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### The whaling issue: Conservation, confusion, and casuistry

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## The whaling issue: Conservation, confusion, and casuistry

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### Abstract

Morishita's "multiple analysis" of the whaling issue [Morishita J. Multiple analysis of the whaling issue: Understanding the dispute by a matrix. *Marine Policy* 2006;30:802–8] is essentially a restatement of the Government of Japan's whaling policy, which confuses the issue through selective use of data, unsubstantiated facts, and the vilification of opposing perspectives. Here, we deconstruct the major problems with Morishita's article and provide an alternative view of the whaling dispute. For many people in this debate, the issue is not that some whales are not abundant, but that the whaling industry cannot be trusted to regulate itself or to honestly assess the status of potentially exploitable populations. This suspicion has its origin in Japan's poor use of science, its often implausible stock assessments, its insistence that culling is an appropriate way to manage marine mammal populations, and its relatively recent falsification of whaling and fisheries catch data combined with a refusal to accept true transparency in catch and market monitoring. Japanese policy on whaling cannot be viewed in isolation, but is part of a larger framework involving a perceived right to secure unlimited access to global marine resources. Whaling is inextricably tied to the international fisheries agreements on which Japan is strongly dependent; thus, concessions made at the IWC would have potentially serious ramifications in other fora.

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### 1. Introduction

In an article that purports to offer a multiple analysis view of the whaling dispute, Joji Morishita [1] gives the Government of Japan's (GOJ) position on whaling as if it were incontestable fact. Morishita's article is in some respects a useful exposition of the elements of the whaling debate and of the changing political environment within the International whaling commission (IWC) from the 1960s to the present day. However, by selectively choosing

the information he presents, ignoring contradictory data, providing "facts" supported by irrelevant citations, trivializing opposing perspectives, and vilifying opponents, Morishita succeeds in creating a discussion of the issue which is in fact nothing more than a one-sided restatement of the GOJ's whaling policy.

Such casuistry is wearily familiar to those of us in the IWC's Scientific Committee (SC), where Japan has unsuccessfully attempted to gain endorsement of some very poor science that is in reality just a front for the continued exploitation of whale stocks while the Moratorium on commercial whaling remains in place [2]. Since 1987, Japan has killed almost 10,000 whales in its two scientific whaling programs in the Antarctic and North

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Pacific; this is more than four and a half times the total number killed for research by all other nations combined since 1952.<sup>1</sup> In addition, as we note at the conclusion of this response, there is much more at stake for Japan on the whaling issue than the catching of whales.

In his Introduction, Morishita complains, “Confusion and intentional misuse of arguments are exacerbating the whaling dispute.” This is certainly true, but Morishita and the GOJ are themselves frequently guilty of these tactics. For example, the author correctly remarks that the blanket statement “whales are endangered” is misleading in light of the widely differing conservation status of the many species of cetaceans, and labels such simplifications as “simply preposterous”. However, no reputable scientist associated with the SC has ever made such a statement. In contrast, we note that Japan frequently promulgates generalizations regarding all aspects of the whaling dispute. For example, the GOJ often states publicly that “whales” consume too much fish. Indeed, in his article (p. 804) Morishita ignores his own admonition about generalization and says, “When stomach contents were analyzed as part of scientific whaling programs, it was found that baleen whales eat a large amount of commercially important fish.”

This simplistic statement obscures the complexity of this topic and ignores several key ecological facts:

- Many whales do not eat fish at all; indeed, the greatest biomass of the world’s baleen whales live in the Southern Hemisphere, where they primarily consume krill [3].<sup>2</sup>
- The sizes of many whale populations today are at a small fraction of their levels in pre-whaling times when commercial fish populations were considerably larger and much healthier than they are today [3,4].
- The primary predators of fish are not whales, but other fish [5].
- The removal of top predators (such as cetaceans) can cause major ecosystem perturbations, with negative consequences for fisheries [6].
- Human over-fishing (not whales) is the cause of the precipitous decline of commercial fish stocks worldwide [7].

