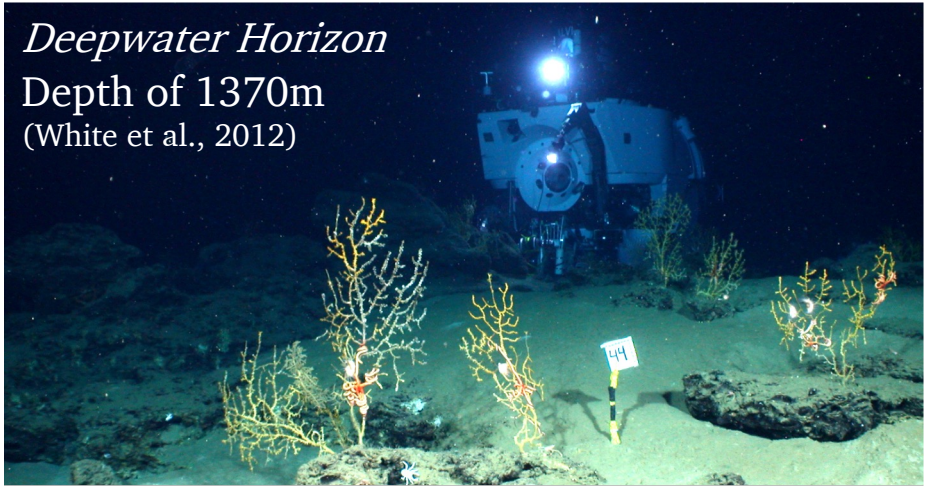
Scientific insights from the *Deepwater Horizon* release:
Implications for spill response & future research

Helen K. White

Haverford College
Haverford, PA, USA


Deepwater Horizon
Depth of 1370m
(White et al., 2012)


Mystery Spill, 2020
Delaware Bay, USA


Persistent oil residues
Prince William Sound
(White et al., 2020)

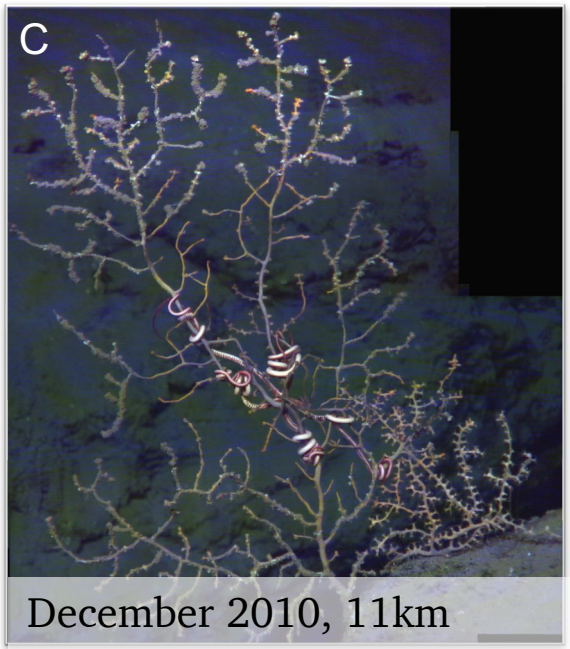

Unknown, 2019
Mumbai, India

Deepwater Horizon release

Impacts to deep sea coral communities (2010)

