Human Health and Water Quality Impacts of Marine Debris

Assembly Committees on
Environmental Safety & Toxic Materials and
Natural Resources

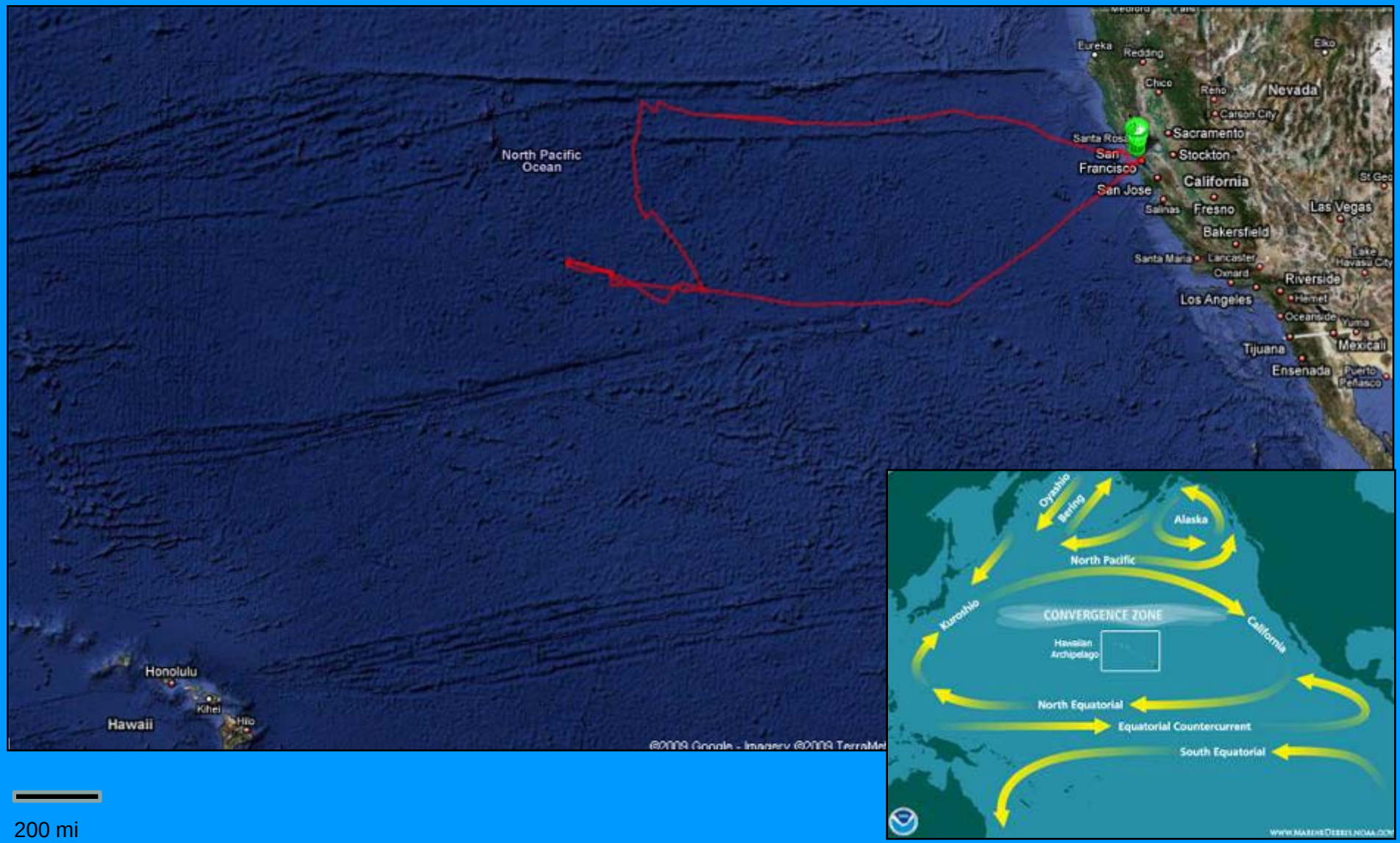
Informational Hearing on
Marine Debris, Its Impacts, and Strategies for Its Reduction

