

Discussion Paper

Proposal to Remove Adak Management District Red King Crab from the Bering Sea and Aleutian Islands King and Tanner Crab Fishery Management Plan

February 2016

Contents

1	Introduction	1
2	Background	3
	2.1 Initial Proposal to Advisory Panel and Council	3
	2.2 Initial Crab Plan Team Review	3
	2.3 Subsequent Activity by the State of Alaska	4
	2.4 Subsequent Crab Plan Team Review	4
	2.5 Subsequent Council Action	5
3	Catch History	5
4	Management Issues	6
	4.1 Federal Controls on Bycatch	7
5	Biological Issues	7
	5.1 Unit Stock Definition	7
6	2015 ADF&G Recon Survey	8
7	Status of Crab Plan Team Concerns	8
	7.1 Rationale for not including some crab stocks in the FMP	8
	7.1.1 Why was Adak not rationalized?	10
	7.2 Red King Crab Stock Structure	11
	7.3 Management Considerations	11
	7.4 Potential for Fishery under Current Management	12
	7.5 Groundfish bycatch of WAI RKC in east and west portions of WAI	12
	7.6 Relative catch in Federal and State waters for crab stocks in and out of FMP	13
8	Discussion/Summary	13
9	References	15

1 Introduction

At the June 2015 meeting, the Council directed staff to develop a discussion paper on the potential removal of a portion of the Western Aleutian Islands (WAI) red king crab (RKC) stock from the Bering Sea and Aleutian Islands King and Tanner Crab Fishery Management Plan (FMP). This action followed the second of two requests from the Adak Community Development Corporation (ACDC), first initiated in 2013, for state-only management of RKC in the area between 171W and 179W longitude in the WAI. Under the FMP, the WAI RKC stock is currently defined as extending from 171W longitude westward to the US-Russia Maritime Boundary Line (see Figure 1).

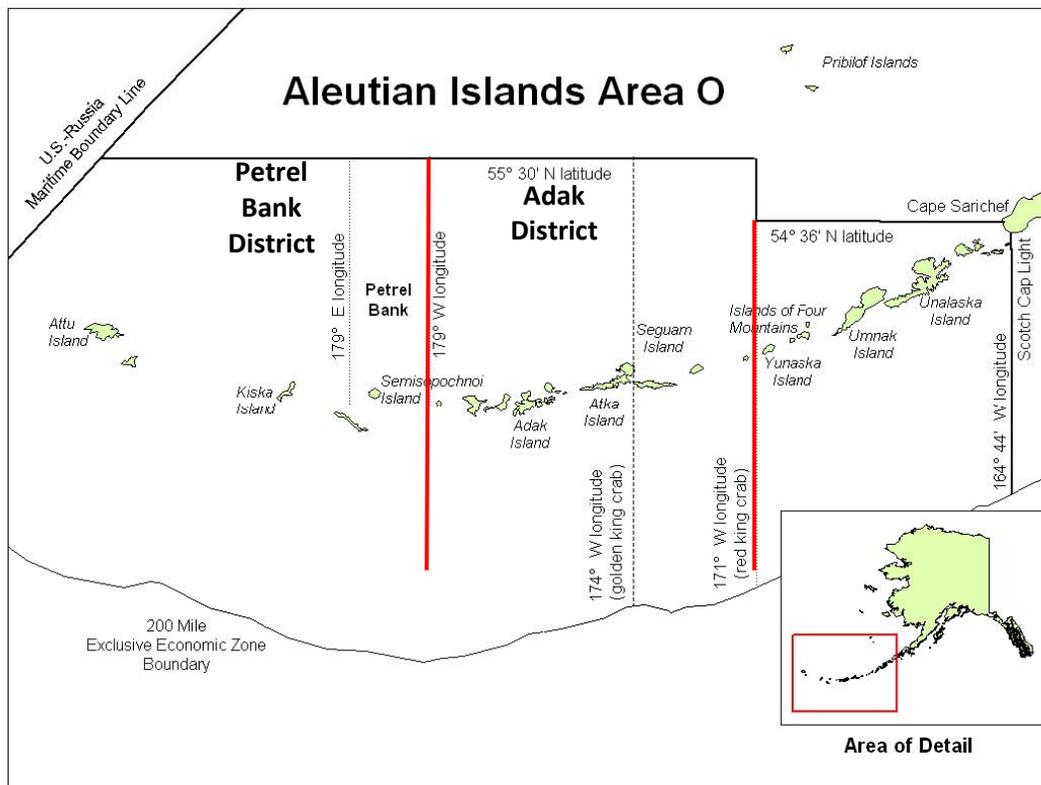


Figure 1. ADF&G Management Districts within Aleutian Islands Red King Crab Area O as of March 2014. The AI stock of RKC under the Federal FMP applies to waters within Area O that are west of 171W longitude. The proposal is to limit Federal management to waters within Area O west of 179W (between red vertical lines). (Image Source: 2015 Crab SAFE).

The WAI is currently split in terms of management approach with the western portion being subject to the crab rationalization program and the eastern portion (proposed to be removed) not rationalized. Retention of RKC in the WAI has been permitted only sporadically since 1995 and the entire WAI has been closed to fishing for RKC since 2004.

Removal of the proposed stock from the FMP would necessitate re-definition of the basis for OFL in the remaining portion of the management unit. At Tier 5, OFL is based on catch history from a reference period (1995/1996-2007/2008). Based on catch history WAI OFL is approximately 5% Adak and 95% Petrel Bank and so removal of Adak is not likely to reduce OFL significantly. ABC (60% of OFL) currently accommodates discard mortalities and exploratory fishing only.

A 2015 State survey of RKC in Adak resulted in very low catches of legal crab (CPUE = 0.03 legals/pot), and so it is highly unlikely that fishing for RKC around Adak will resume anytime soon. Because fishing for RKC in the WAI is likely years into the future, scenarios of potential fishery responses to an abundant WAI RKC stock with/without Adak removed are fairly speculative. Nevertheless, when RKC do become sufficiently abundant, it is likely that Petrel Bank would be characterized by a small IFQ fleet while Adak would support a small boat, nearshore fishery.

Since the initial 2013 proposal, the Crab Plan Team has discussed this issue several times and has identified a number of issues regarding the biological and management implications of removing a portion of the management unit from the FMP. This discussion paper briefly provides background on the

proposal by ACDC, an overview of RKC management in the WAI, and finally some of the potential biological and management implications involved in either maintaining the current management structure or amending the FMP to remove the stock.

