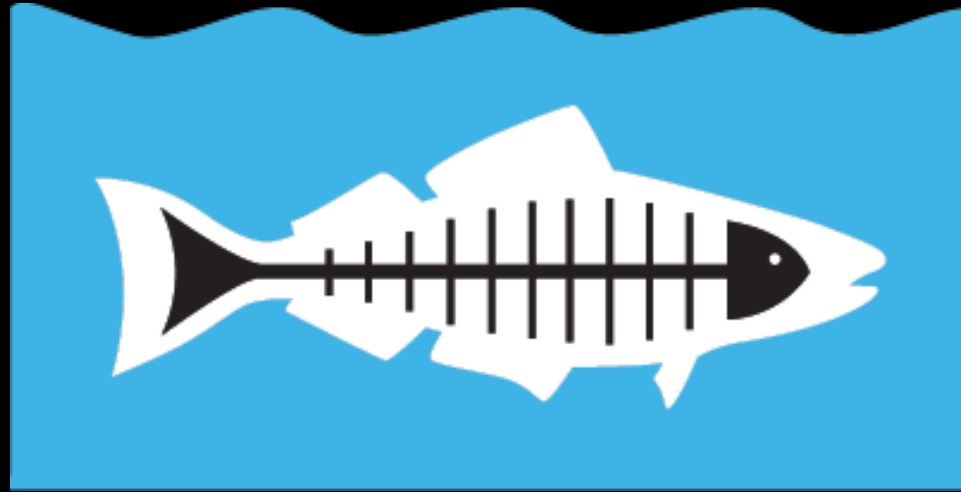


The NowCast System



Predicting Water Quality to Protect
Beachgoer Health

Why Predict Water Quality?



ELSEVIER

Water Research

Volume 59, 1 August 2014, Pages 23-36



Effect of submarine groundwater discharge on bacterial indicators and swimmer health at Avalon Beach, CA, USA

Vincent M. Yau ^a, Kenneth C. Schiff ^b, Benjamin F. Arnold ^c, John F. Griffith ^b, Joshua S. Gruber ^c, Catherine C. Wright ^c, Timothy J. Wade ^d, Susan Burns ^e, Jacqueline M. Hayes ^e, Charles McGee ^f, Mark Gold ^g, Yiping Cao ^b, Alexandria B. Boehm ^h, Stephen B. Weisberg ^b, John M. Colford Jr. ^c ✉



ELSEVIER

Water Research

Volume 46, Issue 7, 1 May 2012, Pages 2176-2186



Using rapid indicators for *Enterococcus* to assess the risk of illness after exposure to urban runoff contaminated marine water

John M. Colford Jr. ^a ✉, Kenneth C. Schiff ^b, John F. Griffith ^b, Vince Yau ^{a, 1}, Benjamin F. Arnold ^a, Catherine C. Wright ^a, Joshua S. Gruber ^a, Timothy J. Wade ^c, Susan Burns ^d, Jacqueline Hayes ^d, Charles McGee ^e, Mark Gold ^f, Yiping Cao ^b, Rachel T. Noble ^g, Richard Haugland ^h, Stephen B. Weisberg ^b

The Surfer Health Study

A Three-Year Study Examining Illness Rates Associated with Surfing During Wet Weather



