



2014 FDA Testing of Alaska Fish for Fukushima Radiation

Dr. Bob Gerlach – Dept. of Environmental Conservation
Dr. Ali Hamade – Dept. of Health and Social Services

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Cs-134

Fukushima Background

- March 2011 – Tsunami and earthquake precipitate a nuclear accident in Fukushima, Japan
- In 2011, state and federal agencies in Alaska issued joint press release indicating safety of wild foods
- Concerns remain of fish contaminated with Fukushima-related radiation
 - Tribal and nontribal concerns over food safety
- DEC and DHSS set up websites to explain radiation monitoring, exposure, and health risk

Sr-90

Cs-137

Insufficient Explanation

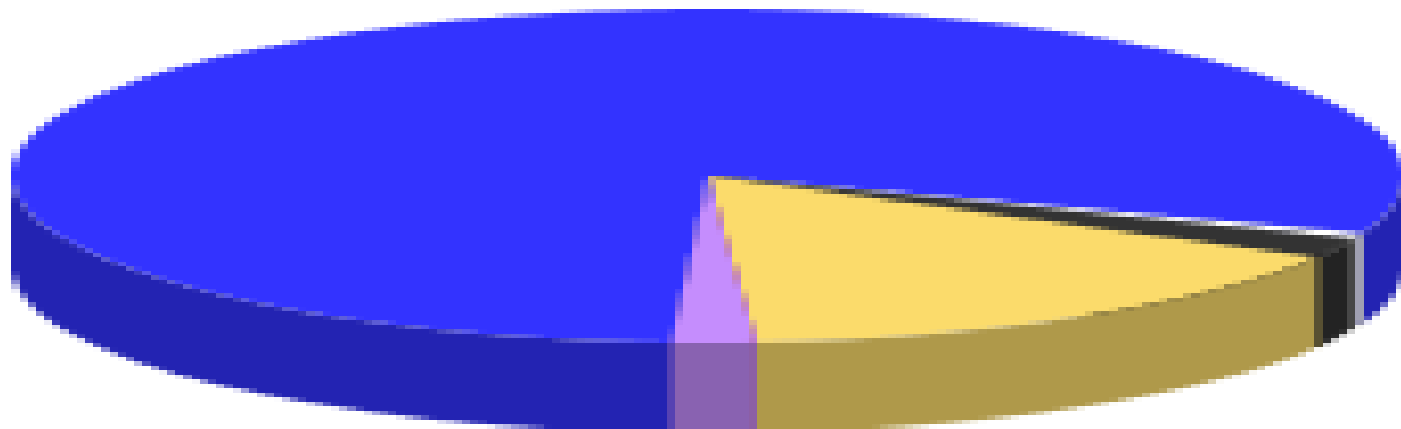
Alaskans demanded testing of fish despite signs from other Pacific states and Canada that Alaska water and fish were unlikely to have been affected

FDA planned to evaluate migratory species of fish: North Pacific Albacore Tuna, Pacific Bluefin Tuna, Pacific Salmon

Public demanded more from the commercial industry

Average Commercial Fishing Harvests 2008-2012

- Groundfish* = 4.0 Billion lbs.
- Shellfish = 92.6 Million lbs.
- Dive = 2.6 Million lbs.
- Salmon = 790.7 Million lbs.
- Herring = 91.4 Million lbs.
- Halibut = 38.4 Million lbs.



