

**Linking Community and Ecosystem Health in Shoreline
Vulnerability Studies: The Richmond Transition Zone
Community Visioning Project**
Heidi Nutters, San Francisco Estuary Partnership





Project Context

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- Coalition of resource agencies, non-profits, citizens and scientists
- We support a range of projects focused on water quality, habitat, wildlife, outreach, watershed management and climate resiliency
- Association of Bay Area Governments is our home agency
- Funded by EPA, as part of the National Estuaries Program



Estuary Blueprint 2016



Project Context

GOALS

- Sustain and improve the Estuary's habitats and living resources.
- Bolster the resilience of Estuary ecosystems, shorelines, and communities to climate change.
- Improve water quality and increase the quantity of fresh water available to the Estuary.
- Champion the Estuary.

32 Actions for a Healthy Estuary

Estuary Blueprint 2016



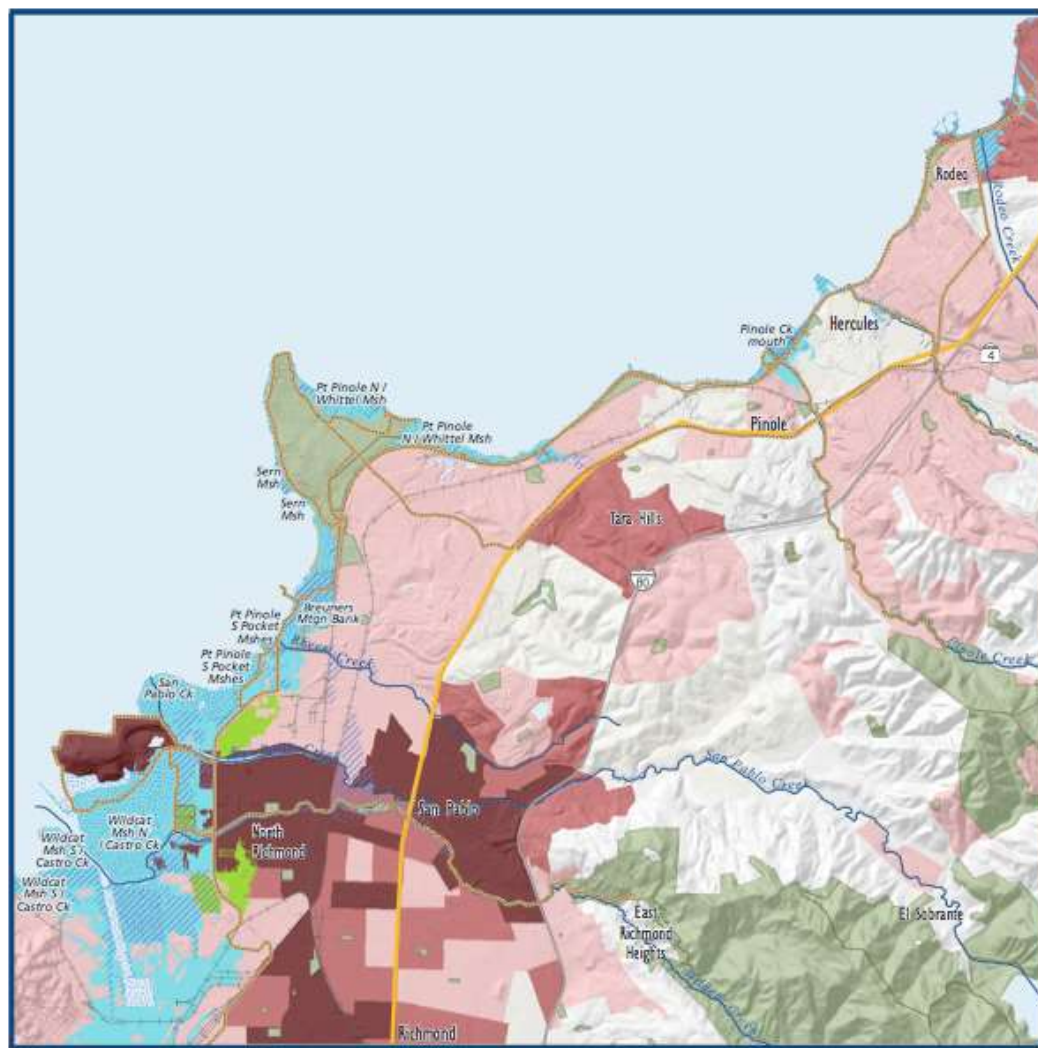
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**But what about
community health
and social justice?**