These points have been made repeatedly in various publications and fora, yet Japan continues to promote the idea of competition by and among whale species as the

primary justification for its scientific whaling [8,9]. The cynics at IWC have little doubt that Japan had already decided what the results of its research would be long before the first ships left the dock: that whales are abundant and increasing, and since Japanese researchers will inevitably find fish or krill in their stomachs, that whales must be out-competing both humans and each other for fisheries resources. This conclusion, which is simplistic and ecologically flawed [5,10], is lent false credence by Japan’s use of ecosystem models. Such models are mathematically dense (and thus are conveniently opaque to non-specialists), but are typically forced to ignore or vastly oversimplify input parameters due to lack of data on numerous ecosystem variables. Consequently, they can provide, at best, only primitive representations of the immensely complex and dynamic marine ecosystems of which whales constitute but one element. Indeed, the SC has concluded, “There is currently no system for which we have suitable data or modeling approaches to be able to provide reliable quantitative management advice on the impact of cetaceans on fisheries or fisheries on cetaceans” [11].

The implication of the competition argument is that abundant whales must be “managed” (i.e. culled) to protect human food security, or to selectively promote the recovery of particularly depleted but commercially valuable species such as the blue whale [8,9]. Yet culling is not only a crude and ineffective method of managing animals in a complex ecosystem, it is antithetical to the objectives of the International Convention for the Regulation of Whaling, and the conservative principles underlying the SC’s agreed method of calculating catch quotas, the Revised Management Procedure (RMP).

Morishita’s contention that the IWC “clearly acknowledge(s) the scientific contributions of (Japan’s) research” is belied by repeated critiques from numerous SC scientists [2,12]. These critiques have pointed out that Japan’s research has little relevance to the input variables required by the RMP, and that the questions concerned could be addressed more cheaply and effectively using non-lethal methods (and indeed are in many other international research programs). When 63 members of the SC (representing more than half of the national delegations present) come to this conclusion [13], it can hardly be called a ringing endorsement of Japan’s research.

In the article, Morishita states or implies that (high) abundance estimates are frequently agreed upon by IWC, when in reality many of these involve considerable scientific uncertainty and debate. As one example, the GOJ has repeatedly given an estimate of abundance that has humpback whales increasing by almost 17,000 animals, or more than 100% (from 16,211 to 33,010) in temporally adjacent surveys in the IWC’s Antarctic management zone known as Area IV [14]. This implausible increase (which is used to support an argument that humpbacks are now out-competing minke whales) is explained by “distributional shifts”, although there are no data from the Antarctic or anywhere else to support the occurrence of such a vast and

<sup>1</sup>As of April 2006, since 1987 Japan had killed 8973 minke whales, 293 Bryde’s whales, 240 sei whales, 43 sperm whales, and 10 fin whales (total 9559 animals). The total catch by all other countries from 1952 to 2006 (including Japan) is approximately 2100 whales. Prior to the IWC moratorium, and like other nations, Japan conducted only small-scale research whaling, with a total catch of 840 whales from 1954 to 1986 (source: IWC).

<sup>2</sup>Ironically, many of the developing countries which have been persuaded through aid or rhetoric to support Japan’s “whales versus fish” arguments have EEZs in tropical waters where some species of baleen whales migrate in winter to mate and calve, but where they do not feed at all.

unprecedented change in habitat use by so many whales over any time period, let alone 2 years.<sup>3</sup> This is only one example of the poor science emanating from Japan's scientific whaling programs, and the GOJ's insistence that the SC accept such numbers as real in the face of the most basic scientific common sense betrays the bias and political motivation that underlies its whale research.