Fukushima



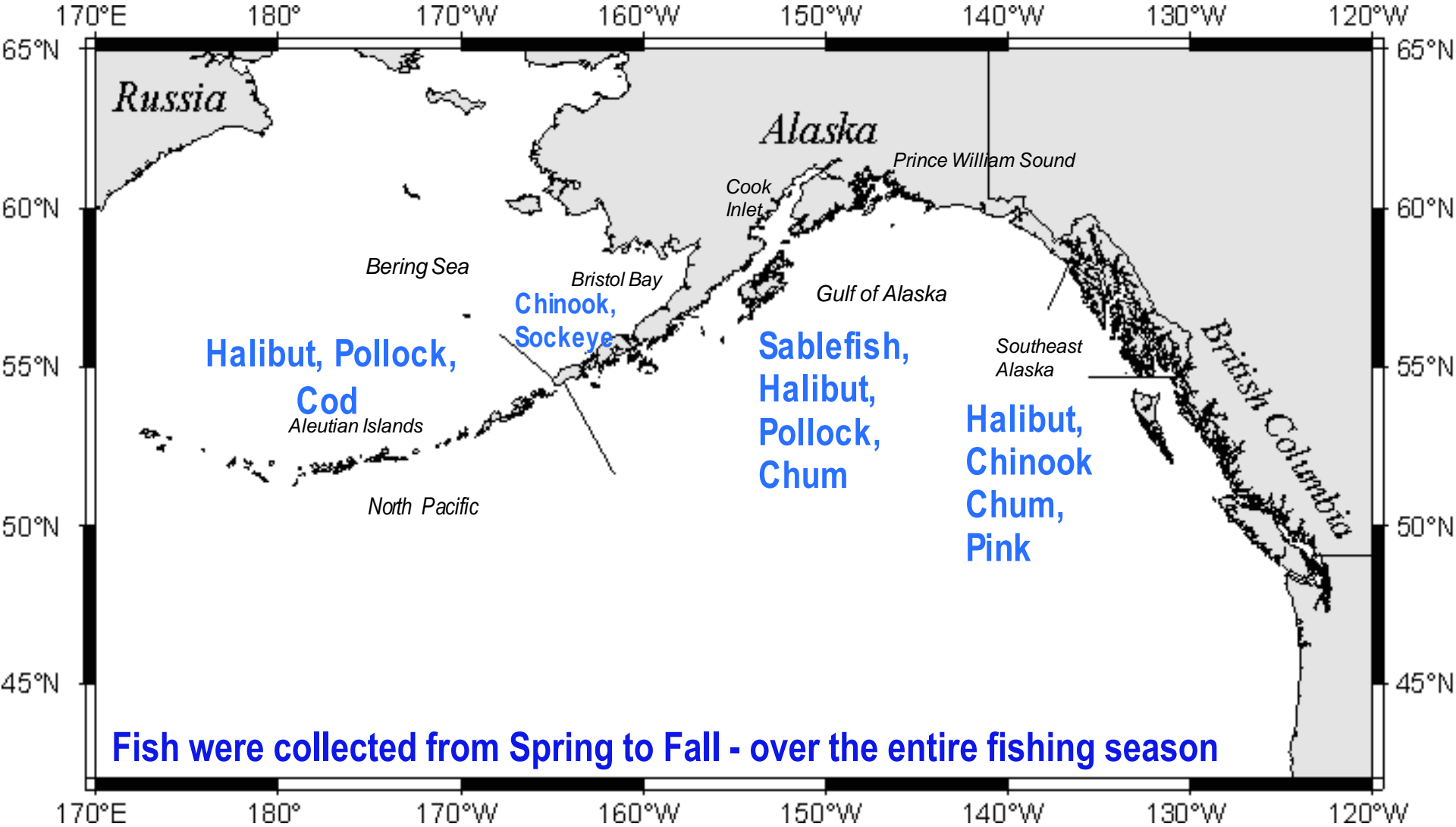
- DEC and DHSS initiated an interagency workgroup call with all Pacific states, Canada, federal agencies, tribal agencies, and academics
 - Compile public concerns
 - Compare biota and other media for radionuclides
- Interagency workgroup helped connect with FDA and researchers testing for Fukushima-related radionuclides

Alaska – FDA Project

DEC Division of Environmental Health Fish Monitoring and Food Safety and Sanitation programs worked with FDA and commercial fisheries

- Fish samples collected using FDA statistical protocols
- Composite samples (4 – 10 fish/sample) = 4lbs
- FDA Standard analytical techniques

Where were samples collected?



What was measured?

- I-131 (Iodine)
- Cs-134 (Cesium) (Short life – usually indicated fresh release)
- Cs-137 (Cesium) (Long life – can indicate old or fresh release)
- K-40 (Potassium)

Results

- No detections of Fukushima-related radionuclides (I-131, Cs-134, Cs-137)
- Detections of only naturally occurring radionuclide Potassium-40 (K-40)

Area	Species	I-131	MDC*	Cs-134	MDC*	Cs-137	MDC*
Aleutian / Bering Sea	Pollock	ND	3.55	ND	2.12	ND	2.06
	Halibut	ND	3.00	ND	1.93	ND	1.82
	Pollock	ND	3.86	ND	2.56	ND	1.97
	Pollock	ND	6.13	ND	2.00	ND	2.01
	Cod	ND	3.71	ND	2.42	ND	1.98
Bristol Bay	Chinook	ND	3.71	ND	2.08	ND	1.88
	Sockeye	ND	3.39	ND	1.92	ND	1.64

