VESSEL SPILL RESPONSE TECHNOLOGIES

GULF OF THE FARALLONES AND CORDELL BANK NMS

Report of a Joint Working Group of the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries Advisory Councils

June 2012

Purpose of Vessel Spill Working Group

Creation of VSWG was recommendation in GFNMS 2008 Mgmt Plan

Objective was to provide recommendations to Sanctuary Advisory Councils (SAC) regarding response technologies – especially the use of oil dispersants within the GF and CB National Marine Sanctuaries.

Timeline:

June 2011 to May 2012

Result:

Consensus document
with 25 recommendations

Vessel Spill Working Group Participants

Working Group Members:

1. Yvonne Addassi, OSPR
2. Sarah Allen, NPS
3. Richard Charter, Ocean Foundation
4. Barbara Emley, SF Com. Fishing Assoc.
5. Ellen Faurot-Daniels, OSPR
6. **Jaime Jahncke (Chair),** PRBO
7. Gerry McChesney, USFWS
8. Renee McKinnon / James Nunez, USCG
9. **Patrick Rutten (Chair),** NMFS
10. Deb Self / Ian Wren, SF Baykeeper
11. Jordan Stout, NOAA
12. Bob Wilson, FMSA, TMMC

and 14 Invited Agency Observers

Invited Speakers

1. Pete Adams, NMFS
2. Gary Cherr, UC-Davis
3. Toby Garfield, SFSU
4. Pete Kalvass, CDFG
5. John Largier, UC-Davis
6. Alan Mearns, NOAA
7. Ron Tjeerdema, UC-Davis
8. Al Venosa, EPA
9. Pete Warzybok, PRBO
10. Glen Watabayashi, NOAA

Supporting Staff

1. Irina Kogan, GFNMS
2. Michael Carver, CBNMS
3. Meredith Elliott, PRBO

Dispersant Use in Sanctuaries

Use of dispersants within Sanctuaries or within 3 nm of shore or MX requires approval from Region 9 Response Team (other areas are “pre-approved”).

ONMS has a consultative role on response technology use and **does not make final decision.**

(from 2008 CA Dispersant Plan)

On-water Response Technologies (1st option)

Mechanical recovery rates are typically less than 20% in sheltered waters and often less than 10% in open-water.

On-water Response Technologies (2nd option)

***In-situ* burning** requires seas less than 2–3 ft. (0.6–0.9 m). Oceanic and regulatory limitations on *in-situ* burning limit use in California.

On-water Response Technologies (3rd option)

Effective **chemical dispersion** of oil requires surface mixing energy (some wind and light chop).

Dispersant operations encounter rates are 10-100 times greater than skimming or burning.

Dispersants may be the only response option during rough, open-water conditions.

Chemically dispersed oil may adversely impact organisms in the upper water column.

Net Environmental Benefits Analysis (NEBA)

