025 which is equivalent to a change of 0.65 feet in 100 years.

Source: NOAA, SF Station.

Future sea level rise: NOAA scenario analysis -- middle case is +1’ by 2060 (.3”/yr) and +3’ by 2100…

Annual Mean Relative Sea Level Since 1960 and Regional Scenarios
9414290 San Francisco, California

The projection of future sea levels that are shown below were released in 2022 by a U.S. interagency task force in preparation for the Fifth National Climate Assessment. The projections for 5 sea level change scenarios are expected to assist decision makers in responding to local relative sea level rise. The 2022 Sea Level Rise Technical Report provides further detailed information on the projections.



Source: NOAA

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Scenario Analysis to understand the range of possible outcomes…



		Months out: Scenarios	Days out: Forecasts
Total Water			
=			
Local Wave Runup	High		Professional Weather Service
	Med		
	Low		
+			
Stillwater			
=			
El Nino	High		Professional Weather Service
	Med		
	Low		
+			
Regional Residual	High		Professional Weather Service
	Med		
	Low		
+			
King Tide		NOAA	NOAA

Professional weather service and local monitoring capability will improve input values over time…

SFYC High Water Scenario Analysis

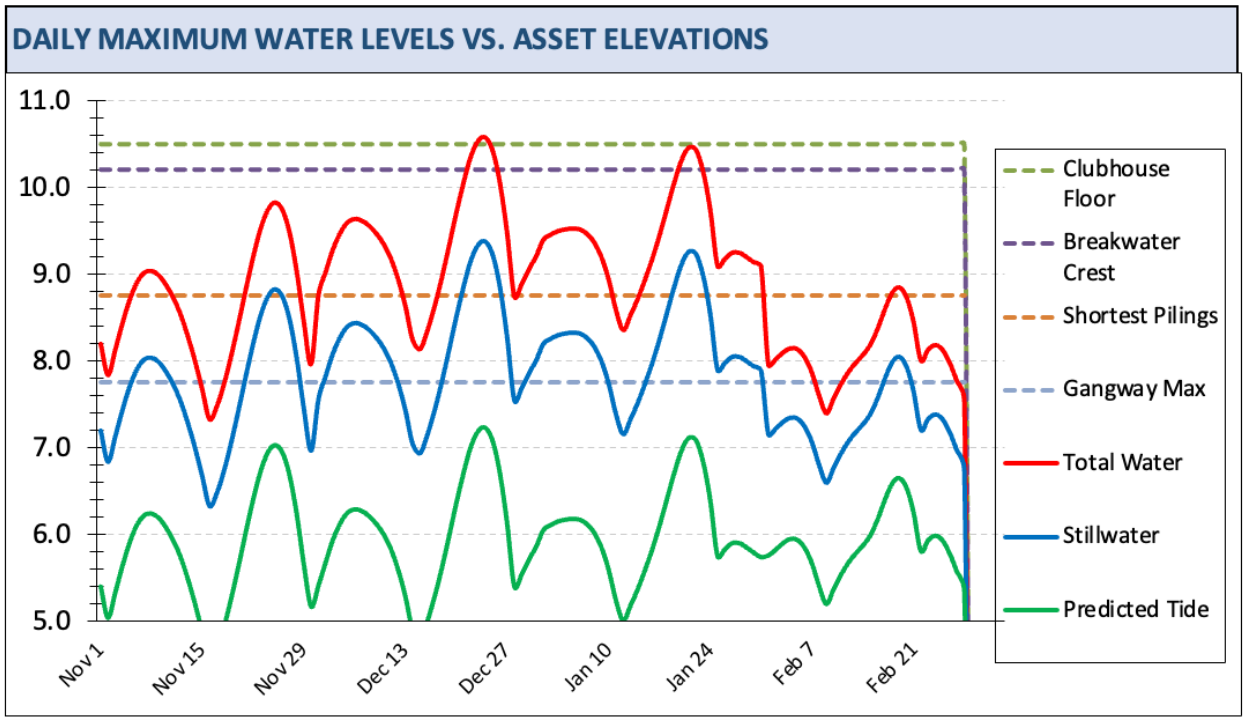
Select forecast scenarios and El Nino effects from drop-down menus below.
Variables for Regional Residual, Local Wave Runup and El Nino Effect are in ***blue*** *-- edit and model will refresh.*

Forecast Scenario:	**High**	Select Low, Med, or High planning levels for regional residual and local wave runup. El Niño is controlled separately.
El Niño Effect:	**High**	Adds a separate seasonal water-level anomaly to forecast stillwater before local wave runup is added.

