

The science-policy disconnect: language issues at the science-policy boundary

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Communication Barriers

- Language
- Dialects
- Accents (verbally)
- Terminology (e.g., slang)
- Phraseology



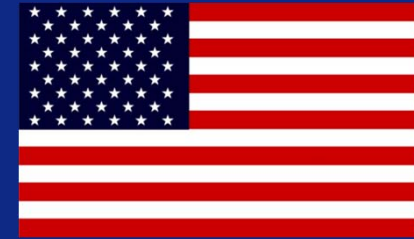
Two Nations Divided By A Common Language



Tap



Faucet



Aubergine



Eggplant

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Underwear

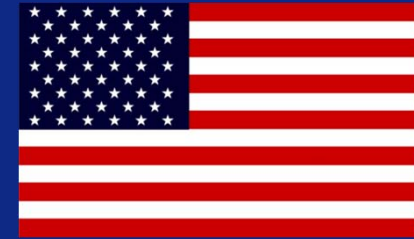
**An object for erasing
pencil marks**

**Slang: Female
genitalia**

Pants

A rubber

Fanny



Trousers

A condom

Slang: Buttocks



**The main
shortcomings**

Hoved mangler

**Head
missing**

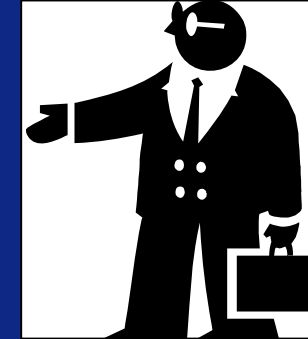
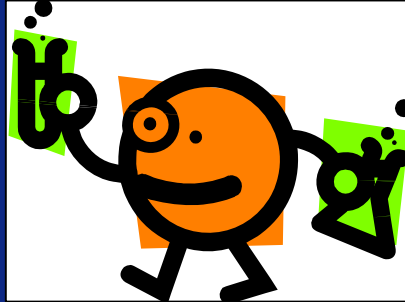


Marsvin





Two Mindsets Divided By A Common Language



Takes time

Science

Costs money

**Should be science-
based**

Policy

Based on values

Research direction

Uncertainty

**Management
obstacle**

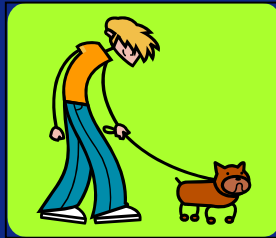
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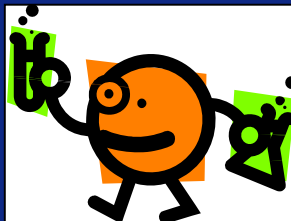


Common Use, Science, and Policy

Theory



A proposed idea; a conjecture



An idea that has been tested repeatedly and not falsified; thus considered to be a scientific 'fact' until disproved



Either of the above, seemingly depending on the direction the wind blows that day

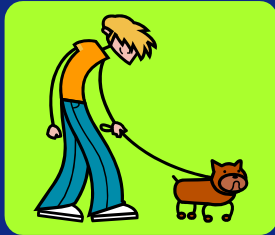
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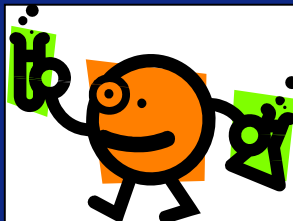


Common Use, Science, and Policy

Significant



**Large (significant profits);
Important (at a significant time)**



**Null-hypothesis disproving result
(statistically significant)**



**Of a level to be meaningful
(biologically significant)**

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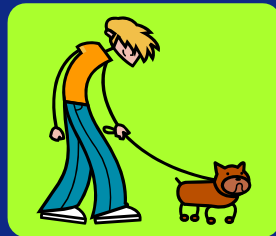


Terminology

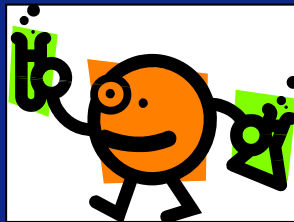
Biologically Significant



At a level that is biologically meaningful



???



???

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U.S. National Research Council, 2005

Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects

“No scientific studies have conclusively demonstrated a link between exposure to sound and adverse effects on a marine mammal population. These considerations have lead to alternative assessments of the effects of sound on marine mammals. On the one hand, sound may represent only a second-order effect on the conservation of marine mammal populations; on the other hand, what we have observed so far may be only the first early warnings or ‘tip of the iceberg’ with respect to sound and marine mammals.”