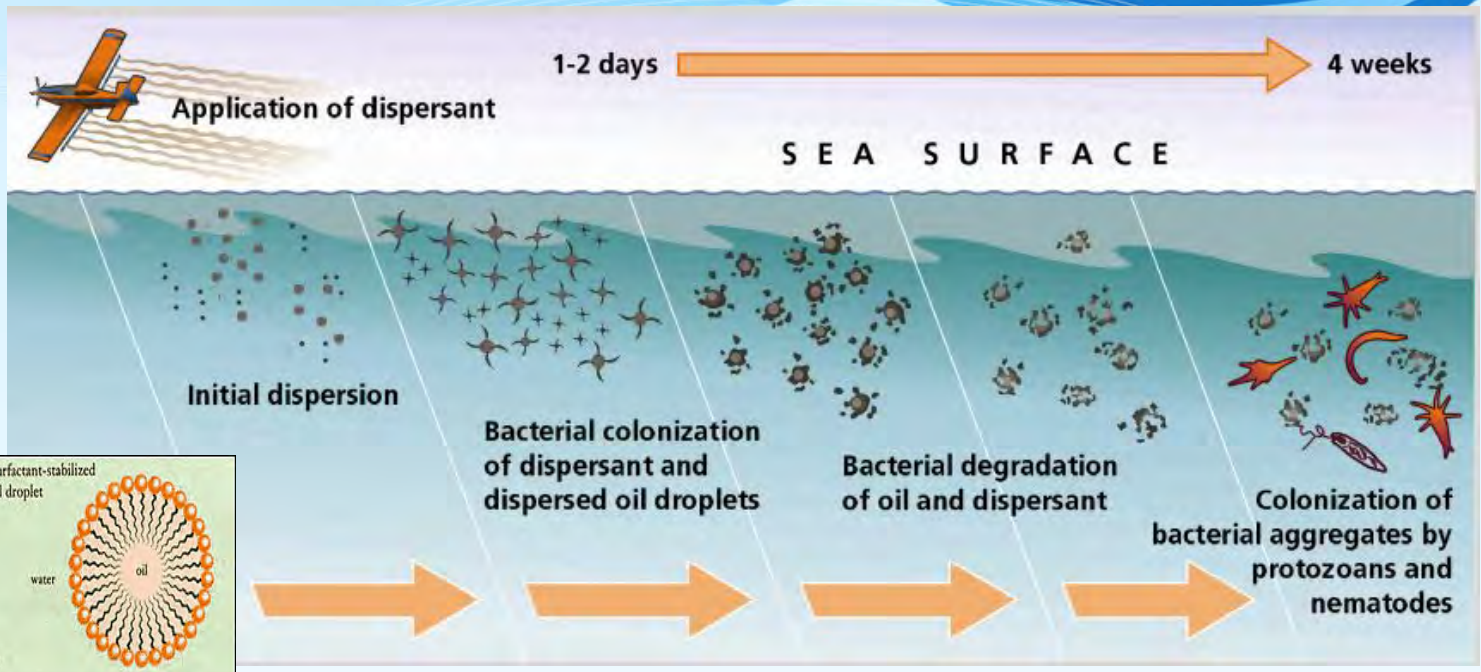
The risk matrix provides a qualitative ranking of population percentage impacted and expected recovery time.

		RECOVERY			
		> 7 years (SLOW) **(1)**	3 to 7 years **(2)**	1 to 3 years **(3)**	< 1 year (RAPID) **(4)**
% of RESOURCE	> 60% (LARGE) **(A)**	1A	2A	3A	4A
	40 to 60% **(B)**	1B	2B	3B	4B
	20 to 40% **(C)**	1C	2C	3C	4C
	5 to 20% **(D)**	1D	2D	3D	4D
	0 to 5% (SMALL) **(E)**	1E	2E	3E	4E

Figure 2. The proposed Risk Square.

Toxicity of Oil and Oil/Dispersant Mixtures

Dispersants Enhance Weathering



- Dispersants break up oil and blend it into the water column
- Small droplets formed are more readily digested by bacteria
- Dispersants/dispersed oil will dilute below detection within 24 hrs

Toxicity of Oil and Oil/Dispersant Mixtures

Chemical dispersants introduce higher total concentrations of oil into the water column than naturally dispersed oil.

Biological Resources in the Sanctuaries

Biological resources were evaluated for potential negative effects from dispersants ranging from the plankton to birds and mammals.

We assembled a list of species of interest drawn from the larger list of species that occur in the region (report Appendix IV).