Southern California Coastal Water Research Project

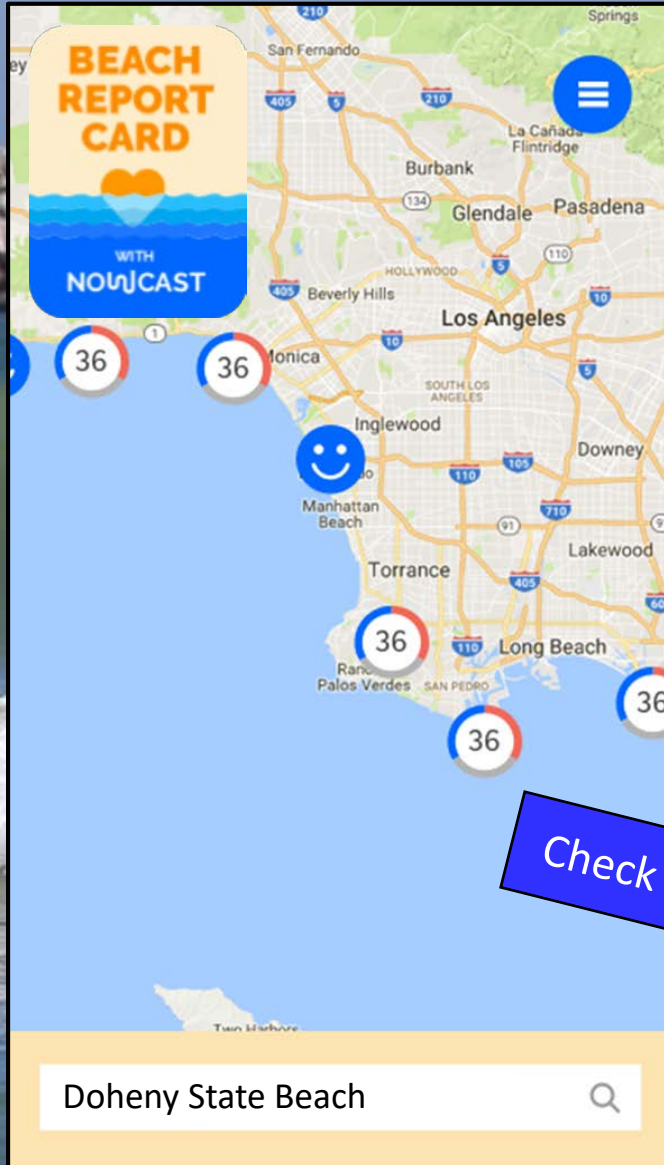
SCCWRP Technical Report 943



Soller Environmental, LLC



NowCast: Predicting Water Quality at California Beaches

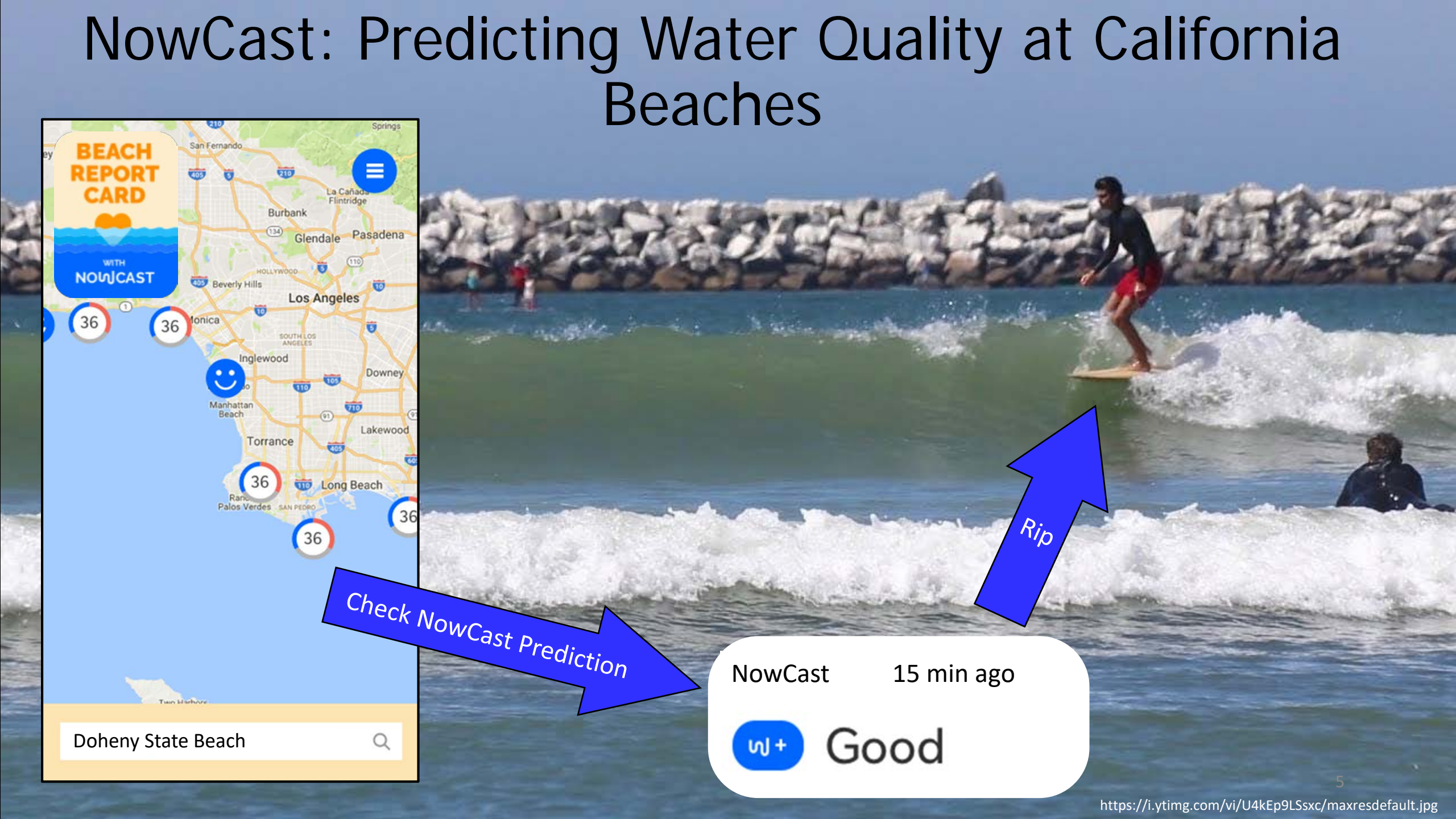


Check NowCast Prediction

Rip

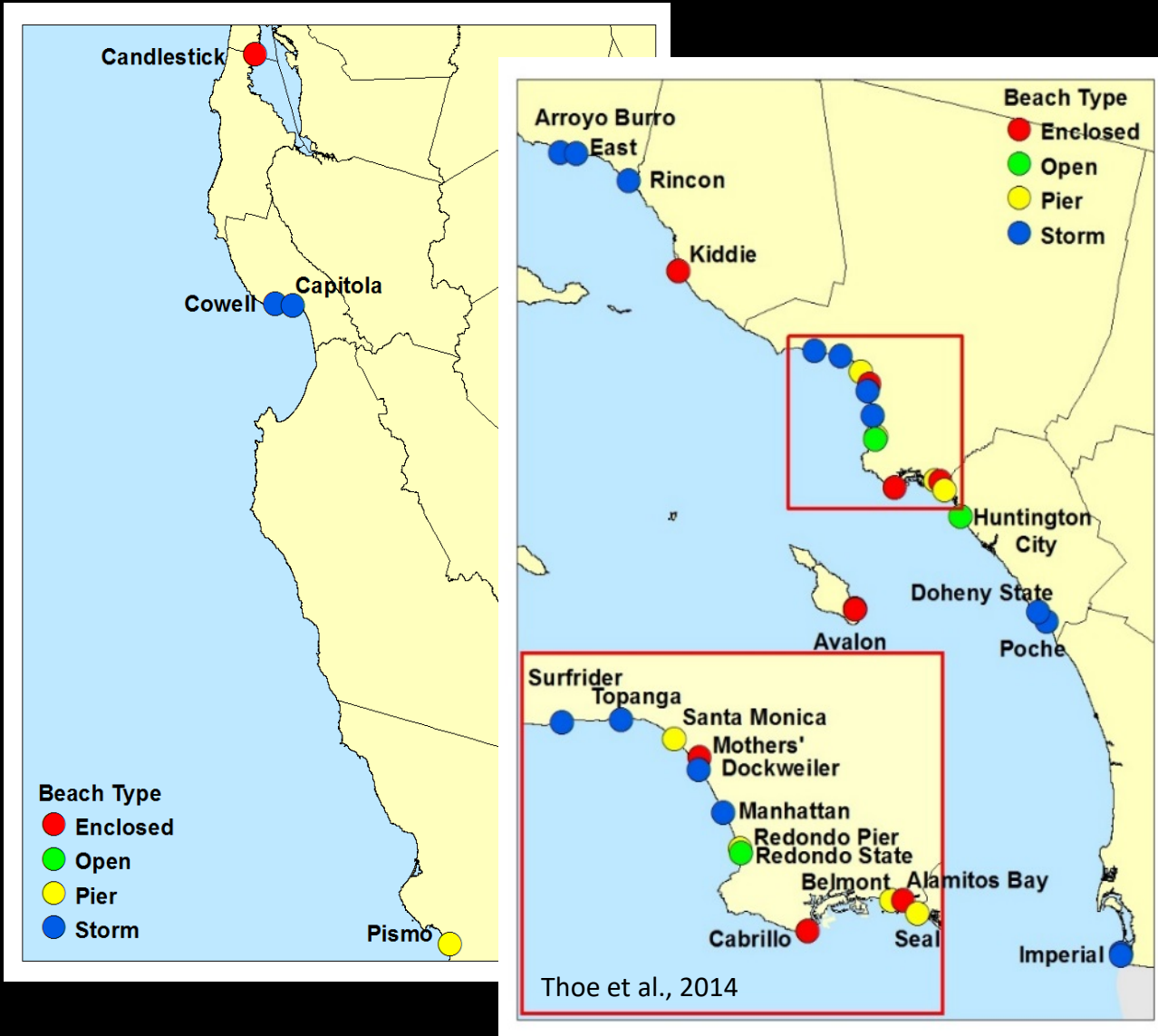
NowCast 15 min ago

 Good

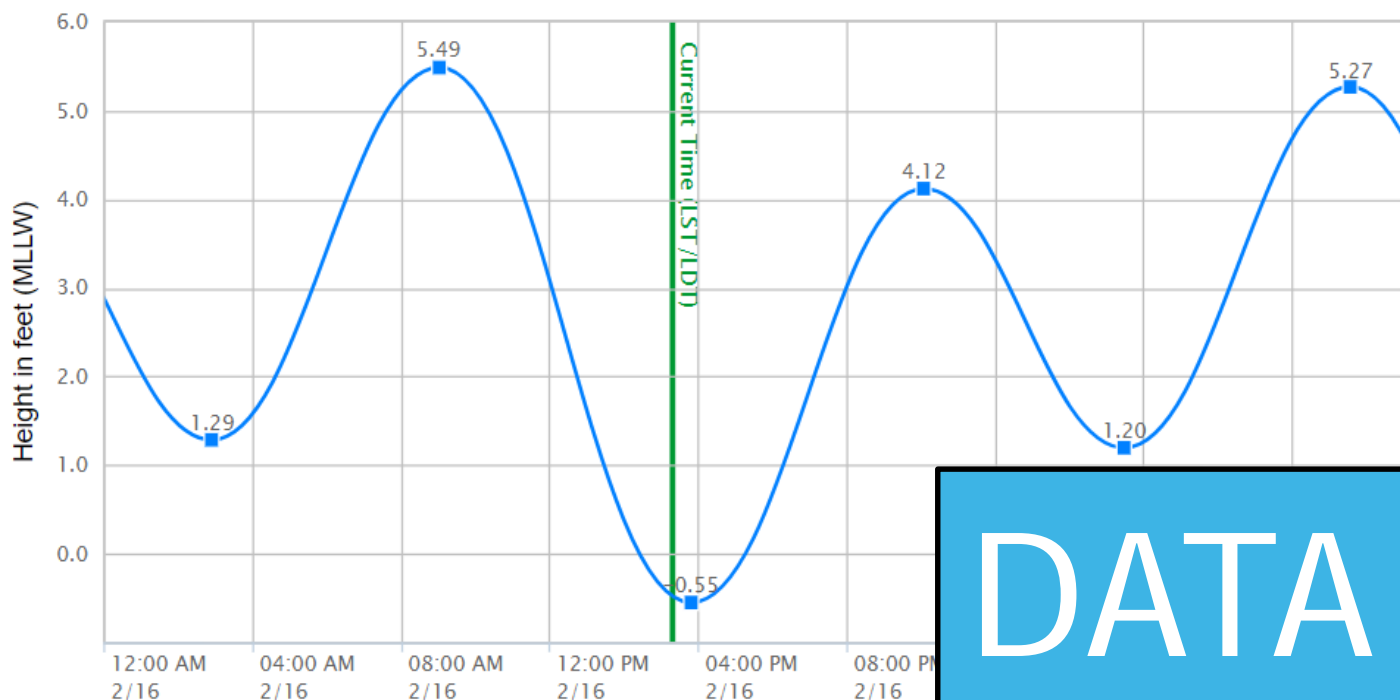


Creating NowCast Models

Initial Research

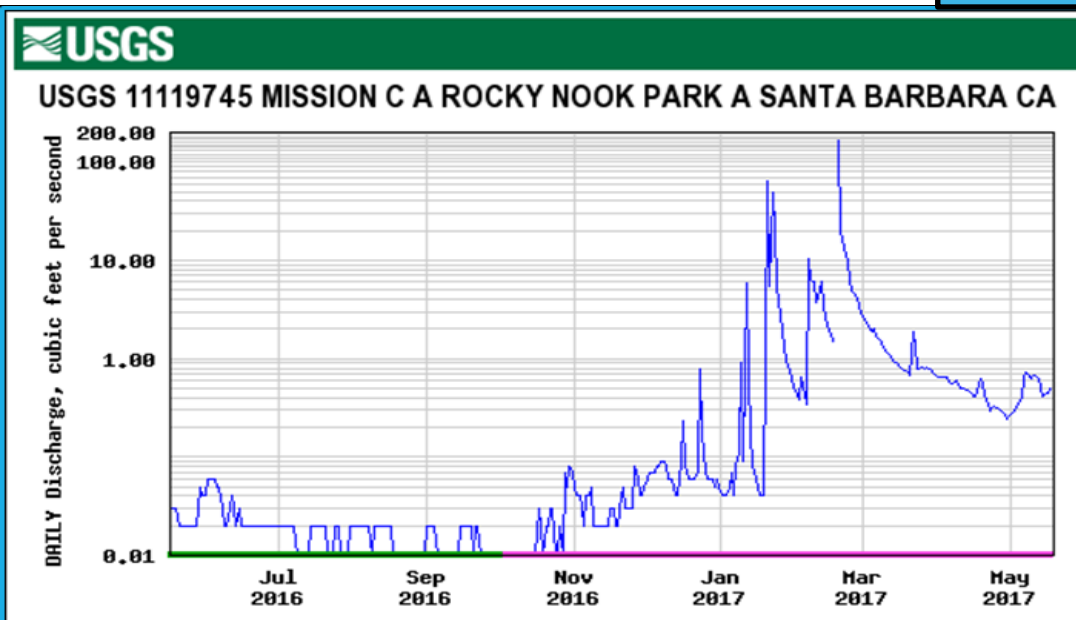


