Whaling: Past, Present, and Future

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The many types of whaling

1. Commercial whaling
2. Illegal whaling
3. Scientific whaling
4. Aboriginal whaling
1. Commercial Whaling
Main* Cast of Characters

- Suborder Mysticeti
  - Baleen Whales
- 13 species

- Blue Whales
- Right Whales (3 spp.)
- Fin Whales
- Sei Whales
- Bryde’s Whales
- Minke Whales (2 spp.)
- Pygmy Right Whales
- Gray Whales
- Bowhead Whales
- Humpback Whales

*Some odontocetes also commercially whaled: sperm, bottlenose, killer whales
Commercially Harvested Whales
Commercial whaling:

• Began in the late 1800s with the development of explosive harpoons, steam-powered ships, air compressors (to prevent dead whales from sinking)
• Coincided with depletion of many traditionally hunted, localized stocks of whales, prompting global travel
• Greatly increased in 1904 with the discovery of vast stocks of whales in Southern Ocean and development of factory ships (1925)
• Was initially driven by need for whale oil (whales later used for many other products)
“The commercial hunting of whales in the 20th century represents what was arguably – in terms of sheer biomass – the greatest wildlife exploitation episode in human history.”

Clapham and Hatch
2000
Officially Reported World Catch
– all great whales

data from Gambell 1999
Officially Reported World Catch - by species

Figure 1. Annual catches of Blue (---), Fin (—→), Sei (-----) and Minke (---••) whales in the Antarctic, showing the successive importance of each species in the fishery (from International Whaling Statistics, Oslo).
Official Cumulative World Catch
– all great whales

1997 = 2,725,886 whales

data from Gambell 1999
1986 – Moratorium on commercial whaling for all member nations of the International Whaling Commission

- Whaling by Norway under IWC objection continues (~100,000 whales total since IWC moratorium)
“While commercial whaling clearly represents a failure of management, some of the exploitation events themselves can be viewed as a series of unintended but highly informative experiments on the consequences of over-hunting.”

Clapham and Hatch, 2000
To what extent have the large whales recovered since we stopped harvesting them?
Complications:

- Pre-exploitation levels difficult to estimate
- Current environmental conditions may differ significantly from past
- “Population” and “Stocks” are identified based on data of extreme variation in nature and quality
Remember the basic life history traits of large whales.

- Long lived
- Delayed sexual maturity
- Low reproductive rates
- Migratory

- Recovery rates expected to be relatively slow
- Protection Difficult
To what extent have the large whales recovered since we stopped harvesting them?

![Bar chart showing the status of whale stocks](chart.png)

- **Severely Depleted**: 44 stocks
- **... and Feasible to Monitor**: 26 stocks
- **... and Monitored**: 12 stocks
- **... and Increasing**: 10 stocks

*Data from Best 1993*
Who has recovered?

- Gray Whales
  - Eastern Pacific
- Bowhead Whales
  - Bering/Chuckchi/Beaufort
- Humpback Whales
  - Northwest Atlantic
  - North Pacific
Eastern Pacific Gray Whale: The Recovery Success Story

- The E Pacific Gray Whale population was greatly reduced by whaling (~15,500 whales were killed between 1846 and 1900) from a pre-exploitation size estimated to be between 15,000 and 24,000 animals.

- Commercial whaling ended in 1946; gray whales were listed as endangered under the U.S. Endangered Species Act in 1973.

- Population estimates based on shore-based counts have documented a recovery to pre-exploitation levels.

- Gray whales were removed from the Endangered Species List in 1994 with the population estimated to comprise around 20,000 whales.

Photo: Chris Johnson

[Graph showing population size over time]
Who is recovering?

• Right Whales
  – South Africa, Argentina, West Australia

• Humpback Whales
  – West and East Australia

• Blue Whales
  – Northeast Pacific, Northeast Atlantic (?)
Expectation of Recovery

“... if whale populations respond to a reduction in population size as might be expected by standard population dynamics theory, then effective legal protection should be followed by recovery.” Best 1993
Who is not recovering?