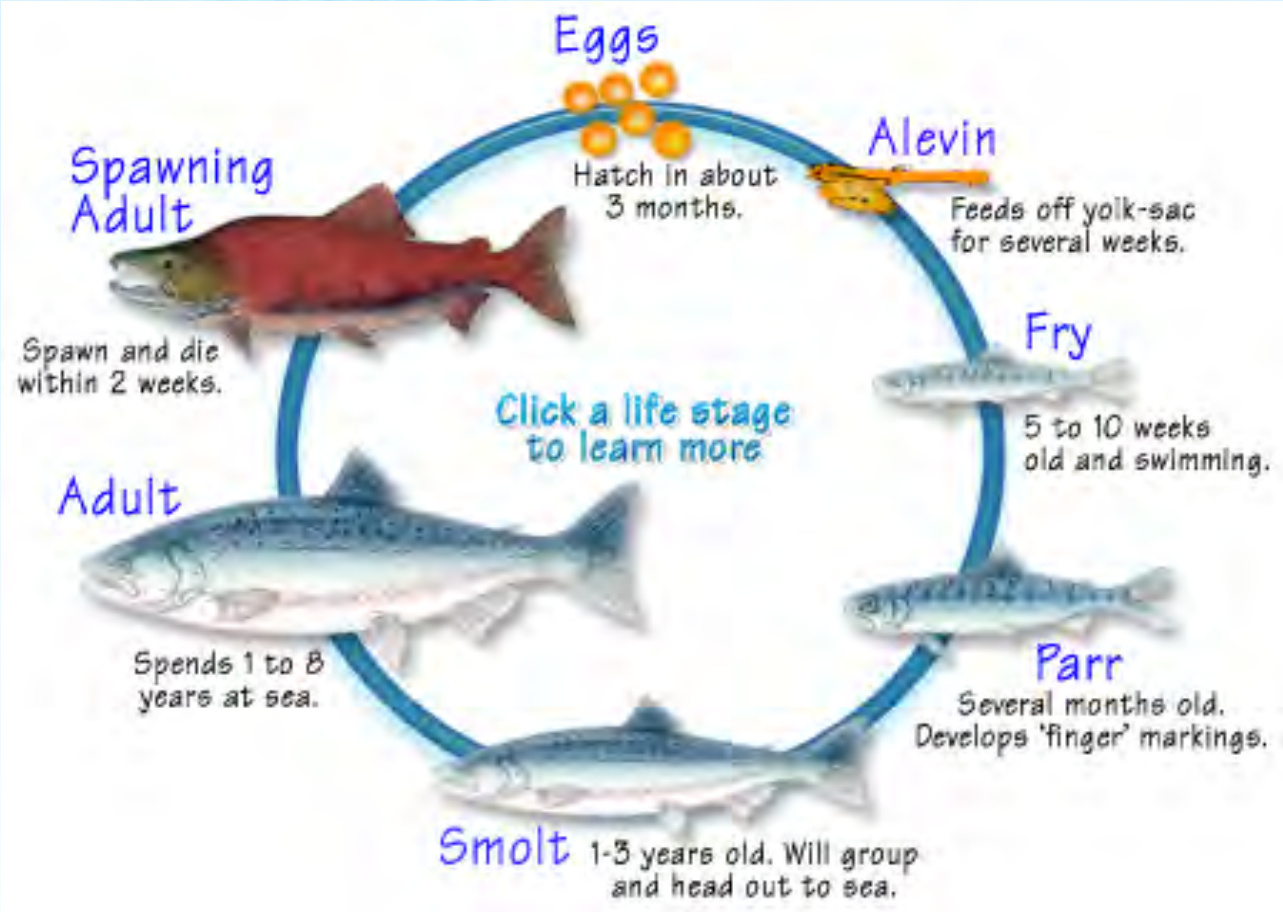
Dispersant-use decisions will be guided by the potential **population impact** and **recovery time** of a species.

Toxicity of Oil and Oil/Dispersant Mixtures

Higher concentration of dispersed oil may potentially impact a wider range of species that would not likely have been exposed or affected by the surface oil slick.

Toxicity of Oil and Oil/Dispersant Mixtures

Embryo-larval stages and early juvenile life stages are generally more sensitive to chemicals than are adults of the same species.



Invertebrates

Zooplankton populations are not likely to be permanently affected by oil spills and are expected to recover quickly.

Larval stages of invertebrates and fish are considered susceptible to oil or dispersants in the water if exposed.

For many invertebrates, the adult phase is considered a high priority for protection because of their reproductive capability.

