SC/68B/ISG/03

Report of the Steering Group of the IWC-POWER (North Pacific Ocean Whale and Ecosystem Research Programme) Programme to SC/68B

Matsuoka (Convenor), Brownell, Clapham, Crance, Donovan, Kato, Kelly, Kim, Kitalado, Miyashita, Murase, Palka, Pastene, Zharikov, Zernini

INTERNATIONAL
WHALING COMMISSION

This updated version includes recent information on the photographic database and the acoustic component of the 2020 cruise options

Report of the Steering Group of the IWC-POWER (North Pacific Ocean Whale and Ecosystem Research Programme) Programme to SC68B

MEMBERS: MATSUOKA (CONVENOR), BROWNELL, CLAPHAM, CRANCE, DONOVAN, KATO, KELLY, KIM, KITAKADO, MIYASHITA, MURASE, PALKA, PASTENE, ZHARIKOV, ZERBINI.

ABSTRACT

This document summarises the progress made during the past year by the Steering Group, including a short summary of the progress made during the period of the IWC-POWER cruises, explanation of the plans for 2020, a recommendation for the cruises to continue and a proposal for 2021 and 2022.

TERMS OF REFERENCE

The Terms of Reference for this long-standing group is to provide advice on the 2018/19 and 2019/20 IWC-POWER cruises (including holding the Planning and Technical Advisory Group Meetings), and advise as required on data analyses, storage and on requests for data/sample use of IWC-POWER/SOWER cruises.

POWER - 2010 TO 2019 AND ITS ACHIEVEMENTS: A SHORT SUMMARY

Background

The Scientific Committee has recognised the importance of the IWC-POWER cruises since the beginning. The IWC-POWER programme has represented an important component of international cooperation within the IWC and the region. Scientists from Australia, Japan, Republic of Korea, Mexico, UK and the USA have contributed to the design and implementation of the programme thus far, in addition to the contribution of the Scientific Committee and the Commission. Of course, none of this would be possible without the extremely generous donation each year of a vessel and crew by Japan.

The cruises are especially important because they cover pelagic waters of the central and eastern North Pacific that have rarely if ever been covered by systematic line transect surveys and have not been surveyed at all in decades. This has important scientific, conservation and management value. The cruises (Fig. 1) have covered almost all of the targeted areas apart from in the western Bering Sea where plans have been agreed (the planned block for 2020) but we are awaiting a permit from the Russian Federation that we hope to receive for the proposed 2021 cruise. The backup block (now the agreed block – see Appendix 1) for 2020 is also shown in Fig. 1. Options for the 2020 cruise are discussed in Appendix 1.

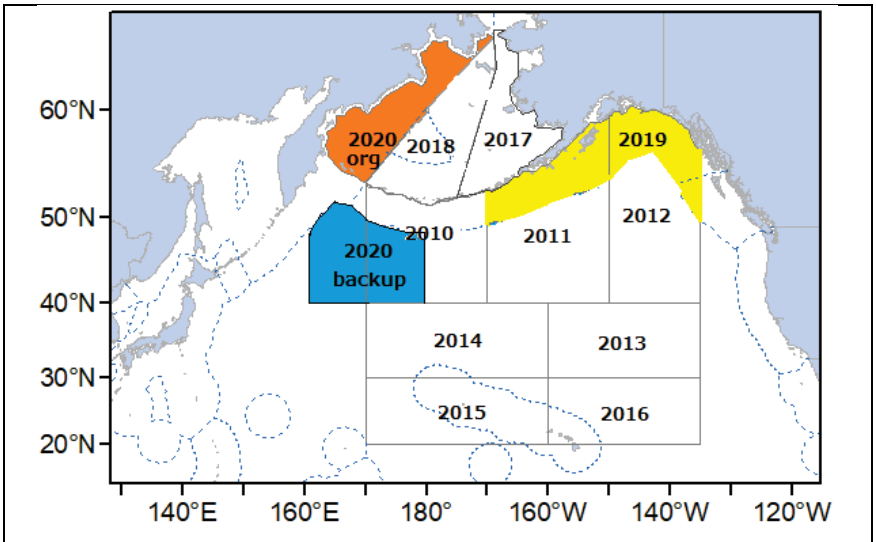

Fig. 1. Map showing the areas surveyed thus far under IWC-POWER (2010-19) with the proposed 2020 area. The original Russian option is shown in orange and the back-up option is shown in blue.

