

Proposed Low- Inflow Criteria for Galveston Bay

**Presentation to Trinity/San Jacinto/Galveston
Bay Basin & Bay Area Stakeholder Committee**

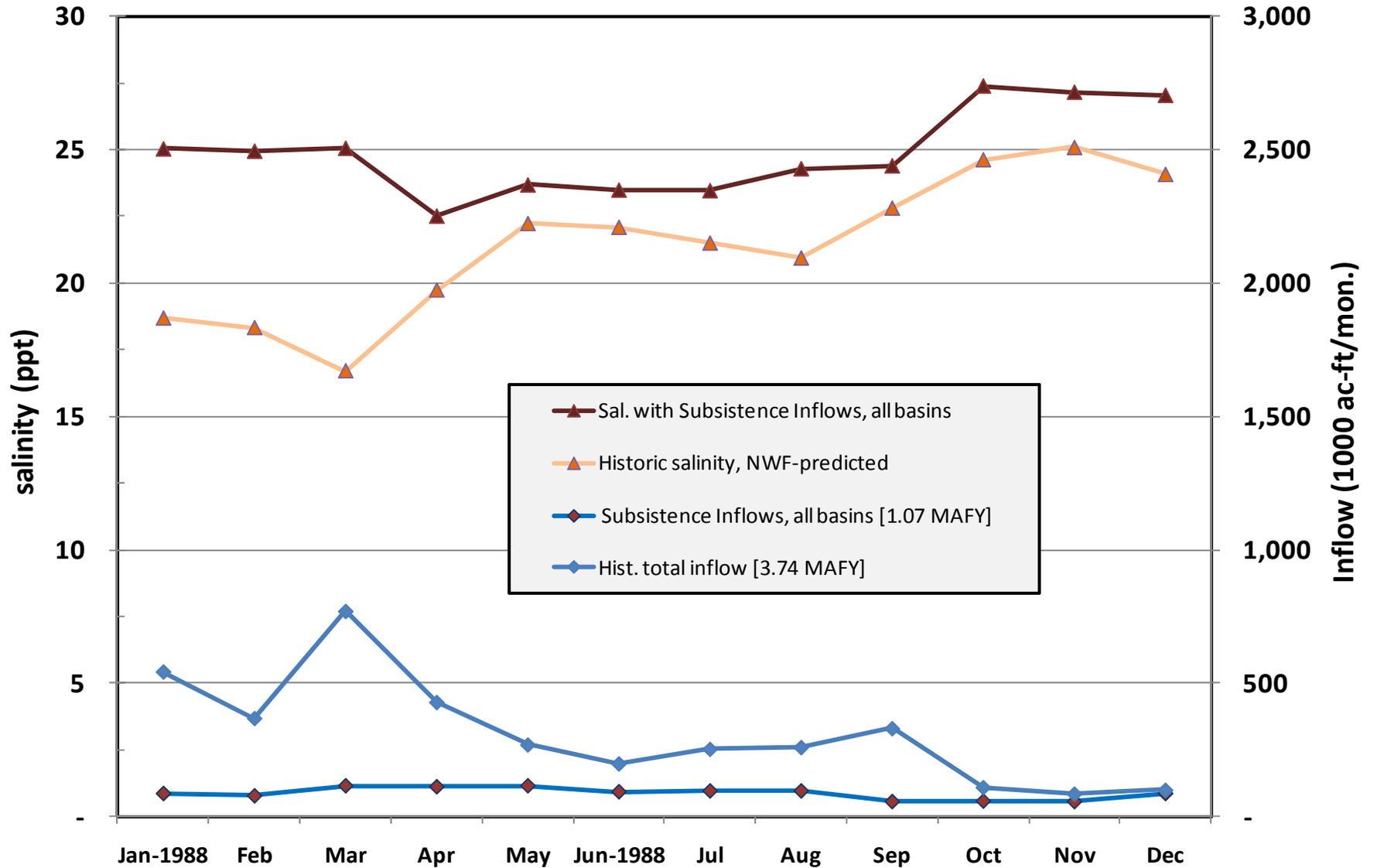
Norman Johns
National Wildlife Federation
April 15, 2010



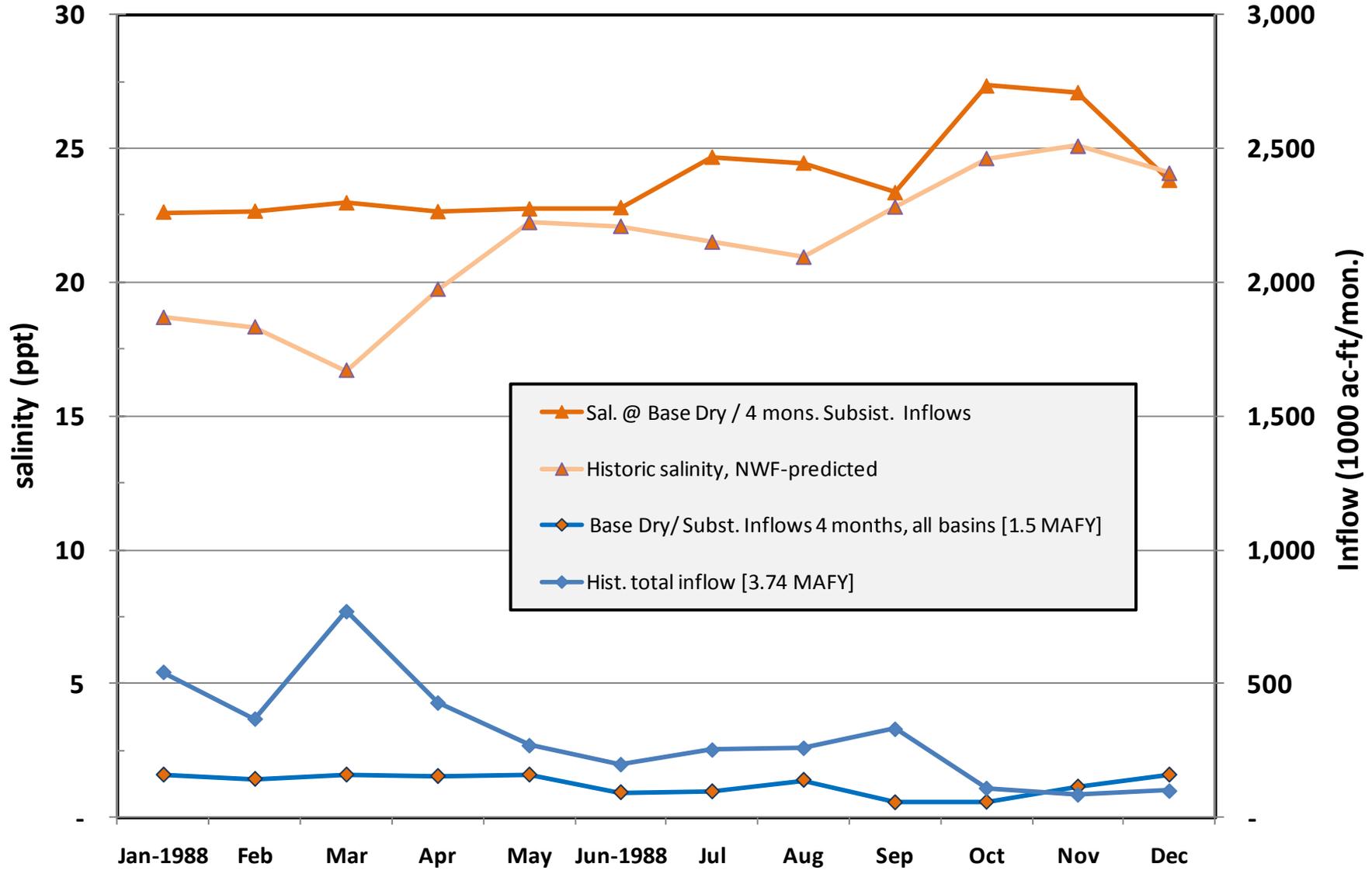
Example HEFR-Derived Inflow matrix: whole Trinity drainage