Morishita also informs readers (in a statement relegated to a footnote) that an abundance estimate of 760,000 for Antarctic minke whales was “agreed” by the SC in 1990, but adds that this number “is currently under review because of new data accumulated since that time”. The parenthetical nature of the wording here obscures the tremendous controversy in this debate. The 760,000 figure came from a decadal set of circumpolar surveys finalized in 1987/88, and included an estimate of the substantial uncertainty around this number. The current analyses from a further set of surveys through the 1990s are suggesting greatly reduced abundance of minke whales, with some predicting a reduction from the earlier point estimate of as much as 65% to 268,000 animals [16]. Indeed, the SC agreed in 2000 that the 760,000 number was no longer appropriate [17], and there has been no resolution of this issue in the past six IWC meetings. To many SC members, the huge discrepancies between the two estimates suggest either an unprecedented decline in the population of minke whales, or that the surveys from which such estimates are derived yield fundamentally unreliable results. Either way, Morishita's obscure rendering of this issue is typical of the manner in which the GOJ ignores or trivializes scientific data and debates that do not support its positions.

Note that the GOJ carefully adjusts the level of its misinformation to the target readership; what is said in journal articles read by scientists is typically far more cautious than the “facts” promulgated to a lay audience. For example, Morishita is careful in his article to note that some whale populations are growing “at more than 10% annually”, yet on the public website of the GOJ's Institute of Cetacean Research (ICR)<sup>4</sup> ([www.icrwhale.org](http://www.icrwhale.org)), readers are told that populations of humpback and fin whales are increasing at “14–16%”—rates that the SC has agreed are biologically impossible.<sup>5</sup> Elsewhere, the 760,000 estimate for Antarctic minke whales is often cited by Japan with no

mention of the fact that the IWC no longer considers it appropriate.

In another case of incomplete narrative, Morishita goes on to say that application of the RMP to Southern Hemisphere minke whales would allow catches of “at least 2000 animals for the next 100 years without posing adverse effects on the stock”. First, this calculation is contingent upon the much-contested abundance estimate of 760,000 noted above, and would also require currently unavailable data on the manner in which the populations of Antarctic minke whales are divided around their circumpolar distribution. Second, application of a circumpolar abundance estimate is not applicable to the Japanese whaling effort, which has occurred in only a portion of the Antarctic. What he also fails to mention is that if the RMP were applied to Japan's scientific whaling catches in the North Pacific, the current takes—notably of minke whales in Japanese coastal waters—would likely be well above what would be authorized by this procedure. Furthermore, the proposed Japanese catches of humpback and fin whales in the Antarctic will occur in populations that are generally believed to be below 54% of *K*, the minimum threshold below which the RMP does not permit catches.

The article contends, “The group that is economically most dependent on the whaling issue is ironically the extreme anti-whaling NGOs such as Greenpeace”. However, not all NGOs are green; there are several pro-whaling groups that are just as embroiled in this controversy; and there are more than enough other environmental problems on which to base fund-raising campaigns. Furthermore, the commercial reliance of the GOJ on a continuation of whaling—currently in the form of scientific permit catches—to keep their aging whaling fleet operational is far more relevant in this context. Left to purely market forces, this industry would likely die since Japan's populace has lost its taste for whale meat and there is currently a growing mountain of unsold product being held in cold storage [20]. Additionally, despite the GOJ's rhetoric about preserving “culturally significant” small-type coastal whaling in Japan, most of the government's resources go into the Southern Ocean scientific whaling enterprise, the last remnant of the old commercial factory ship operations that drove many whale stocks to commercial extinction. As we note below, access to high-seas fisheries resources is of paramount importance to Japan.

In his section on politics, Morishita makes the statement that the US brought up the whaling issue at a 1972 UN conference to turn attention away from defoliation in Vietnam, and supports the idea that this is “widely believed” with a single citation which turns out to be a pro-whaling editorial in the *Japan Times* newspaper.<sup>6</sup> We find it remarkable that *Marine Policy* permitted this sort of

<sup>3</sup>Abundance estimates of these same humpback whale populations on their low-latitude breeding grounds to the north provide evidence for lower and biologically plausible increase rates [15].

<sup>4</sup>ICR is a semi-governmental organization that conducts the research on whales killed by Kyodo Senpaku Corporation; it is funded by the Fisheries Agency of Japan. ICR is the permit holder for the two whaling research programs; it lies within the jurisdiction of the Fisheries Agency, and its director is a former official of the latter body.