2 Background

2.1 Initial Proposal to Advisory Panel and Council

At the April 2013 Council meeting, a proposal¹ from ACDC came before the Council requesting removal of a portion of the WAI RKC stock from the Bering Sea Aleutian Island (BSAI) King and Tanner Crab FMP. Specifically, it was proposed that RKC in the portion of Alaska Department of Fish & Game Management Area O east of 179W (Figure 1) be removed from the Federal FMP with full management responsibility in that area being assumed by the State of Alaska. The proposal stated that the circumstances surrounding the RKC fishery in that area are similar to those resulting in the exclusion of twelve crab stocks from the FMP through Amendment 24 (NPFMC 2007). The primary purpose of Amendment 24 was to establish the current five tier system for stock status determination for crab stocks in the FMP. In addition, the amendment also removed twelve crab stocks from management at the federal level. In consideration of a biological basis for separate management, the 2013 proposal cites a statement in the 2012 SAFE that acknowledges the potential for isolation of juvenile and adult RKC in the WAI by deep water trenches. It is suggested that Amchitka Pass, located at 179W, could potentially prevent movement of RKC between the Adak and Petrel Bank areas. The Advisory Panel and Council responded to the 2013 proposal by recommending that the proposal be sent to Council's Crab Plan Team (CPT) for review and comment.

2.2 Initial Crab Plan Team Review

The ACDC proposal was reviewed at the May 2013 CPT meeting and a number of biological concerns and management issues were identified and recommended for consideration by the Council:

- Develop a clear rationale as to when a stock should be removed from an FMP. This rationale should be consistent with the rationale associated the removal of the crab stocks not currently included in the FMP and, if possible, provide a discussion about why the proposed area was not rationalized;
- Characterize the current level of knowledge on stock structure and whether this information supports dividing the stock as proposed;
- Describe management scenarios and complexities between State of Alaska and Federal management. In particular, analyze the complexity associated with managing State and Federal fisheries east versus west of the dividing line, including an explanation about how groundfish PSC mortality could be handled;
- Investigate whether this type of small scale fishery can be accommodated under the current Tier 5 ABC setting process;
- Characterize groundfish bycatch by reporting area and/or at a smaller spatial scale if possible; Provide the ratio of total catch for the eastern and western portion of Area O as defined by the proposed dividing line; and
- Where possible, provide the ratio of catch in Federal versus State waters for BSAI King and Tanner Crab FMP stocks and stocks removed from the FMP under Amendment 24.

No further actions were taken either by staff or by the CPT to address these concerns, pending direction by the Council.

¹ Letter from ACDC to NPFMC, March 2013

2.3 Subsequent Activity by the State of Alaska

At the March 2014 Alaska Board of Fisheries meeting, the Board reviewed a proposal by ACDC to establish separate State RKC management districts east and west of 179W in State Management Area O. As part of the deliberation, ADF&G was *neutral* on the proposal while citing that there is no evidence that RKC in the two areas comprise separate stocks. The Board acted to establish the Adak District from 171W to 179W and the Petrel District west of 179W within Area O (Figure 1).

Additionally, for the 2015/2016 season in the Adak District, the State established:

- A daily fishing period (8:00 a.m. – 5:59 p.m.)
- Logbook and daily reporting requirements consistent with RKC regs in other State waters areas
- Vessel length restrictions (<60 ft) in state waters
- Vessel pot limits for state waters (10) and the EEZ (15)
- A conditional harvest strategy for opening State and Federal waters

Although a cooperative state/agency exploratory (i.e. reconnaissance) survey had been discussed for the area of interest by ADF&G, no such survey occurred in 2014.

2.4 Subsequent Crab Plan Team Review

The re-districting and potential for a reconnaissance survey was discussed at the May and September 2014 Crab Plan Team meetings. Among the related issues the CPT discussed was a scientific paper by Grant and Cheng (2012) that identified evidence of genetic distinction between WAI and Dutch Harbor RKC. RKC genetic samples from the WAI appear to be more related to Asian and Norton Sound RKC than to Dutch Harbor and Bristol Bay RKC. A more deliberate sampling of Adak and Petrel Bank RKC would be needed to address genetic separation between those two areas. Other recommendations and concerns taken directly from the CPT Minutes are itemized below:

- During the reconnaissance survey, take genetic samples to inform if a genetic difference occurs across Amchitka Pass and measure crabs to identify size distribution.
- Investigate if Amchitka Pass is truly a stock boundary. Research could address movement of larvae using models and what is known about currents. The oceanographic models may not work well in the Aleutian region because of boundary issues and because of the extent of models that are currently available.
- Use the template from the AFSC Stock Structure Working Group to evaluate red king crab stock structure and extent of available information.
- Data are needed on crab abundance throughout the Aleutian Islands. A more standardized pot survey would be needed after the planned reconnaissance survey before a fishery could be prosecuted.
- A larger analysis could be conducted to identify if there is evidence for stock boundaries in this area. Until more information is available, the CPT cannot provide a recommendation on this issue.

At the May 2015 meeting, the subject was again revisited, with an updated proposal by ACDC² (attached). It was pointed out that ADF&G had entered into a cooperative agreement³ with the Aleutian King Crab Research Foundation to conduct a reconnaissance survey of RKC in the Adak District in fall

² Letter from ACDC to NPFMC, May 2015

2015. That survey was conducted, and the results are summarized briefly in section 6. The complete report is included as a separate attachment.

2.5 Subsequent Council Action

At the June 2015 Council meeting, a revised ACDC proposal was presented to the Advisory Panel. This time the majority of the AP recommended that staff initiate a discussion paper. The motion included a rationale and a minority report.

Majority rationale:

- Responsive to request from public testimony and ACDC comment letter.
- Removing this area could allow the State of Alaska to take full management responsibility for RKC management.
- A discussion paper could help guide data necessary to establish a fishery in this region.

Minority report: A minority of the AP felt that initiation of a discussion paper to remove Adak District red king crab from the Federal BSAI King and Tanner Crab FMP was premature and offered the following comments:

- There is no biological information to support a stock split at this time. Specifically, there is currently no way to determine overfished status because estimates for MMB and MSST do not exist. Additionally, there are concerns with a lack of data on abundance, genetics, larval drift, and the appropriate definition of a stock.
- In recent years, because of the extreme uncertainty associated with this stock, there was a 75% buffer between the OFL and ABC. Currently, the single OFL is the only management measure available and in place for protection of this stock. Even under a single OFL, separate spatial management is still available, such as through the use of separate ABCs.
- An industry supported reconnaissance survey will provide much needed initial information to guide potential future action this issue; therefore, initiation of any action should at least wait until this data is available.
- Action taken by the BOF in March 2014 established management measures for a state water Adak District RKC fishery as long as a biomass threshold for opening the fishery was met; therefore, a fishery is possible without action to remove this district from the FMP.

The Council agreed with the majority opinion of the AP and directed staff to prepare a discussion paper.