Overbank Flows	Q: 66,150 cfs with Frequency 1 per 2 years Volume is 2,399,592 Duration is 34											
	Q: 35,290 cfs with Frequency 2 per year Volume is 935,130 Duration is 19											
High Flow Pulses	Q: 24,400 cfs with Frequency 1 per season Volume is 564,924 Duration is 14			Q: 24,810 cfs with Frequency 1 per season Volume is 745,299 Duration is 17			Q: 9,593 cfs with Frequency 1 per season Volume is 144,730 Duration is 6			Q: 17,940 cfs with Frequency 1 per season Volume is 227,898 Duration is 7		
	Q: 12,660 cfs with Frequency 2 per season Volume is 205,319 Duration is 7			Q: 9,180 cfs with Frequency 2 per season Volume is 87,869 Duration is 6			Q: 3,892 cfs with Frequency 2 per season Volume is 18,794 Duration is 3			Q: 6,935 cfs with Frequency 2 per season Volume is 44,533 Duration is 3		
Base Flows (cfs)	3782(62.9%)			3784(67.1%)			2351(48.1%)			1970(37.6%)		
	2091(73.7%)			2077(78.5%)			1638(64.0%)			1318(49.3%)		
	1370(82.5%)			1457(87.8%)			1166(79.8%)			852(61.0%)		
Subsistence Flows (cfs)	533			993			661			191		
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	Winter			Spring			Summer			Fall		

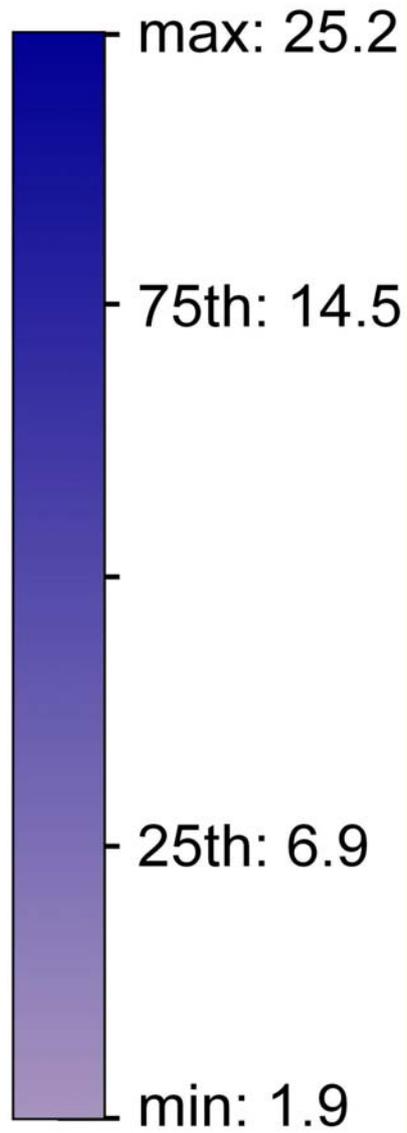
Mid-bay: Inflow and @ Subsistence Inflows, all basins 1988



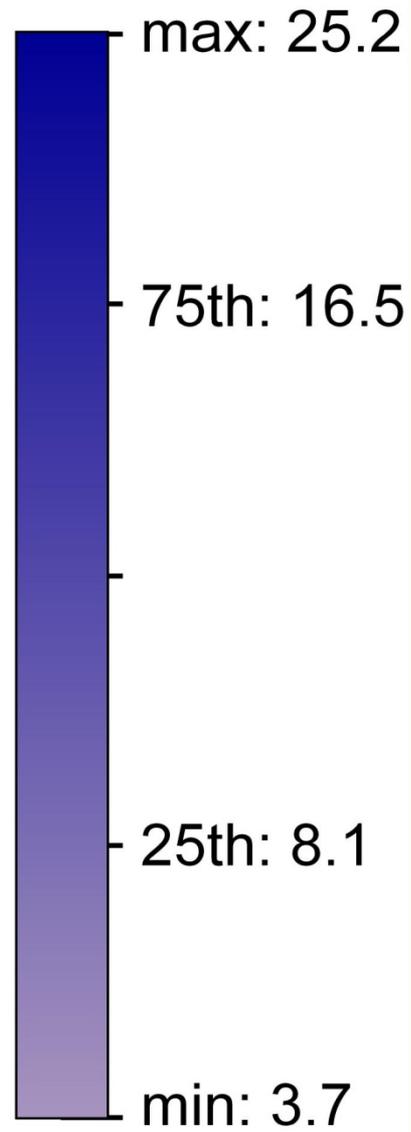
Mid-bay: Inflow and @ Base Dry / Subsistence Inflows, all basins 1988