Objectives

A thorough review of the available information was undertaken at a comprehensive workshop in 2010 (IWC, 2011) that reviewed all that was known about large whales in the North Pacific at that time and in light of that information developed a series of objectives that have since been agreed by the Scientific Committee and updated periodically in light of the results of the cruises.

Long-term

The IWC agreed (IWC, 2012a) that the long-term IWC-POWER programme

> 'will provide information to allow determination of the status of populations (and thus stock structure is inherently important) of large whales that are found in North Pacific waters and provide the necessary scientific background for appropriate conservation and management actions. The programme will primarily contribute information on abundance and trends in abundance of populations of large whales and try to identify the causes of any trends should these occur. The programme will learn from both the successes and weaknesses of past national and international programmes and cruises, including the IDCR/SOWER programme.'

The Steering Group **recommends** that these remain unchanged, in accordance with the most recent report of the Technical Advisory Group (SC/68B/Rep01).

Medium-term

The Steering Group **recommends** that the slightly modified medium term objectives (Table 1) agreed in the most recent report of the Technical Advisory Group (SC/68B/Rep01) be adopted by the Scientific Committee.

Table 1

Suggestions for updated medium-term priorities based upon results from Phase 1 for IWC-POWER (* refers to likelihood of obtaining an abundance estimate at least in some areas; ** refers to likelihood of obtaining biopsy and/or photo-ID data from encountered schools)

Initial priority/feasibility	Rationale/comments
Blue whale (High) Medium direct*, high opportunistic**	• Depletion level (i.e. highly depleted based on catch history) • Initial abundance estimates from IWC-POWER (still being finalised) suggest it remains heavily depleted. • Results of analyses of existing samples (27 IWC-POWER samples available) in conjunction with other samples (e.g. samples collected under Japanese national programmes) important in addressing population structure in context of idea/scope of occasional focussed cruises (see (4) below. • Potential for some blue whale focussed cruises in specific areas (including directional acoustics) should be considered (e.g. Gulf of Alaska) as well as continuing opportunistic studies. • Continued collaboration with existing photo-id work e.g. US and Japanese national programmes is important (42 individuals available from IWC-POWER) – and Japan west existing samples. • Consider telemetry studies
Fin whale (High) High direct*, high opportunistic**	• Depletion level (i.e. high based upon catch history) • Initial abundance estimates from IWC-POWER (still being finalised) suggest some recovery • Results of genetic analyses important to contribute to future survey strategy and future Comprehensive Assessment (e.g. is there evidence of more than one stock from the existing 124 biopsy samples that cover waters from 170E to 135W?). • Work in Russian Federation waters provided appropriate permits can be obtained is important • Co-ordination with national programmes in Japan, Korea and USA needed including existing samples
Right whale (High) Medium direct*, high opportunistic**	• Depletion level: (i.e. highly depleted based on catch history) • Still critically low numbers in east (from US studies and IWC-POWER) • Feasibility of collecting biopsy and photo-ID data high if targeted and using acoustics • Feasibility of obtaining abundance in east from line-transect low given such small numbers; may be higher in west e.g. Sea of Okhotsk • Although new area, consideration should be given to a targeted survey in Sea of Okhotsk - high feasibility and priority to obtain good abundance, photo-id and biopsy data provided appropriate permits can be obtained from the Russian Federation.