The following sections provide more background on the WAI RKC fishery as well as the management and biological issues associated with removing Adak RKC from the FMP.

3 Catch History

A thorough discussion of the catch history of WAI RKC, including tabulated annual retained and discarded catch, is provided in the 2015 Crab SAFE (attached), from which the following excerpt is taken:

“The domestic fishery has been prosecuted since 1960/61 and was opened every season through the 1995/96 season. Peak harvest occurred during the 1964/65 season with a retained catch of 21.193-million lb (9,613 t). During the early years of the fishery through the late 1970s, most or all of the retained catch

³ Regional Operation Plan CF.5J2.15.02, Cooperative Red King Crab Reconnaissance Survey in the Adak Area, 2015

was harvested in the area between 172° W longitude and 179°15' W longitude. As the annual retained catch decreased into the mid-1970s and the early-1980s, the area west of 179°15' W longitude began to account for a larger portion of the retained catch. Retained catch during the 10-year period 1985/86–1994/95 averaged 0.943-million lb (428 t), but the retained catch during the 1995/96 season was only 0.039-million lb (18 t). The fishery has been opened only occasionally since the 1995/96 season. There was an exploratory fishery with a low guideline harvest level (GHL) in 1998/99, three commissioner's permit fisheries in limited areas during 2000/01–2002/03 to allow for ADF&G-Industry surveys, and two commercial fisheries with a GHL of 0.500-million lb (227 t) during the 2002/03 and 2003/04 seasons. Most of the catch since the 1990/91 season was harvested in the Petrel Bank area (between 179° W longitude and 179° E longitude) and the last two commercial seasons (the 2002/03 and 2003/04 seasons) were opened only in the Petrel Bank area. Retained catch in the last two commercial fishery seasons was 0.506-million lb (230 t) in 2002/03 and 0.479-million lb (217 t) in 2003/04. The fishery has been closed every season during 2004/05–2014/15. Non-retained catch of red king crab occurs in the directed red king crab fishery (when prosecuted), in the Aleutian Islands golden king crab fishery, and in groundfish fisheries. Estimated annual weight of bycatch mortality during the 1995/96–2013/14 seasons averaged 0.002-million lb (1 t) in crab fisheries and 0.018-million lb (0 t) in groundfish fisheries. Estimated weight of annual total fishery mortality during 1995/96–2013/14 averaged 0.087-million lb (39 t); the average annual retained catch during that period was 0.066-million lb (30 t). Estimated total fishery mortality for 2013/14 was <0.001-million lb (<1 t). Data for estimating total fishery mortality for the 2014/15 season are not yet available.”

4 Management Issues

Crab fisheries in the BSAI that are in the FMP are managed through a cooperative management structure with the State of Alaska. The following three categories of management measures are identified in the FMP:

- I. Those that are fixed in the FMP and require an FMP amendment to change;
- II. Those that are framework-type measures that the State can change following criteria set out in the FMP; and
- III. Those measures that are neither rigidly specified nor frame-worked in the FMP and are at the discretion of the State.

Management Unit. Changes to the definition of the management unit would fall under Category I and would necessitate an FMP amendment. If the Council were to recommend that the proposed portion of the WAI RKC stock be removed from the FMP that would constitute a change to the definition of the management unit, and an amendment to the FMP would be needed. Full authority over Adak RKC by the State of Alaska would not occur until that amendment was approved by the Secretary.

Status Determination. Determinations of total allowable catches (TACs) and guideline harvest levels (GHLs) are a Category II management measure and are deferred to the State following criteria in the FMP. Currently, catch levels established by the State must be in compliance with OFLs established in the FMP to prevent overfishing. NMFS annually determines if total catch levels exceed OFLs or if stocks are overfished or are approaching an overfished condition. If either of these occurs, NMFS notifies the Council and the Council must immediately end overfishing and develop an FMP amendment to rebuild the stock, if necessary, within two years. Obviously these requirements do not apply to stocks that are not in the FMP and thus, harvest of Adak RKC would cease to be monitored by NMFS, nor would any Council action be required if harvest levels were to result in overfishing. The State of Alaska would have sole responsibility for assuring that overfishing is prevented.

Accountability Measures. Accountability measures (AMs) prevent overfishing through a precautionary approach to setting ABC. Additionally, AMs include (from the FMP): “individual fishing quotas and the

measures to ensure that individual fishing quotas are not exceeded, measures to minimize crab bycatch in directed crab fisheries, and monitoring and catch accounting measures. Accountability measures in the harvest specification process include downward adjustments to the ACL and TAC in the fishing year after an ACL has been exceeded.” Removal of Adak RKC from the FMP would eliminate federal accountability measures for that portion of the stock.

OFL/ABC calculation. From a federal perspective, the ongoing actions necessary to manage RKC in the WAI include annual specification of OFL and ABC. These reference points are set annually for the entire management unit. Any change to the definition of the management unit would necessitate a change in the basis for calculating OFL so that the measure applies appropriately to the stock or portion of the stock that is covered by the FMP. Redefinition of OFL for the remainder of the WAI RKC stock would be the responsibility of the Council and would likely be carried out by the CPT with SSC approval.

The reference points for WAI RKC are set under Tier 5 which reflects the greatest degree of scientific uncertainty about the condition of a crab stock. Under Tier 5, in the absence of a stock assessment or survey, the status of the stock is considered to be “unknown” (i.e., with regard to overfished/not overfished). The paucity of information about stock condition also contributes to a conservative basis for ABC. For the 2011/2012 fishing year, ABC was set with a 75% “buffer” relative to OFL, i.e., $ABC = 25\% \text{ OFL}$. Since then, ABC has been set with a 40% buffer to allow for an exploratory fishery. By definition under Tier 5, OFL is set as the average of annual catches based on a reference period, in this case total catch, including landings and discards, from 1995-2008. Based on this approach OFL for the WAI has been set consistently at 56 mt since 2010 when it was first put into place by the SSC. Because the fishery is closed, only bycatch of RKC currently accrues against OFL.

4.1 Federal Controls on Bycatch

There are no groundfish PSC limits on RKC in the WAI. Bycatch of RKC by the groundfish fleet as well as the WAI golden king crab fishery is monitored by the CPT and is included in the SAFE chapter (see attached). An annual 50 count limit on RKC exists under the scallop FMP for the “Adak” area, which, as written in the Scallop FMP means the entire WAI west of 171W. If Adak RKC were to be removed, then an adjustment to the RKC limit for scallop dredges would likely be needed. The only effort by scallop fishery in the WAI occurred in 1995.

Area closures have been implemented in the AI to protect benthic habitat, especially coral communities; these also secondarily reduce crab bycatch below what otherwise could occur. Gear modifications have also been put in place for minimizing bycatch and cryptic fishing mortality impacts to crab species from trawl and pot fisheries. These measures affect groundfish and crab fishing in both federal and state waters. If the Adak portion of WAI RKC were to be removed from the FMP, no changes in these existing protective measures would occur.