1941-2005



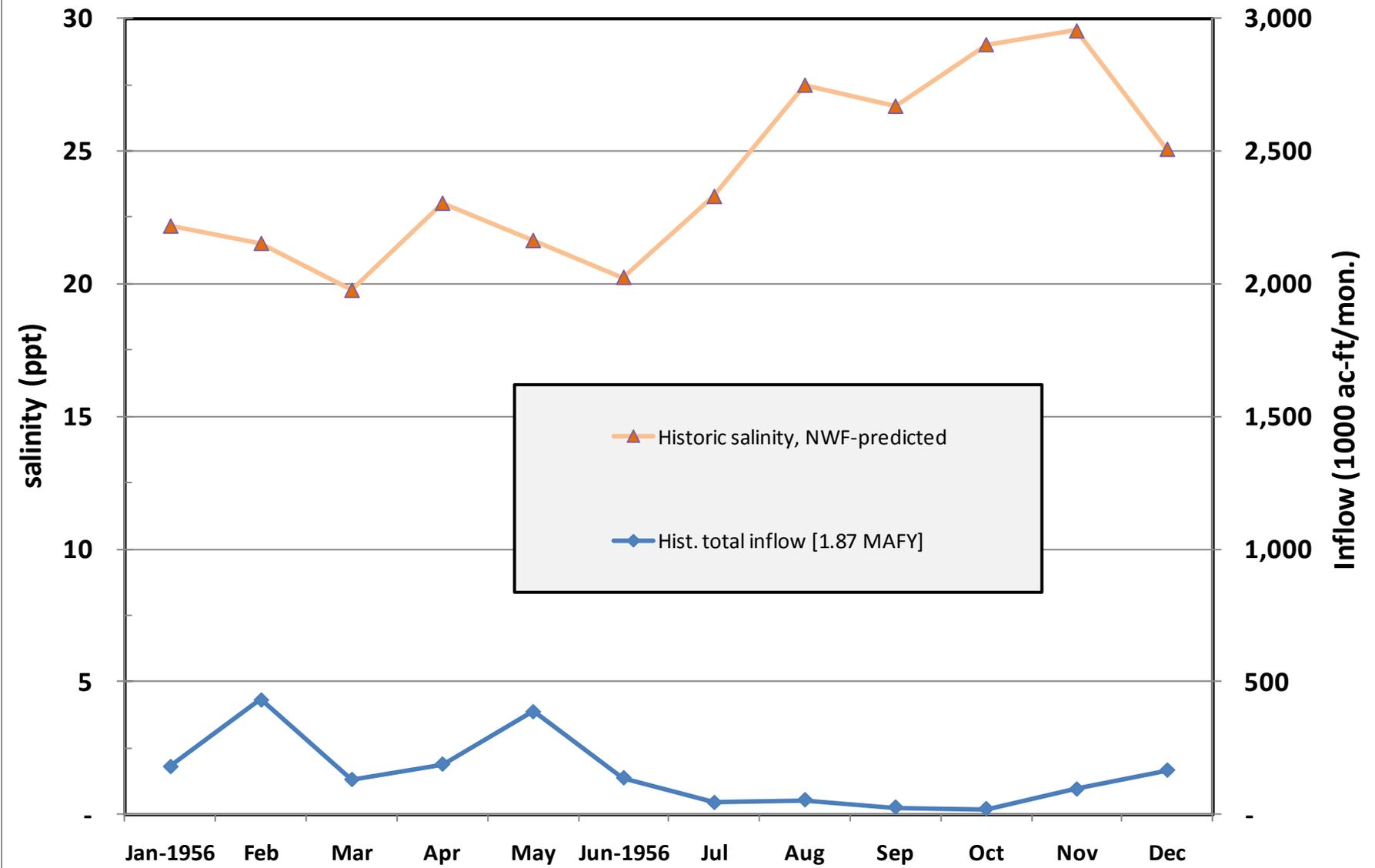
1977-2005



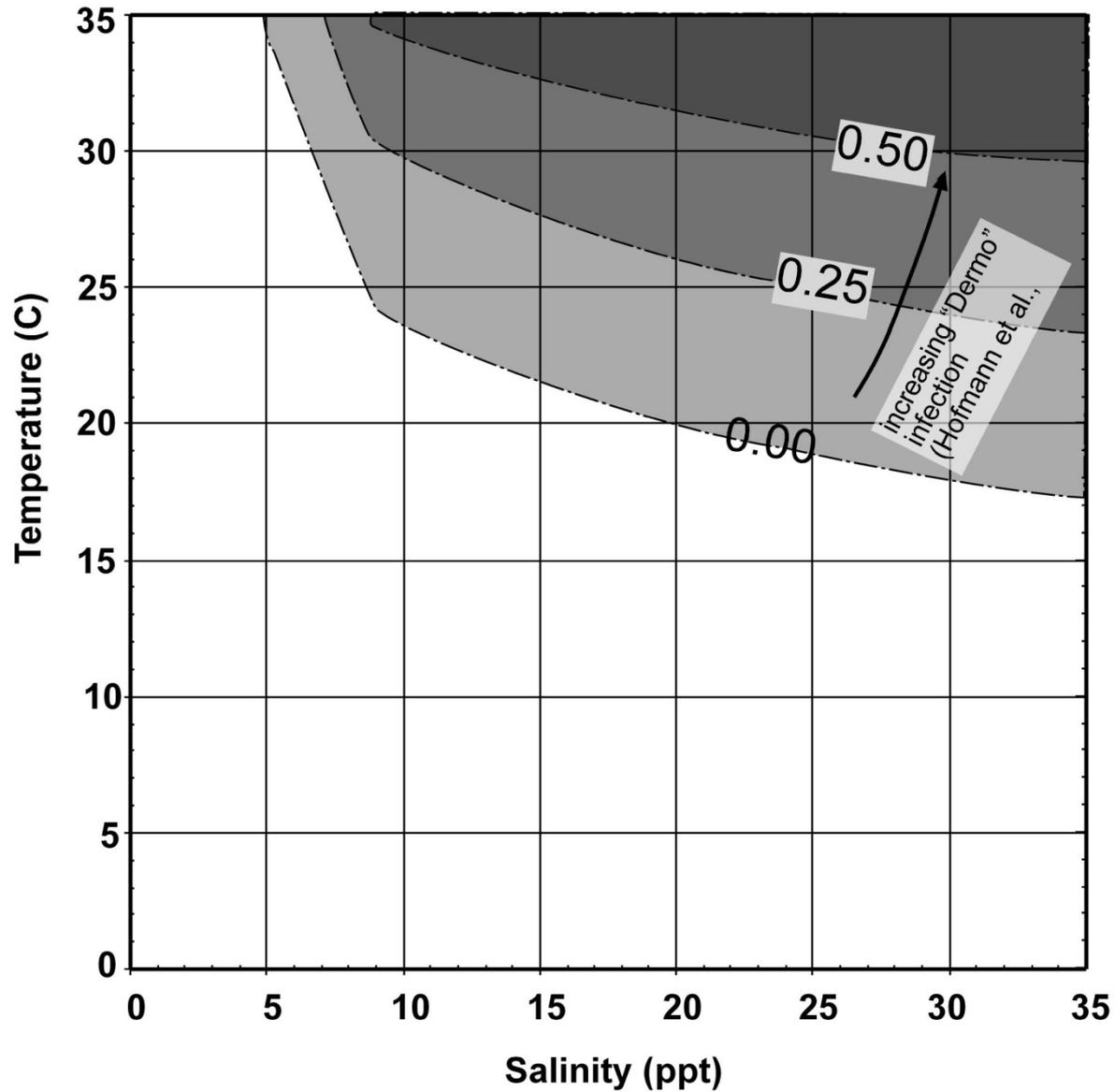
-“During 1956, the worst year of the drought, only about 14% of the average annual freshwater inflows [arrived at] the state's bays and estuaries. “

**-“As a result of the [multi-year] drought, bay oyster (*Crassostrea virginica*) production in Texas practically ceased, white shrimp (*Litopeneus setiferus*) harvest were drastically reduced...”
(Simmons and Breuer 1962 & excerpt from Powell, et al., 2002 *Estuaries*)”**

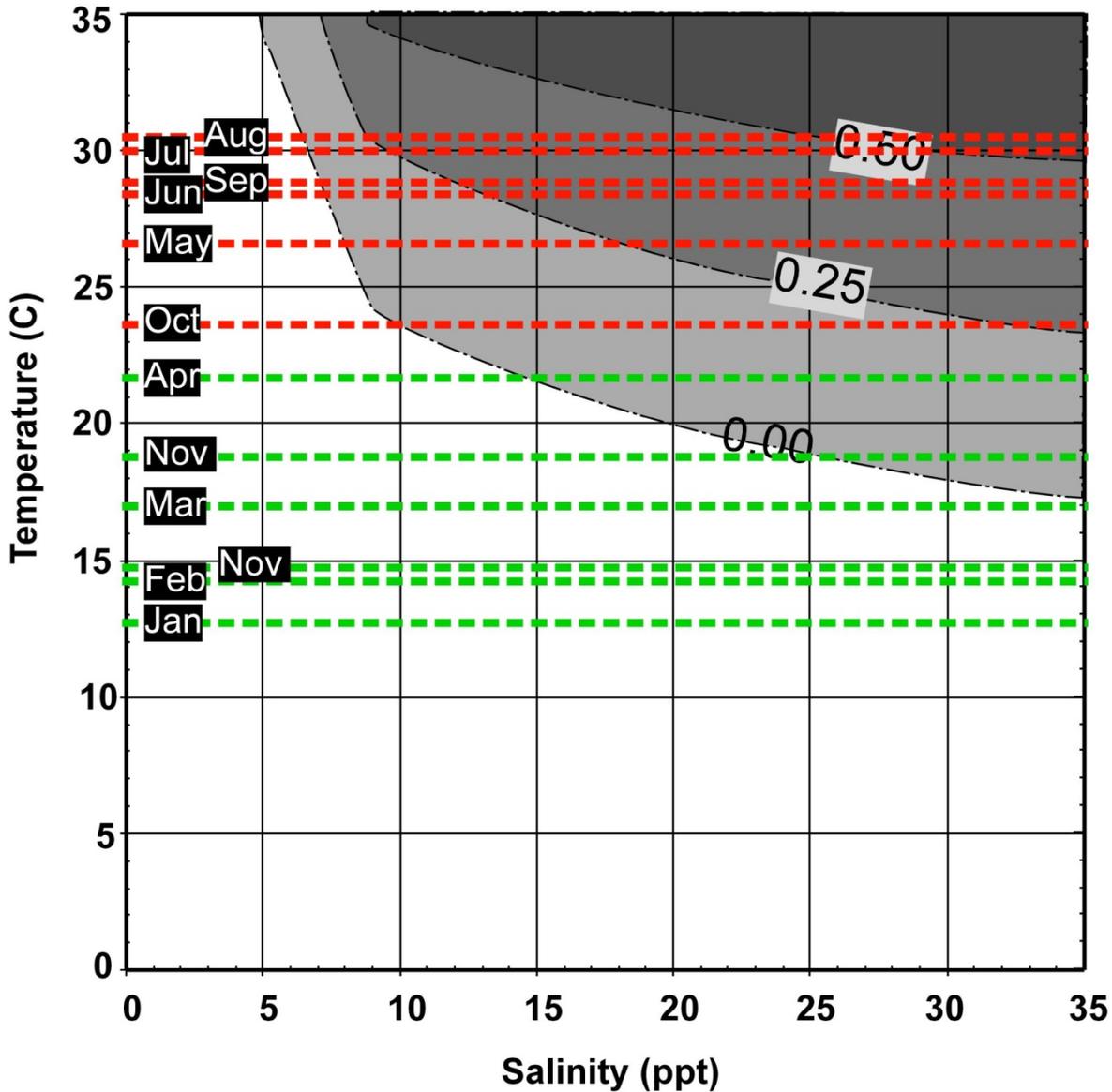
Mid-bay: Historic Salinity@Subsistence Inflows, 1956