NOAA/NOS/CO-OPS
Tide Predictions at 9410230, La Jolla CA
From 2018/02/16 12:00 AM LST/LDT to 2018/02/17 11:59 PM LST/LDT



HYPERION SHORELINE BACTERIA SAMPLES

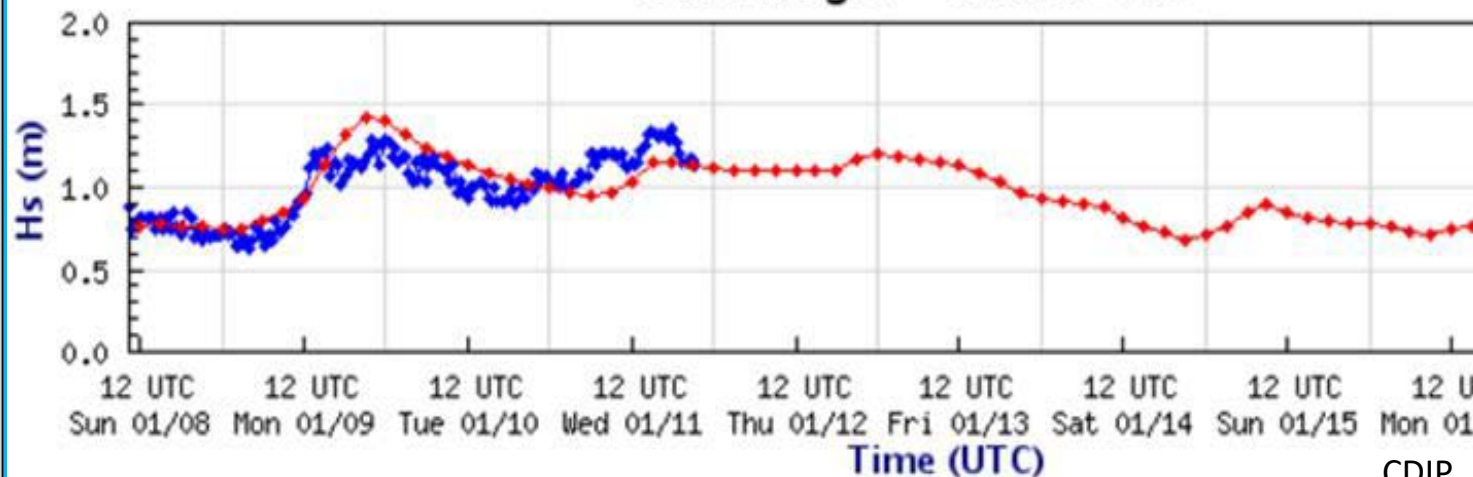
Hyperion Shoreline - S1 (SMB TMDL: SMB-MC-2) Malibu Crk, Malibu Lagoon County Bch Pt. Zero	Tot >	13,000	a
	Ec	280	X
	Ent	10	
Hyperion Shoreline - S2 (SMB TMDL: SMB-1-18) Topanga Cyn, Topanga County Bch Pt. Zero	Tot	1,000	b X
	Ec	430	
	Ent	87	
Hyperion Shoreline - S3 (SMB TMDL: SMB-2-04) Pulga Cyn SD, Will Rogers SB Pt. Zero	Tot		
	Ec		
	Ent		
Hyperion Shoreline - S4 (SMB TMDL: SMB-2-07) Santa Monica Cyn SD, Santa Monica SB Pt. Zero	Tot <	67	
	Ec <	67	
	Ent <	10	
Hyperion Shoreline S5 - (SMB TMDL: SMB-3-03) Santa Monica Pier SD, Santa Monica SB Pt. Zero	Tot	1,500	a
	Ec	1,100	b X
	Ent	53	
Hyperion Shoreline - S6 (SMB TMDL: SMB-3-04) Pico-Kenter SD, Santa Monica SB Pt. Zero	Tot >	13,000	a
	Ec	3,900	b X
	Ent >	2,000	c