Initial priority/feasibility	Rationale/comments
Sei whale (Medium) High direct*, high opportunistic**	• Depletion level: (i.e. high based on catch history) • Initial abundance estimates from IWC-POWER (still being finalised) and Japan suggest some recovery • IWC-POWER has provided valuable information for the ongoing Comprehensive Assessment (the 2020 backup cruise will provide biopsy samples from a poorly covered area) • Results of that CA will help focus future IWC-POWER medium-term strategy and priority for this species - e.g. (a) possible focussed biopsy sampling in postulated coastal stock areas and (b) frequency and scope dedicated abundance surveys in 'pelagic' area to examine trends
Humpback whale (Medium) High direct*, high opportunistic**	• Good information already available from SPLASH and national programmes suggests overall high abundance (genetic and photo-ID mark-recapture) hence medium priority • Continue to contribute to existing genetic and photo-ID databases. • Ongoing Comprehensive Assessment will assess status and potential depletion of [sub-] populations. • Abundance estimates from IWC-POWER (still being finalised) can provide interesting 'snapshot' estimates to compare with mark-recapture estimates by population/feeding aggregation • The results of the CA will assist in developing medium-term strategy and priority for this species within IWC-POWER
Sperm whale (Medium) Medium direct* and medium opportunistic**	• Depletion level: (unknown but possibly high given catch history) • Lack of good information on population structure and status at present although good distributional data from IWC-POWER • Obtaining abundance estimates from visual surveys can be problematic due to long dive times and other issues • Combined acoustic (towed array)/visual surveys have been successful for sperm whales however feasibility in the context of IWC-POWER depends on availability of equipment and practicality in light of other priorities • Possibility of using towed acoustic arrays in some years should be considered
Gray whale (Medium) Low direct*, high opportunistic**	• There are ASW hunts but that primary data sources to evaluate those are from other visual, genetic and photo-ID programmes (e.g. US, Mexico, Sakhalin Island) – hence medium priority • Main IWC-POWER contribution is in obtaining biopsy/photo-ID in areas outside those programmes for comparison and information on population structure • Sharing of data with other programmes should continue
Bryde's whale (Medium) High direct*, high opportunistic**	• Suggest low priority for first six or so years of next phase of POWER because: o Recently completed IR shows good population status and apparently low level of threats o Removing from target species allows a great reduction in size of priority research area to north of 40ºN • If required, a targeted survey or surveys could be designed towards end of 10-year period (e.g. from 2027)
Common minke whale (Low) Suggest only opportunistic unless able to enter waters of the Russian Federation	• Depletion level (probably low east/central based upon catch history) and in west dealt with by national programmes • However, if Okhotsk Sea is able to be covered for high priority species (e.g. right whales) then would provide valuable information incl. biopsy samples • If permission granted by Russian Federation then consider modifying present 'acceptable' conditions as at the present high range they are unsuitable for estimating abundance for this species

Stock structure and movements

Genetics

An excellent summary of the genetics work undertaken as part of the IWC-POWER programme is given in SC/68B/SDDNA/ASI16. Suffice it to say here that the programme has greatly increased the number of available biopsy samples in the North Pacific, particularly for blue, fin, sei and Bryde's whales, for which few if any samples were previously available from the survey area (Table 2). Maps showing the distribution of the samples by species can be found in SC/68B/Rep01. This has and will continue to contribute greatly to the Committee's present and future assessment work as summarised in SC/68B/SDDNA/ASI16. This is important not only to the assessment of Bryde's whales and the ongoing assessment of sei whales and humpback whales, where the spatial coverage has been in some cases greatly extended, but also for the poorly understood and previously heavily exploited species/populations such as North Pacific right whales (where the IWC-POWER samples have also allowed sex to be assigned to previously and newly photo-identified individuals), blue whales and fin whales.

The Steering Group **reiterates** the view of the TAG (SC/68B/Rep01) of the great value of the samples obtained and their analyses to the work of the Scientific Committee.