1x  = 2,000,000

eggs per spawning
multiple spawning ea. summer
can live 20-40 years

Fish (Rockfish)

Rockfish do not move widely and are considered more vulnerable to oil spills locally

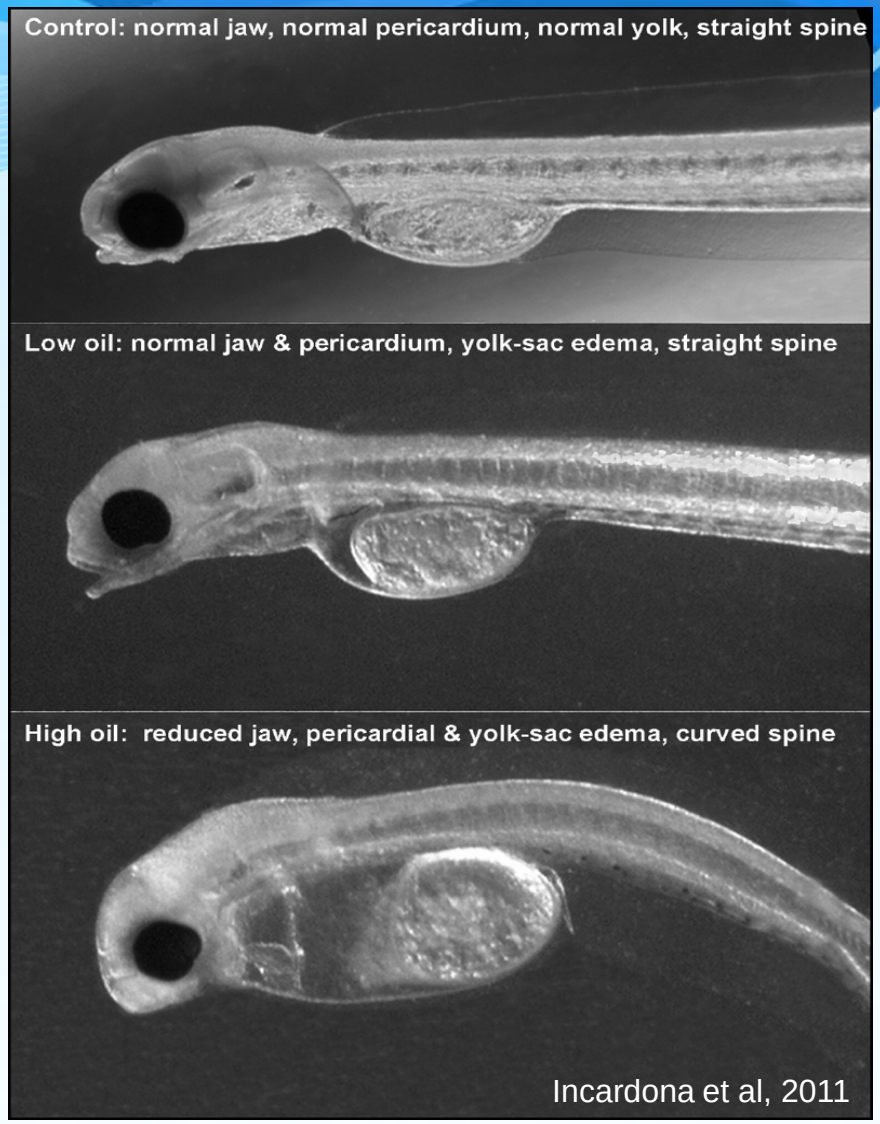
Are generally found at depths that provide significant dilution for dispersed oil and

They would be replaced by natural recruitment of larvae from adjacent areas.

Fish (Anchovy and Herring)

Wide ranging species with large populations such as anchovies were not considered to be vulnerable to spills or dispersants at the population level.

Herring eggs and larvae in the intertidal zone exposed to **undispersed oil** experienced significant mortality that was accelerated by sunlight.



Marine Birds

Some seabirds are attracted to surface oil slicks on the water because they look like fish oil slicks.

Storm-petrels may be inadvertently attracted to sulfurous crude oil slicks because that particular oil smells like krill.