November 17, 2009

Margy Gassel, Ph.D.
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

The Path of the *S/V Kaisei*

August 4 – August 31, 2009



200 mi

S/V Kaisei

Thermo
TRACE GC ULTRA
Thermo
TRACE GC ULTRA
DFS
Kimwipes

S

KAISEI

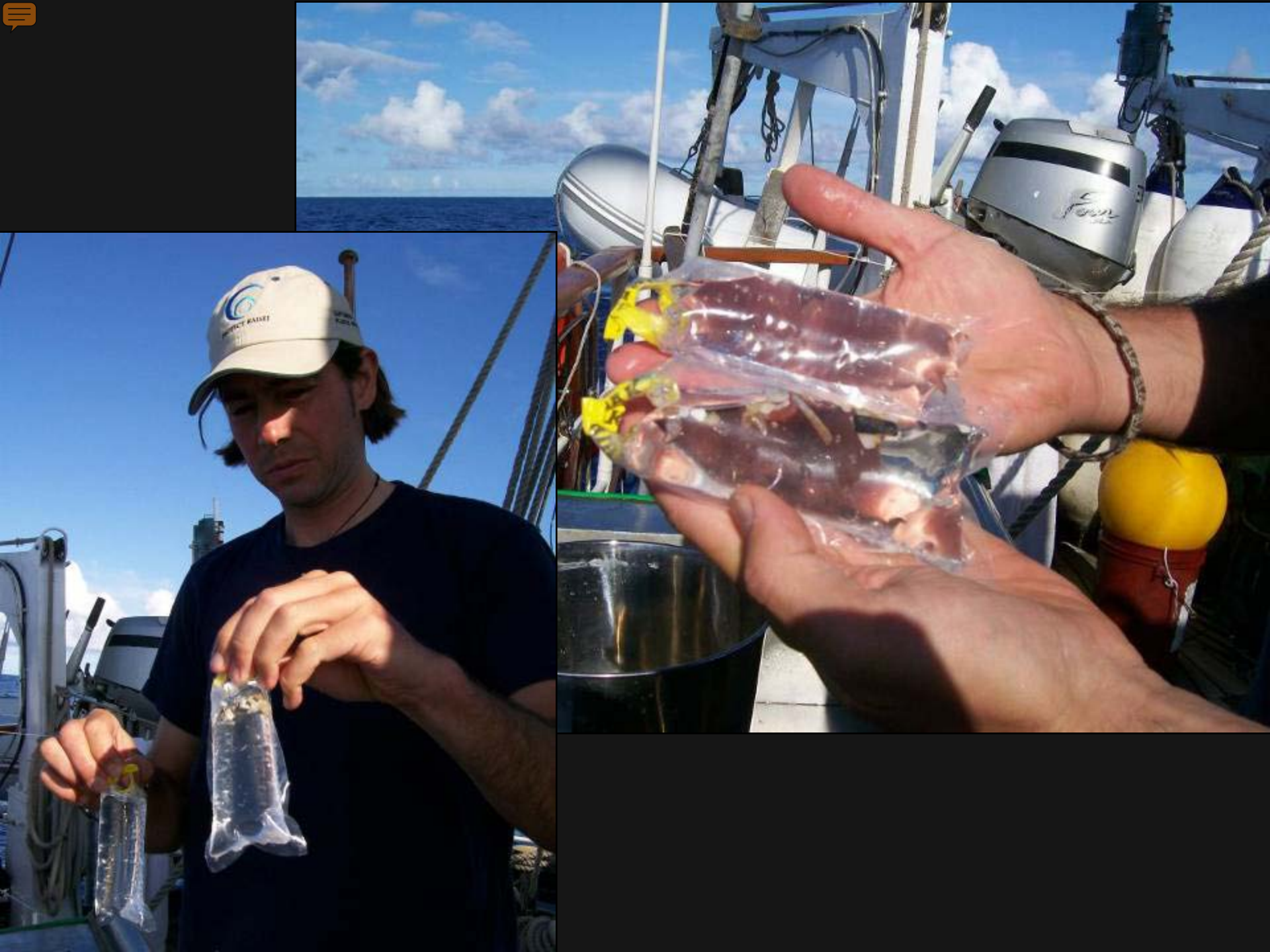
Cod end

5 mm