Community Indicators: Count of Community Indicators Per Block Group
Contra Costa ART Project

- Project Area
- Equivalent Water Levels:**
 - 100-yr tide + 30" SLR
 - 50-yr tide + 48" SLR
 - MSHW + 77" SLR
- FEMA 100-yr Flood Zone
- Hydraulically Disconnected Areas > 1 Acre
- Major Wetlands and Water Bodies
- Existing Bay Trail
- Railroad
- Highway
- Parks and Open Spaces
- Number of Community Indicators**
 - 3 - 4
 - 5 - 6
 - 7 - 10

- Community Indicator Descriptions:**
1. Households without a proficient English speaker 15 years and older
 2. Households without a vehicle
 3. Housing cost burdened households
 4. Persons of color
 5. Persons 25 years and older without a high school degree
 6. Persons 75 and older
 7. Persons under 5
 8. Rental households
 9. Transportation cost burdened households
 10. Very low income households



Disclaimer: These maps are intended as planning level tools to illustrate the potential for coastal flooding as sea levels rise and do not represent the exact location or depth of flooding or structure overtopping. The maps are based on model outputs and do not account for all of the complex and dynamic bay processes or future conditions. For more context, including a description of the data and methods used, please see Adapting to Rising Tides: Contra Costa County Sea Level Rise Vulnerability Assessment Final Report February, 2016. http://www.adaptingtoringtides.org/wp-content/uploads/2016/04/Contra-Costa_ART_Final_Report_mch_2016.02.08.pdf Community Indicators Methods. Slack groups were identified if they met a triggering level for each indicator, based on the regional mean plus half a standard deviation. Data Source: 2010-2014 ACS, Center for Neighborhood Technology, BCCDC, BAAPL, FEMA, Bay Trail, CPAD, ESRI. Map created by GreenInfo Network.

Estuary Blueprint 2016

Action 4: Identify, protect, and create transition zones around the Estuary



Task 4-1 Convene a regional steering committee and technical advisory committee to guide a Bay-wide, science-based, inventory of existing and projected future transition zones. Base the inventory on current baylands restoration projects, land use, ownership, topography, elevation, and other criteria consistent with climate change adaptation science and regional, state, and federal agency initiatives.

By 2017: Establish transition zone inventory steering and technical advisory committees.

Task 4-2 Complete a regional inventory of transition zones based on the methodology developed by the technical advisory committee.

By 2018: Complete Bay transition zone inventory.

Task 4-3 Protect transition zones and land use for migration space, based on identified needs and opportunities, through acquisition of fee title, partnerships to develop conservation easements, or other management agreements.

By 2021: Protect, or plan to protect, 10 of the identified sites.

Task 4-4 Include enhancement, restoration, or creation of transition zones in tidal restoration and multi-benefit climate adaptation projects where feasible.

By 2021: Include transition zones in five tidal restoration projects.



Transition zones definition

(Baylands Goals Science Update, 2015)

- Areas of existing and predicted future interactions among tidal and terrestrial or fluvial processes
- Result in mosaics of habitat types, assemblages of plant and animal species, and sets of ecosystem services
- Distinct from those of adjoining estuarine, riverine, or terrestrial ecosystems.