Ashy Storm-petrels

- Small global population in decline
- Breeds within GFNMS
- Winter raft in CB, GF, MB NMS
- Species vulnerability to oil spill in these Sanctuaries: High

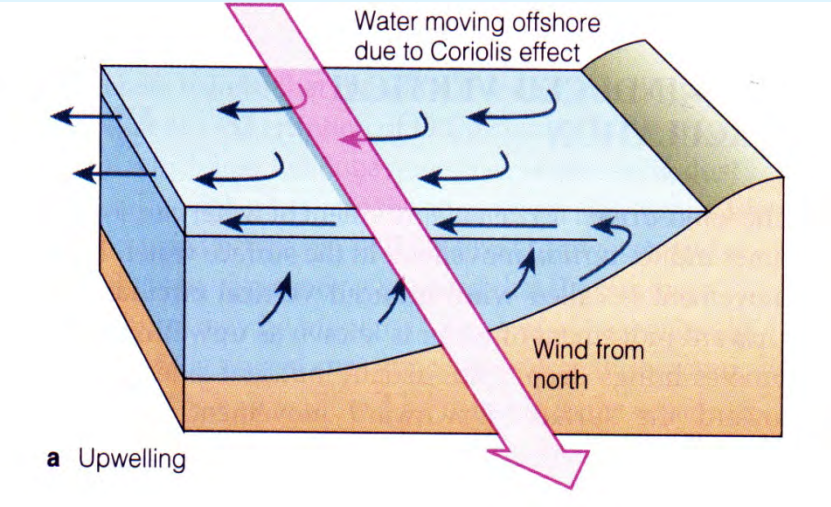
Marine Mammals

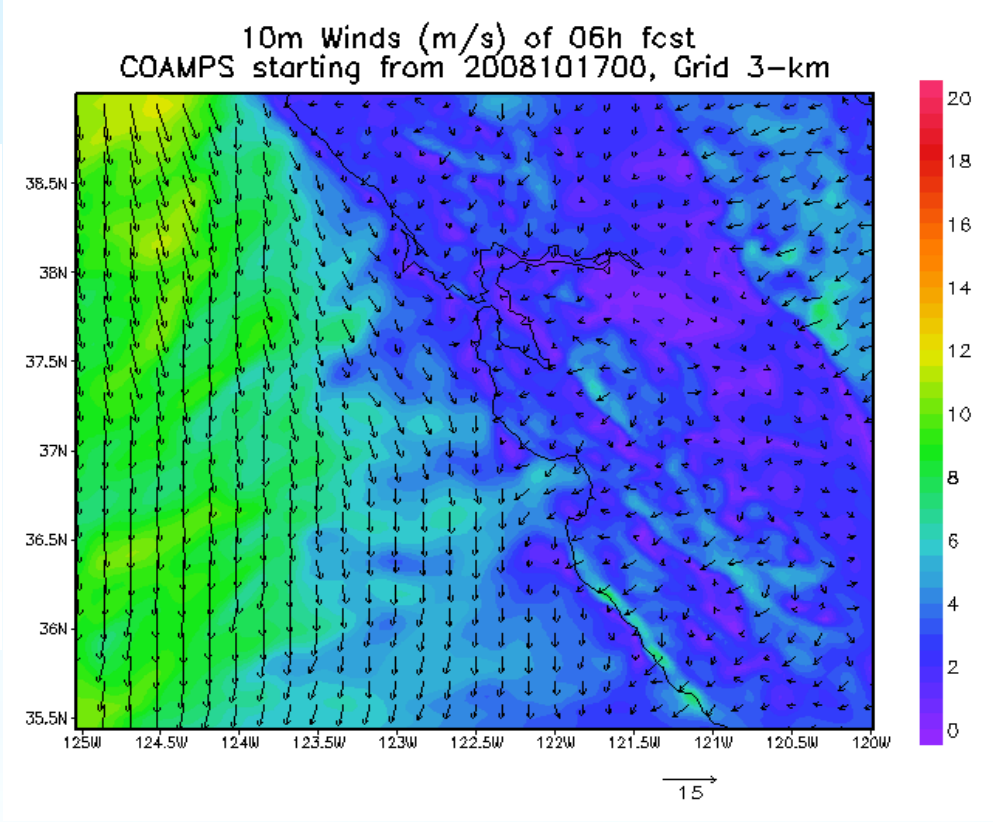
All breeding species are potentially vulnerable to oil spills because of nursing pups/calves that might ingest oil and because most species congregate during feeding.

The species most vulnerable to exposure to oil are those that rely on fur for insulation including sea otters and fur seals.

