

Case Study: Managing Catastrophic Risk

Loss of the M/V Selendang Ayu

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December 8, 2004: The Selendang Ayu runs around

On December 8, 2004, the freighter *M/V Selendang Ayu* lost power while traversing the Aleutian Islands in a severe storm and ran aground after 53 hours adrift.



Loss of the *M/V Selendang Ayu*

- Six crewmen died during the rescue.
- 336,000 gallons of heavy fuel oil.
- 60,000 tons of soybeans.
- 2nd worst oil spill in Alaska history.
- 70 miles of shoreline were oiled.



- The vessel loss cost to insurers was \$12 million,
- The cleanup cost was \$100 million
- A fine of \$10 million was levied against the owners



Stills
from the
video



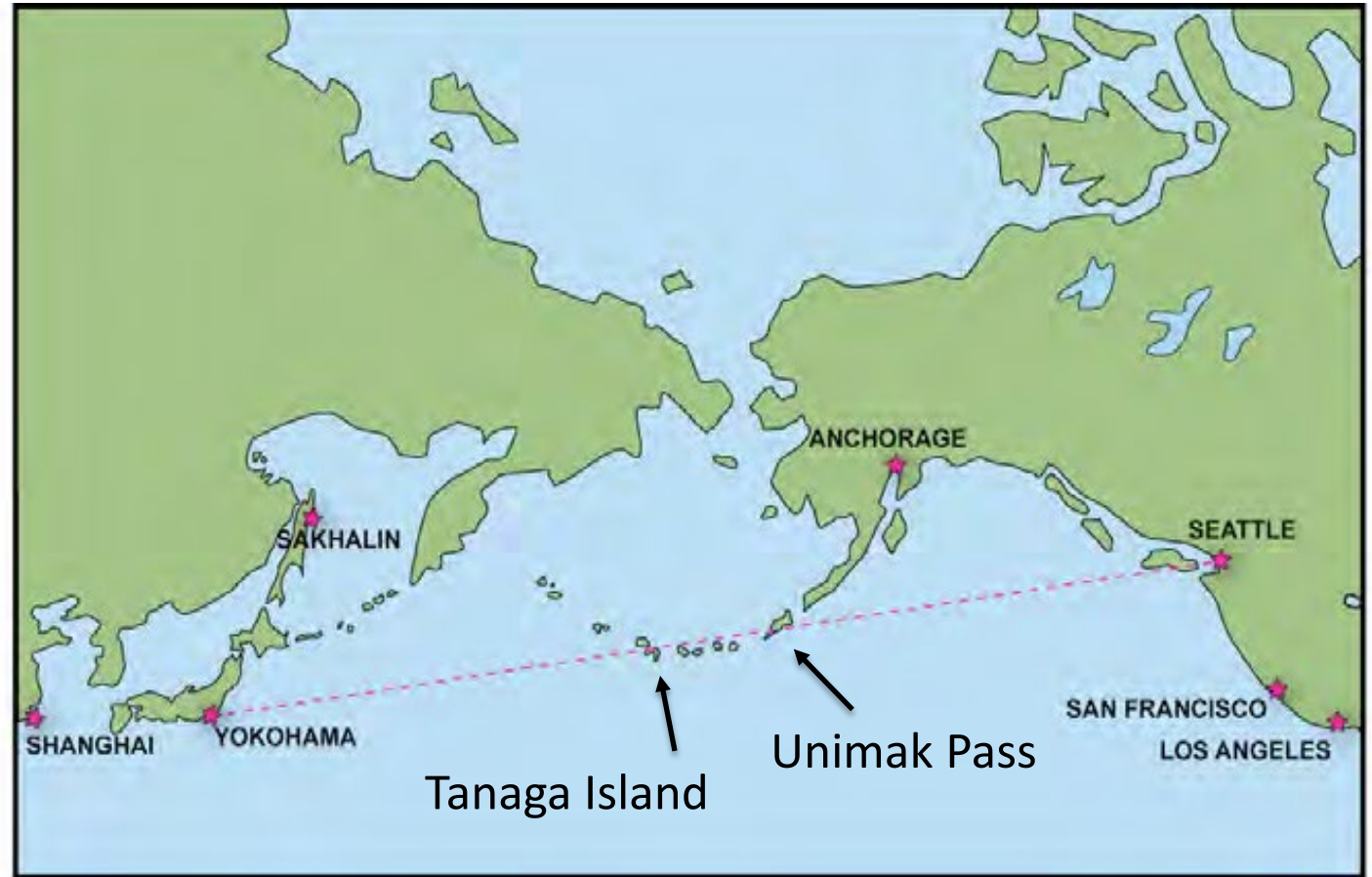
Shipping Route

\$3 Trillion in global trade

- 5,000 – 7,000 ships pass through annually
- Projected growth by 80% by 2040

\$1 Billion in local economy

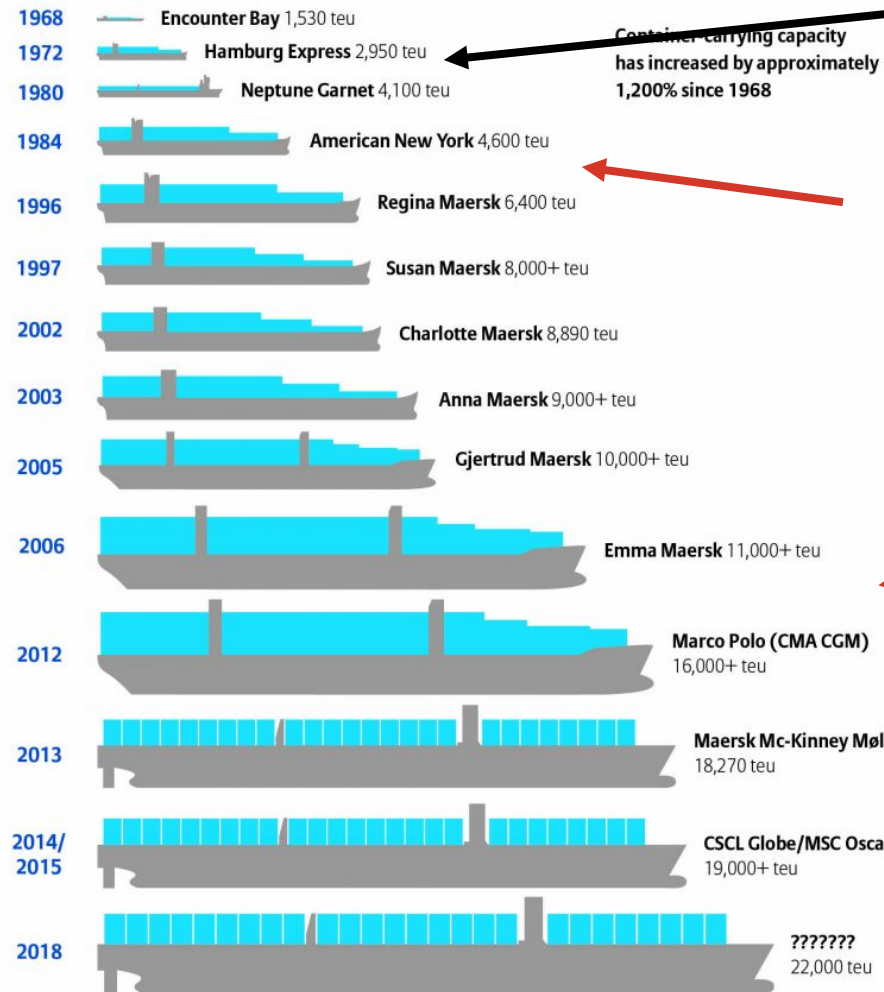
- Most fertile fishing area for the USA



International Treaty → “Innocent Passage”, states that vessels moving between two non-U.S. ports, crossing through U.S. waters, are not subject to U.S. maritime regulations