<sup>5</sup>In a 2006 review, the SC agreed that the maximum plausible annual rate of increase for humpback whales is 10.6% [18]; similar constraints would also apply to fin whales. Despite this, from its scientific whaling program data Japan has reported rates of increase as high as 18.1% (CV = 0.21) and 29.8% (CV = 0.1) per annum for Antarctic humpback and fin whales, respectively [19].

<sup>6</sup>The editorial was written by Mr. K. Yonezawa, who was the IWC Commissioner for Japan from 1977 to 1984, after which he was hired as the Senior Managing Director of Nippon Suisan Kaisha Ltd, the second largest marine products company in Japan.

statement and its attendant “citation” to appear in its pages unchallenged.

In another example of selective information, Morishita cites an opinion poll which purportedly found that 71% of the US public “supported limited and controlled whaling”, and generalizes this to the broader statement that when the public is “provided with *objective* information” (italics ours), their views on whaling are not what the NGOs would have us believe. As everyone knows, the answers one gets in a poll depend in part upon the way in which questions are phrased; the poll concerned is 10 years old and its results are contradicted by other surveys which have consistently found broad opposition to whaling among the public in the United States and many other countries. Indeed, a poll conducted in 2006 found opposition to whaling among ten Pacific and Caribbean nations whose governments have been paid by Japan to support its position at the IWC [21].

Morishita accuses environmentalists of using scientific uncertainty about whale stocks “as the basis for calls for the prohibition of whaling.” Yet, despite mounting evidence of declining populations, for years this uncertainty was exploited by whaling nations to give the benefit of the doubt to the whalers, with disastrous results. In this light, the Moratorium can be seen as a tardy but appropriately conservative response to the large-scale failures of management and oversight which all but extirpated some whale stocks, and brought some species (such as Antarctic blue whales and Northern Hemisphere right whales) perilously close to extinction.<sup>7</sup> Uncertainty in any data used for management is invariably a given in science, and modern management models are careful to define these uncertainties and to accommodate precaution in the selection of an estimate from within the range of possibilities. The IWC’s SC follows exactly such a process in the RMP. Clearly, the lack of defensible and credible ranges of abundance of many whale species remains a cogent disqualifier of proposed management actions to exploit those populations. Japan has been particularly concerned about scientific uncertainty since the 1991 United Nations General Assembly global moratorium on all large-scale high seas drift-net fishing, a ban which was based largely upon the precautionary principle.

Among the major management failures of the past was the absence of an International Observer Scheme (IOS) until 1971, a problem which allowed widespread falsification of whaling catch data. The most egregious example was that of the former USSR, which is now known to have killed well over 100,000 whales illegally in the years 1947–73 [23,24]; these illegal catches hastened the collapse

of some Southern Hemisphere baleen whale populations, and almost extirpated the right whale in the eastern North Pacific [25].<sup>8</sup> Yet the Soviets were neither the only nor the most recent example of such deception: Japan is known to have falsified catch data on sperm and Bryde’s whales in its coastal whaling operations [26,27]. For the latter species, these catches occurred until at least 1987, i.e. the year after the IWC Moratorium took effect. Additional details on the extent of past falsification by Japan are currently unknown; it is worth noting that (unlike Russia with the Soviet case) Japan has yet to acknowledge that these falsifications occurred. Furthermore, even after the IOS was instituted in the Southern Hemisphere, Japanese inspectors aboard at least one Soviet factory ship failed to report that the USSR exceeded the IWC sperm whale quota in the 1971/72 Antarctic whaling season.