All RKC captured by the groundfish fleet (reported or observed) are required to be returned to the water, regardless of area. Counts of discarded crab are assigned a discard mortality rate based on gear (e.g., 80% for trawl) and are taken into account in crab stock assessments. If Adak RKC were to be removed from the FMP, then bycatch mortality for that portion of the stock would no longer be monitored by either NMFS or the CPT. The data, however, would still be collected and be available to state biologists who participate in state management of crab stocks.

5 Biological Issues

5.1 Unit Stock Definition

National Standard 3 states that “To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close

coordination.” Nevertheless, the definition of a management unit can often have its origin based on historic harvest patterns by the fishery. In the early 1960s, harvest of WAI RKC was initially separated between Dutch Harbor (Registration Area O) and Adak (Registration Area R). Registration Area S was established to cover Petrel Bank in 1967, but was then merged into Area R in 1978. In 1996, the BOF merged all of the AI RKC from Dutch Harbor west into Area O. When Dutch Harbor RKC was removed from the FMP in 2008, the remaining area from 171W west defined the management unit and unit stock for stock assessment purposes. At no point has it been clearly established whether RKC in the AI comprise a single population or multiple biologically distinct populations. For this reason, the CPT’s concerns about the biological considerations in removing Adak RKC from the management unit focus on whether the two areas contain distinct stocks or not. Without a clear answer to that question, the Council might consider two logical bounds on the biology of WAI RKC.

Scenario 1) There is a single stock of RKC in the WAI such that there is thorough mixing of reproductively mature crab, as well as linked patterns of recruitment, growth, and natural mortality.

Scenario 2) RKC in Adak and Petrel Bank are isolated in terms of population dynamics due to an absence of mixing of reproductively mature crabs, as well as independent patterns of natural mortality, growth, and recruitment.

The stock likely falls somewhere in the middle of these scenarios. The fact that the same species is in the two areas suggests, at the very least, some linkage in the past (e.g. see Grant and Cheng 2012). The question then becomes, what are the biological impacts associated the two scenarios if Adak RKC are removed. Table 2 also summarizes these concerns. The answer to that question would be addressed in detail through the CPT if the Council were to consider further development of this issue. Nevertheless, the degree to which those population processes need to be understood is at least, in part, a function of the need for that information given the management approach for the resource. Because WAI RKC is managed under a Tier 5 assessment, population dynamics are not taken into account, and an adjustment to OFL determination under Tier 5 would not be precluded if Adak RKC were removed. If management depended on a stock assessment model, then factors affecting population dynamics would necessarily need to be better understood and accounted for in order to be modeled.

6 2015 ADF&G Recon Survey

In September 2015, a cooperative survey was carried out under a Regional Operational Plan. The report for the survey is included under a separate attachment and is briefly summarized here. A total of 730 pots were deployed around Adak Island with soak times ranging from 8 to 24 hours. A total of 441 RKC were caught, however this included only 23 legal male crabs such that CPUE of legal crab was approximately 0.03 crab/pot. Catches were highly localized with only 14 pots (Sitkin Sound and Adak Strait) catching RKC and 88% of the total catch coming from two pots. Despite the low CPUE, the survey caught many more RKC than were caught in the previous survey in 2002 which caught only 4 RKC in about 400 pot lifts. Genetic samples were obtained and the plan, albeit uncertain, is for additional samples in 2016 from a similar survey in Petrel Bank.

7 Status of Crab Plan Team Concerns

The following sections follow, as possible, the issues raised by the CPT. Those issues, listed above, are paraphrased in the section headings below. Issues raised at the 2015 CPT meeting propose future research that is beyond the scope of this discussion paper.

7.1 Rationale for not including some crab stocks in the FMP

Amendment 24 removed 12 crab stocks from the FMP (Option A in the amendment). The following comprises the analysis from the amendment:

“Option A would remove specific stocks from the FMP for which (1) there is no directed fishery; (2) harvest only occurs incidentally during fisheries targeting other crab stocks; (3) harvest only occurs in limited, exploratory fisheries; or (4) the majority of catch occurs in State waters. Under the Magnuson-Stevens Act, to remove these stocks from the FMP, NMFS and the Council need to find that there is a legitimate interest of the State of Alaska in the conservation and management of these stocks. The State would have sole management authority for these species, as they do for hair crab (the hair crab fishery, which occurs in the EEZ, was removed from the FMP). Currently, the FMP defers the management of these fisheries to the State. Therefore, the State already manages these stocks and collects all of the biological information. Except for the EAI Tanner crab stock, none of these stocks are surveyed. Harvest histories of the unsurveyed stocks are sporadic and the harvests from those stocks are managed either as incidental catch in fisheries targeting other crab stocks or as limited, exploratory fisheries. Any future exploratory fishery would be operated by ADF&G commissioner’s permit, which means the State determines if and when these fisheries occur, who may participate, observer requirements, and how much is harvested. The EAI Tanner crab fishery is essentially a state-waters fishery because 93 percent of landings from 1985-2006 were in state-waters statistical areas.”

Option A would remove the following 12 stocks from the FMP:

1. EAI Tanner crab
2. WAI Tanner crab
3. EBS grooved Tanner crab (*Chionoecetes tanneri*)
4. EAI grooved Tanner crab
5. WAI grooved Tanner crab
6. BS triangle Tanner crab (*Chionoecetes angulatus*)
7. EAI triangle Tanner crab
8. St. Matthew golden king crab
9. St. Lawrence Island blue king crab
10. AI scarlet king crab (*Lithodes couesi*)
11. EBS scarlet king crab
12. EAI red king crab (Dutch Harbor)

“Section 306(a)(3) of the Magnuson-Stevens Act provides for State management authority in Federal waters off Alaska in the absence of Federal management of the species in question. Under Option A, the State of Alaska would continue existing State management for these crab stocks. The existing delegated authority is costly and burdensome for these stocks with limited fishery histories for the following reasons: (1) State personnel are required to comply with the additional Federal management processes; (2) the State needs to meet both state and Federal requirements which are often on different timeframes for management (e.g., public meetings and reports); and (3) the State cannot meet the costly assessment requirements needed to develop OFLs for these stocks. Instead, conservative management of the species under exclusive State management would be less costly and less onerous.”

