

U.S. Polar Icebreaker Fleet & Arctic Change



Homeland
Security

Ice diminished Arctic Symposium

11 July 2007

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Icebreaker 😊



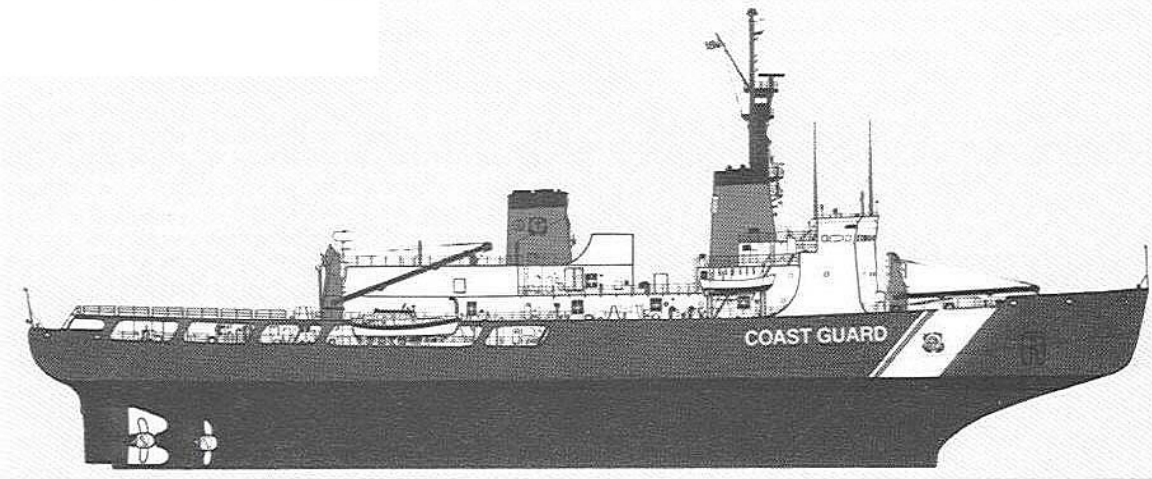
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Other Techniques

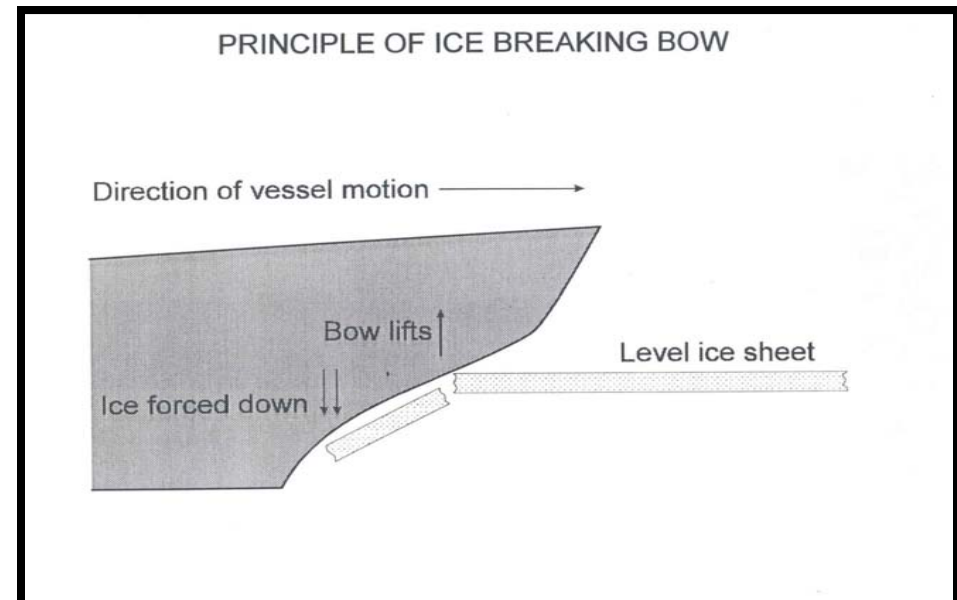


Polar Icebreaker Design Features

1. Sloping bow causes flexure failure of ice ($\leq 30^\circ$)
2. Hook
3. Wide beam/Deep Draft
4. Round hull
5. Reinforced hull with:
 - Extra frames
 - Double bottom
 - Thicker, cold resistant steel
6. Powerful propulsion
7. Large Size & Weight forward
8. Self Sustainment (harsh, isolated)
9. Materials & systems built to withstand cold temperatures



More capable polar icebreakers require more robust engineering features - \$\$



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USCG POLAR ICEBREAKERS Today

POLAR SEA, POLAR STAR & HEALY are the only multi-mission U. S. surface assets capable of supporting U.S. national mission needs and capable of operating in polar regions year around.