*Minimum Detectable Concentrations = analytical detection limits (Bq/kg)

Results

Area	Species	I-131	MDC*	Cs-134	MDC*	Cs-137	MDC*
Gulf of Alaska	Sablefish	ND	2.11	ND	1.96	ND	1.68
	Sablefish	ND	2.72	ND	2.31	ND	1.86
	Halibut	ND	2.67	ND	2.13	ND	1.94
	Halibut	ND	2.34	ND	1.75	ND	1.51
	Pollock	ND	3.41	ND	1.88	ND	1.77
	Pollock	ND	5.92	ND	2.07	ND	1.74
	Chum	ND	5.97	ND	2.23	ND	1.76
	Chum	ND	5.29	ND	1.88	ND	1.72
Southeast	Halibut	ND	3.31	ND	1.81	ND	1.67
	Halibut	ND	6.07	ND	1.94	ND	1.91
	Chinook	ND	5.05	ND	1.8	ND	1.79
	Chum	ND	9.99	ND	1.8	ND	1.4
	Pink	ND	10.61	ND	2.08	ND	2.05

Are Alaskan fish safe to eat?

YES!

- No detections of Fukushima-related radionuclides
- Minimum Detectable Concentrations (MDCs = analytical detection limits) are significantly lower than FDA's Derived Intervention Levels (DILs)



FDA's Derived Intervention Levels (DILs)

Radionuclide Group

DIL (Bq/kg)

Iodine-131

170

Cesium-134 + Cesium-137

1,200

- FDA's Derived Intervention Levels (DILs) take into consideration:
 - Percent of food in diet
 - Amount eaten
 - Exposure time
 - Sensitive populations (infants & children)
- DILs are used by the FDA to determine whether a food presents a safety concern.
- FDA uses food-density corrected data to evaluate food safety

