



Marine Mammal Commission

An independent agency of the U.S. Government



Health Monitoring and Analysis Platform (HealthMAP):

A vision for marine mammal stranding response,
health surveillance, science, and management

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The Value of Marine Mammal Health Data

- Timely information sharing is of value for enhancing animal care and rehabilitation, conservation, public health and scientific research
- Title IV of the MMPA states
 1. Facilitate the collection and dissemination of reference data on the health of marine mammals and health trends of marine mammals in the wild;
 2. Correlate the health of marine mammals and marine mammal populations, in the wild, with available data on physical, chemical, and biological environmental parameters;



The Value of Marine Mammal Health Data

- “Marine mammals as sentinels” implies that the marine mammals are early warnings of ecosystem change, thus need to have an early warning system to convey information from these animals
- Increases in the reporting of diseases in marine organisms suggest ocean health is deteriorating yet this could be skewed by publication effort (*Harvell et al. 2004, Simeone et al 2015*)
- Climate change predicted to change the incidence of diseases, detecting such changes requires integrating health data with climate sensitive environmental parameters (*Burek et al. 2008*)



Marine Mammal Health Observing Systems

- National Stranding Database exists, contains little health data, no standardized cause of death/stranding
- Multiple internal organizational and regional health data sharing systems exist or are under development,
 - GulfMAP
 - Eastern Pacific Marine One Health Coalition
 - MARCO (Mid-Atlantic Regional Council on the Ocean) Mid-Atlantic Ocean Data Portal:
 - Wildlife Rehabilitation Medical Database
 - National Wildlife Health Center <https://whispers.usgs.gov/home>
- Currently there is often dependency on informal communication amongst individuals that results in after-hours communications
- National “Integrated Ocean Observing System” currently measures multiple environmental variables, especially physical parameters, that are shared real-time with users and the public, little marine mammal data, no health data



HealthMAP: Vision

- National marine mammal health tracking program that is web-based & readily accessible to scientists, managers & public (to different degrees)
 - Integrate health data from strandings, live capture-release programs, bycatch & subsistence sources
- Add a marine mammal health component to the existing “Integrated Ocean Observing Systems” (IOOOS) with regional hubs
 - Integrate ecosystem-based analyses of marine mammal health data with physical, chemical, and biological environmental data (Title IV)
- Allow detection of spatiotemporal changes in marine mammal health that will enable
 - early warning of health issues and trends,
 - identify disease hotspots facilitating detection of cause,
 - share potential public and animal health risks outside the stranding network



Pros & Cons

Concerns

- Scale of US coastline, no. animals involved
- Sharing data that results in publications by others outside stranding network without acknowledgement, or out-of-context use
- Will require consistent definitions of health parameters, diseases
- Duplication of data entry effort

Gains

- “One Health” approach by integrating with terrestrial animal databases, thus early warning of changes in disease incidence
- Preservation of decades of data/samples that may disappear (retirements, lab closures)
- Reduced need for one-on-one emails out of hours to inform managers, public health agencies
- Ability to correlate health data with oceanographic and environmental data in IOOOS
- Develop understanding of disease epidemiology, causes
- Meet MMPA Title IV mandates