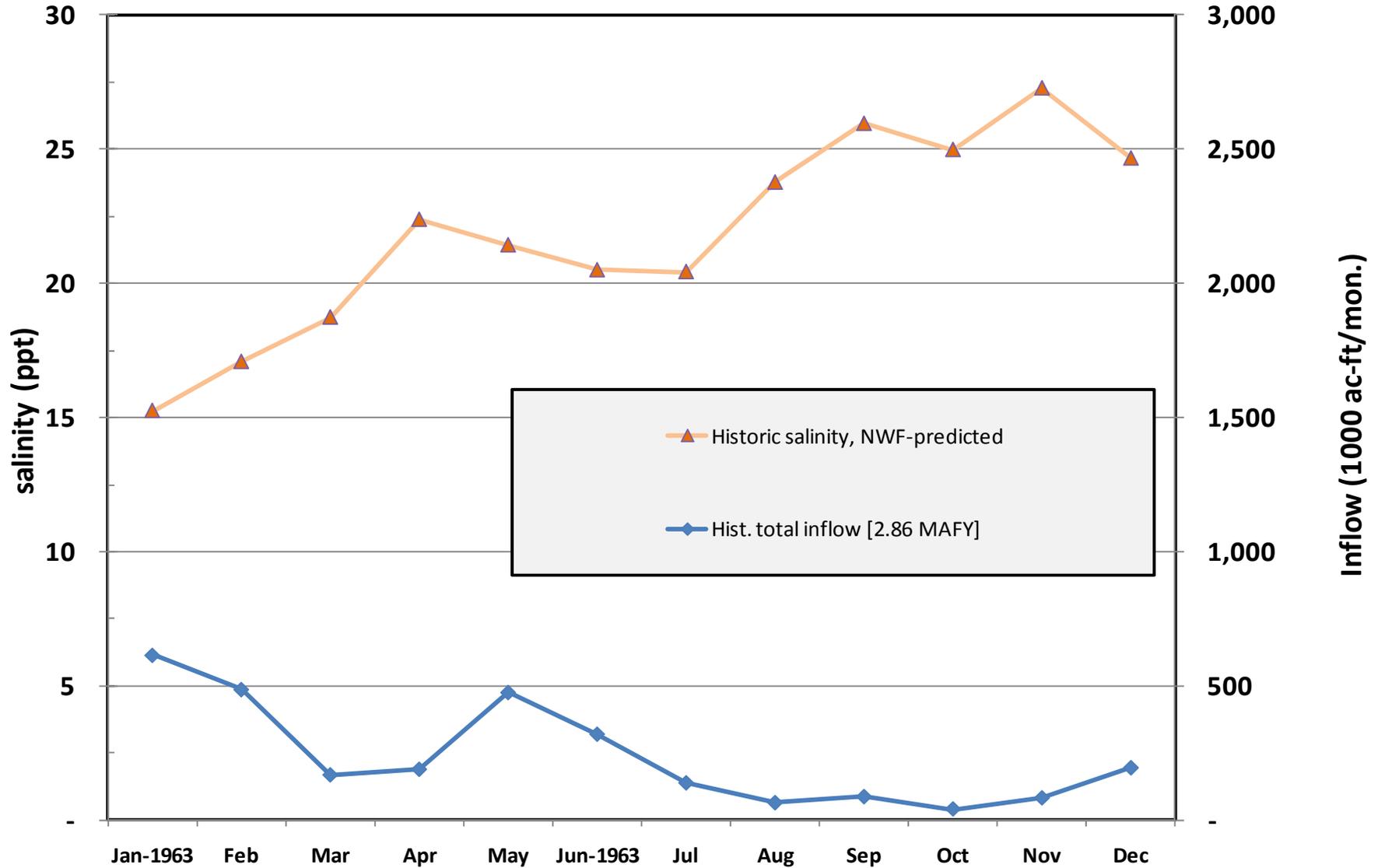
Oyster Parasite *Perkinsus marinus* (aka "Dermo") growth as function of Temperature and Salinity



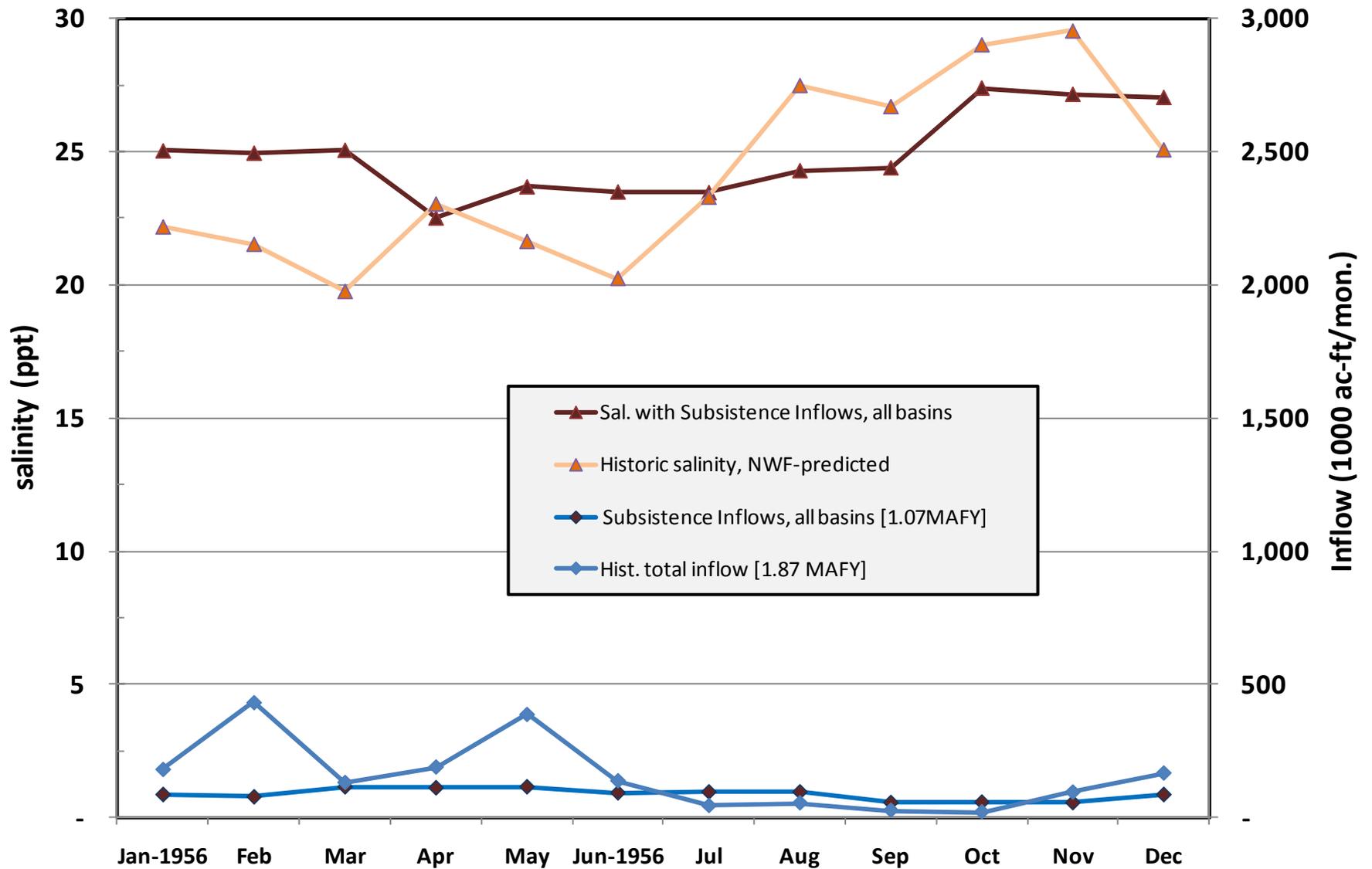
Oyster Parasite *Perkinsus marinus* (aka "Dermo") growth as and Average (1987-2000) Temperature in Galveston Bay.