Cs-137 and Cs-134 Not Detected

1400

1200

Derived Intervention Level (FDA Level of Concern) 1,200

1000

800

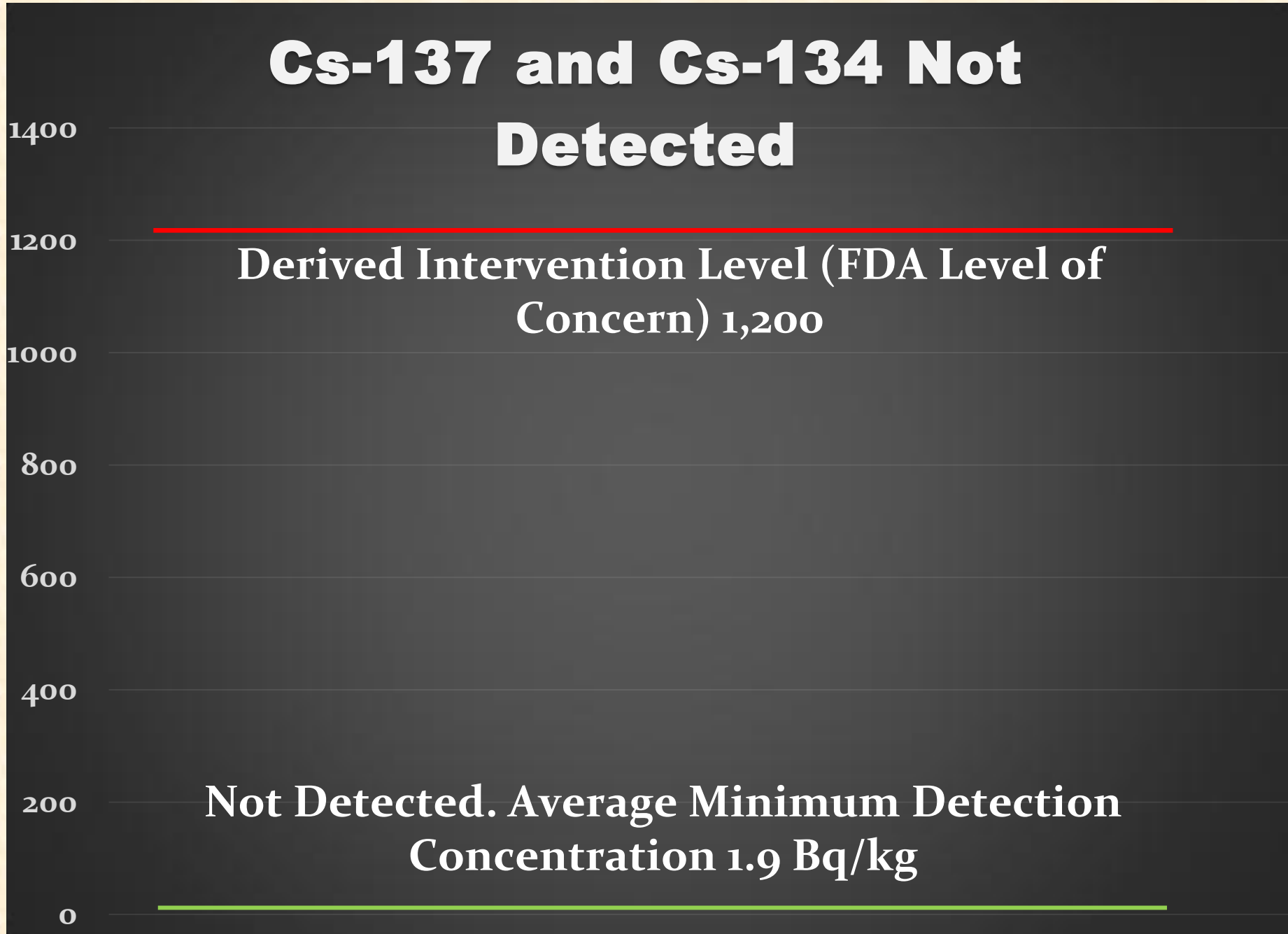
600

400

200

Not Detected. Average Minimum Detection Concentration 1.9 Bq/kg

0



What are the risks?

Is the FDA DIL protective of subsistence or upper end fish consumers?

- We assumed
 - 273 pounds (124 Kg) consumption of a variety of fish over a 70-year period
 - Radionuclide level was at the limit of detection of FDA analytical method
- We found
 - Excess cancer risk = 1 - 10 cancers in every 10,000,000 persons exposed (*i.e.*, very low)

There is no appreciable risk to Alaskans' health from Fukushima-related radionuclides in Alaska Fish

Marine Mammal Testing (North Slope Borough +UAF)

Analysis Result		Bq/Kg dry weight	
Sample	Location	Cs-134	Cs-137
Ringed Seal	North Slope, AK	<MDA	1.07
Bearded Seal	Little Diomedede, AK	<MDA	0.99
Ringed Seal	Point Lay, AK	<MDA	0.85
Ringed Seal	Hooper Bay, AK	<MDA	0.55
Ringed Seal	Shishmaref, AK	<MDA	1.34
Historical data (1996-97) (Cooper et al., 2000)			
Bearded Seal	North Slope+Canada	Not analyzed	0.8
Ringed Seal	North Slope+Canada	Not analyzed	0.6
Spotted Seal	North Slope, AK	Not analyzed	1.23