- Gray Whales – (1 population)
- Right Whales – (6 populations)
- Bowhead Whales – (4 populations)
- Humpback Whales – (5 populations)
- Blue Whales – (min 2 populations, likely more)
- Fin Whales – (1 population)
Reasons for Lack of Recovery

i. Population Extirpation
   – 10 populations from 5 species
   – No evidence of recovery or repopulation
Time Since Commercial Extinction: 40 – 390 years

data from Clapham and Hatch 2000
Blue whales taken in December, 1926

Structuring of populations within a species means that extirpation will not necessarily be followed by repopulation.

South Georgia
Reasons for Lack of Recovery

i. Population Extirpation

ii. Incidental Anthropogenic Mortality
   - Fishery interactions (net entanglements)
   - Ship strikes
   - Pollution?
   - Habitat degradation?
Case Study: Northwest Atlantic Right Whale

Dependent upon coastal and shelf habitat
Slow swimming
Critically endangered (ca. 300 individuals)
No apparent population increase despite 60 years of protection

57% of 118 identified individuals show net entanglement scars
1/3 of mortality in first four years of life due to ship collisions and net entanglement
Six recorded mortalities during winter of 1995/96 = 2% of population
Reasons for Lack of Recovery

i. Population Extirpation

ii. Incidental Anthropogenic Mortality

iii. Indirect Effects, e.g.,

- Competition with fisheries for prey
- Ocean basin regime shifts
- Niche replacement

*Lecture topic: 6 June*
Reasons for Lack of Recovery

i. Population Extirpation
ii. Incidental Anthropogenic Mortality
iii. Indirect Effects
iv. Illegal Whaling
2. Illegal Whaling

Whaling that occurs in contravention of national laws or internationally agreed upon quotas, season, area restrictions, and other limitations (Brownell and Yablokov 2009)
Three general forms of whaling violations:

- Targeting protected species
- Altering records to camouflage catches of under-sized animals or lactating females
- Over-reporting of “legal” species to provide credible catch totals
Case Study: USSR Commercial Catch Data in the Southern Hemisphere, 1947-1972

- Of note:
  - Over-reporting of non-protected species (e.g., fin whale) disguised take of protected species (e.g., pygmy blue, sei, humpback, southern right whales)
  - Almost half of total illegal catch was humpback whales
  - 80+% of data on length, weight, sex, reproductive status estimated to be false

- Illegal whaling partly/fully explains lack of recovery for many of these whale stocks

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<th>Species</th>
<th>Reported</th>
<th>Actual</th>
<th>Disparity</th>
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<td>3,887</td>
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<td>Pygmy blue whale</td>
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<td>Fin whale</td>
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<td>Killer whale</td>
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<td>“Others”</td>
<td>0</td>
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<td>Total</td>
<td>141,795</td>
<td>232,733</td>
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Brownell and Yablokov 2009
Soviet Illegal Whaling*

- Global in scope
- ~40-year period, beginning in 1948
- Seven factory fleets with efficient catch and processing capabilities
  - Largest ships processed 200 small sperm whales, 100 humpback whales, or 35 pygmy blue whales *per day*
  - “Processing” mainly stripping of blubber and discarding remaining carcass

*The best documented and, to date, most egregious example; e.g., Ivashchenko et al. 2012
• Planning system set annual production targets, bonuses when met, and subsequent increase in targets – leading to rapid reduction of whale populations

• Whaling positions were coveted: high salaries, potential for bonuses

• Women employed, including one female captain

• Falsified catch data submitted to Bureau of International Whaling Statistics; true data preserved for research and administrative purposes

• Worldwide estimate of illegal take ~180,000 whales

Ivashchenko et al. 2012
Other illegal whaling nations include:

• Japan
  – 1.4-3 x more sperm whales (1954-1964), 1.6 x more Bryde’s whales (1981-1987) caught than reported
  – Protected species identified in Japanese market (source unknown)

• Korea
  – Known illegal take of fin and minke whales as recently as early 2000

Brownell and Yablokov 2009
Pirate Whaling

- Unregulated whaling conducted outside of national/international laws or agreements, sometimes by non-member nations of IWC and/or under a flag of convenience, e.g.,
  - Norway and Japan pirate whaling under Somalia, Cyprus, Curacao, Panamanian flags
    - Operated in Atlantic
    - Meat shipped to Japan
    - Data only partially preserved; include blue, fin, sei, Bryde’s, hujmpback, minke catch
  - Olympic Challenger and fleet of 12 catcher boats
    - Financed by Greek-born Argentine citizen
    - German captain, expedition manager Norwegian
    - Panamanian and Honduras flags
    - Thousands of whales illegally taken in waters off Chile, Peru, Ecuador, and in the Antarctic

Brownell and Yablokov 2009
3. Scientific Whaling
What is scientific whaling?