Existing Mapping Efforts	Sub-zones			
	SZ1 Evolutionary Adaptation	SZ2 Refuge	SZ3 Flood Control	SZ4 Sea Level Rise Accommodation
Fulfroast and Thomson (in Preparation)	GIS model of the landward limit of backmarsh based on DEM and interpolated tidal datums		Local Maps of flood infrastructure based on LiDAR plus maps of flood-prone areas used to estimate landward extent of flood control needs and opportunities.	
H.T. Harvey and Associates 2002	Combination of field methods and remote sensing used to estimate bayward limit of freshwater discharge effects on tidal marsh vegetation			
Collins and Goodman-Collins 2010, Harvey et al. 1978, NOS 1975	Relative abundance of tidal marsh plant species along field transects used to assess the landward extent of the backmarsh			
SFEI 2013; FEMA 2003				
SFEI 2014	Physical and botanical field indicators used to delineate the upstream and downstream limits of local heads-of-tide.			
NOAA 2012			GIS model used to forecast future Bay margins based on interpolated tidal datums, coarse DEM, and selected sea level rise rates.	
Possible Augmentations of Existing Mapping Efforts	SZ1	Use field methods (e.g., NOS 1975, Harvey et al. 1978, H.T. Harvey and Associates 2002, Sawyer et al. 2008) to calibrate remotely sensed spectral and structural signatures of plants indicative of the landward and bayward aspects of SZ1, and the landward extent of SZ2, and add these signatures to a hybrid of existing GIS models (e.g., based on SFEI 2010, NOAA 2012, Fulfroast and Thomson in Preparation) to improve maps of SZ1 and SZ2.		
	SZ2			
	SZ3	Combine existing numerical hydrological models used to manage flood risks with new models of combined effects of storm surge and terrestrial runoff plus new maps of flood infrastructure (SFEI 2013) and HOT (SFEI 2014) to forecast effects of sea level rise and changing precipitation patterns on flood hazards, and to test the efficacy of dispersing riverine floodwaters across accommodation spaces, tidal marsh plains, and diked baylands (i.e., SZ3).		
	SZ4	Augment the existing federal approach to sea level rise mapping (NOAA 2012) with high-resolution DEMs, new flood infrastructure maps (SFEI 2014), BAARI (SFEI 2011), and detailed land use maps to provide local estimates of accommodation space needs and opportunities for selected sea level rise scenarios.		





In summary...

- Increasing urgency to map this area to move forward multi-benefit projects along the shoreline
- Lack of scientific and planning agreement on HOW to implement a mapping approach based upon this definition
- Critical need to work with socially vulnerable communities

Project Goals

1. Improve understanding of human uses of the shoreline, including infrastructure and informal uses
2. Identify opportunities for urban greening along the shoreline
3. Improve scientific understanding of the landward extent of the upland transition zone
4. Integrate an equity and technical mapping approach to develop a community vision for the N. Richmond shoreline



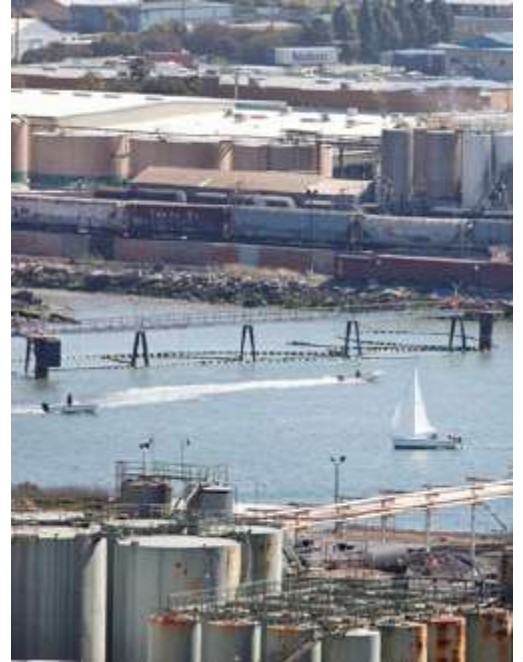


The North Richmond community

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North Richmond, CA Mapping/Community Visioning Effort

- ◉ A city of roughly 100,00 residents just N. of Berkeley
- ◉ Largely non-white population (33% African American, 11% Asian; 32% “other race, non-white” from 2010 Census)
- ◉ Established as an industrial town in the early 1900’s



North Richmond, CA Mapping/Community Visioning Effort

- ◉ Richmond residents live surrounded by 5 major oil refineries, three chemical companies, 8 superfund sights, dozens of toxic waste sites, highways, two railyards, ports and marine terminals
- ◉ Pollutants from numerous sources are in the area, including the Chevron refinery, diesel trucks along Richmond Parkway and the Santa Fe train
- ◉ Health problems -- especially child and adult asthma -- persist.





"A dynamic, multi-cultural community that is transforming its political climate from a polluted company town to a vanguard in the environmental justice movement...Residents have reached across racial and social divisions to achieve some of the nation's biggest successes for environmental equity"

-- Environmental Health News

North Richmond, CA Mapping/Community Visioning Effort

- Adapting to Rising Tides Project, led by BCDC has improved understanding of vulnerability to sea level rise and extreme flooding in Contra Costa County, and Richmond

Projected damage/disruption to rail lines; Loss of rail service could result in increased truck traffic, congestion and air quality impacts

A number of roads that provide access to port are vulnerable to flooding
Creekside communities will likely experience more frequent or extensive flooding as sea levels rise

5 Shoreline parks in Richmond will face flooding

Access to employment sites will be impacted through flooded roadways or interstates





The challenge: Can we combine these efforts to provide equity benefits, engage community members and improve resilience of the shoreline through multi-benefit projects?