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The Research

Grey whales abandoned one of their breeding lagoons due to dredging and shipping (Bryant et al., 1984).

NRC 2005 response: “Although long-term abandonment of critical gray whale breeding habitat clearly reaches the threshold of biological significance, it has not been demonstrated that it impeded the recovery of the population.”

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The Research

An entire, well-studied local population of Cuvier's beaked whales in the Bahamas was either killed or displaced for at least four years, after exposure to sonar and subsequent mass stranding in March 2000 (comments by Ken Balcomb in 2004 during the MMC FACA Meetings).

The NRC response: The recent beaked whale mass-strandings cannot be described as having an 'adverse effect on the population' as the population sizes and ranges for these species remain unknown (comments at the presentation of the Committee's results to the Ocean Studies Board of the National Academy of Sciences, 11th November 2004).

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The Research

Why behavioural responses may not reflect the population consequences of human disturbance (Gill et al., 2001)

“The effect of human disturbance on animals is frequently measured in terms of changes in behaviour in response to human presence. The magnitude of these changes in behaviour is then often used as a measure of the relative susceptibility of species to disturbance; for example species which show strong avoidance of human presence are often considered to be in greater need of protection from disturbance than those which do not. In this paper we discuss whether such changes in behaviour are likely to be good measures of the relative susceptibility of species, and suggest that their use may result in confusion when determining conservation priorities.”

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The Research

No observable response \neq no impact.

Likewise a small behavioural response \neq minor long-term impacts.

Caribou (Harrington and Veitch, 1992)

Humpback whales (Todd et al., 1996)

Sea lions (NMFS, 1996)

Oystercatchers (Stillman and Goss-Custard 2002)

Birds (Beale and Monaghan, 2004)

Dolphins (Bejder, 2005)

Reconfirmed by an expert panel at the 2006 Workshop on Noise Related Stress and Marine Mammals (2007 special issue of the International Journal of Comparative Psychology 20(2-3) available at: <http://www.comparativepsychology.org/>).



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Energy Producers Caucus Statement, 2006

“None of the growing body of scientific research has identified circumstances in which human-generated sound – including seismic – has adversely affected marine mammals at the population level. Consequently, based on all of the available scientific information, it appears to be indisputable that there is not a “crisis” involving marine mammals and anthropogenic sound...

“Much research has been completed during the past several years, including four scientifically rigorous reviews conducted in 1994, 2002, 2003 and 2005 by the National Research Council. These studies have not been able to conclude that there is any connection between anthropogenic sound and population level effects.”



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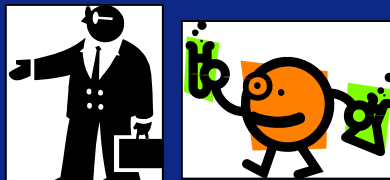
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U.S. Marine Mammal Commission's Report to Congress, 2007

“The effects of sound on marine mammal populations are uncertain. The National Research Council (2005) characterized that uncertainty as follows: ‘...sound may represent only a second-order effect on the conservation of marine mammal populations; on the other hand, what we have observed so far may be only the first early warnings or “tip of the iceberg”....’”



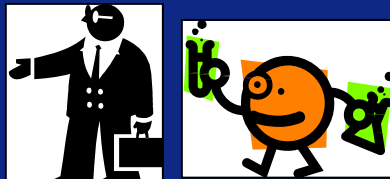
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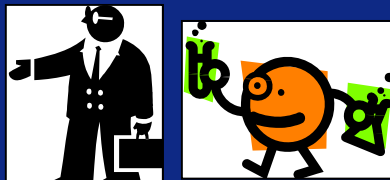
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“Sound has not been considered a factor in several major declines over the past few decades involving pinnipeds and sea otters, species more easily monitored than cetaceans. Abundance and trends of cetacean populations often are poorly known and difficult to monitor; many populations could decline by half without such loss being detected (Taylor et al. in press). Thus, it is difficult to form reliable conclusions about the potential effects of sound or other risk factors on many marine mammal populations. At least one cetacean population that is well monitored, the southern resident killer whale, is subject to disturbance from vessel presence and noise, which have been identified as potential factors in the population’s decline and subsequent listing under the ESA (70 Federal Register 69903).”