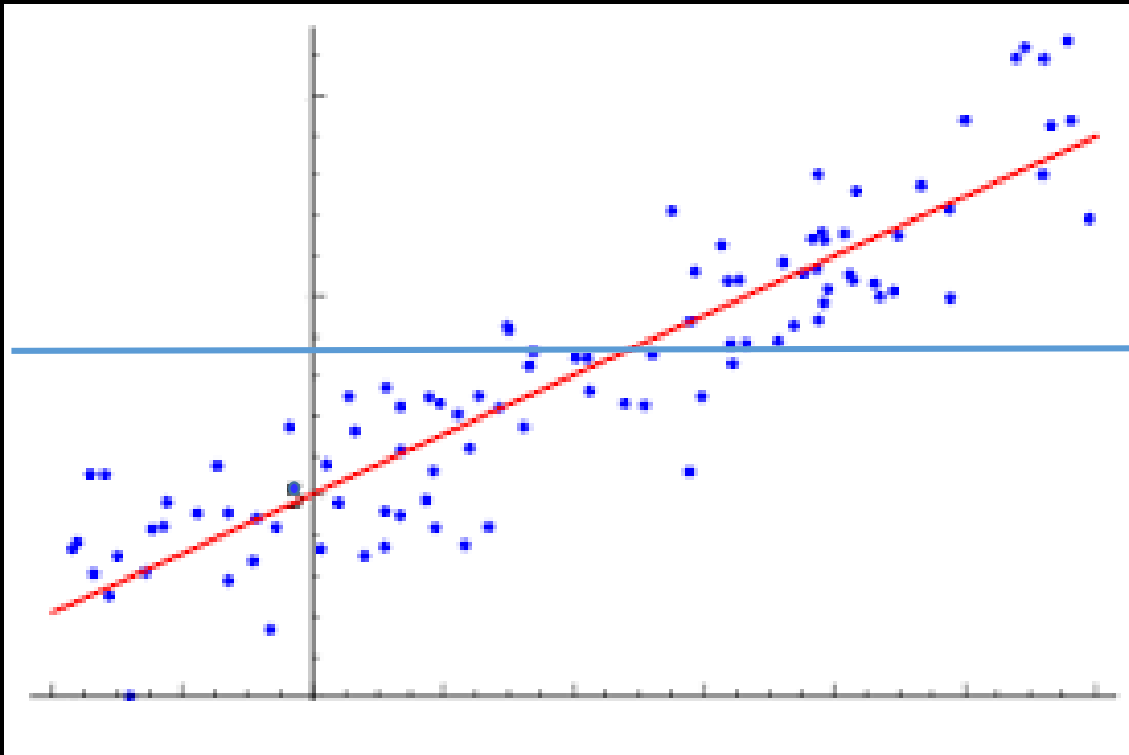
Santa Monica Bay, CA Conditions + Forecast