A stylized blue-toned illustration of a landscape. In the foreground, there are dark blue reeds. In the middle ground, a suspension bridge with two towers and cables spans across a body of water. Two birds are flying in the sky above the bridge. The background shows dark blue hills or mountains.

N. Richmond Community Visioning Process and Upland Transition Zone Mapping Approach

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Transition Zone Project Phase 1 -- Mapping Approach

- Engage a technical task force made up of 15 experts (and hope they can all agree on something!)
- Resolve a mapping methodology approach to better understand the extent of the upland transition zone and future scenarios for the shoreline
- Define the outer edge of the upland transition zone



Transition Zone Project Phase 2 – Community Visioning Process

- Integrate maps into a community vision for a greener shoreline
- Identify multi-benefit projects within the transition zone that provide community benefits and based on community needs
- Build new partnerships: San Francisco Estuary Institute, The Watershed Project, Urban Tilth, San Francisco Bay Joint Venture, Contra Costa County



Next Steps...

- Finalize the mapping approach this Spring
- Already started community process in N. Richmond
- Learn from our partners and from other regions -- building a shared vocabulary & open to new ways of seeing things
- Further integrate equity into Estuary Blueprint moving forward



THANKS!

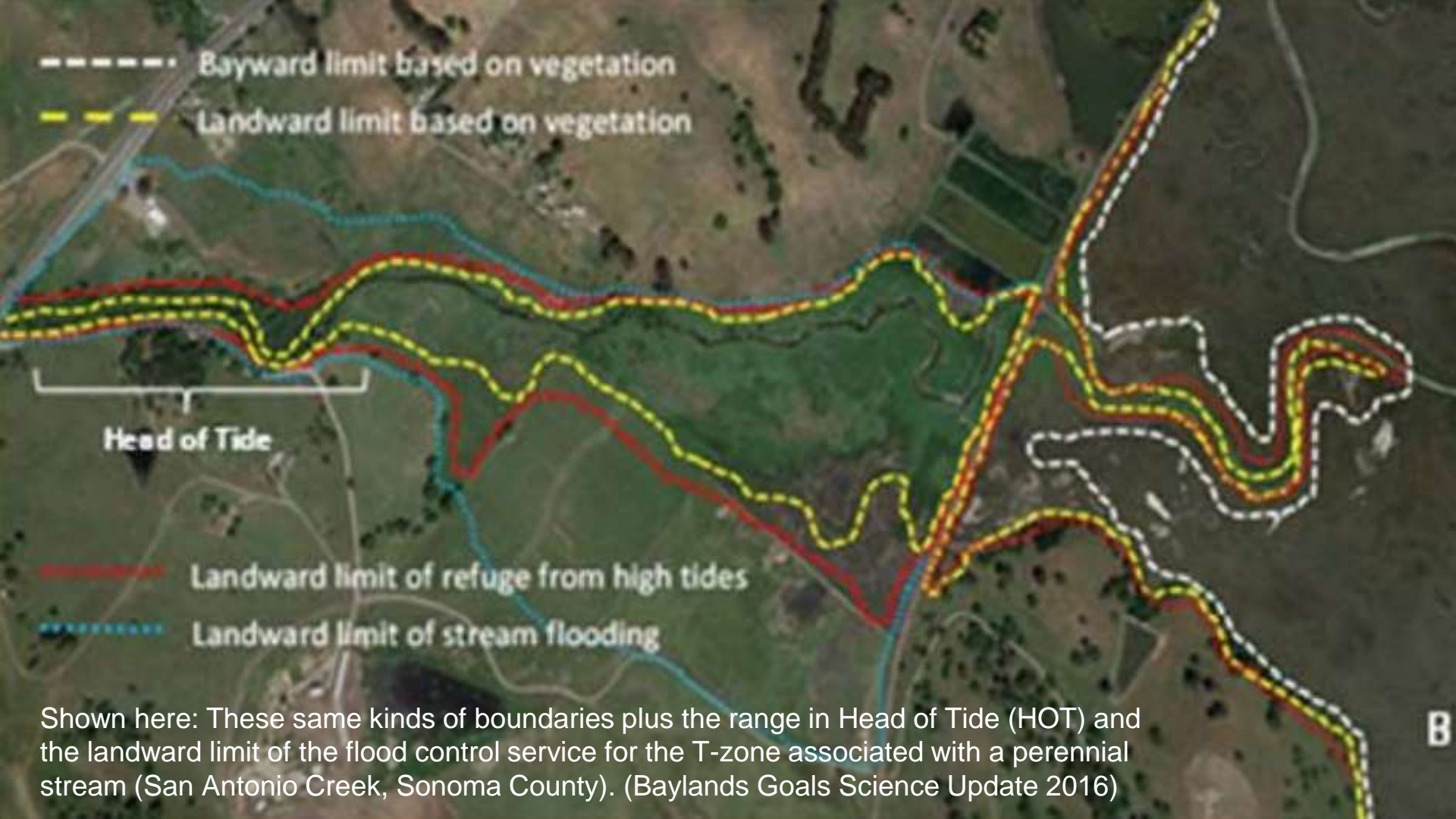
Any questions?