Individual identification

Identification of individuals (primarily done so far by photographs but possible using genetic techniques) has been an important component of the IWC-POWER programme. The total numbers collected thus far are summarised in Table 3 and photographs have been submitted to several wider North Pacific programmes for blue, gray, humpback, North Pacific right and killer whales and catalogues are being built up for the first time in this regions for species such as fin, sei and Bryde's whales.

Table 2

Summary of biopsy work undertaken during 2010-2019 cruises, including transit surveys between Japan and the research areas (number of individuals sampled).

Biopsy	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Blue whale	1	4	2	0	1	0	1	0	6	12	27
Fin whale	2	12	12	1	0	0	0	28	24	45	124
Sei whale	13	31	36	0	0	0	1	0	0	4	85
Bryde's whale	0	0	0	6	78	34	16	0	0	0	134
Common minke whale	0	0	0	0	0	0	0	0	0	0	0
Humpback whale	0	1	0	0	0	0	0	18	29	12	60
North Pacific right whale	0	0	0	0	0	0	0	3	3	0	6
Gray whale	0	0	0	0	0	0	0	9	7	2	18
Sperm whale	0	0	0	0	0	1	5	0	0	0	6
Killer whale	2	0	1	0	1	2	0	2	7	0	15
Total	18	48	51	7	80	37	23	60	76	75	475

Table 3

Summary of photo-identification work undertaken during 2010-2019 cruises including transit surveys between Japan and the research areas (estimated number of individuals photographed, requires confirmation, especially of the killer whales from 2019).

Photo-ID	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Blue whale	3	9	4	0	1	0	1	0	8	16	42
Fin whale	0	25	59	3	0	0	0	79	69	51	286
Sei whale	0	27	51	2	0	0	1	0	0	0	81
Bryde's whale	0	0	0	6	73	49	12	0	0	0	140
Common minke whale	0	0	0	0	0	0	0	0	4	0	4
Humpback whale	5	48	26	0	0	0	0	48	39	30	196
North Pacific right whale	0	0	1	0	0	0	0	12	3	0	16
Gray whale	0	0	0	0	0	0	0	16	41	6	63
Sperm whale	0	0	1	0	4	22	2	0	4	0	33
Killer whale	45	18	50	0	3	4	0	84	33	19	256
Total	53	127	192	11	81	75	16	239	201	122	1,117

The Steering Group **reiterates** the view of the TAG of the importance of this work, noting that it is making a valuable contribution to the ongoing Comprehensive Assessment of the North Pacific humpback whales and to information on the critically endangered eastern North Pacific right whales.

The Steering Group also noted the value of the IWC's photographic database that now has over 105,000 images from the IWC-POWER cruises coded by species, keyword and image quality, including 36 species. It ***reiterates*** *the value of this work and agreed that that this work should continue.*

Distribution, abundance and trends

Perhaps the most important component of the IWC-POWER programme is to obtain abundance estimates for species of large whales that have never or only partially been covered by systematic surveys although they have been exploited heavily in the past. These estimates are vital to the objectives of the programme and have already made or will make important contributions to the assessments of Bryde's whales, sei whales, and humpback whales and more recently work to estimate $g(0)$ has been undertaken as well as an extremely thorough analysis of angle and distance experiments. Work is also underway on model-based as well as design-based approaches and comparison of these that may have wider implications for survey and analytical approaches beyond the present survey regions. A brief summary of the work undertaken thus far is given in Table 4 and more details can be found in SC/68B/Rep01. Although the initial focus has been on analysing the results for large whales the impressive body of data on smaller cetaceans is now being investigated.

In addition to the line-transect abundance estimates themselves, it should be recognised that the humpback whale photographs from the IWC-POWER cruises are contributing to the mark-recapture analyses being undertaken as part of the ongoing Comprehensive Assessment of the North Pacific humpback whales.

Finally, it should be noted that the marine debris data collected on the cruise have been analysed and will be published within the coming year.