Yellowtail jack

Seriola lalandi

CAPTURING THE
PLASTIC VORTEX



Polymer Debris + Sunlight =

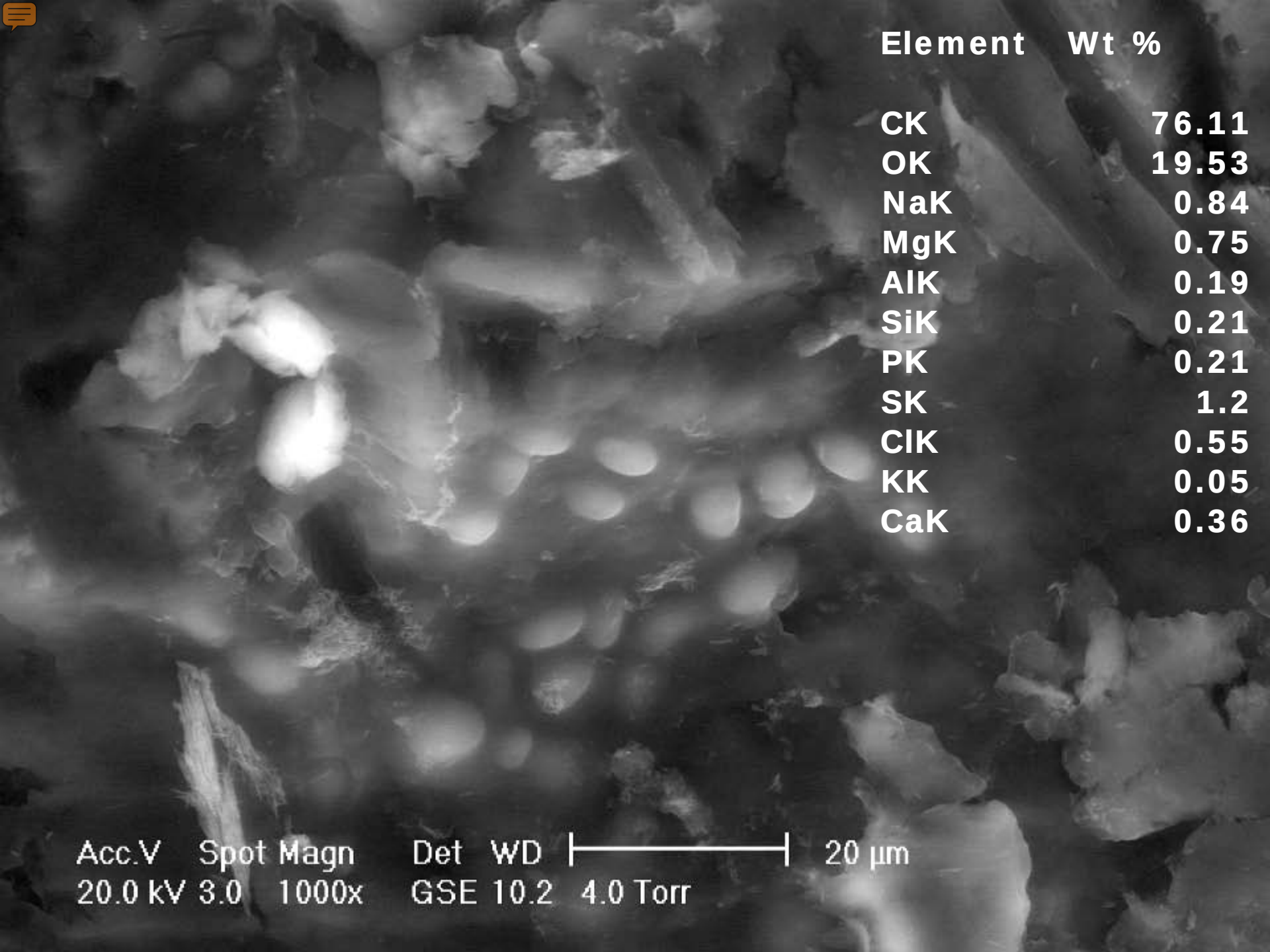
- Increased production of hydrogen peroxide in seawater
- Causes oxidative stress for organisms
- Affects organisms’ ability to detoxify reactive substances