November 2010, >20m

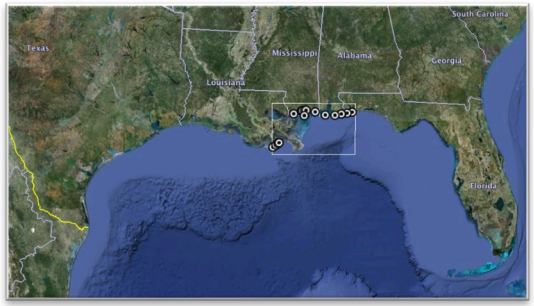
November 2010, 11km



December 2010, 11km

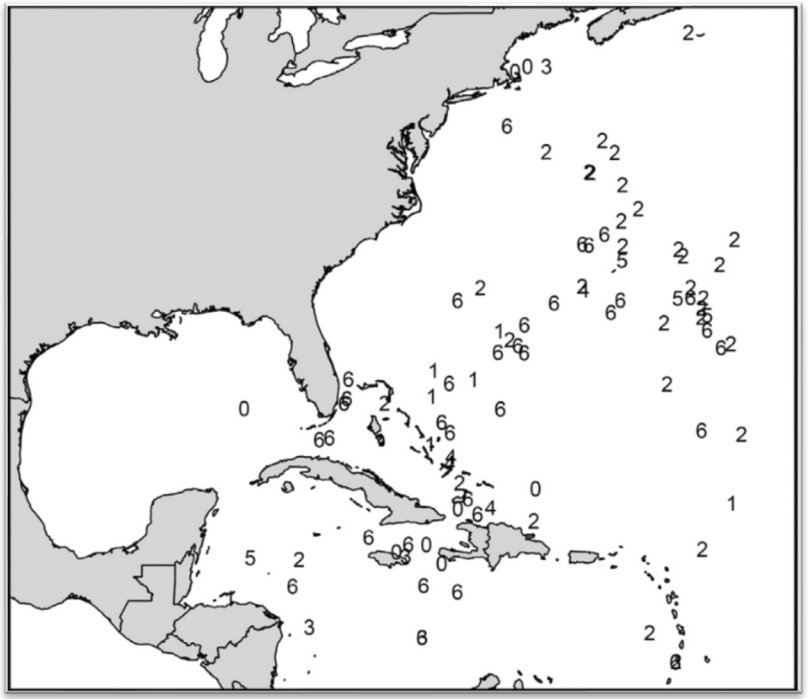
Deepwater Horizon release

Oil residue collections (2012-2022)



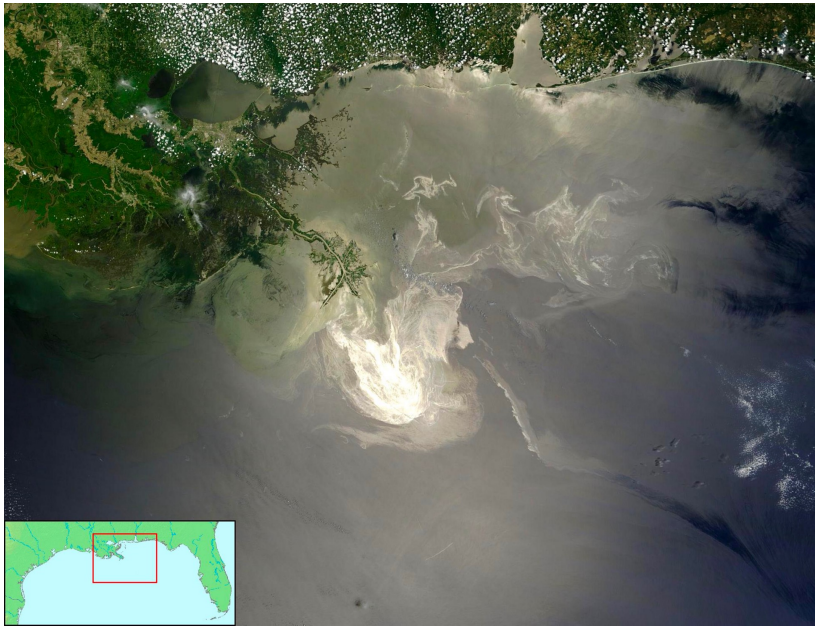
Pelagic tar balls (1988–2016)

(Green et al., 2018)