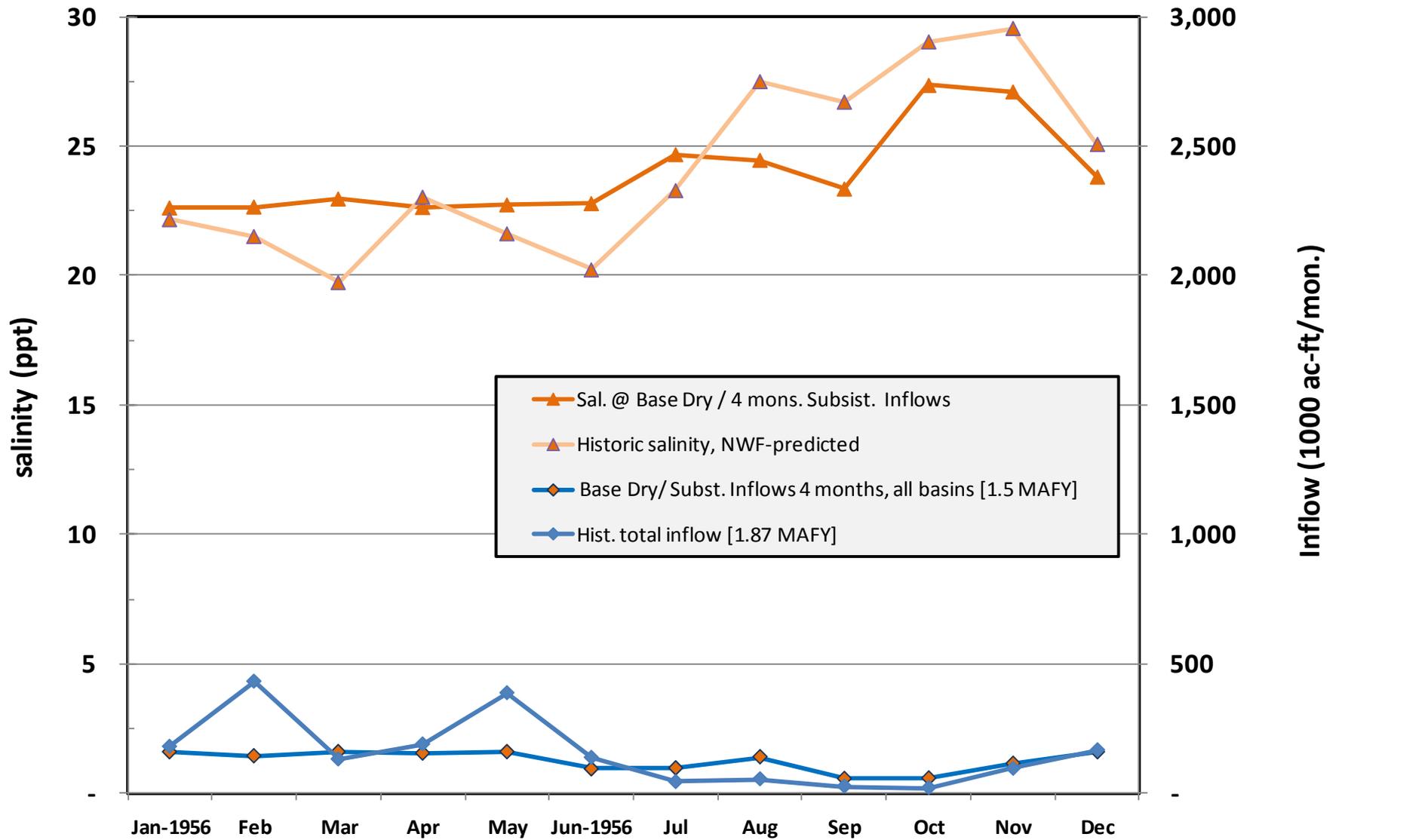
Mid-bay: Historical Salinity@ Drought Inflows 1963