Pre-production
plastic pellets

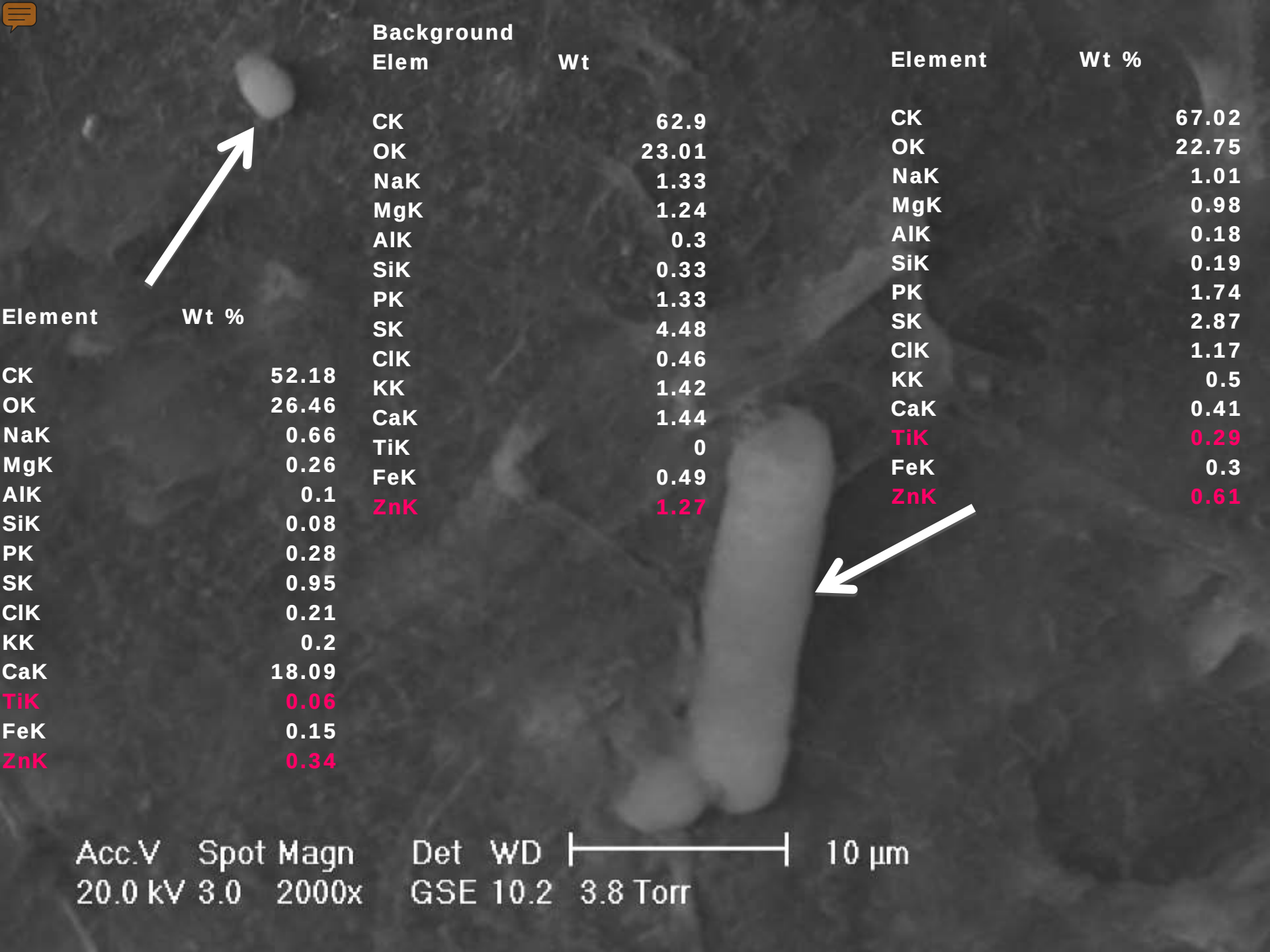
PCBs and DDE

Urbanization and pollution levels in the surrounding environment

Weathered pellet



Element	Wt %
CK	76.11
OK	19.53
NaK	0.84
MgK	0.75
AlK	0.19
SiK	0.21
PK	0.21
SK	1.2
ClK	0.55
KK	0.05
CaK	0.36