Insights from *Deepwater Horizon*

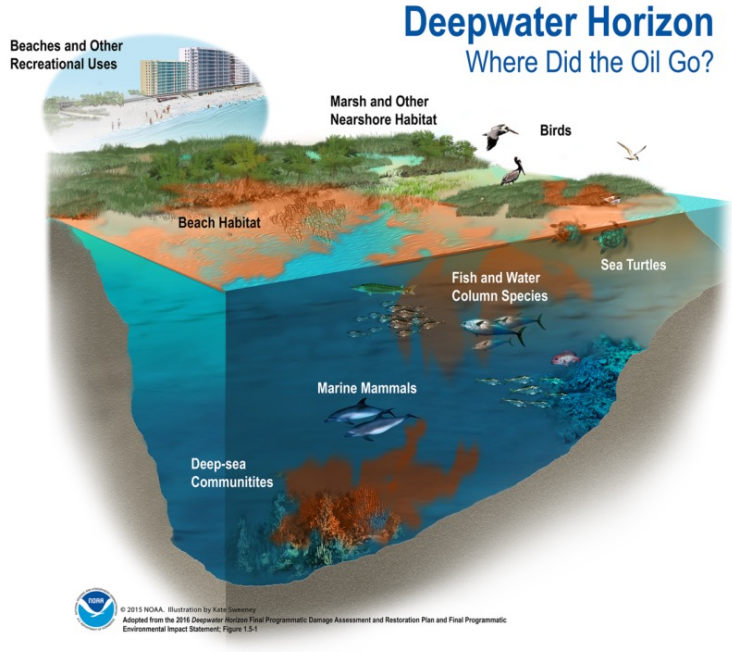
1. Oil type & location
2. Spill response
3. Human health



Oil seen from space by NASA's Terra Satellite on May 24, 2010

1. Oil Type & Location

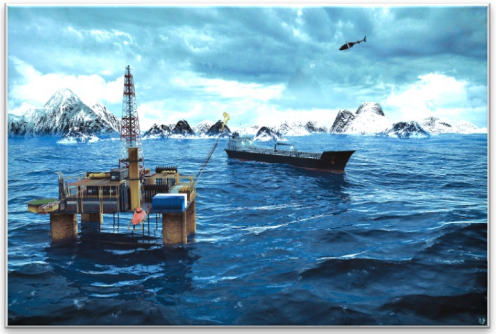
- All spills are different
  - Oil type
  - Location
  - *Volume of spill*
- The fate & impacts of a spill are strongly influenced by oil type & the location impacted
- The ability to mobilize a rapid response depends on the accessibility of the location



1. Oil Type & Location Priorities

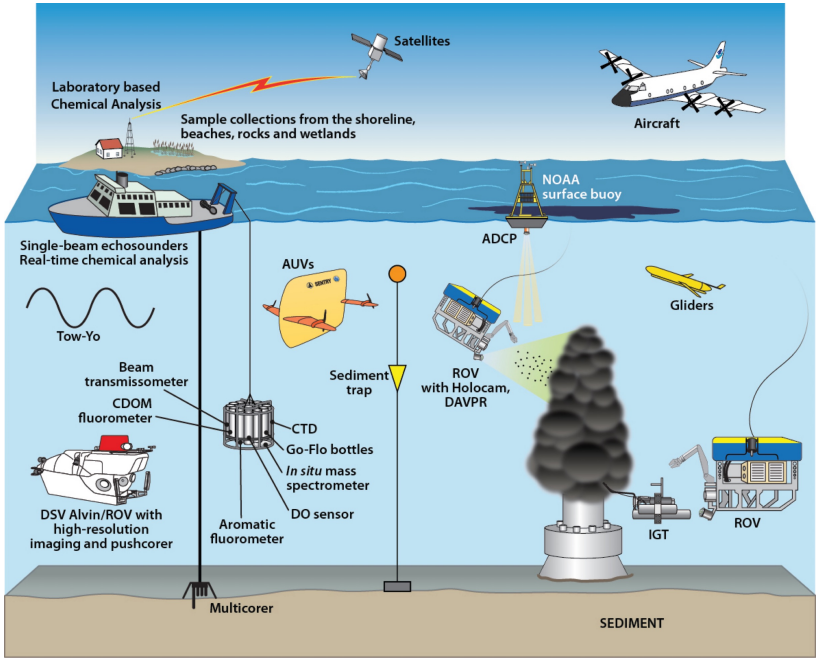
- Examine the composition, toxicity & behavior of:
  - New types of fuels
    - e.g. low-sulfur fuel oil & biofuels
  - Petroleum products
    - e.g. diluted bitumen