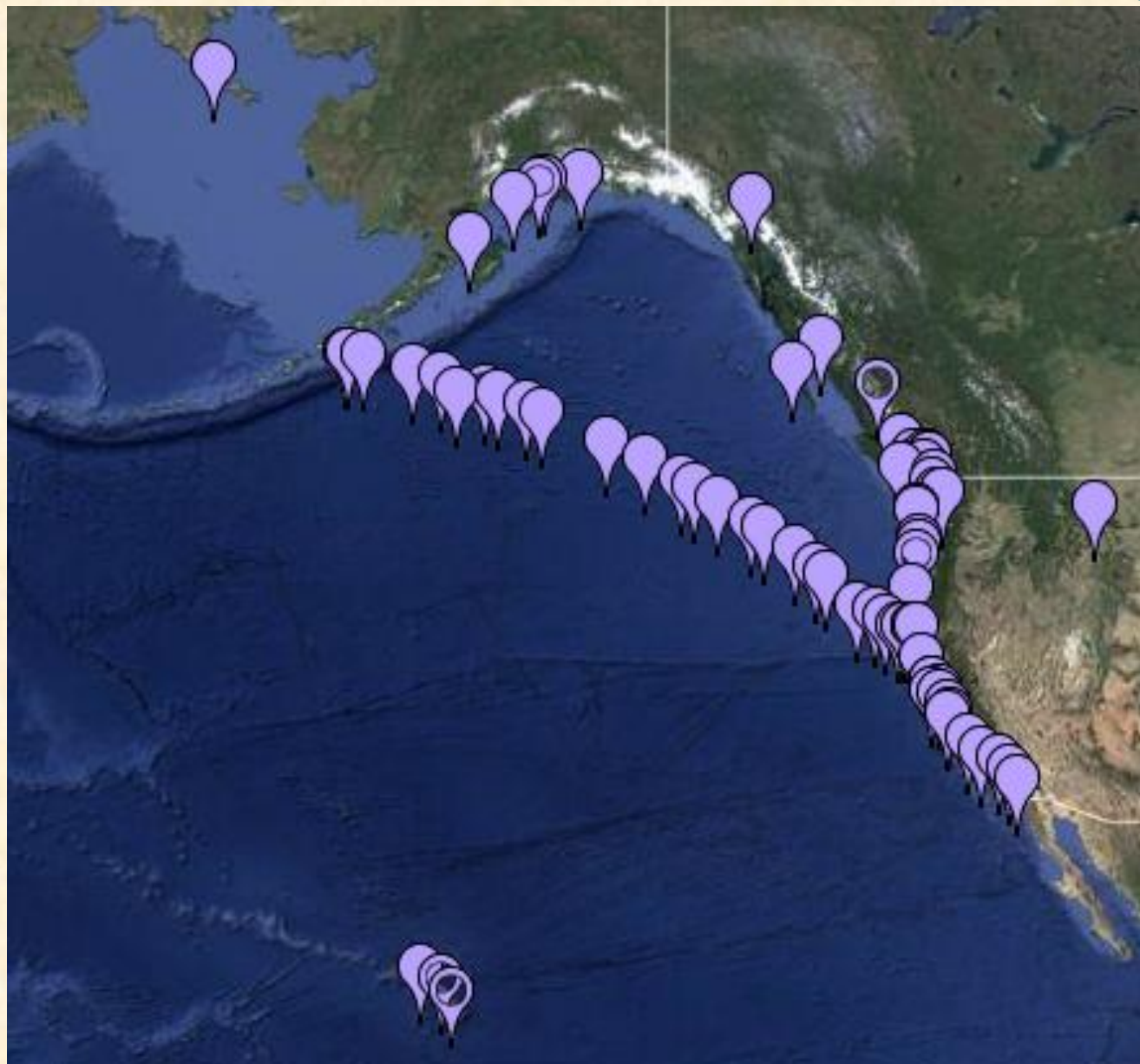
Dasher et al., 2011

What about Water?

Wood's Hole Crowd Sourcing efforts

- Collect a container of water, ship to California, get radiation test result for water
 - 5 Alaskan locations
(St Lawrence Is., Kodiak Is., Cook Inlet, Seward, Prince William Sound)
 - Dozens of other locations, mostly from Pacific Coast
- Detection Limits
 - 0.1 Bq/m³ for ¹³⁷Cs
 - 0.2 Bq/m³ for ¹³⁴Cs
 - EPA maximum acceptable level in drinking water = 7,400 Bq/m³)