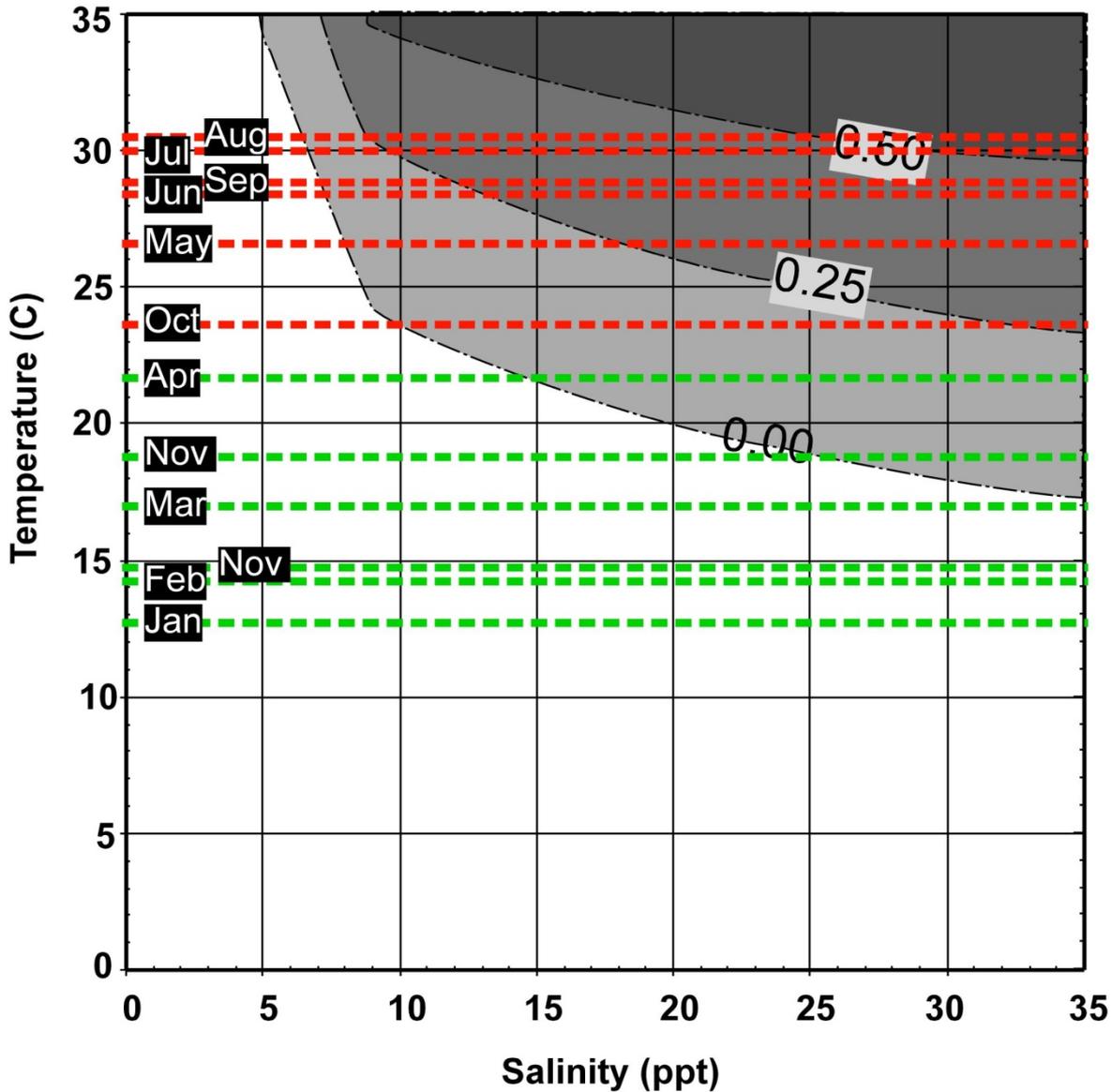
Mid-bay: Salinity@Subsistence Inflows, all basins 1956



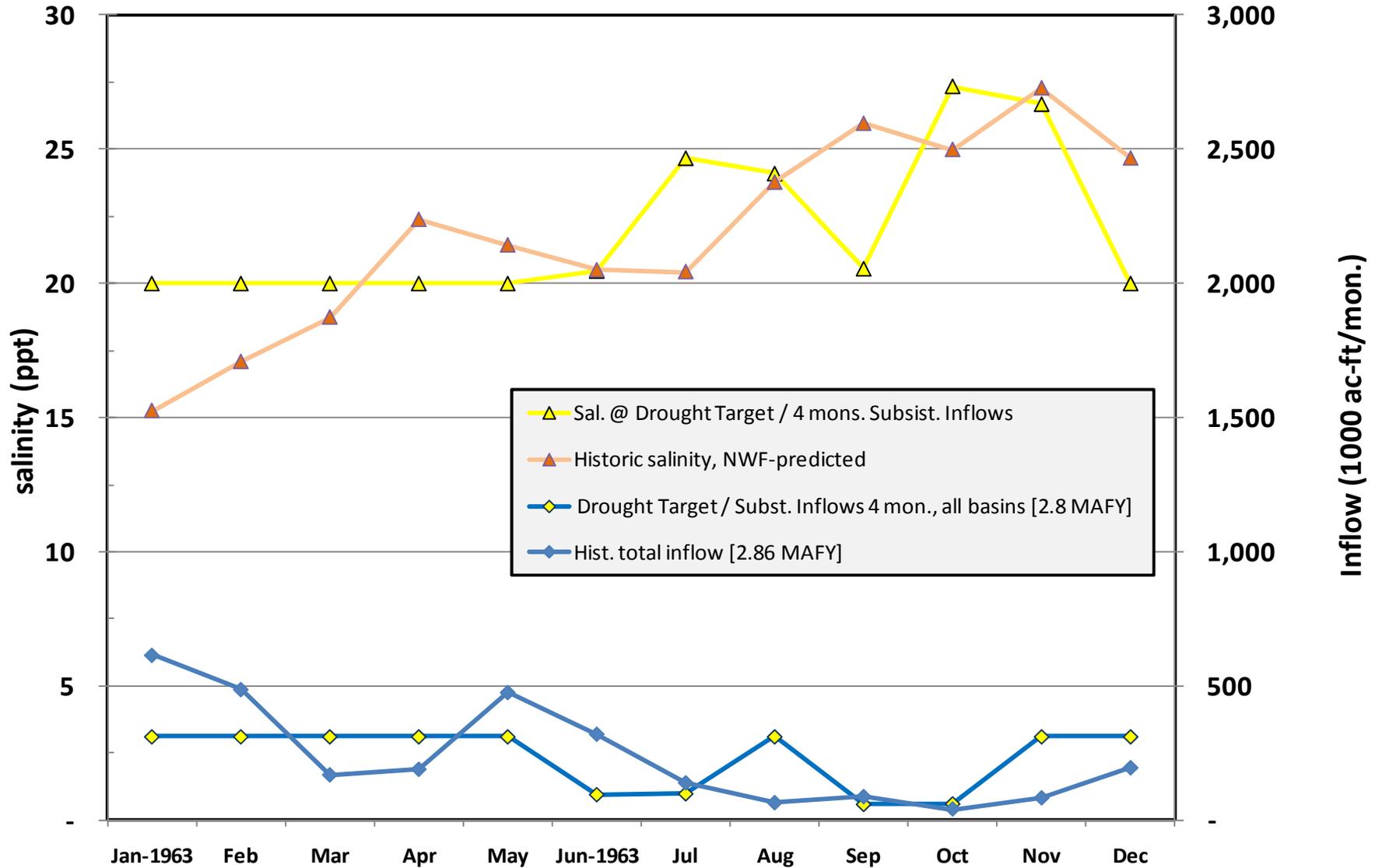
Mid-bay: Salinity@ Base Dry & Subsistence Inflows, all basins 1956