- Plan for locations with different conditions to *DWH* (e.g. high latitudes):
  - Remote locations
    - limited infrastructure & access
  - Cold temperatures
    - biodegradation & weathering



2. Spill Response

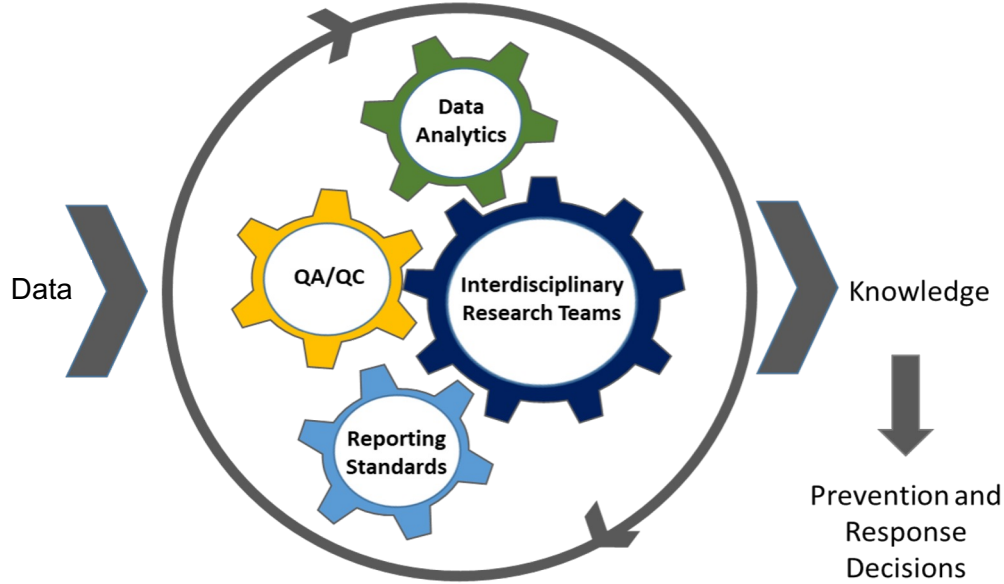
- Integrate technology, analytical platforms & data synthesis to inform response
- Observe & sample earliest stages of the spill
- Important breakthroughs in oil spill science
  - New methods & technologies
  - Transport, behavior, fate of oil
  - Short & long-term effects of oil
  - Rates & mechanisms of processes
  - Mechanical & chemical response



(White et al., 2016)