Woods Hole 2014 Water Samples



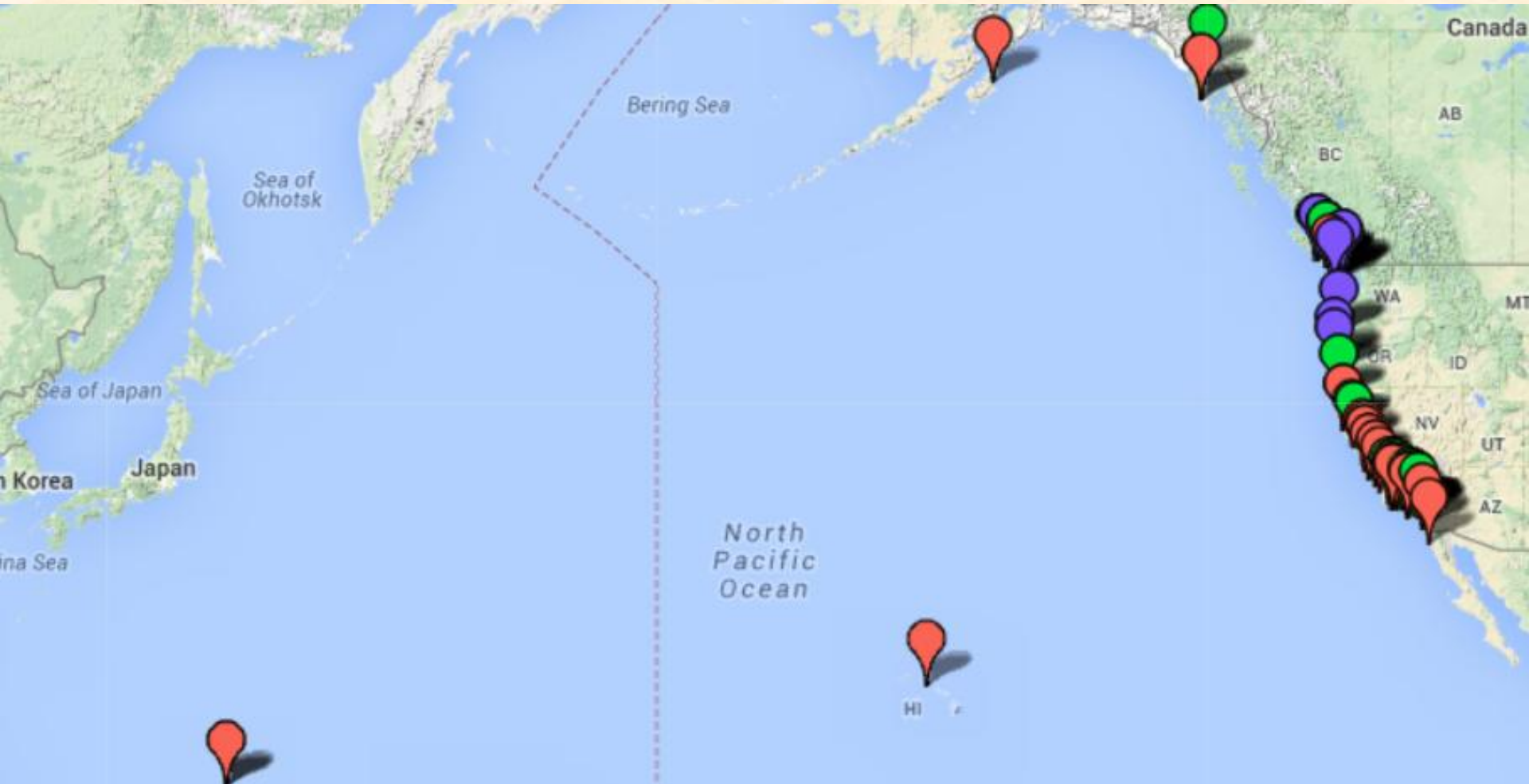
Alaska Water Results

- Nondetect for Cs-134
- Background for Cs-137
- Positive for Cs-134 at 100 miles from the Northern California Coast
 - Radiation level = $< 2 \text{ Bq/m}^3$ [lower than the EPA drinking water standard = $7,400 \text{ Bq/m}^3$]

KelpWatch

- California researchers test kelp samples for radiation
 - Mostly samples from the Pacific Coast states, including Alaska
- Marine brown seaweeds are known to concentrate Cesium (Cs) and Iodine (I) into their tissues among many other elements.
 - *Macrocystis* tissue Cs levels are 20x that of its concentration in seawater
- If you send them a kelp sample, they will analyze it for free

KelpWatch – No signs of Fukushima in >80 Samples



Fukushima-related Radiation expected to peak in US marine waters in 2015

Will there be continued monitoring?

- Peak activity North Pacific predicted → 3 to 5 Bq/m³ (EPA safe drinking water limit = 7,400 Bq/m³)
- **Fish sampling** – Collaborative Effort with FDA again in 2015
 - Sampling of 20 samples across Alaska
 - Same target species of fish
 - Collection time and location dependent on DEC inspectors schedules
 - Plan to collect over the entire fishing season

Summary

- Based upon exposure & detection levels, there is no public health concern for Alaskans.
- DHSS and ADEC continue to do public outreach & education
- Continued assessment of the situation
 - Federal agencies - NRC, NOAA, EPA, & FDA
 - Alaska state agencies - ASMI, DHSS, DF&G, NSB
 - Pacific States
 - Academic and Private Institutions

Contacts

Bob Gerlach, VMD
Alaska Department of Environmental
Conservation (ADEC)
Division of Environmental Health
Office of the State Veterinarian
Bob.Gerlach@alaska.gov

Clyde E. Pearce, RHS
Alaska Department of Health & Social
Services (DHSS)
Division of Public Health
Radiological Health
Clyde.Pearce@alaska.gov

Ali Hamade, Ph.D.
Alaska Department of Health & Social
Services (DHSS)
Division of Public Health
Section of Epidemiology
Ali.Hamade@alaska.gov

Marlena (Marty) Brewer
Alaska Department of Environmental
Conservation (ADEC)
Division of Environmental Health
Marlena.Brewer@alaska.gov