Element	Wt %
CK	52.18
OK	26.46
NaK	0.66
MgK	0.26
AlK	0.1
SiK	0.08
PK	0.28
SK	0.95
ClK	0.21
KK	0.2
CaK	18.09
TiK	0.06
FeK	0.15
ZnK	0.34

Background

Elem	Wt
CK	62.9
OK	23.01
NaK	1.33
MgK	1.24
AlK	0.3
SiK	0.33
PK	1.33
SK	4.48
ClK	0.46
KK	1.42
CaK	1.44
TiK	0
FeK	0.49
ZnK	1.27

Element	Wt %
CK	67.02
OK	22.75
NaK	1.01
MgK	0.98
AlK	0.18
SiK	0.19
PK	1.74
SK	2.87
ClK	1.17
KK	0.5
CaK	0.41
TiK	0.29
FeK	0.3
ZnK	0.61

Marine salp ingesting plastic debris

Appendix 2. *Continued.*

Species	*I/E*	*Material*	*Location*	*Source*
Red phalorope, *Phalaropus fulicaria*	I+	Plastic fragments, polystyrene, plastic particles	N. Atl.: N. Carolina N. Pac.: California	Moser and Lee 1992 Conners and Smith 1982; Robards et al., Chapter 6, this volume
Antarctic skua, *Catharacta maccormicki*	I−/E?	Fishing line in mouth and around neck	S. Ocean S. Pac.	Slip 1990 Robards et al., Chapter 6, this volume
Tristan skua, *Catharacta skua hamiltoni*	I−	Plastic particles	S. Atl.: Gough Is.	R.W. Furness 1985a
Great skua, *Stercorarius skua*	I+	Plastic particles	S. Atl.	Ryan and Fraser 1988
Long-tailed jaeger, *Stercorarius longicaudus*	I−	Plastics	N. Atl.: N. Carolina	Moser and Lee 1992
Parasitic jaeger, *Stercorarius parasiticus*	I−	Plastics	N. Atl.: N. Carolina	Moser and Lee 1992
Pomarine jaeger, *Stercorarius pomarinus*	I	Plastics	N. Atl.: N. Carolina	Moser and lee 1992
Laughing gull, *Larus atricilla*	I/E	I: Plastics E: Monofilament line, six-pack yokes	N. Atl.: Florida N. Atl.	Below 1979
Black-headed gull, *Larus ridibundus*	E+	Fishing line, fishhooks, string, wire, fishing net	N. Atl.: Brit. Isl.	Onions and Rees 1992
Bonaparte's gull, *Larus philadelphia*	I+	Plastic fragments Plastic particles	N. Atl.: N. Carolina Eastern Canada	Moser and Lee 1992 Braune and Gaskin 1982
Heermann's gull, *Larus heermanii*	I	Pellets and plastic fragments	N. Pac.: California	Baltz and Morejohn 1976
Mew gull, *Larus canus*	I	Plastic fragments	N. Pac.: California N. Atl.: North Sea	Baltz and Morejohn 1976; Robards et al., Chapter 6, this volume; Vauk-Hentzelt 1982
Herring gull, *Larus argentatus*	I/E+	I: Plastic bags, stryofoam, cellophane E: Fishing line, string, fish hooks, wire, six-pack yokes	N. Atl. N. Atl.: Brit. Isl.	Day et al. 1985; Vauk-Hentzelt 1982 Onions and Rees 1992
Western gull, *Larus occidentalis*	I−/E	I: Plastic E: Fishing line	Not identified N. Pac.: California	H. Ogi (cited in Day et al. 1985) Jameson 1986
Glaucous-winged gull, *Larus glaucescens*	I−	Plastic fragments	N. Pac.	Baltz and Morejohn 1976

Lantern fish

Family Myctophidae

Lantern fish

Sample size range: 20-100 mm total length

Yellowtail Jack

Sale! $5.99
SHIKAI
HENNA GOLD
Organics
alba
GPB
JASON
20% Off!
20% Off!
20% Off!

Mediah

The Future?

- **Decreased use of single-use, disposable products**
- **Decreased production of non-biodegradable plastic products and decreased use of harmful chemicals**
- **Increased recycling via incentives or mandates for consumers and businesses**