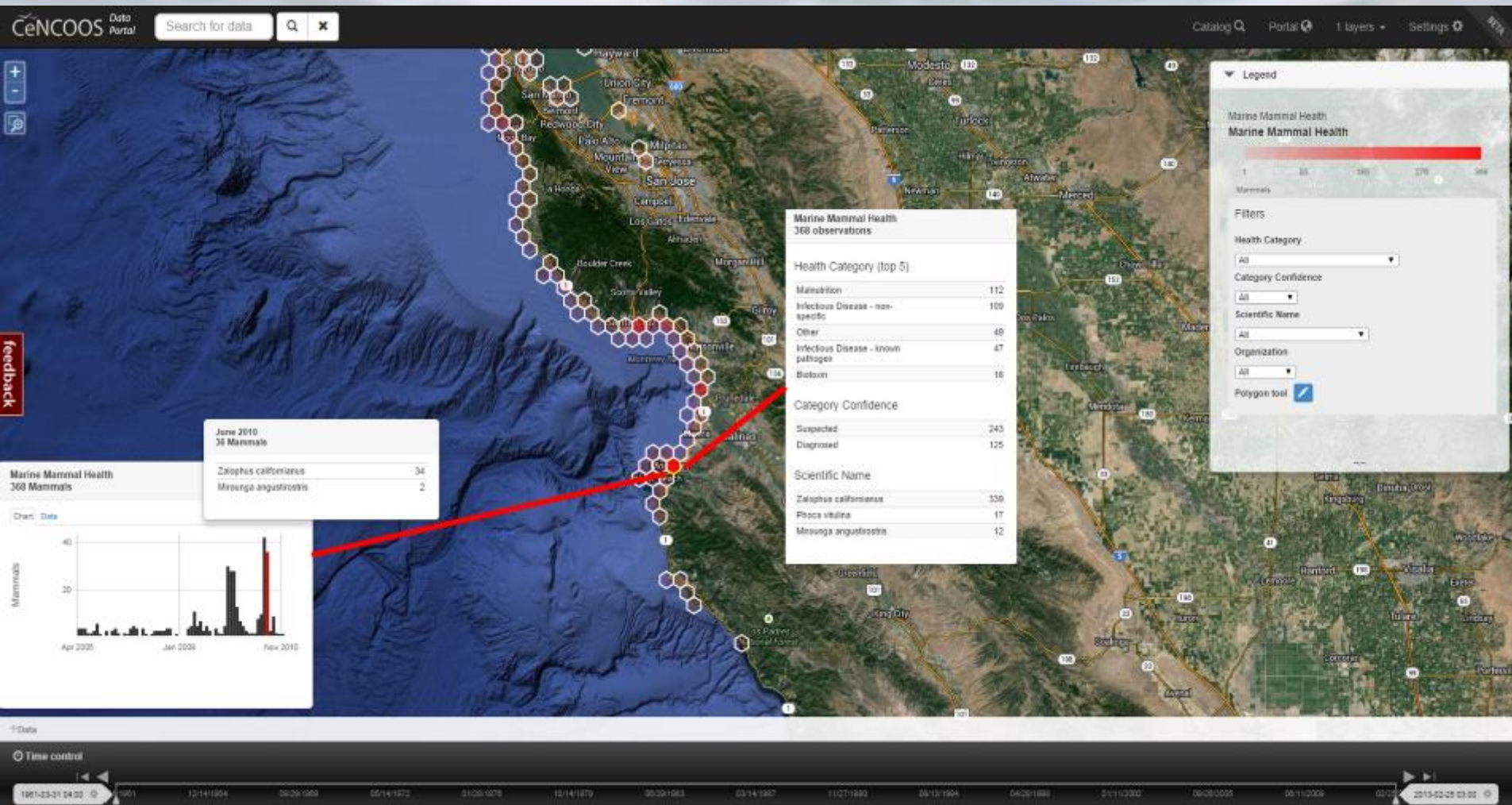
Pilot Project

Proof of Concept for a Workshop in 2014

- Pilot project with 5 California volunteer groups (federal, private, 2 NGO, academia)
- 5 years of data from dead stranded animals 2005-2010
- 3110 records from paper records (71%) or electronic data
 - Each organization binned their cases into broad health categories: Trauma (Human caused/Not human caused), Biotoxin, Infectious disease (known pathogen/non-specific), Malnutrition, Neoplasia, Other, Unknown

Field Number	Health Category	Category Confidence	Date	Latitude	Longitude	County	Scientific Name	Organization	Category
CSL-9831	Biotoxin	Diagnosed	9/10/2010	38.25	-122.968	Marin	Zalophus californianus	TMMC	1 of 1
CSL-9914	Infectious Disease - known pathogen	Suspected	12/19/2010	38.25	-122.968	Marin	Zalophus californianus	TMMC	1 of 1
HS-1943	Infectious Disease - non-specific	Diagnosed	4/26/2009	38.25	-122.968	Marin	Phoca vitulina	TMMC	1 of 2
HS-1943	Malnutrition	Diagnosed	4/26/2009	38.25	-122.968	Marin	Phoca vitulina	TMMC	2 of 2
CSL-7999	Biotoxin	Diagnosed	12/3/2008	38.253	-122.968	Marin	Zalophus californianus	TMMC	1 of 1
HS-1948	Other	Diagnosed	5/3/2009	38.258	-122.971	Marin	Phoca vitulina	TMMC	1 of 1
CSL-9677	Infectious Disease - non-specific	Suspected	6/15/2010	38.78	-123.553	Mendocino	Zalophus californianus	TMMC	1 of 2
CSL-9677	Malnutrition	Suspected	6/15/2010	38.78	-123.553	Mendocino	Zalophus californianus	TMMC	2 of 2
ES-2943	Infectious Disease - known pathogen	Diagnosed	4/29/2009	38.801	-123.577	Mendocino	Mirounga angustirostris	TMMC	1 of 1
CSL-7453	Infectious Disease - known pathogen	Suspected	9/2/2007	38.803	-123.581	Mendocino	Zalophus californianus	TMMC	1 of 1

<https://axiomdatascience.com/maps/marine-mammal-health-map/#>



HealthMAP to Date

- Marine mammal health data are of value to people beyond those who collect data from these wild animals
- IOOS is ever more effective, marine mammal health data needed
- Pilot program in California effective
- Challenge is scaling up to include multiple types of data from different sources nation wide
- Currently no allocation of federal funds specifically for development of a HealthMap
- It will take a village!



Thank you!



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