HEALY Characteristics:

Length: 420' Width: 82'
Draft: 29.3' Displacement: 16k LT
Propulsion: Diesel-Electric AC/AC
SHP: 30,000 HP (max)
Fuel: 1.22M gals
Continuous IB: 4.5' @ 3kts
B&R IB: 8' backing & ramming
Science: up to 50 scientists

Polar Class Characteristics:

Length: 399' Width: 83.5'
Draft: 28' Displacement: 13.1k LT
Propulsion: Diesel-Electric/Turbine
SHP: 18,000 HP (DE)
60,000 HP /75k HP (burst)
Fuel: 1.3M gals
Continuous IB: 6' @ 3kts
B&R IB: 21' backing & ramming
Science: up to 35 scientists

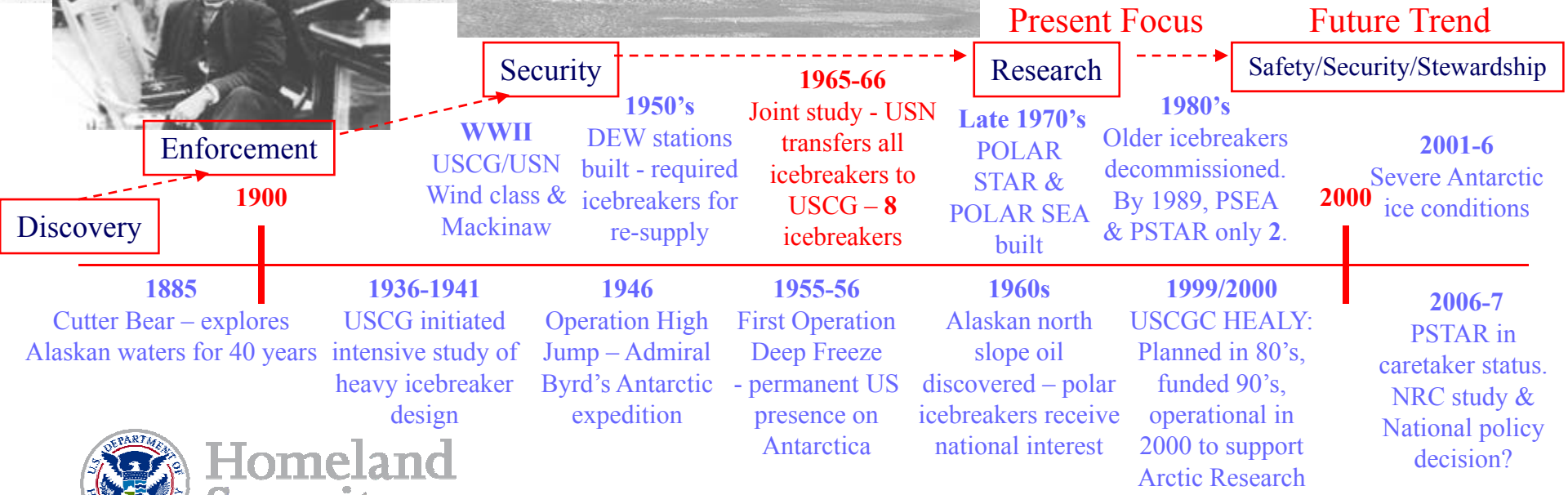


HEALY commissioned 1999



POLAR STAR & POLAR SEA
commissioned in 1976, 1978 respectively

U. S. Polar Icebreaker Operations: Changing Priorities



1885
Cutter Bear – explores Alaskan waters for 40 years

1936-1941
USCG initiated intensive study of heavy icebreaker design

1946
Operation High Jump – Admiral Byrd's Antarctic expedition

1955-56
First Operation Deep Freeze - permanent US presence on Antarctica

1960's
Alaskan north slope oil discovered – polar icebreakers receive national interest

1999/2000
USCGC HEALY: Planned in 80's, funded 90's, operational in 2000 to support Arctic Research

2001-6
Severe Antarctic ice conditions

2006-7
PSTAR in caretaker status. NRC study & National policy decision?