Size of Ship

50 years of Container Ship Growth



M/V Selendang Ayu
212 Meters

Panamax

Neopanamax

OOCL: 21,000 TEUs

Chronic vs. Catastrophic (2011-2013)

Average loss (minus catastrophic events):

- 300-675 containers lost at sea per year

Catastrophic events (2 events):

- 4,293 containers loss (*MOL Comfort*)
- 900 containers loss (*M/V Rena*)



The Ship Owner: Loss of the vessel

Hull insurance covers the ship

Motivation: recover the recovery of their physical assets



Insured Hull Value ~\$13 million

The Crew: Injury and Death

Personal and Indemnity insurance: Six crew lost their lives

Motivation: Might get fired for late deliveries and hold up the global supply chain



Actuarial value of a life:

- \$9.1 million (US Environmental Protection Agency, 2010)
- \$7.9 million (US Food and Drug Administration, 2010)

Personal and Indemnity Insurance: ~\$ 7 M

The Shipper: Cargo

Cargo value is based on what's inside it.

Motivation: Shipper buys insurance for their own cargo

Insured cargo value (Panamax ship) ~\$130 Million



Item	Low (per container)	High (per container)
Sports Shoes	\$ 350,000	\$ 2,520,000
Toys (low quality)	\$ 60,000	\$ 720,000
Consumer electronics (small)	\$ 170,000	\$ 430,000
Ship Value Range (Panamax):	\$ 84 Million	\$ 3,528 Million
Ship Value Range (Triple E):	\$ 540 Million	\$22 Billion

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USA federal
gold reserves:
\$11 Billion



The Locals: Costal Damage

Potential of economic damage: 2003 Landings by U.S. Port, ranked by pounds

Rank	Port	Millions of Pounds	Millions of Dollars
1	Unalaska/Dutch Harbor, Alaska	908.7	156.9
2	Empire-Venice, LA	400.0	50.8
3	Reedville, VA	375.3	24.2
4	Introcoastal City, LA	325.2	21.5
5	Kodiak, Alaska	262.9	81.5

Costal Damage: \$100 million cleanup

- ~300,000 gallons spilled
- ~ \$11 million in fines and cost recovery

Exxon Valdez: \$7 billion cleanup

- 11 million gallons spilled,
- \$1B in fines and cost recovery



Aggregated Risks

- Loss of Cargo → Affects clients (individually) ~\$130 M
- Loss of life → Affects the crew ~\$7 M
- Loss of ship → Affects the ship owner ~13 M
- Costal damage → Affects local fisheries ~100 M + long-term damage
- Fines → From the Govt to Owners ~\$10 M

Insurers protect themselves by dis-aggregating the risk components.