	Regional Residual			Local Wave Runup			El Niño Effect				Cumulative Adjustments to NOAA Predicted High Tide Levels (ft)	
											Stillwater	Total Water
Month	**Low (ft)**	**Med (ft)**	**High (ft)**	**Low (ft)**	**Med (ft)**	**High (ft)**	**None (ft)**	**Low (ft)**	**Med (ft)**	**High (ft)**	**Residual + El Niño**	**Residual + El Niño + Wave Runup**
November	0.40	0.85	1.30	0.30	0.65	1.00	0.00	0.10	0.25	0.50	1.80	2.80
December	0.50	1.00	1.50	0.40	0.80	1.20	0.00	0.15	0.35	0.65	2.15	3.35
January	0.50	1.00	1.50	0.40	0.80	1.20	0.00	0.15	0.35	0.65	2.15	3.35
February	0.40	0.65	1.00	0.20	0.50	0.80	0.00	0.10	0.20	0.40	1.40	2.20

These are planning assumptions, not climatological averages. They are intentionally conservative to support operational decision-making during potentially hazardous high-water events. They should be refined over time using NOAA observations and SFYC field measurements.

What could happen this winter?



Stillwater is compared with the clubhouse floor, pilings and gangways; Total Water is compared with the breakwater crest.

"High Storm/High El Niño" Scenario

- Regional Residual: +2.15 feet (of which El Niño = .65)
- Local Wave Runup: 1.2 feet

- Gangways inverted, lowest pilings topped
- Breakwater freeboard under 1' for 37 days, with overtopping in Dec & Jan
- Clubhouse freeboard vs stillwater under 1' for 7 days

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High Water Playbook: Edgartown YC example

- 1,000 member club, mostly seasonal, Martha's Vineyard
- 100-year-old building on 50-60 pilings at end of useful life



- Clubhouse flooding on a regular basis, with up to a foot and a half of water, several times per year
- Developed early warning system and action plans to anticipate and respond to high risk events

	Phase 1 (0-10 years)	Phase 2 (10+ years)
Operations	• **Flooding was a fact of life – focus was on preparation, response, resiliency** • Early warning system with weather forecasting service 2-3 days before storms & hurricanes • Can mobilize & evacuate clubhouse in 3 hours with 2-3 staff • Moving company on retainer, chairs on tables, wet vac afterwards, recovery in 1-2 days	• Weather & moving services still on retainer • No flooding since
Capital	• Clubhouse fortification – raised the electrical & HVAC 30 years ago • Kitchen appliances/ equipment on casters with mechanicals on top • Trophies, valuables up high, carpet w no padding • 10-year planning process for raising the building	• Steel frame design is extendable in future with lower cost & complexity • $8.5M project -- $3.5M lift, $5M remodel • Funding: $3.5M from savings, $3.5M assessment, $1.5M debt (paid off in 2-3 yrs) • 9-month build – fall 2018 to spring 2019, on time, on budget

High Water Playbook: Early warning system with pre-defined levels of risk and response…

Operational Readiness Levels

ORL / Description	Assets at Risk	Stillwater Level (ft MLLW)	Total Water Level (ft MLLW)
ORL 1 - Storm Watch	Wind Driven (vs Flood Driven)	6.75	8.20
ORL 2 - Flood Advisory	Harbor (Gangways, Pilings)	6.75	8.20
ORL 3 - Flood Watch	Breakwater	9.20	**9.20**
ORL 4 - Flood Warning	Clubhouse	**9.50**	10.20

Action Implications (Committees & Staff)

- **Executive**
- **Harbor**
- **Facilities**
- **House**
- **Historical**

High Water Playbook: Anticipate high risk periods & align with Committee/Staff actions…

SFYC High Water Resilience Playbook — High Risk Event Calendar

FORECAST SCENARIO: HIGH — regional residual and local wave runup; EL NIÑO: HIGH.

Dynamic 4 month calendar. Color reflects the highest ORL assigned to any forecast high-tide event on that calendar day.

November 2026

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

December 2026

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

January 2027

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

February 2027

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

Operational Readiness Level Legend

- **ORL 1 - Storm Watch > Wind Driven Risk**
- **ORL 2 - Flood Advisory > Harbor Risk**
- **ORL 3 - Flood Watch > Breakwater Risk**
- **ORL 4 - Flood Warning > Clubhouse Risk**

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Board Adopted Sea Level Strategy: **Anticipate. Act. Adapt.**

- Because of the uncertainty around the water levels to be faced by SFYC – from this winter to 50 or 100 years from now – **we advocate a strategy of "Anticipate. Act. Adapt."**

- The objective is not to make a single large bet today on precisely how high or how quickly the Bay will rise. Instead, SFYC should **take relatively low-cost actions now** that materially improve our preparedness and resilience, **advance capital projects** that we know will be necessary, **develop better information** about our specific exposure, and **preserve the flexibility** to accelerate larger investments as conditions warrant.

- There are **actions available today that are comparatively inexpensive, and valuable** under any future sea-level scenario: better insurance, better forecasting & measuring, better operating procedures, improvements to vulnerable gangways and pilings, and more complete engineering and capital planning.

- There are also **larger investments that should be staged deliberately**. Raising the breakwater earlier appears increasingly attractive. Fortifying the Clubhouse can buy additional resilience. Raising or rebuilding the Clubhouse remains a potential long-term solution, but one for which extensive planning is required.

- **This approach gives SFYC meaningful protection now** without requiring the Club to prematurely commit to its most expensive and complex long-term solution.