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Shown there: The upper and lower boundaries based on plant species assemblages indicative of the backmarsh, plus the landward boundary of the high tide refuge service for the T-zone associated with a levee (Richmond, Contra Costa County) (Baylands Goals Science Update, 2016)





----- Bayward limit based on vegetation
- - - - - Landward limit based on vegetation

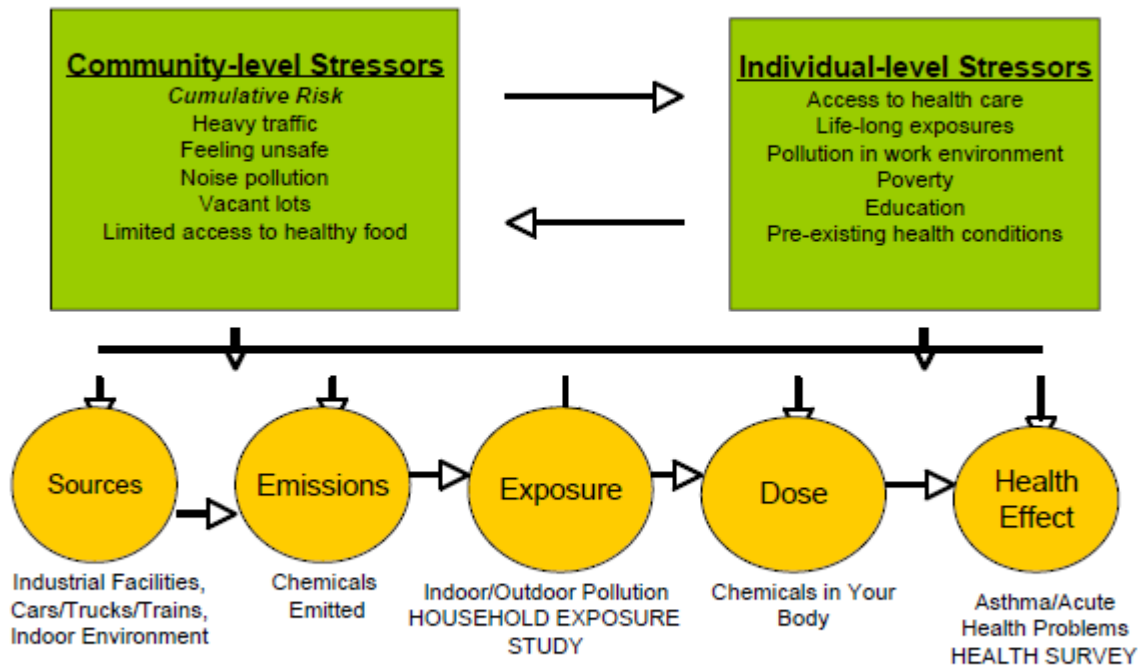
Head of Tide

— Landward limit of refuge from high tides
..... Landward limit of stream flooding

Shown here: These same kinds of boundaries plus the range in Head of Tide (HOT) and the landward limit of the flood control service for the T-zone associated with a perennial stream (San Antonio Creek, Sonoma County). (Baylands Goals Science Update 2016)

B

The Big Picture: Understanding Health in Richmond



Adapted from: Morello-Frosch, 2007