“Under this option, Federal management would be removed, including the Magnuson-Stevens Act measures, such as the limited access requirements, Essential Fish Habitat (EFH) designation, and status determination criteria. Currently, vessels that intend to participate in these fisheries need a Federal license limitation program (LLP) license with a minor species or AI Tanner crab endorsement. NMFS issued crab LLP licenses with new species endorsements to crab LLP license holders subsequent to removing the LLP requirements for fisheries under the Crab Rationalization Program. NMFS issued an

AI Tanner crab endorsement to holders of crab LLP with a BSAI snow and Tanner crab endorsement and issued crab LLPs with minor species endorsements to all crab LLP license holders. Therefore, the LLP requirement does not limit access to these potential fisheries to historic or recent participants. “

“Although a Magnuson-Stevens Act requirement, insufficient information is available to determine EFH for grooved Tanner, triangle Tanner, and scarlet king crab (See EFH EIS, NMFS 2005). The EFH designated for golden king crab, Tanner crab, and blue king crab species would not change with the removal of WAI and EAI Tanner crab, St. Matthew golden king crab, and St. Lawrence blue king crab stocks. Additionally, these stocks would continue to benefit from the Federal habitat protection measures for the EFH for these three species.”

To the extent that the FMP language is binding, the conjunction “or” before the last of the enumerated criteria in the first quoted paragraph above is critical in that it means that any one of these criteria being met qualifies a stock as potentially being removed from the FMP – as opposed to “and” which would require all of the criteria being met.

A distinction between Adak RKC and the stocks that were removed in AM24 is that Adak RKC stock is currently considered to be part of a stock, the rest of which would remain in the FMP. Amendment 24 did not split defined crab stocks as being partially in/ partially out of the FMP. Therefore, true consistency with Amendment 24, to the extent that is needed, would treat Adak and Petrel Bank RKC as separate stocks. There is currently a great deal of uncertainty, as noted by the CPT, as to whether or not these are separate stocks.

The amendment cites an MSA obligation for NMFS and the Council to demonstrate that the State of Alaska has a legitimate interest in the conservation and management of the stock(s) in question. This is addressed in the amendment by pointing out that the State already manages and collects all of the biological information for the stocks proposed to be removed in the amendment. Recent actions by the state to establish separate management districts in the WAI and also establish specific management criteria for RKC in the Adak District suggests that the State has an interest in full management of Adak RKC and would have little to do, administratively to assume full responsibility.

Finally, AM24 rationalizes the removal of stocks from the FMP by noting the cost and burden to the State for stocks with limited fishery histories and stating that “conservative management of the [stocks] under exclusive State management would be less costly and less onerous” [than Federal management].

The effect of removing stocks from the FMP is described in the EA for Amendment 24. Generally, the effect on Federal management was that any limited access requirements, Essential Fish Habitat designations, and status determination criteria would be removed.

7.1.1 Why was Adak not rationalized?

When the elements and options for the crab rationalization program were developed by the Council in 2001, the WAI (“Adak”) RKC was initially included, but the area east of 179W was later dropped. Testimony during the AP report at the time appears to indicate that areas with no directed fishery were eliminated from the program. Presumably, this was because their inclusion did not contribute to an evaluation of catch histories. Interestingly, although the 2004 final rule for the rationalization program (70FR10174) states that an LLP would be required for RKC in WAI east of 179W, in the regs, the LLP requirement was dropped. Apparently, the intention of the State at the time was for an open access fishery in the area if the stock did return to a level that could support a directed fishery (pers. comm. K. Bush). In contrast, an LLP for RKC in the abutting Dutch Harbor portion of Area O was developed,

though the stock was removed from the FMP with Amendment 24. NMFS intends to propose regulations to remove the LLP requirement for this stock for consistency with the FMP.

7.2 Red King Crab Stock Structure

Currently, four RKC stocks are addressed in annual Crab SAFE – Bristol Bay, Pribilof Islands, Norton Sound, and WAI. The most thorough discussion of overall RKC stock structure can be found in the SAFE section addressing WAI RKC. The assessment author cites genetics work by Seeb and Smith (2005) as showing evidence of genetic divergence of RKC in Adak and Norton Sound from Bristol Bay and Pribilof Islands. Referenced Adak genetic samples were from RKC caught near Adak Island and no genetic assays have been reported for the Petrel Bank area that would allow for comparison within the WAI. RKC from WAI are more similar, genetically, to RKC from Asia than from RKC in Bristol Bay and the Pribilof Islands (Grant et al. 2014). Grant and Cheng (2012) note that the three State of Alaska registration areas (O, T, and Q) largely coincide with the major genetic groupings of RKC in the BSAI area.

Genetic differentiation of RKC is suggested by Grant and Cheng (2012) to have its historical basis in post-ice-age isolation with RKC expanding from a common ice-age refuge to more dispersed areas which have led to varying degrees of demographic independence. Samalga Pass, at roughly 170W is mentioned as a possible barrier explaining the WAI and Bristol Bay genetic separation. Although Amchitka Pass has been suggested as a potential barrier for adult movement, there is no direct evidence as yet that RKC in the Petrel Bank and Adak districts are demographically separated by this oceanic feature. Nevertheless, the 2014 SAFE cites tagging work by McMullen and Yoshihura (1971) that suggested that adult RKC do not migrate through deep ocean passes.

In conclusion there is not a clear case for splitting Adak and Petrel Bank based on genetic evidence, primarily because the genetic samples are lacking not that they are present but with inconclusive results. There is some inferential evidence that post-settlement demographics may be independent between the two areas, but that speculative at this point.

7.3 Management Considerations

There is some precedent created for removing stocks from the FMP created by Amendment 24. Key differences exist, though, between the actions of Amendment 24 and the proposal for removing WAI RKC east of 179° W. The differences are that Amendment 24 removed entire stocks, whereas this proposal would split the stock into two separate regions. Additionally, the stocks removed by Amendment 24 were removed prior to having OFLs and ABCs set. To meet NMFS and the Council's conservation responsibility, the State of Alaska would need to demonstrate it has a legitimate conservation and management interest in solely managing this portion of the WAI RKC stock.

Removing a portion of the WAI RKC from the FMP will have implications for the bycatch estimation process. There is not a PSC limit on WAI RKC, however it is caught as bycatch in both the groundfish fisheries and the golden king crab (GKC) fisheries. AKFIN and NMFS currently use observer data from the groundfish fisheries to estimate crab bycatch in the groundfish fisheries by crab stock areas (described in Section 6.5). Changing the RKC stock boundary would require a modification to the bycatch estimation procedure. The change would likely be manageable, but a potential complication is whether the new boundary would line up with the groundfish statistical reporting areas. If they do not align, it could be more complicated to account for bycatch in the portion of the WAI RKC remaining under the FMP. NMFS has not established a mechanism to transmit bycatch reporting data from the federal groundfish fisheries to the State for crab stocks that are not included under the FMP, and this may be something the Council wishes to consider for this action. Due to the State's role in monitoring and managing the BSAI crab fisheries, a similar problem does not exist for WAI RKC bycatch in the GKC fisheries.