Observations: C
Forecast: NOAA

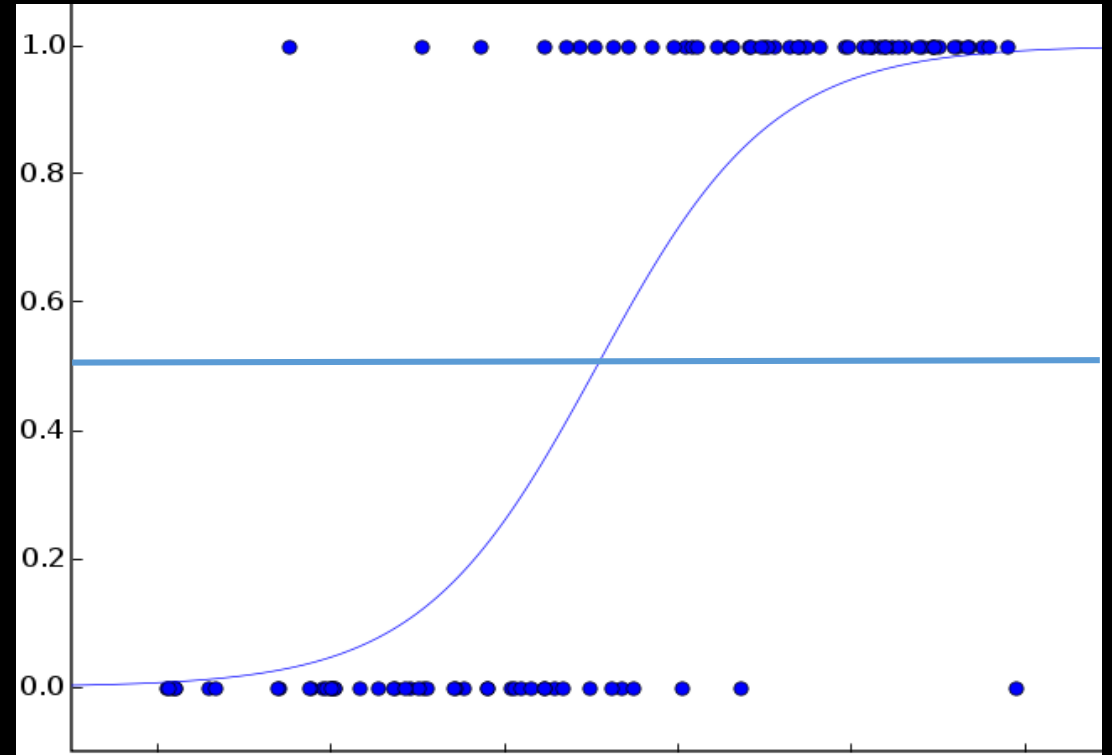
Wave height - Station 028



Modeling Methods

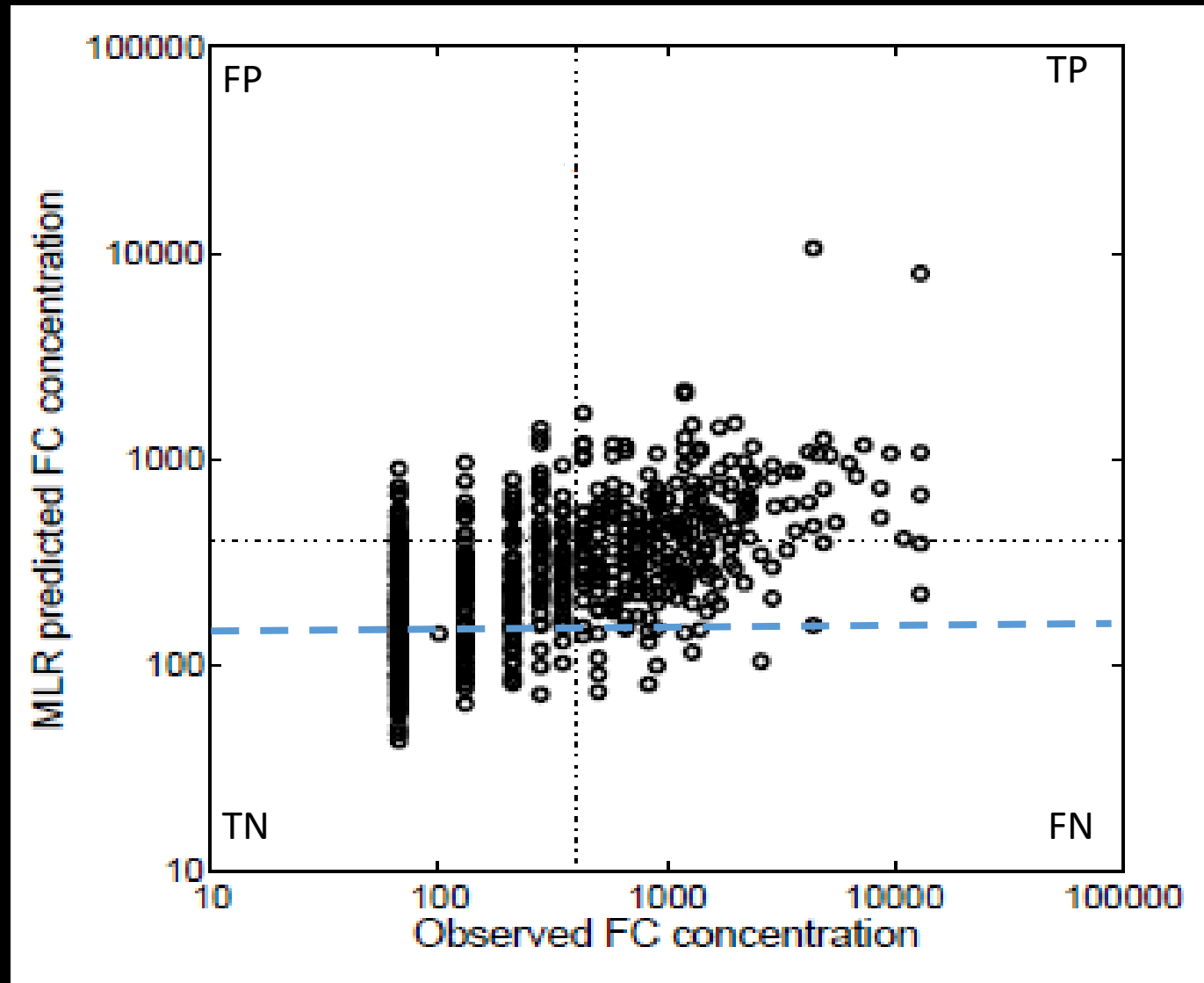


Multiple Linear Regression (MLR)

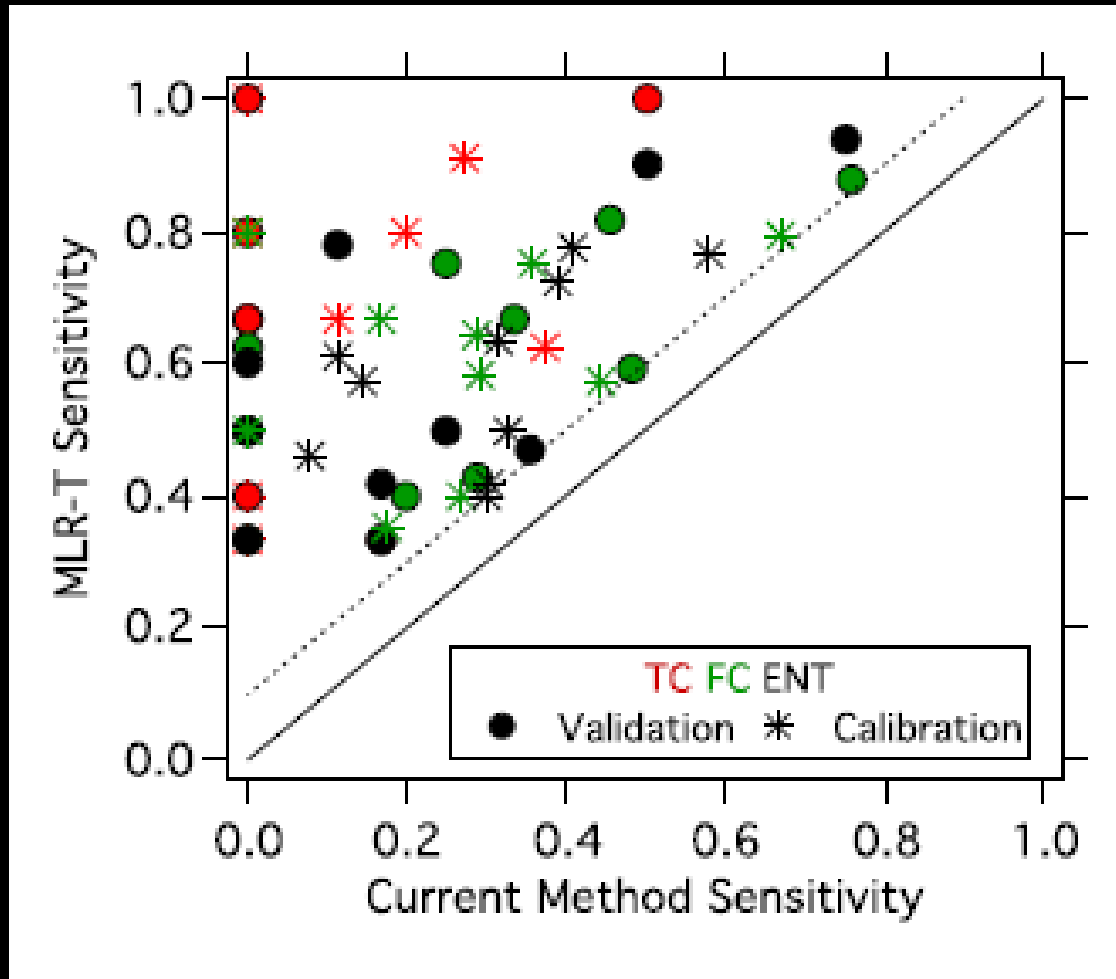


Binary Logistic Regression (BLR)