Morishita tells us that existing international and domestic oversight procedures “are adequate to ensure sustainable whaling” and that the Revised Management Scheme (RMS)<sup>9</sup> “has not been agreed by the IWC because of delaying tactics of anti-whaling governments”. Yet one of the biggest delays in implementation of the RMS has arisen from the refusal of Japan and other whaling nations to accept true transparency in the monitoring of whaling. Both Norway and Japan have established DNA databases to archive reference material from legally killed whales as a check on the origin of products found in the market. However, both countries refuse to allow truly independent oversight or third-party monitoring of such databases and sampling schemes, and both take the position that market oversight lies outside the jurisdiction of the IWC. Given the quite recent history of duplicity by Japan and others in catch reporting (and their dramatic parallels in illegal fishing), it is not surprising that the “anti-whaling nations” view such recalcitrance with suspicion.

For many people in this debate, the issue is not that some whales are not abundant, but that the whaling industry cannot be trusted to regulate itself or to honestly assess the status of potentially exploitable populations. It is hard to trust a government agency which frequently serves up nonsensical estimates of abundance and population growth, which refuses to allow independent oversight of its actions, and which pays lip service to the RMP while simultaneously stating that the proper way to manage whales is to cull them.

Throughout his article, Morishita portrays as irrational or hostile any party disagreeing with the GOJ’s position. The term “anti-whaling” appears no fewer than 33 times in the article, tied to 14 other words (anti-whaling *organizations, countries, campaign, interests, governments, movement, NGOs, policy, views, side, values, interests,*

<sup>7</sup>The basis for the Moratorium is encapsulated in a statement made by some scientists in the 1981 SC report: “Upon reviewing the breadth and depth of uncertainties which exist... not one whale stock assessment exists which is free of the uncertainties described. We view this as untenable and suggest that it is reasonable to consider developing and adopting management regimes, including a cessation of whaling if necessary, which decrease the risk of whaling in the face of such uncertainties.”[22]

<sup>8</sup>Japan’s response to these revelations has been to publicly question the integrity of the former Soviet biologists who (at considerable personal risk within the Soviet system) meticulously documented these catches.

<sup>9</sup>The RMS includes the set of controls and inspection procedures to be put in place should commercial whaling recommence.

*philosophy*, and *sentiments*). In this view, those who agree with the GOJ are reasonable, bona-fide scientists. In contrast, anyone in the SC or elsewhere who takes a contrary position is branded with any of a series of derogatory terms; these include (to quote from various parts of the article) *emotional*, *unobjective*, *extreme*, *preposterous*, *sensational*, *non-experts*, *fear of Japan*, *hostile to Japan*, *Japan-bashers*, *manipulative*, *outrageous*, *unacceptable*, *egocentric*, *brain-washed*, and *culturally imperialistic*.

He rejects a priori the concept that many people oppose a resumption of whaling today because they genuinely believe that inadequate controls are in place to ensure that it is truly sustainable. Similarly, Japan's abuse of science to justify escalating catches numbers, and the whaling nations' contention that whales (and other marine mammals<sup>10</sup>) need to be culled [28], leave little room for good-faith negotiations on responsible resource management. These actions, and Norway's recent announcement that it is unilaterally modifying the RMP because it is "too conservative" and gives catches that "are inappropriately small" [29], do little to convince skeptics that the whalers genuinely intend to manage whales in a way that will not repeat the mistakes of the past. In other words, given the recent history and statements of the industry, there is reason enough to distrust current whaling practices without ever needing to stray into issues of differing ethical perspectives about the value of whales, or serious concerns regarding the often protracted time to death of the whales from harpooning.

On the surface, it is difficult to understand the tenacity with which Japan clings to whaling in the face of so much international opposition, or to comprehend the huge expenditure of effort and resources that are currently poured into the issue. As Morishita himself notes, whaling is heavily subsidized by the GOJ, well beyond its potential economic value for the near future. In addition, Japan gives millions of dollars in aid and other support to developing nations in exchange for their membership and pro-Japan votes at the IWC. Whaling continues to ramp up despite excessive supply of, and poor demand for, whale meat [20,30]. Why then do they persist in this endeavor?