Amendment 20 to the FMP may be a precedent for splitting a crab stock (final rule published on June 7, 2006) for management rather than biological purposes. Amendment 20 divided the Eastern Bering Sea Tanner stock at the 166° W longitude boundary into two stocks, consistent with a State determination that Tanner crab be managed as two separate stocks. The Tanner stock was divided “as a means to avoid localized depletion by the commercial fishery, particularly of those legal-sized males in the Pribilof Islands area”. However, the Tanner crab stocks are managed under a single OFL and ABC. The State, in its role setting the TAC, apportions a separate TAC for the EBT and the WBT stocks.

The 2015 SAFE states, “Although the State of Alaska’s harvest strategy and management controls for this stock are different east and west of 166° W, the unit stock of Tanner crab in the EBS appears to encompass both regions and comprises crab throughout the geographic range of the NMFS bottom trawl survey. Evidence is lacking that the EBS shelf is home to two distinct, non-intermixing, non-interbreeding stocks that should be assessed and managed separately.”

7.4 Potential for Fishery under Current Management

The following is taken from the 2015 WAI RKC SAFE (p. 11):

Only vessels 60 feet or less in overall length may participate in the commercial red king crab fishery within the state waters of the Adak District (5 AAC 34.610 (d)); no vessel size limit is established for federal waters in the Adak District or for state or federal waters in the Petrel District. Federal waters in the Adak District are opened to commercial red king crab fishing only if the season harvest level established by ADF&G for the Adak District is 250,000 lb or more (5 AAC 34.616 (a) (2)); there is no comparable regulation for the Petrel District. In the Adak District, pots commercially fished for red king crab may only be deployed and retrieved between 8:00 AM and 5:59 PM each day (5 AAC 34.625 (g) (2)) and the following pot limits pertain: 10 pots per vessel for vessels fishing within state waters (5 AAC 34.625 (g) (1) (A)); and 15 pots per vessel for vessels fishing in federal waters (5 AAC 34.625 (g) (1) (B)). In the Petrel District there is no regulation pertaining to periods for operation of gear and a pot limit of 250 pots per vessel (5 AAC 34.625 (d)).”

In summary, existing state and federal regulations do allow and provide for small boat, small pot limit fishing for RKC within the Adak District if indications of harvestable numbers of RKC exist.

7.5 Groundfish bycatch of WAI RKC in east and west portions of WAI

Figure 2 shows the distribution of observed RKC bycatch in the WAI since 2001. The bulk of the observed bycatch occurred west of the boundary line of the Adak and Petrel Bank districts. Note, however, that effort by the fleet and total observer coverage is not displayed which would be necessary for making conclusions about the representativeness of the observed discards.

The following is taken from the Crab Bycatch in the Bering Sea/Aleutian Islands Fisheries Discussion Paper (May 2010):

“In groundfish fisheries, crab bycatch is currently tabulated by number of crabs. The overall weight of crabs in crab fisheries (in kilograms and lbs) is also tabulated. For purposes of accruing against the stock specific OFLs, the weight is the important measure. NMFS has developed a procedure for catch accounting applying the average crab weights by year against the extrapolated numbers of crab in the observer database. Described below is a general description of the procedure of moving from extrapolated numbers of crab to weight of crab for purposes of accruing against stock-specific OFLs (excerpted from Gasper et al. 2009). Observer information must be used to infer the total of weight of crabs because both the blend and catch accounting systems (CAS) only estimate the number of crabs. Crab bycatch numbers

are estimated by the NMFS through the Groundfish Observer Program. Catch data are reported to the NMFS-Alaska Fisheries Science Center (AFSC) Observer Program in Seattle for extrapolation, next forwarded to the NMFS in-season management division, who run the extrapolated data through the blend program to estimate the total catch. The observed PSC bycatch rate is then applied to the estimated total catch to obtain the PSC bycatch number used in management of the fishery.”

“Currently there is mismatch in the units used to sample and estimate crab bycatch in the Alaska groundfish fisheries. The observer program obtains samples of crab as weight and then converts the weight into numbers of individual crabs. This conversion is done so that the Alaska Region can estimate crab PSC (prohibited species catch) as numbers of crab because the current crab PSC management measures set limits on the number of crabs. The crab stock assessment authors, however, need estimates of crab catch in total weight. Thus, to obtain an estimate for the stock assessment authors, the Alaska Region converts total PSC estimates of number of crabs back to weight of crab using a global average weight per crab by gear (fixed or trawl), species, and crab year. This process results in multiple conversions, from weight to number and then back to weight, that rely on averages that do not necessarily correspond with the sampling frame. For this reason, the estimates of crab bycatch by gear and groundfish fishery should be viewed as relative comparison rather than a true estimate of the crab bycatch amount.”

7.6 Relative catch in Federal and State waters for crab stocks in and out of FMP

Table 3 shows the ratio of state to federal water landings of crab by area throughout the Alaska Region. The vast majority of landings are from federal waters in the BSAI (as compared to the GOA where harvest of crab is not permitted in federal waters). Note that although still predominately federal, WAI and Dutch Harbor comprise the largest state water contribution to landings.

8 Discussion/Summary

The Council may wish to consider several of the following issues in deciding how to proceed.

Purpose and Need – There is not currently a purpose and need statement for this issue, and one would need to be developed if the Council wishes to move forward. The ACDC proposal implies that with two separate management schemes, two very different fleets potentially fishing in the two areas, and OFL locked to historic catch, it is inconsistent and inefficient to specify a single OFL for the two areas. If Adak RKC is removed from FMP, there may be greater flexibility under State-only management for earlier or more responsive development of a fishery in Adak . The Council may wish to expand on this position in moving forward.

Biological Issues - There does not appear to be a biologically compelling reason to split the management unit. The collection of RKC samples for analysis of potential genetic distinctiveness between the two areas is ongoing. Samples have been obtained from the Adak District, however, collection from Petrel Bank is still pending. Nevertheless, if genetic analysis were to show that RKC from the two areas are not distinct from each other, it would not necessarily compel the Council to keep both areas in the FMP. Through the FMP, specification of OFL under Tier 5 for Petrel Bank only would likely be based on Petrel Bank catch only. The existing reference timeframe for WAI OFL is 1995-2008. The Adak District was closed after the 95/96 season so catch from Adak contributes minimally to OFL (Table 4).

Management Options – Alternatives for this potential action do not currently exist and would be developed to complement the purpose and need. Several management options are apparent, however, at this time, not necessarily limited to the following:

No Action – Keep Adak RKC in the WAI management unit. This option would affirm the current management arrangement whereby a single OFL/ABC is specified for the entire WAI which applies to the rationalized Petrel Bank area and the unrationalized Adak area.