2. Spill Response Priorities

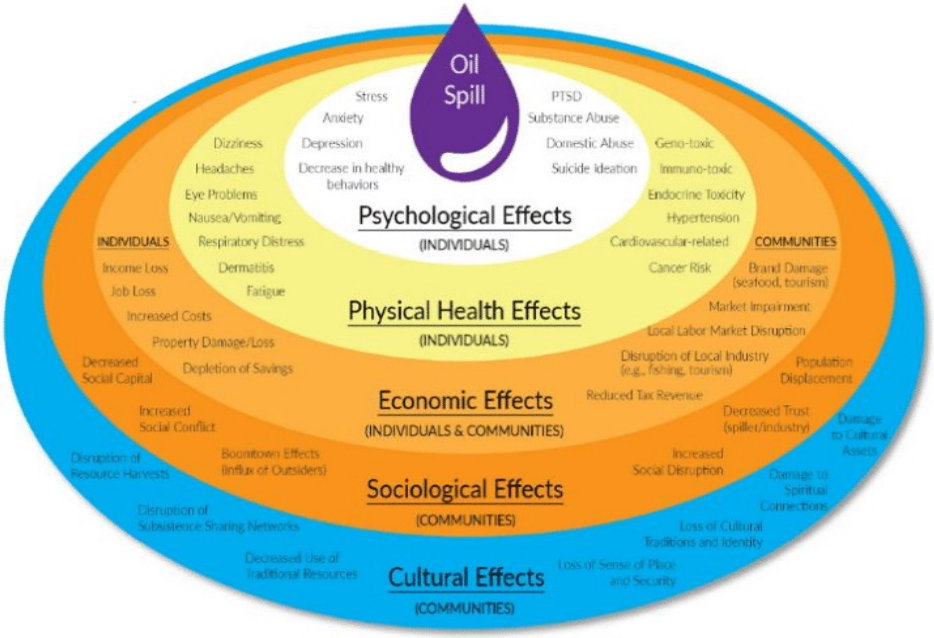
- Strategic embrace of complex biological & chemical data
- Collaboration between research scientists & oil spill responders
- Focus on a rapid, informed & responsible approach to minimizing oil spill effects



(Oil in the Sea IV, 2022)

3. Human Health

- Direct human effects depend on:
  - Oil type & volume
  - Location
  - Time of year
  - Response actions
  - Safety protocols
- Other life stressors, traumas & previous disaster experiences increase susceptibility to spill effects



(Sandifer et al., 2021)

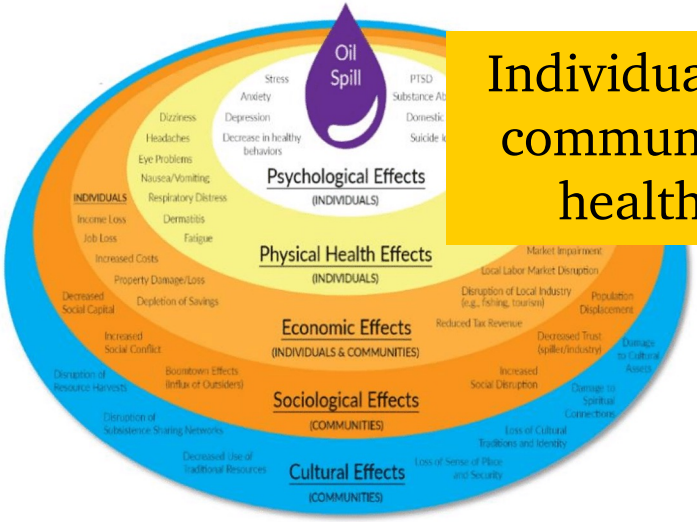
3. *Human Health Priorities*

- Develop a more holistic decision-making & response process to include:
  - Individual & community mental & behavioral health effects
  - Community socioeconomic disruptions

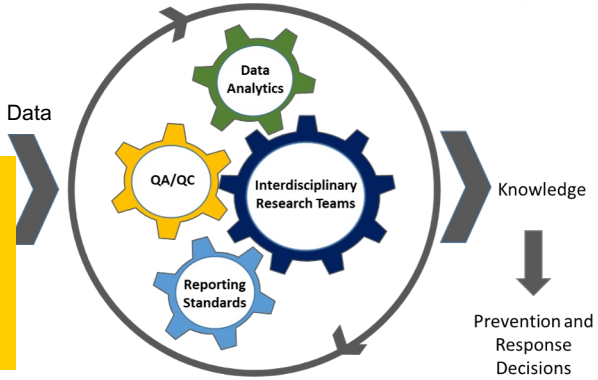
(Sandifer et al., 2021)

New fuels

Individual & community health



Integrate research & response



Remote locations