WWII
USCG/USN
Wind class & Mackinaw

1950's
DEW stations built - required icebreakers for re-supply

1965-66
Joint study - USN transfers all icebreakers to USCG – 8 icebreakers

Late 1970's
POLAR STAR & POLAR SEA built

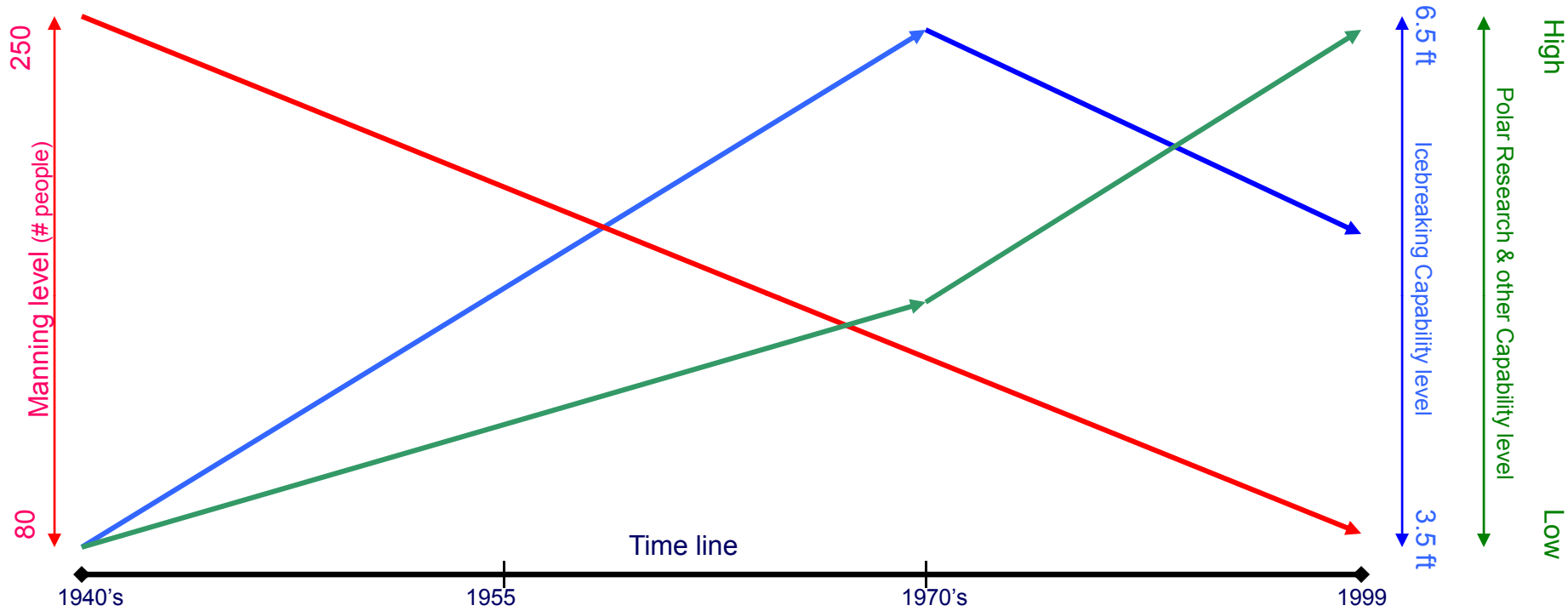
1980's
Older icebreakers decommissioned. By 1989, PSEA & PSTAR only 2.

2001-6
Severe Antarctic ice conditions



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USCG Polar Icebreaker Capability & Manning Improvements



Wind Class (6.5k tons)

GLACIER (8.9k tons)

Polar Class (13.5k tons)

HEALY (16.2k tons)

Polar Class & HEALY: Why?

Polar Class (1971 Appropriations):

- 1969 – SS Manhattan transited through Northwest Passage with Polar Icebreaker assistance. Proof of concept voyage of transporting crude oil from the North Slope of Alaska to refineries on the U.S. East Coast
- 1960-70 Natural resource discoveries along north slope of Alaska
- 1970s Oil shortage in US

HEALY (1990 Appropriation):

- Post Cold War
- Growing need for polar research
- 1990 Presidential Memo to Congress on US polar icebreaker needs
- Replace decommissioned Wind Class and GLACIER polar icebreakers

Photo # NH 68437 S.S. Manhattan in the Arctic Ice, 1969



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Current U.S. Polar Icebreaker Needs

1. Strategic/National Security (Primary purpose)

- Project power & influence through presence - sovereignty

2. Direct Mission Tasking (Majority of official tasking)

- Polar Research (support Arctic & Antarctic research efforts)
- Logistics support or re-supply (U.S. Antarctic Program resupply & Thule Greenland)

3. Contingency Tasking (Readiness missions)

- Homeland Security
- Enforce U.S. laws and treaties
- Global Mobility
- Search & Rescue
- Maritime Pollution Response

Thule Airbase Annual Re-supply (Operation PACER GOOSE)

- Built in 1950's
- Distant Early Warning (DEW) network
- Requires annual sealift re-supply
- 1992 US/Canada reciprocity agreement.
 - US - West Arctic
 - Canada – East Arctic
- Since 1993, CCG icebreaker support on behalf of USCG



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