- Allowed through a provision in the International Convention for the Regulation of Whaling
- Member countries of the IWC allowed to kill whales for research related to management issues
- Formulated in the 1940s
- Scientific whaling nations include Japan, Iceland (periodically)
Case Study: Japan

• “JARPN II” – scientific whaling in the North Pacific
  – Subsequent to “JARPN” – original, feasibility study
  – Full program begun in 2002
  – Annual catch of 150 minke, 50 Bryde’s, 10 sperm, and 50 sei whales
  – “Long-term research programme of undetermined duration”
  – Primary objective: “feeding ecology”
  – Secondary objectives: “environmental pollutants”, “stock structure”

• “JARPA” – scientific whaling in the Antarctic
  – Began in late 1980s
  – Focus on minke whales (~6000 killed by early 2000s)
  – Expanded in 2005 to double annual catch of minke whales (to ~900/yr) and to add fin and humpback whales to targeted species

Since 1987, Japan has killed > 10,000 whales through these two scientific whaling programs.

Clapham et al. 2003
These programs have been heavily criticized.

- Feeding ecology is not relevant to the current IWC management scheme for commercial whaling
- Programs
  - lack testable hypotheses and performance measures
  - Use selective or inappropriate data for abundance estimation
  - Unnecessarily rely on lethal sampling
  - Use inappropriate geographic sampling for assessing population structure
  - Fail to include key data on ecosystem components, or sensitivity analyses in use of ecosystem models (which are themselves flawed)
- Publication record is poor
  - JARPA produced 1 paper in peer-reviewed literature, 137 “other publications” (cruise/progress/meeting reports, conference presentations, theses, unpublished papers)
- “JARPN II exists to ‘demonstrate’ – all data to the contrary notwithstanding – that whales eat too much fish and therefore should be culled by more whaling.”

Clapham et al. 2003, Gales et al. 2005
Unnecessary reliance on lethal sampling:

• Lethal methods are not necessary to assess populations (primary objective of the IWC)
• Non-lethal methods often provide better data at less cost to address objectives of scientific whaling, e.g.,
  – Population structure best studied with genetic methods; biopsy samples of skin routinely and successfully used; cheaper to obtain and process

Clapham et al. 2003, Gales et al. 2005
4. Aboriginal Whaling
Earliest Whaling

- Accounts of human interactions with whales date to at least 4\textsuperscript{th} century BC – Alexander the Great’s men in the Indian Ocean

- Basques were the first to hunt large whales in an organized and intentional manner, perhaps dating to the Stone Age (2000-5000 BC)
Aboriginal whaling today:

• Weaponry, etc. largely modern (most) vs primitive methods* (rare)

• Regulated vs Non-Regulated
  – Member nations must obtain quota from IWC for large whales (mysticetes and sperm whales), e.g.,
    • Bequians, Caribbean: humpback whales
    • Greenland Eskimos: minke, fin, humpback whales
    • Alaskan Eskimos – bowhead whales
    • Russian native peoples – gray whales
  – Unregulated whaling, e.g.,
    • Greenland Eskimos: belugas and narwhals
    • Faroese: pilot and bottlenose whales, At white-sided dolphins
    • *Indonesia: sperm, killer, pilot whales, several dolphin species
      – Boats w/out nails, rattan sails, wind or manpower for locomotion, harpoons with iron tips
Hot Topic:

• Makah tribe of NW Washington
• Subsistence hunt of gray whales
• Marine Mammal Protection Act requires all US Citizens intending to “take” marine mammals to obtain a waiver
  – “Take” = any alteration to state without human presence
• Decision on granting the Makah waiver to kill gray whales rests with NMFS