Acoustics

In recent years, the addition of acoustic work using sonobuoys has provided an important new component of the IWC-POWER cruises. This has been especially valuable for studies of the rare eastern North Pacific right whales where directional acoustic studies have allowed detection and subsequent biopsy and photo-ID efforts that probably would have been missed on standard broad-scale line-transect surveys. The detection of calls from other large whale species has provided additional valuable information to supplement sightings data on the distribution of other species such as fin, humpback, sperm, killer and gray whales (see SC/68B/Rep01 Annexes D and E for positional plots from sightings and acoustic detections).

Table 4

Summary of work on the analyses of the sightings data* D=design based; M=model based

Species	Analysts	Status and Schedule
Blue	ICR/TUMSAT (D, ?M?)	Revised version of Kitakado *et al.,* (2018) expected at SC68b
Fin	TUMSAT/ICR (D, M)	Draft by Inai *et al* (WP7) reviewed here, revised version expected at SC68b
Sei	ICR (D)	Hakamada and Matsuoka (2015)
	TUMSAT (D, M)	Draft by Inai *et al* (WP7) reviewed here, revised version expected at SC68b
Bryde's	ICR (D)	Completed up to 2015 survey (Hakamada and Matsuoka, 2018), to be updated with 2016 data in 2020
	TUMSAT (D, M)	Draft by Inai *et al* (WP7) reviewed here, revised version expected at SC68b
Humpback	TUMSAT/ICR (D, M)	Draft by Inai *et al* (WP7) reviewed here, revised version expected at SC68b
Sperm	SWFSC?/ICR?	No work conducted to date
Killer	TUMSAT/ICR	Initial estimates expected at the next TAG meeting
Dolphin sp.	TUMSAT+NRFSFS+ICR	Initial estimates expected at the next TAG meeting
Marine debris	TUMSAT/ICR	Draft by Yasuhara et al. (WP9) reviewed here. Expected 2020 publication (see Item 6.2)

* The feasibility of estimating the abundance of common minke whales will be considered by ICR given the non-optimal 'acceptable' conditions for this low priority species for IWC-POWER

THE FUTURE OF IWC-POWER

Last year (IWC, 2020 Item 24.1, 27.8) the Committee had **reiterated**

> *'... to the Commission the great value of the data contributed by the Committee-designed IWC-POWER cruises which cover many regions of the North Pacific Ocean not surveyed in recent years and addresses an important information gap for several cetaceans species, providing fundamental information on abundance necessary for developing conservation and management advice'* and
>
> *'...that it would be valuable for the scientific, conservation, management and assessment work of the SC for these cruises to continue, particularly in light of the information being provided on the status of species once heavily exploited by whaling including blue, fin, sei, humpback, gray, and right whales.'*

The Steering Group **agrees** with these sentiments and reiterates the small cost to the Scientific Committee compared to the donation of a vessel and crew for around 60 days or more. It therefore **recommends** that these cruises continue. A no increase budget proposal for the next financial year is provided in a separate document for the consideration of the Committee.

It also **supports** the TAG proposal for the holding of a workshop or pre-meeting (included in the proposal) to develop detailed plans for the post-2021 cruises after the identified preparatory work had been undertaken that in addition to the present work should have 'an emphasis on participation from all range states and …..also include consideration of more methodologically focussed cruises in some years (e.g. use of a towed acoustic array, telemetry work, use of SeaGlider etc.)'

Options for 2020

Options for the 2020 cruise in light of the unprecedented situation surrounding the COVID-19 situation are given in Appendix 1.

APPENDIX 1

OPTIONS FOR THE 2020 POWER CRUISE

BACKGROUND

The Planning Meeting was held from 20-21 January 2020 (SC/68B/Rep02) and it was confirmed that the 2020 IWC Pacific Ocean Whale and Ecosystem Research (POWER) cruise objectives will be broadly the same as in previous years but the details will differ depending by option depending on whether or not a permit was obtained to operate in Russian waters. For logistical reasons it was agreed that the non-Russian waters option (Plan B developed by the TAG – SC/68B/Rep01) would be adopted if notification of the Permit was not received by 1 April 2020. This turned out to be the case.