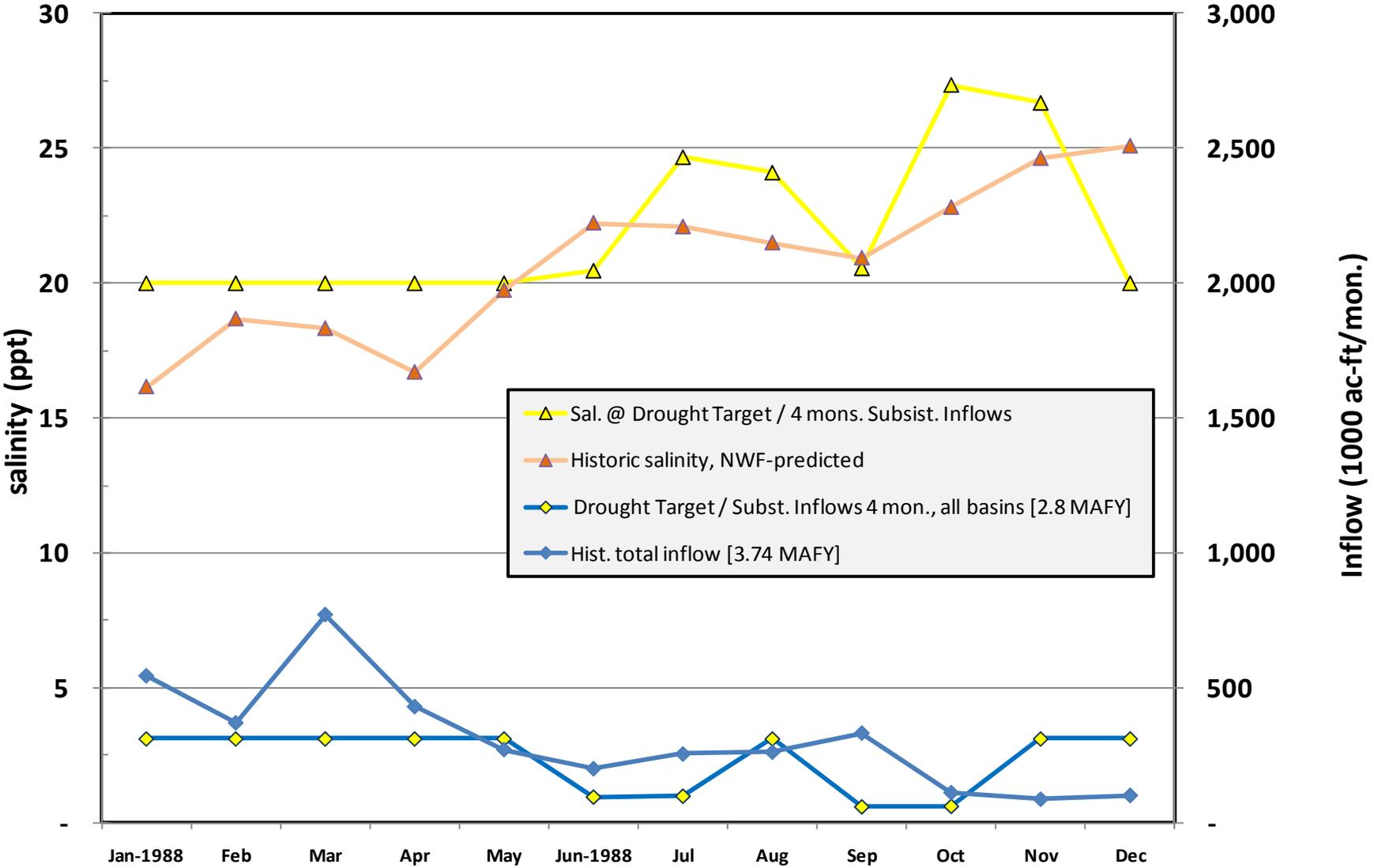
Oyster Parasite *Perkinsus marinus* (aka "Dermo") growth as and Average (1987-2000) Temperature in Galveston Bay.



Mid-bay: Salinity@ Drought Target & 4mons. Subsistence Inflows, all basins 1963



Mid-bay: Salinity@ Drought Target & 4mons. Subsistence Inflows, all basins 1988



Criteria	annual volumes	aim	Applicability
mid-range “Consolidated	5.4 MAFY (~20 th P’tile)	-maintain the habitats and important life requirements of key species indicated by BBEST	more “normal” seasons ~GBFIG / Reg H “Target Frequency”: 50%
Target drought criteria	2.8 MAFY (~5 th Percentile)	-limit harm to oysters to levels similar to recent bad drought years (e.g. 1963, 1988). -limit harm to Vallisneria in Trinity delta.	“normal” droughts ~GBFIG / Reg H “Target Frequency”: 75%
“worst case” drought criteria	1.5 MAFY (<hist. min.)	-strive for oyster survival and recovery through conditions similar to worst of 1950’s (1956).	“extreme” droughts ~1 per 50 years