Remove Adak RKC from the FMP – This action would redefine the WAI management unit in the FMP such that it only applies to RKC west of 179W longitude. This would require an FMP amendment including NEPA and other supporting documentation. Category I federal management measures would no longer apply to Adak RKC and all management authority for RKC in that area would shift entirely to the State. Groundfish bycatch of RKC in the Adak district would no longer be monitored by NMFS or the CPT. OFL/ABC would apply only to the rationalized Petrel Bank area.

Recognize separate stocks but retain in FMP – This action would be partially modeled after the action taken in Amendment 20 which was responsive to the determination by ADF&G of two Tanner crab stocks in the EBS. The Council, in that case modified allocative schemes for the two stocks, while maintaining them as a single management unit for stock assessment and OFL/ABC setting purposes. Because separate federal management schemes already exist for Adak and Petrel Bank, this action would result in the State specifying separate TACs for the two areas, which could be done consistent with Category II actions already taken by the BOF to recognize separate management districts. This action would not require an FMP amendment.(right?)

Specify separate subarea ABCs – This action could be initiated at the Plan Team level. It would not require a plan amendment, but would allow the Council to specify separate ABCs based on a single OFL for the two areas. This approach has been used several times in the groundfish FMPs for adapting harvest policy to the spatial distribution of stocks across management areas.

Future fishery composition- Given the current low numbers of RKC in the WAI, it is very unlikely that a population of RKC sufficient to support a viable fishery will be present within the near term (e.g., five years from present). This limits the possibility of characterizing the composition of a future fishery in that area with any precision because the potential for participation may be affected by changes in availability of other resources, other management actions, and any number of internal business decisions over that timeframe. Nevertheless, if Adak RKC is removed from the FMP, future participants would likely consist of a small rationalized fleet that would operate in the Petrel Bank District, and a nearshore small boat fishery that would operate in the Adak district. There has never been any issuance of Petrel Bank RKC quota since the crab rationalization program was put in place and so there are no years to reference in which vessels were active. The WAI golden king crab fishery currently supports 2-3 vessels, and the expectation is that there would be some overlap as well as a limited number of additional participants for RKC. There are currently a little less than twice as many WAI RKC quota shareholders as GKC quota shareholders. Landings of RKC from Petrel Bank would likely be delivered to Adak and Dutch Harbor with the amount being delivered to Adak dependent on the level of development there.

For Adak, the fishery would likely develop from the existing pool of small boats that currently participate in pot cod and, perhaps, halibut fisheries in the area. In the last ten years there were between 10-40 vessels with non-trawl cod gear in the WAI. These vessels would fish from and deliver to Adak. Because removal of Adak RKC from the FMP would allow the State to extend vessel size restrictions into federal waters, access to RKC in federal waters could be limited to this small boat fleet if the State chooses.

If the removal of Adak RKC does not occur, then when the fishery opens again, the rationalized RKC fishery would have exclusive access to Petrel Bank and would also have access to federal waters in the Adak District which are currently open access. The existing pot limit (15) in federal waters of the Adak

District may limit the likelihood of activity by the rationalized fleet there, however. The small boat fleet would have access to both state and federal waters under the regulations established by the State.

9 References

- Grant, W.S. and Cheng, W. 2012. Incorporating deep and shallow components of genetic structure into the management of Alaskan red king crab. *Evolutionary Applications* 5(8): 820-837.
- Grant, W.S., D.A. Zelinina, and N.S. Muge. 2014. Phylogeography of red king crab: implications for management and stock enhancement. Pages 47-72 in B.G. Stevens (ed.): *King Crabs of the World: Biology and Fisheries Management*. CRC Press, Taylor & Francis Group, New York.
- McMullen, J., and H. Yoshihara. 1971. King crab research: Alaska Peninsula-Aleutian Islands Area. In: ADF&G. 1971. King crab management report to the Board of Fish and Game, April 1971 meeting. Kodiak.
- North Pacific Fishery Management Council (NPFMC). 2007. Public Review Draft: Environmental Assessment for proposed Amendment 24 to the Fishery Management Plan for Bering Sea and Aleutian Islands King and Tanner Crabs to Revise Overfishing Definitions. 14 November 2007. North Pacific Fishery Management Council, Anchorage.
- Pengilly, D. 2015. Western Aleutian Islands red king crab: 2015 Crab SAFE Report Chapter. Pages 903–940 in: *Stock Assessment and Fishery Evaluation Report for the King and Tanner Crab Fisheries of the Bering Sea and Aleutian Islands Regions (2015 Crab SAFE)*, September 2015. North Pacific Fishery Management Council, Anchorage, AK.
- Seeb, L., and C. Smith. 2005. Red king crab and snow-Tanner crab genetics. *Bering Sea Crab Research II, Project 2. Final Comprehensive Performance Report for NOAA Award NA16FN2621*. October 2005. ADF&G, Juneau.

Table 1. Management actions associated with alternative management of Adak RKC. Two scenarios are envisioned: removal of Adak RKC, and retention of Adak RKC with differential Adak/Petrel Bank harvest limit setting.

Management Issue	Adak removed entirely from management unit	Adak retained in management unit, but recognition of separate management areas
Definition of Management Unit	FMP amendment with re-definition of WAI RKC management unit	No amendment needed
Specification of OFL/ABC	CPT would need to redefine Tier 5 OFL based on catch history for Petrel Bank only.	CPT would calculate OFL for management unit and apportion ABC to subareas
ACLs/AMs	Adjusted to apply only to catches in Petrel Bank	Re-tooled to accommodate subarea ABCs (ACLs)
PSC Limit (Scallop fishery only)	Reconsideration of bycatch limit for the scallop fishery - currently 50 RKC in the "Adak" region	Possibly need to be recalculated for subarea PSCs
Observer Monitoring of directed fishery	No observer requirement currently exists for CVs that meet the length requirements in the Adak District	Observer coverage is required for larger CPs that typically fish in Petrel Bank. This would be maintained.
Annual review of bycatch by CPT	Catches from Adak would not be reviewed by CPT.	Status quo
Discard requirements for other fisheries	All mandatory discarding of incidentally caught RKC would be maintained in both areas	Status quo
Bycatch reporting in Federal groundfish fisheries	Bycatch reporting procedures would be modified to account separately for bycatch in Adak subarea and Petrel Bank subarea; bycatch in the Adak subarea would no longer be used in the OFL/ABC specification process	Bycatch reporting procedures would be modified to account separately for bycatch in Adak subarea and Petrel Bank subarea

Table 2. Biological issues associated with the potential removal of Adak RKC from the FMP. The first row identifies issues associated with the biological determination of unit stock. The second and third rows address outcomes of that exercise (one stock or two).