It has now been confirmed that the *Yushin-Maru No.2* will depart from Japan as scheduled (on 11 July). From the Japanese perspective (FAJ, ICR and Kyodo-Senpaku), there are no logistical impediments for the 2020 POWER cruise to be conducted. However, the main uncertainty at this moment is whether or not foreign researchers (e.g. from the US) can participate given the extraordinary circumstances of COVID-19.

On 20 April, a Zoom meeting of the steering group was held to discuss the options for the 2020 cruise and the results are summarised below. Work is underway amongst our Japanese and US colleagues on the logistics of transporting acoustic sonobuoys from the USA to Japan for those options for which acoustics can be undertaken i.e. those with US scientists onboard. Japanese colleagues are also seeking the relevant permission for the use of sonobuoys on board the *Yushin-Maru No. 2* in accordance with its national law.

Addendum since version 1:

Unfortunately on 12 May it was confirmed by Japan that advice from MIAC (Ministry of Internal Affairs and Communications) that it would not be possible in the time available, especially given COVID-19, to obtain permission in accordance with Japanese national law to use sonobuoys on board this summer even for research activities on the high seas. Japan reiterated its view of the great value of the co-operative acoustic work undertaken since 2017 and stressed that it would make every effort to obtain the necessary permission for future years. The options below have been modified accordingly.

OPTIONS

The cruise will go ahead in the Plan B research area (see Fig. 1) with at least Japanese researchers *provided* that the situation with respect to logistics and COVID-19 in Japan allows it. Matsuoka and Murase[1] will act as Cruise Leaders. Within this the following options remain:

A. With US/international researchers on board

(1) Conduct the full-scale Plan B (i.e. Leg 1 (western) for the 1st half and Leg 2 (eastern) for the 2nd half) based on the agreed plan with the original schedule and IWC financial support (provided that the COVID-19 situation has improved by the end of June). *Although sonobuoys cannot be deployed, on Leg 1 Crance will bring a small, non-directional 'dipping hydrophone' to record encounters of North Pacific right whales and blue whales to compare with animals from the eastern North Pacific – deployment takes only 5 minutes and Crance will assist with photo-ID work on the cruise when not deploying the hydrophone.*

(2) Conduct the full-scale Plan B based on the agreed plan with the original schedule but swapping the 1st and 2nd halves but with US researchers on board only in 2nd half and IWC financial support (provided that the COVID-19 situation allows). *Provided an appropriate person can be found (Crance is unavailable) the same 'dipping hydrophone' approach will be followed on the 2nd half of the cruise.*

(3) Postpone the start of the research until August and undertake only the 2nd half of the survey (Leg 2) from 20 Aug-25 Sep) with the IWC financial support (provided that the COVID-19 situation allows).

---

[1] Contact e-mail: matsuoka@cetacean.jp

B. No US researchers on board

(1) Conduct the Plan B (full scale; 1st half & 2nd half) with only Japanese researchers on board based on the agreed plan with the original schedule with the IWC financial support. *A Japanese scientist will be able deploy the dipping hydrophone and record following advice from Crance*

(2) Postpone the commencement of the research until August (only 2nd half survey (Leg 2) from 20 Aug-25 Sep.) with only Japanese researchers if the COVID-19 situation permits. *A Japanese scientist will be able deploy the dipping hydrophone and record following advice from Crance*