Board Adopted Sea Level Strategy: Board Decisions

	Near-Term (~0-3 yrs)	Mid-Term (~3-7 yrs)	Long-Term (~7-10 yrs)
Operations:	1. **Insurance**: Increase flood insurance by $1-2M 2. **Operations**: Adopt High-Water Resilience Playbook and operating protocols 3. **Forecasting**: Hire professional weather forecasting service 4. **Monitoring**: Develop local monitoring capabilities	• **Improvement**: Continue to run Playbook and improve accuracy with local data gathering	• **Improvement**: Continue to run Playbook and improve accuracy with local data gathering
Capital:	5. **Harbor**: Execute capital projects on gangways and pilings 6. **Breakwater**: Execute breakwater extension project in 2028 or 2029, rather than 2031. Final design should be verified by an independent engineer. 7. **Clubhouse Fortification**: Develop Clubhouse fortification options 8. **Clubhouse Raise/Replace**: Explore Clubhouse raise/replace options 9. **Funding**: Continue accruing unspent Clubhouse capital toward future projects.	• **Clubhouse Fortification**: Execute Clubhouse fortification projects • **Clubhouse Raise/Replace**: Complete planning for Clubhouse raise/replace	• **Clubhouse Raise/Replace:** Raise/replace Clubhouse if/when needed
	10. **Governance**: Review the strategy, action plans, playbook assumptions, high-water events, sea-level projections, capital plans and timing with Board at least annually.		

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Operating Committee Chairs



S/C Bill Melbostad
Harbor Committee Chair



Director Rich Pearce
Facilities Committee Chair



Mat Lundberg
House Committee Chair

Sea Level Planning – Harbor Committee

	Near Term	Medium/Long Term
Operations:	• Operational Readiness by November • Work with professional forecasting service • Local water/weather monitoring & logging	• Learning & adapting as conditions change
Capital:	• Piling survey & extensions • Gangway redesign or replacement	• Ongoing piling extensions & replacements • Breakwater extension

Sea Level Planning – Facilities Committee

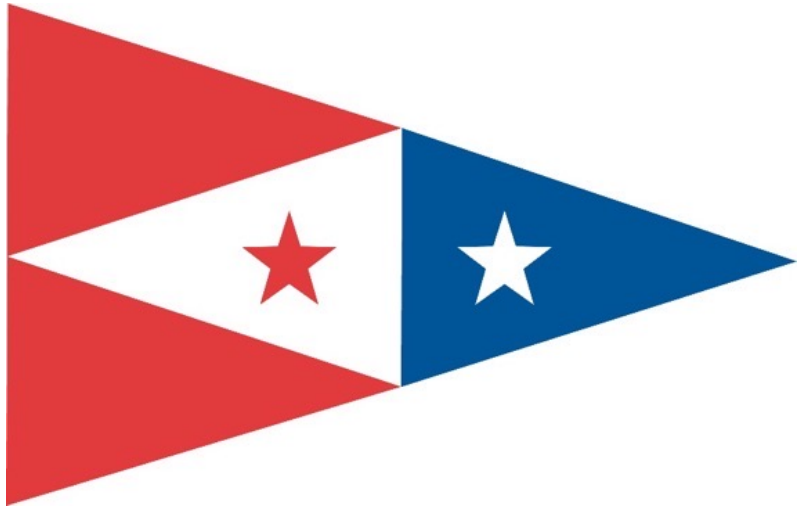
	Near Term	Medium/Long Term
Operations:	• Insurance coverage assessment • Committee Collaboration • Inspections/Preventive Maintenance • Mitigation / Restoration planning	• Barrier devices • Monitoring, Learning & Adapting
Capital:	• Barrier devices • Temporary labor / restoration agreements	• Clubhouse alternatives • Raising, razing, relocation

Sea Level Planning – House Committee

	Near Term	Medium/Long Term
Operations:	• Increase data backup frequency as event approaches • Relocate and secure outdoor furniture away from glass • Relocate items located on floor to shelves, countertops, or Cove House • Relocate dining room chairs to tabletops • Relocate bar furniture to Cove House • Relocate F&B stock and equipment from floor to shelves and countertops	• Continue to improve Playbook • Develop fortification plan to further improve resiliency should the building flood • Establish contract with remediation company i.e. Servpro
Capital:	• Shelving/Risers/Casters • Straps/Covers/Brackets	• Pumps/Generators/Battery Backup • Fortification Capital i.e. moving utilities away from floor or replacing flooring with more water resilient materials

Sea Level Planning – Executive Committee

	Near Term	Medium/Long Term
Operations:	• Adopt High-Water Resilience Playbook and operating protocols • Hire professional weather forecasting service • Develop local monitoring capabilities • Develop distribution list for persons responsible to execute action plans • Develop distribution list for key resources • Review and rehearse at least annually	• Continue to run Playbook and improve accuracy with local data gathering
Capital:	• Continue to accrue capital while developing plans	• Fortify/Raise/Replace Clubhouse if/when needed



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