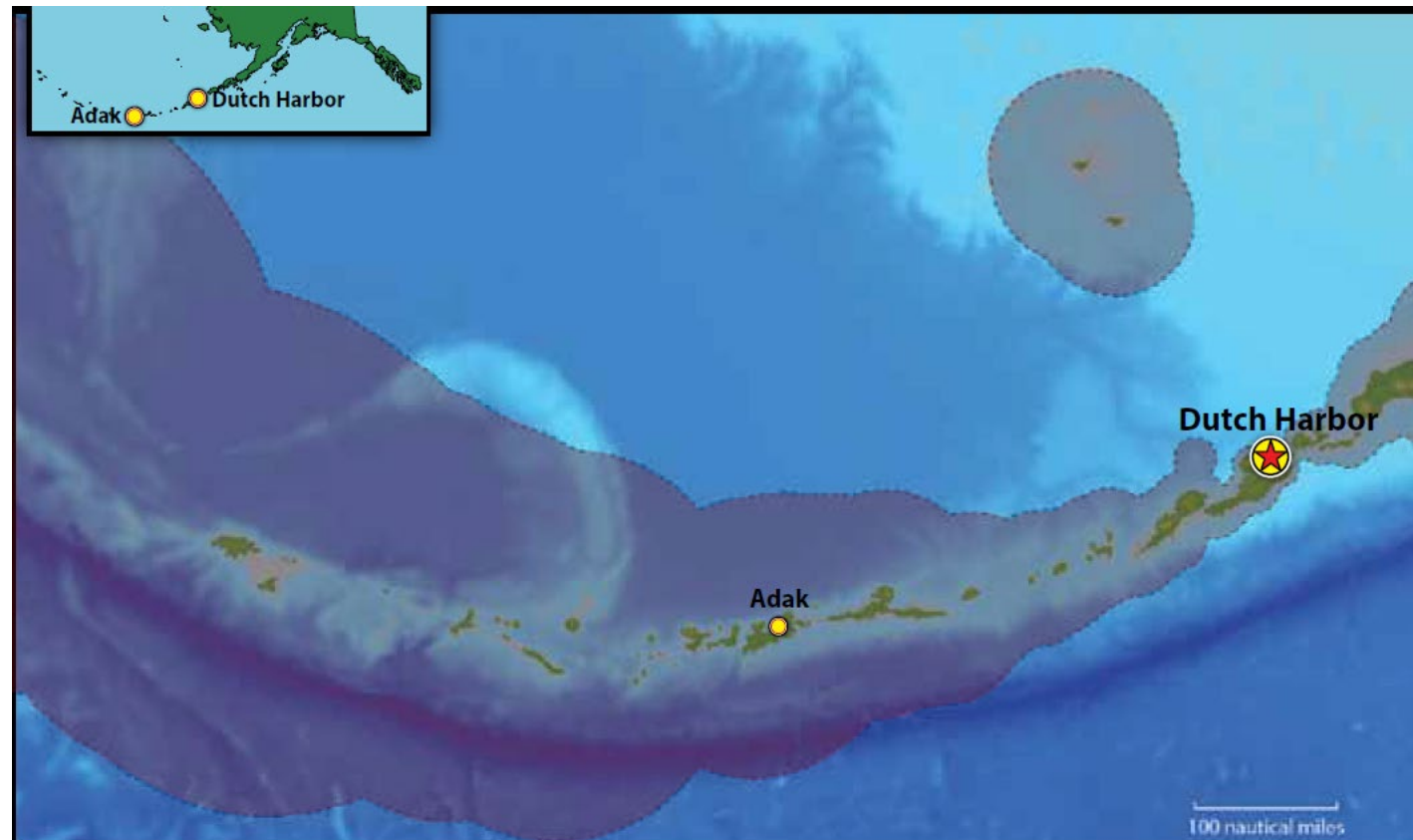
Is any stakeholder responsible for overall safety of all groups?

Overall Responsibility: US Coast Guard

- USCG's mission to protect the U.S. economic interests and the environment.
- How do you balance increasing trade AND minimizing damage?

Shaded area:
“Zones of No Save”

Ships will drift onto shore before a tug could intercept them from Adak or Dutch harbor.



Optimal Response System for the Aleutian Islands

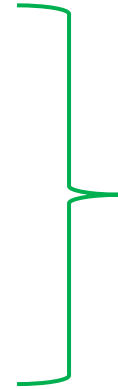
1. Preparation
2. Incident Prevention
3. Early Warning



4. Strategic Activation



5. At-Sea Intervention
6. Damage Mitigation
7. Oil Spill Response
8. Long-Term Management



Prevention and compliance



Incident Operations

Annual System Costs

Recommended Optimal Response System

**\$13.6
Million**



Full Implementation of Federal Regulations

**\$42.7
Million**



- Managing Entity
- Prevention
- Salvage
- Towing
- Spill Response

Figure 11. Comparison of the estimated total, annualized cost of the recommended Optimal Response System and the estimated total, annualized cost of fully implementing federal regulations in the Aleutian Islands for tank vessels (Nuka Research et al., 2013).

Points

- Incremental risk management has an exponential cost.
- When you are in a closed system, there will always be the risk of catastrophic failure.
- “Net Zero” or “Carbon Offset” strategies presume an open system – not entirely helpful for long-term sustainability.
- Prevention of risk is always cheaper than cleanup.



Questions?