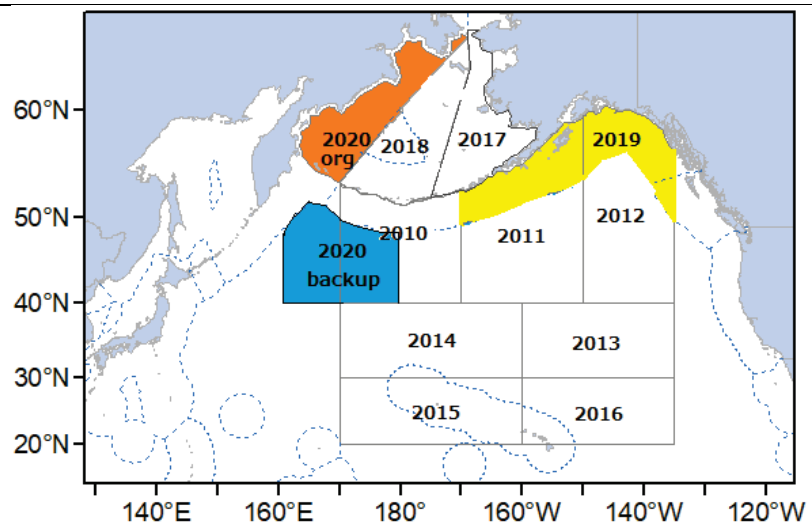

Fig. 1. Map showing the areas surveyed thus far under IWC-POWER (2010-19) with the proposed 2020 area. The preferred Russian option is shown in orange and the back-up option is shown in blue.

Appendix Table 1

Itinerary for the IWC-POWER cruise assuming 76 days (logistics mean up to 60 days in the research area)

Option 1: Original back up plan		**Option 2: Backup plan (Switch survey blocks)**	
Date	**Event**	**Date**	**Event**
10 July 2020	Pre-cruise meeting in Shiogama	10 July 2020	Pre-cruise meeting in Shiogama
11 July	Vessel departs Shiogama	11 July	Vessel departs Shiogama
17 July	Vessel starts research area survey	18 July	Vessel starts research area survey
13 August	Vessel completes first half of survey	12 August	Vessel completes first half of survey
17 August	Vessel arrives Kushiro for refuelling	17 August	Vessel arrives Kushiro for refuelling
20 August	Vessel leaves Kushiro	20 August	Vessel leaves Kushiro
25August	Vessel starts research area survey	25August	Vessel starts research area survey
18 September	Vessel completes survey	20 September	Vessel completes survey
24 September	Vessel arrives Shiogama	24 September	Vessel arrives Shiogama
25 September	Post-cruise meeting in Shiogama	25 September	Post-cruise meeting in Shiogama

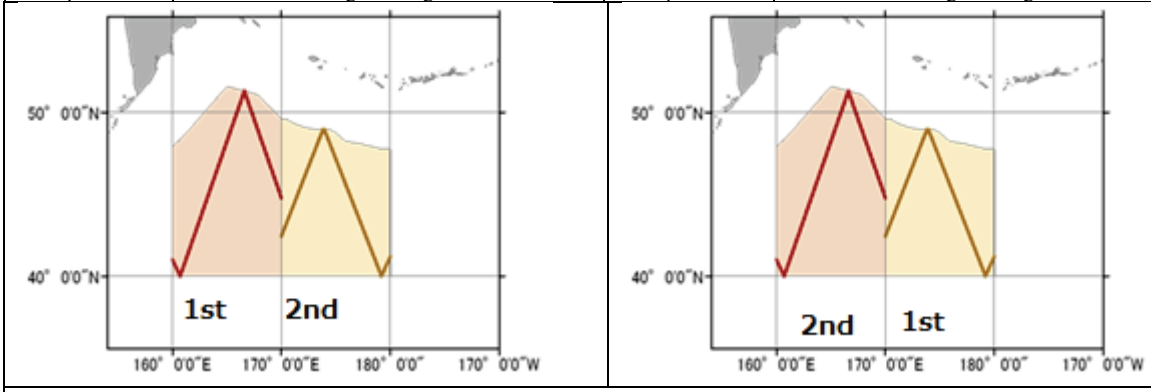

Fig. 2. Tacklines for the original backup plan (a), (c), (d) and (e) (left) and the additional "option (b)" (right).