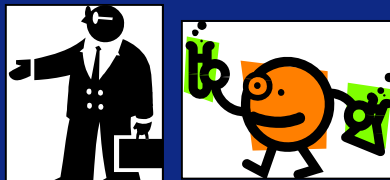
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Summary of Events

2005: NRC Report – “No evidence of effect on populations” /
“Unknown: second-order vs. tip of the iceberg”

2006: Energy Producers Caucus Statement – “No evidence”

2007: MMC Report – “Unknown”



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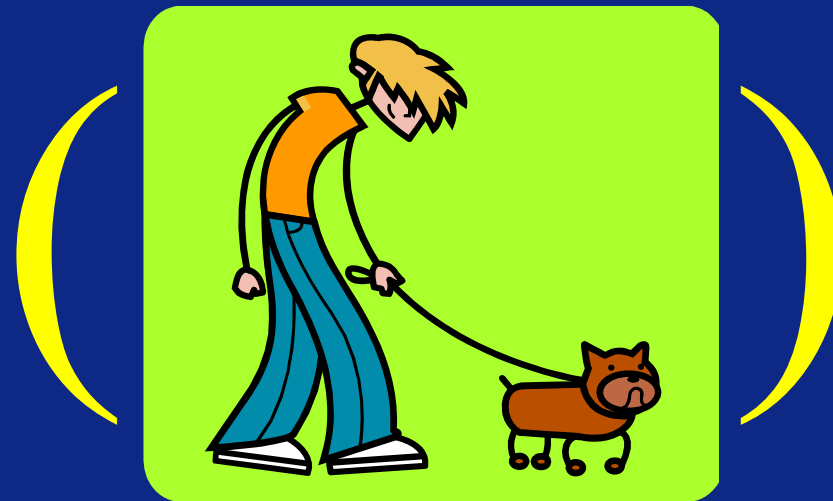
2006: Review of NRC 2005 pointing out the potential for
mischaracterisation (Wright, 2006)

2006: Energy Producers Caucus Statement – “No evidence”

2007: MMC Report – “Unknown”

What Went Wrong

The NRC panel did not consider their audience!



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What They Should Have Done At The Start

Avoid using seemingly conclusive statements.

Be explicit about the lack of data.

Be explicit about the uncertainty of the limited data that is available.

Consider that ocean noise had become a highly charged topic, which had entered the public domain. Not everyone who would be reading the report have scientific backgrounds and would be familiar with the current standard for scientific acceptance ($p < 0.05$) and its flaws.

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U.S. National Research Council, 2005

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Science/Policy Accurate Statement

“No scientific studies have conclusively demonstrated a link between exposure to sound and adverse effects on a marine mammal population...”



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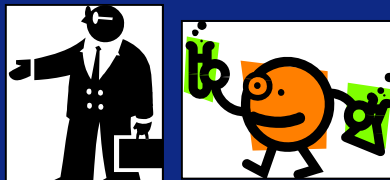


Science/Policy Accurate Statement

“No scientific studies have conclusively demonstrated a link between exposure to sound and adverse effects on a marine mammal population...”

There is currently not enough known about marine mammals or the impacts of anthropogenic sound upon them to conclusively demonstrate [whether] there is or is not a link between exposure to sound and adverse effects on a marine mammal population...

See Wright, 2006



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What They Should Have Done Later On

Acknowledge the potential for the statement to be misleading.

Correct any known misuses or misquotation of their intended meaning. This is in their interest anyway, since bad quotations will essentially misrepresent their scientific opinions.

Produce an official errata / clarification document for distribution with any further copies of the report purchased.

Make the errata / clarification document part of official electronic copies.

Consider a second edition.

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Why They've Been Lucky - So Far

For the most part, citations of the NRC 2005 report have been generally in line with their intent.

The release of the MMC 2007 report to Congress fairly soon after the NRC report was released (on Congressional timeframes) helped to avoid misunderstandings by becoming the standard go-to document on the issue of management of noise and marine mammals (the NRC report is still pervasive in scientific literature) and quickly reframing the situation more accurately in plain language.

Focus on the NRC 2005 report has been mainly on their path forward, mostly on their Population Consequences of Acoustic Disturbance (PCAD) Model.

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Rules of Thumb

- Consider your audience.
- Consider your audience!
- Consider your audience!!
- Assume that anything that can be taken the wrong way, will be taken the wrong way.
- Remember, absence of evidence is not evidence of absence.
- Remember, not everyone understands the consequences of using $p < 0.05$.



Rules of Thumb

- And always, *always*, use proper (i.e., British) English!



Acknowledgements

Thanks are due to:

- Pine Eisfeld and Liz Taylor for comments early in this work;
- Leslie Walsh for providing American/British translation material, encouragement and putting up with being the test audience for this presentation repeatedly; and
- You all for listening just this once.

Thanks!

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