Three factors are in play on this issue. First, Japanese domestic cultural values concerning whales are at odds with the anti-whaling "norm" of the international political arena [31]. Second, the control of all decision-making on whaling policy by powerful pro-whaling government agencies is hegemonistic in scope, and this has effectively precluded anti-whaling advocates both inside and outside Japan from exerting influence [31]. Powerful political pressure from within Japan comes from special interest groups, the fishing lobby, the Fisheries Agency and numerous politicians who all want to defend what they

see as a right to secure unlimited access to global marine resources [32]. As a recent review noted, "As long as domestic cultural and political structures remain intact, Japan's pro-whaling policy will continue." [31].

Finally, to understand the importance of whaling to Japan, the issue must be seen not in isolation but in the much broader context of international fisheries policy. Concessions in other management fora could impact whaling; indeed, strict inspection provisions are already in place in some existing fisheries agreements, and the GOJ is clearly resisting their inclusion in the RMS in an effort to resume commercial whaling with as little restriction as possible. But whaling itself represents a potentially slippery slope: a major loss or concession on this issue could potentially have severe ramifications for Japan's extensive and critically important fisheries agreements elsewhere.

Mr. Morishita himself inadvertently illustrated this dilemma in an amusing incident which occurred at the 2001 IWC meeting in London. In an intervention at an SC plenary session, he explained why he disliked a procedure that had been suggested for managing Antarctic minke whales, and concluded by saying that this was "a very bad way to manage southern bluefin tuna." After a pause in which everyone in the room looked up quizzically, he added, "Sorry-wrong meeting." The slip said much about the inextricable connection between whaling and other fisheries issues for the GOJ, and the basic blueprint underlying its approach to the management of a wide range of exploited marine species.

For a nation that is as dependent upon fisheries resources as Japan, this is a critical fight to win. Or to modify the concluding statement of Morishita's article: Japan's fisheries policy can't be protected without whaling.

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## References

- [1] Morishita J. Multiple analysis of the whaling issue: understanding the dispute by a matrix. *Marine Policy* 2006;30:802–8.
- [2] Clapham PJ, Berggren P, Childerhouse S, Friday NA, Kasuya T, Kell L, et al. Whaling as science. *Bioscience* 2003;53:210–2.
- [3] Nemoto T. Feeding patterns of baleen whales in the ocean. In: Steele J, editor. *Marine food chains*. Berkeley, CA: University of California Press; 1970. p. 241–52.
- [4] Pauly D, Palomares M-L. Fishing down marine food web: it is far more pervasive than we thought. *Bulletin of Marine Science* 2005;76:197–211.
- [5] Trites AW, Christensen V, Pauly D. Competition between fisheries and marine mammals for prey and primary production in the Pacific Ocean. *Journal of Northwest Atlantic Fisheries Science* 1997;22:173–87.
- [6] Clapham PJ, Link J. Whales, whaling, and ecosystems in the North Atlantic. In: Estes J, Demaster DP, Doak DF, Williams TM, Brownell Jr RL, editors. *Whales, whaling, and ecosystems*. Berkeley: University of California Press; 2006. p. 241–50.

<sup>10</sup>The Japanese Fisheries Agency still permits a cull of Steller sea lions, a species which is classified as endangered by the International Union for the Conservation of Nature.