Model Tuning



Performance Criteria



- Specificity:
 - At least 85%*
- Sensitivity:
 - At least 30%
 - At least 10% > Current Method

Models must achieve this in both the calibration dataset and a separate validation dataset

Making Predictions

A surfer in a black wetsuit is captured mid-air, performing a high takeoff on a wave. The surfer is positioned in the center of the frame, with their body arched and arms outstretched. A large, dynamic splash of white water is erupting behind the surfer, creating a dramatic backdrop. The wave is a deep green color, and the surrounding ocean is a vibrant blue. The sky is a clear, light blue. The overall scene is one of intense action and skill.

NowCast for Manhattan (28th St) (Date: 02/16/2018)

Collecting environmental data:

Grabbing wave parameters at CDIP buoy 028 for a sample time

Wave variables obtained

Tide variables obtained

Weather variables obtained

Checking rain advisory status:

Manhattan (28th St) is not under a rain advisory

Environmental data collected and saved to Manhattan_(28th_St)

Running FC model (Manhattan (28th St)):

Variable	Coefficient	Value
rainH_b	0.412	0.00000
lograin4T	0.097	-2.30103
pres1	-0.459	30.10000

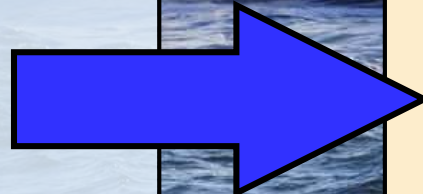
Constant: 15.731

PM: 1.415

FC (Predicted): 248 CFU/ 100 mL

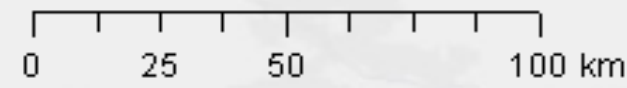
Posting Decision: No Post

Running ENT model (Manhattan (28th St)):



Mobile app interface for Manhattan Beach water quality monitoring. The screen shows a 'NowCast' for the 28th Street Storm Drain, updated 15 minutes ago, with a 'Good' status. Below this, there are two cards: 'Dry Grade' (21 days ago) with an 'A+' rating and a smiley face icon, and 'Wet Grade' (18 days ago) with a 'D+' rating and a frowny face icon. At the bottom, there is a section titled 'The Latest' with placeholder text.

Summer 2017 Beaches



Arroyo Burro (AB) East (EB)



Santa Monica Pier (SM)



Redondo Beach Pier (RP)



Belmont Pier (BP)



Long Beach City Beach (LB)



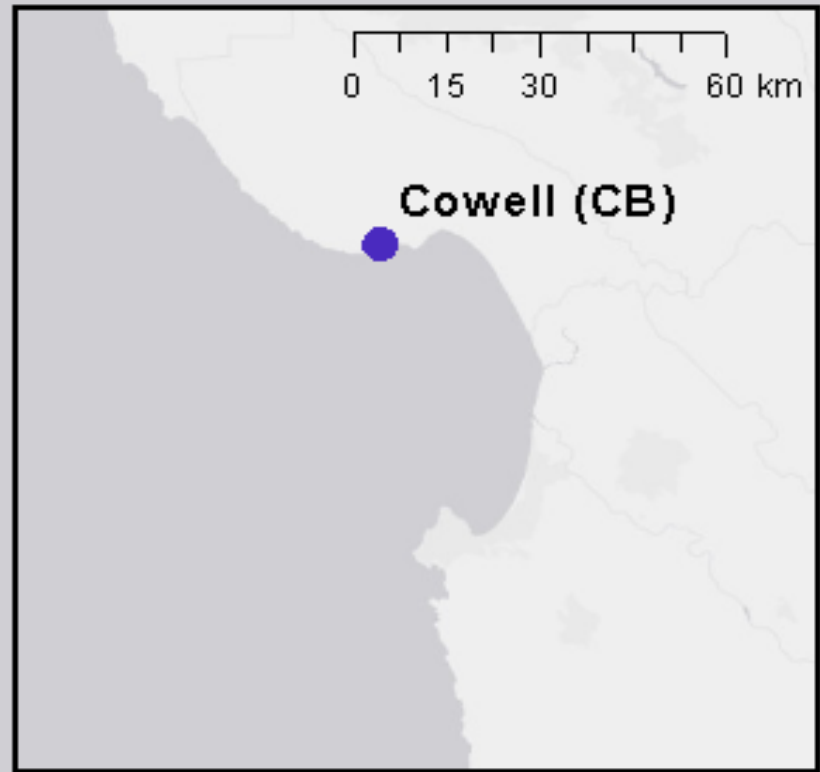
Huntington State (HS)



Doheny State (DS)