Oceanography of North-Central California

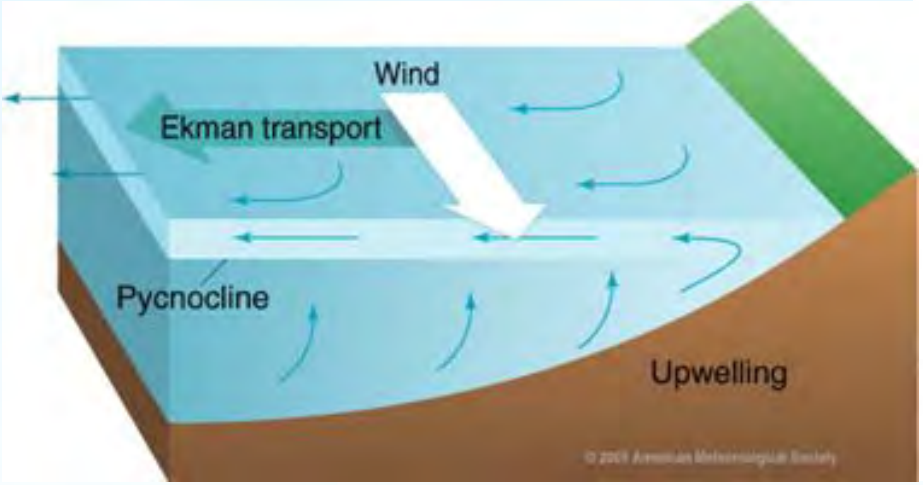
Transport of surface oil and dispersed oil may be different based upon wind and current patterns at the time of the spill. (e.g. dispersed oil and surface oil may move in different and even opposite directions)

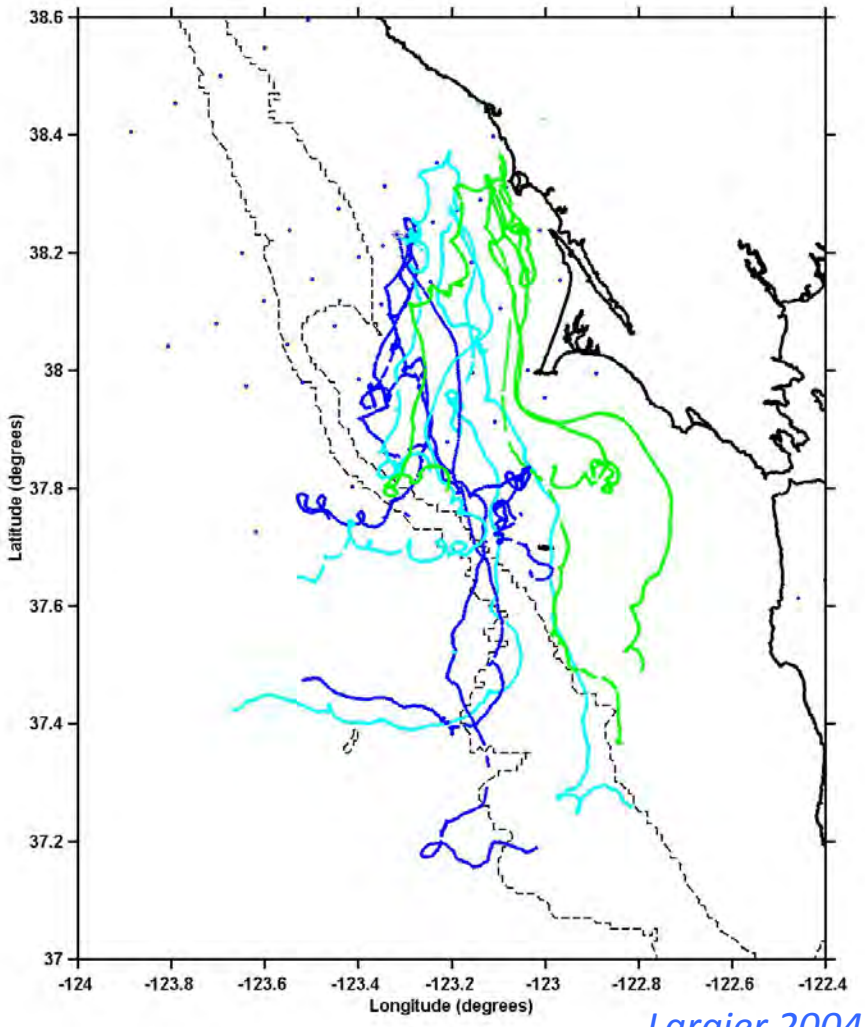




Oceanography of North-Central California

During times of **upwelling**, it is expected dispersed oil will remain in the upper water column where it will experience dilution carries the water south and away from the coast.