Biological Issue	Actions Needed
Determination of Unit Stock	<ol style="list-style-type: none"> 1. Application of Stock Structure Template 2. Genetic sampling, comparison of RKC from the two areas (samples obtained for Adak, pending for Petrel Bank) 3. Evaluation of physical, oceanic features as stock boundaries or barriers to movement by life stage 4. Evaluation of differences in recruitment patterns
Stock assessment of split unit stock where demographics (recruitment, mortality) are linked between areas	<ol style="list-style-type: none"> 1. If a stock assessment model were to be developed that estimates recruitment and fishing mortality, then there would need to be a mechanism for incorporating catches (directed and incidental) and recruitment from both Adak and Petrel Bank into the model. Bycatch data from the observer program and state catch accounting could provide that info. Failure to account for dynamics in portion of assessed stock would confound assessment results. 2. If stock performance continues to be evaluated at Tier 5, then would simply drop the Adak portion of the catch data.
Stock assessment of separate stocks where demographics are independent	<ol style="list-style-type: none"> 1. If a stock assessment model were to be developed, it could address Petrel Bank as a discrete population of RKC. 2. If stock performance continues to be evaluated under Tier 5, then simply drop the Adak portion of the catch data.

Table 3. Crab landings (lbs) from 1991 fwd in State and Federal waters in the Alaska Region.

CRAB_FISHERY	State Waters	Federal Waters	Pct Fed
AKPEN		49,563	100%
BRISBAY		71,647	100%
DHRBOR	24,014	141,673	86%
EAG	7,577,341	73,606,331	91%
KOD	1,210	111,055	99%
NORTSD	153,378	6,110,725	98%
PRIB	9,304	2,170,579	100%
PWS	1,988		0%
SOUEST	12,188,750		0%
STLAW	92	10,658	99%
STMAT		27,514	100%
WAG	8,554,509	51,630,705	86%
WAI	588,322	3,696,338	86%
YAKT	26,702		0%
Total	29,125,610	137,626,788	83%

Table 4. Average removals (dead discards and landings) for Adak and Petrel Bank during the 1995/1996 – 2007/2008 reference period for OFL determination. If Adak is removed from the FMP, then the likely change in OFL would be the removal of the Adak catch in the catch averaging (~5% of OFL).

Avg removals (lb)			
by source, 95/96-07/08	East of 179 W	West of 179 W	Total
Landings _{95/96-07/08}	34	96,898	96,932
Crab Fishery Disc _{95/96-07/08}	265	2,735	3,000
GF Fishery Disc _{95/96-07/08}	6,152	17,783	23,935
OFL (lb)	6,451	117,416	123,867

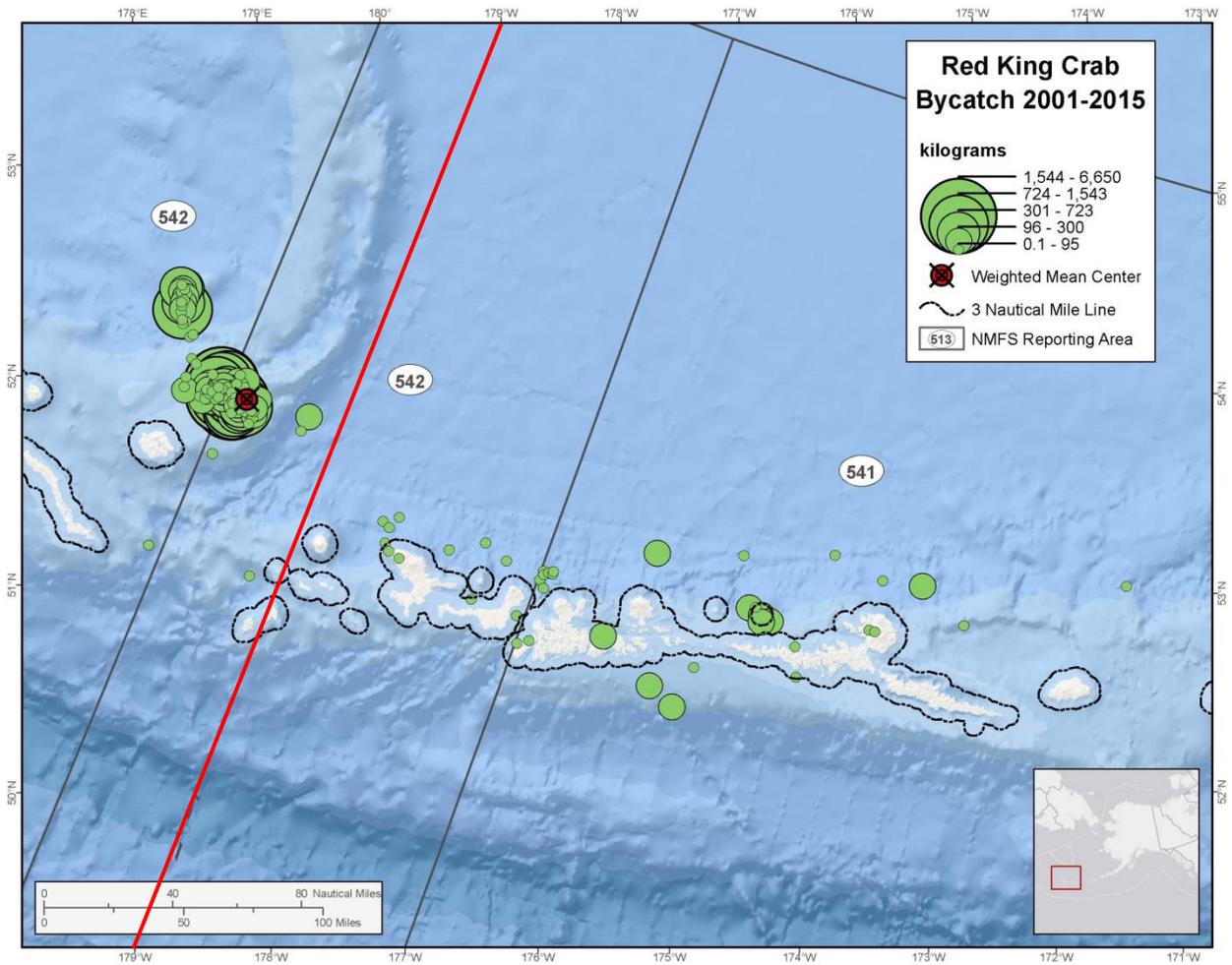


Figure 2. Observed groundfish fishery bycatch of red king crab from in the western Aleutian Islands from 2001 – 2015. The boundary between Petrel Bank and Adak Districts is shown by the red line. All gear types in query, bycatch is 99% from trawl gear.