- [7] Pauly D, Alder J, Bennett E, Christensen V, Tyedmers P, Watson R. The future for fisheries. *Science* 2003;302:1359–61.
- [8] Morishita J, Goodman D. Competition between fisheries and marine mammals-feeding marine mammals at the expense of food for humans. In: *Proceedings of the third world fisheries congress*, 31 October–3 November 2000, Beijing.
- [9] Institute of Cetacean Research. Why whale research? Institute of Cetacean Research 2006. <<http://www.icrwhale.org/04-B-jen.pdf>.>
- [10] Clapham PJ, Brownell Jr RL. Potential for interspecific competition in baleen whales. *Reports of the International Whaling Commission* 1996;46:361–7.
- [11] IWC. Report of the Scientific Committee. *Journal of Cetacean Research and Management* 2004;6(supplement):30.
- [12] Gales NJ, Kasuya T, Clapham PJ, Brownell Jr RL. Japan's whaling plan under scrutiny: useful science or unregulated commercial whaling? *Nature* 2005;435:883–4.
- [13] Childerhouse S, et al. Comments on the Government of Japan's proposal for a second phase of special permit whaling in the Antarctic (JARPA II). *Journal of Cetacean Research and Management* 2006;8(supplement):260–1.
- [14] Matsuoka K, Hakamada T, Nishiwaki S. Distribution and abundance of humpback, fin, and blue whales in the Antarctic areas III E, IV, V and VI W (35 E–145 W). Document JA/J05/JR 10 available from <<http://www.icrwhale.org/eng/JA-J05-JR10.pdf>.> 2005.
- [15] IWC. Report of the workshop on the comprehensive assessment of Southern Hemisphere humpback whales. SC/58/Rep 5. *Journal of Cetacean Research and Management*, 2007, in press.
- [16] Branch TA, Butterworth DS. Southern Hemisphere minke whales: standardized abundance estimates from the 1978/79 to 1997/98 IDCR-SOWER surveys. *Journal of Cetacean Research and Management* 2001;3:143–74.
- [17] IWC. Report of the Scientific Committee. *Journal of Cetacean Research and Management* 2001;3(supplement):31.
- [18] IWC. Report of the Scientific Committee. *Journal of Cetacean Research and Management* 2007;9(supplement):37 in press.
- [19] Matsuoka K, Hakamada T, Murase H, Nishiwaki S. Current abundance estimates of humpback and fin whales in the Antarctic Areas III E, IV, V, and VI W (35 E–115° W). Paper SC/56/SH11 available from the International Whaling Commission, Cambridge, UK. 2004.
- [20] Tabuchi H. Japan faces whale meat glut after boosting catch; Prices plunging. *The Canadian Press*, February 9, 2006.
- [21] WWF survey on attitudes towards commercial whaling in the Caribbean and the Pacific. World Wildlife Fund 2006. <<http://assets.panda.org/downloads/wwfresearchsurveycommercialwhaling.pdf>.>
- [22] IWC. Report of the Scientific Committee (p. 57). *Reports of the International Whaling Commission* 1981;31:31.
- [23] Zemsky VA, Berzin AA, Mikhalev YA, Tormosov DD. Soviet pelagic whaling after WWII: review of actual catch data. *Reports of the International Whaling Commission* 1995;45:131–5.
- [24] Yablokov AV, Zemsky VA, Mikhalev YA, Tormosov VV, Berzin AA. Data on Soviet whaling in the Antarctic in 1947–72 (population aspects). *Russian Journal of Ecology* 1998;29:38–42.
- [25] Doroshenko NV. Soviet whaling for blue, gray, bowhead and right whales in the North Pacific Ocean, 1961–79. in: *Soviet Whaling Data (1949–79)*. Moscow: Center for Russian Environmental Policy; 2000. p. 96–103.
- [26] Kasuya T. Examination of the reliability of catch statistics in the Japanese coastal sperm whale fishery. *Journal of Cetacean Research and Management* 1999;1:109–22.
- [27] Kondo I, Kasuya T. True catch statistics for a Japanese whaling company in 1965–78; Paper SC/54/O13 available from the International Whaling Commission, Cambridge UK, 2002.
- [28] Corkeron P. Fishery management and culling. *Science* 2004;306:1891.
- [29] At the 2004 IWC meeting, Norway submitted a document announcing its intention to modify the Revised Management Procedure; see <<http://www.highnorth.no/news/nedit.asp?which=338>.> Further details were given at the 2006 meeting.
- [30] Hesse S. Marine management is all at sea. *The Japan Times*; 2006.
- [31] Hirata K. Why Japan supports whaling. *Journal of International Wildlife and Policy* 2005;8:129–49.
- [32] Danaher M. Why Japan will not give up whaling. *Pacifica Review: Peace, Security, and Global Change* 2002;14:105–20.