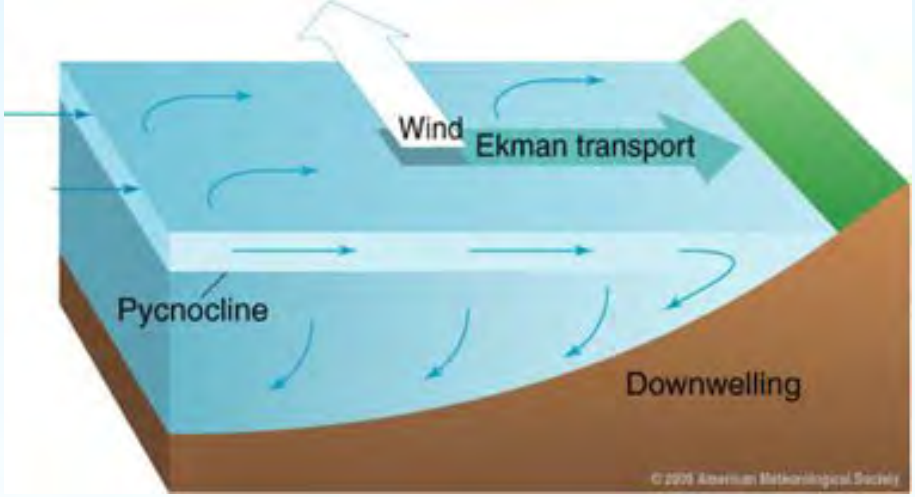


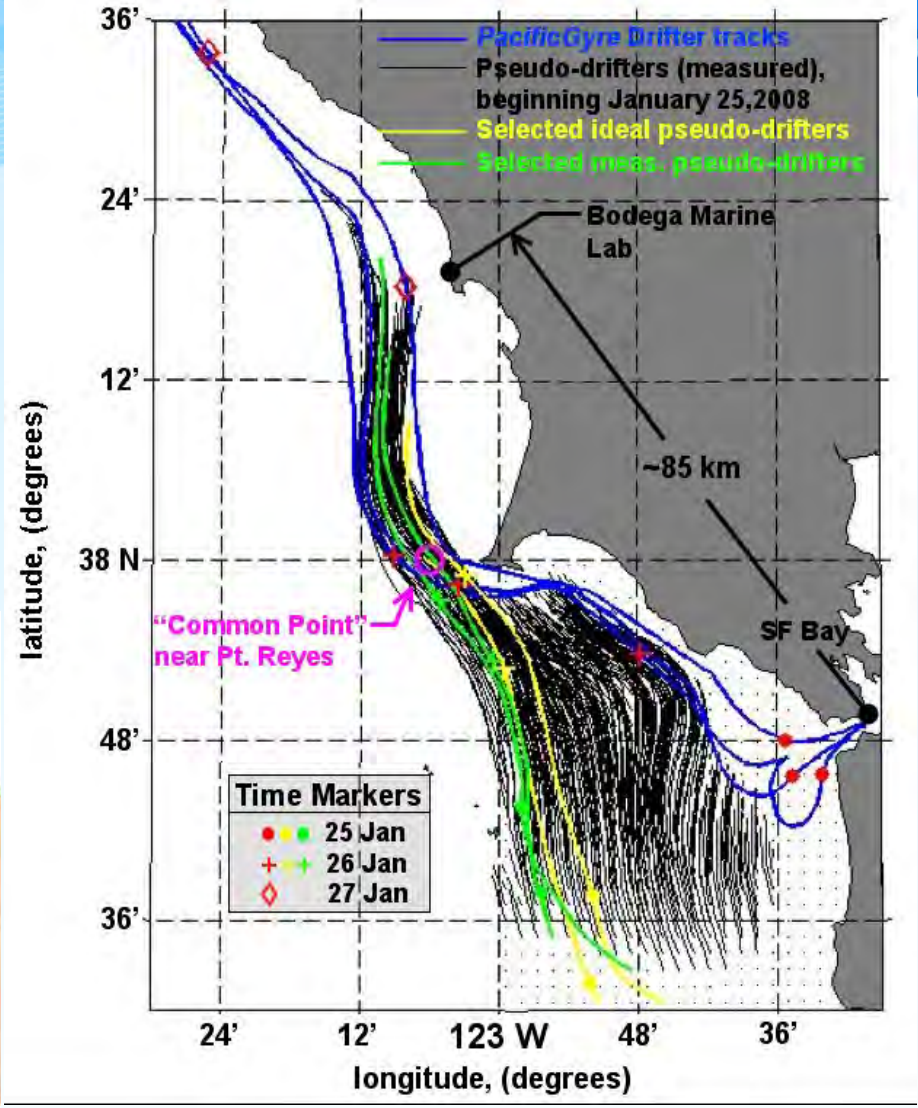


Largier 2004

Oceanography of North-Central California

During times of **downwelling**, dispersed oil will travel into the nearshore zone and will be driven deeper into the water column where it will experience significant dilution.





General Science Recommendations (1 of 2)

- Support research and development of “next generation” dispersants and alternative spill response technologies.
- Support research to find more effective seagoing and coastal oil spill containment and sorbent booms, skimmers, separators, and “oil mop” types of petroleum recovery devices for use in Sanctuaries.
- Identify existing sources of real-time data on surface and subsurface currents within the Sanctuaries.
- Identify the seasons and species that use GFNMS and CBNMS in substantive numbers where an oil spill and/or dispersed oil could have significant long-term impacts on the viability of the population.
- Identify research on effects of inhalation and exposure of dispersed and non-dispersed oil on wildlife.

General Science Recommendations (2 of 2)

Support research on:

- effects of dispersed oil on fish and invertebrate egg and larvae.
- reproductive success and behavioral effects of dispersed oil on abalone.
- effects of dispersed oil on important commercial/public trust resources.
- species of concern affected by oil/dispersants, especially in winter.

Support research that includes:

- standardization of dispersant toxicity studies for inter-comparability.
- maximizing dispersant efficacy while minimizing potential toxicity.
- feather and fur wetting effects by realistic conc. of dispersed oil.
- toxicity testing of species of concern to update species sensitivity curves.

General Education Recommendations

