Spatial analysis of the value of whaling and whale conservation in Japan

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1. Introduction

In 1946, the International Whaling Commission (IWC) was established to support the orderly development of the whaling industry by conserving whale stocks. The IWC's own Scientific Committee has never recommended a moratorium on all commercial whaling, but it has been adopted in 1982, when anti-whaling has become a new international norm with an increasing spread of environmental non-governmental organizations (NGOs). Some countries, now a minority at IWC meetings, continue to practice whaling, and more than one thousand whales were hunted in 2013 alone.

One of the major whaling countries, Japan, does not currently engage in commercial whaling but seeks to expand whaling, which has resulted in its withdrawal from IWC in 2018. As the importance of whale meat in Japanese diets has declined, the rationale for whaling has shifted from food security and sustainable use to cultural identity and cultural diversity, which may not be universally shared amongst the public.

In this study, we examine spatial difference in the value of whaling in Japan. We hypothesize that local difference in the consumption of whale meat and culture generates a spatial disparity in the value of whaling. We capture the value of whaling measured as willingness to pay to continue Japan's whaling for those who support whaling and willingness to pay to abandon Japan's whaling for those who disapprove whaling. We also examine how the difference is brought about, and in particular, we consider various environmental attitudes, the familiarity of whales, and the knowledge of whale and whale management as well as demographics.

2. Materials and methods

We conducted web-based surveys in Japan in February 2016. The candidates were recruited through existing online panel of a local research company. Upon initial contact in the recruitment process, potential respondents were asked to participate in the survey titled "Survey on the Environment and Marine Life"; the title did not mention the subject of whaling to avoid possible selection bias. Candidates were pre-screened to ensure that the sample distributions approximated

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the distributions of the general population with respect to gender, age, and residential region. The final sample contains 5,100 respondents.

Stated preference valuation techniques were employed to measure the total value of whales. A hypothetical market was established for: (1) WTP of Japanese households to abandon Japan's whaling, and (2) WTP for Japanese households to continue whaling activities. The WTP values of (1) and (2) were calculated using the sub-samples of anti- and pro-whaling respondents, who constituted 27% and 73% of the full sample, respectively. For WTP calculations, a payment card was used to collect the data.

3. Preliminary Results

To identify spatial heterogeneity for WTP to continue whaling and WTP to discontinue whaling in Japan, the Getis-Ord G_i^* statistic is calculated and mapped (Fig. 1). The distance for the G_i^* statistic is derived by iteratively estimating the global Moran's *I* for each incremental distance between 1 and 50 km, and the distance that attained the highest z score is chosen. The results from the spatial clustering show that the value of whaling as well as whale conservation in Japan has spatial autocorrelation and spatial heterogeneity is significant. In particular, the value of whaling is high in Kyushu region but the hot spots for whale conservation concentrates in Shizuoka prefecture and the middle of Japan.

The GWR model is used to further examine various determinants of the support/disapproval of whaling. Our preliminary results suggest that for the value of whaling being female and whether considering protecting endangered species as important are both positively related in the western Japan and negatively related in the eastern Japan and a similar spatial pattern was observed in the value of whale conservation for protecting endangered species and income.

Fig. 1a Hot/Cold spots for whaling

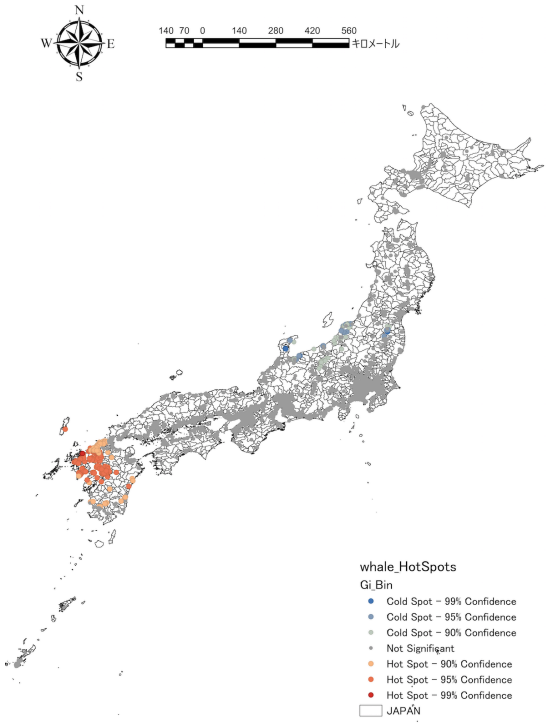

Fig. 1b Hot/Cold spots for whale conservation