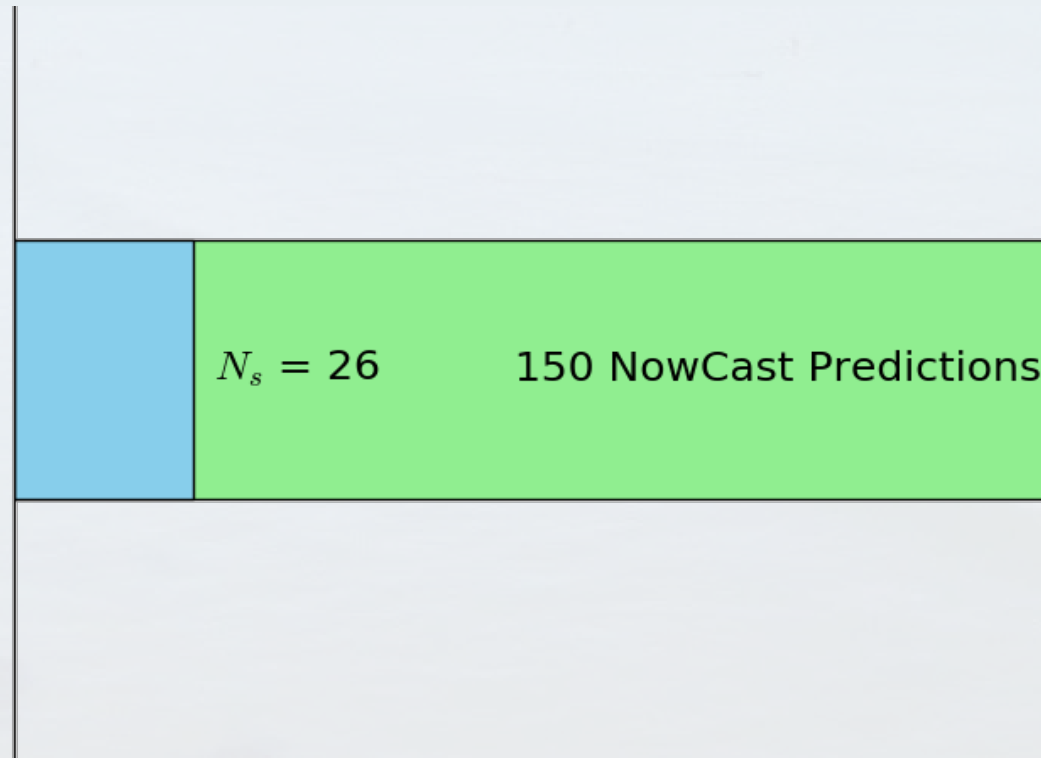


Moonlight (MB)



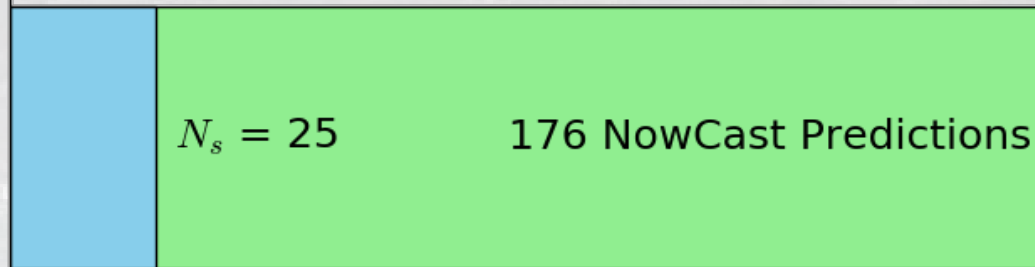
Cowell Beach

124 Additional Predictions Beyond Sampling



Redondo Beach Pier

151 Additional Predictions Beyond Sampling



Doheny State Beach

163 Additional Predictions Beyond Sampling

$N_s = 40$

203 NowCast Predictions

Looking Forward

Launch Website and App

Aim: Memorial Day 2018

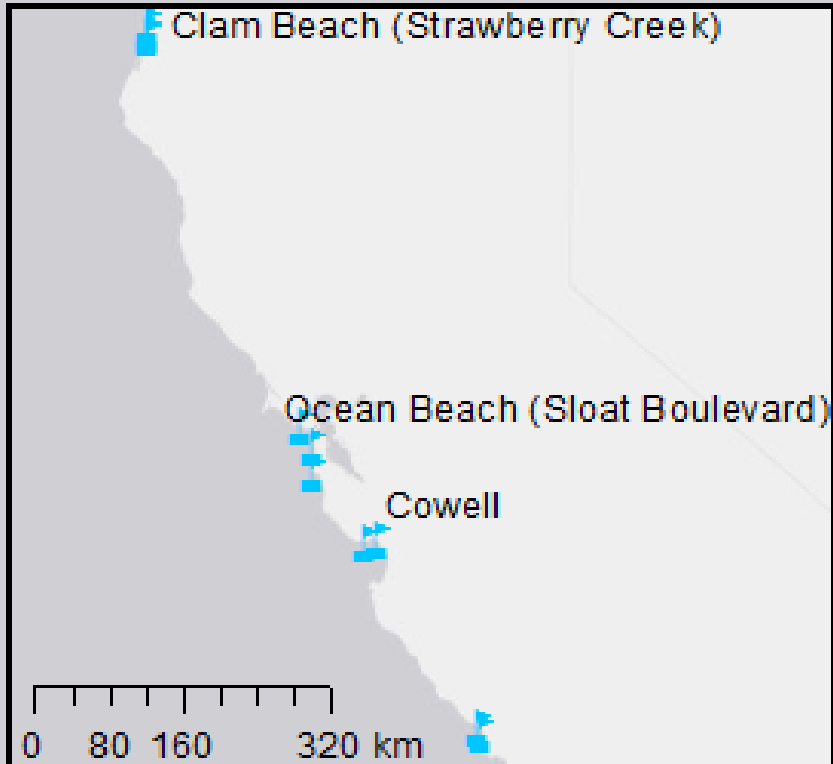
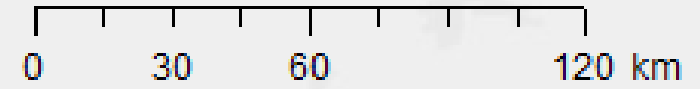
Add More Beaches to System

Future Research

Modeling Data-Poor Beaches
Forecasting

Expand NowCast System Internationally

Potential Summer 2018 Beaches



Jalama

Leadbetter

Topanga

Venice Pier

Manhattan (28th Street)

Belmont Pier

Doheny State Beach

Oceanside (San Luis Rey River)

La Jolla Cove

Looking Forward

Launch Website and App

Aim: Memorial Day 2018

Add More Beaches to System

Future Research

Modeling Data-Poor Beaches
Forecasting

Expand NowCast System Internationally

Contact Info

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CA State Water Resources Control Board

Publications available upon request