- Establish annual coordination meeting on coordinating the San Francisco Bay-Delta Contingency Plan pre-spill planning with the Sanctuary roles/response coordination.

- Develop an oil spill and response outreach plan for county and local governments that border the Sanctuaries to raise awareness and establish pre-spill working relationships.

- Provide annual briefing to SAC members on spill modeling, cleanup technologies, dispersants exposure research, non-toxic dispersant development or any emerging news on oil spill response technologies.

General Policy Recommendations

- Seek funding to complete the SW ERMA placing a priority on the GFNMS and CBNMS and in the process of building data sets for highest priority/most sensitive species at risk during an oil spill.

- Develop a standing policy that provides for using commercial fishermen in response and clean-up which takes advantage of local knowledge and expertise to most effectively deploy response assets.

- Support the development of a specialized NEBA within Sanctuaries that focuses on specific resources, physical events, and sensitive habitats that support species known to be highly sensitive to oil spills.

Specific Sanctuary Recommendations

- The SAC recommends a precautionary approach to any incident response technology.
- Response decisions require a proof of need given the productivity and sensitivity of the Sanctuaries.
- Consider a policy of no-aerial spraying area within one mile of the Farallon Islands, and other sensitive habitats.
- Attention needs to be given to the Sensitive Species Matrix (Appendix V).
- Provisions need to be made to review additional data collection needs and updating of the matrix.
- Consider human health effects of oil and dispersed oil on responders and general public.

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QUESTIONS?