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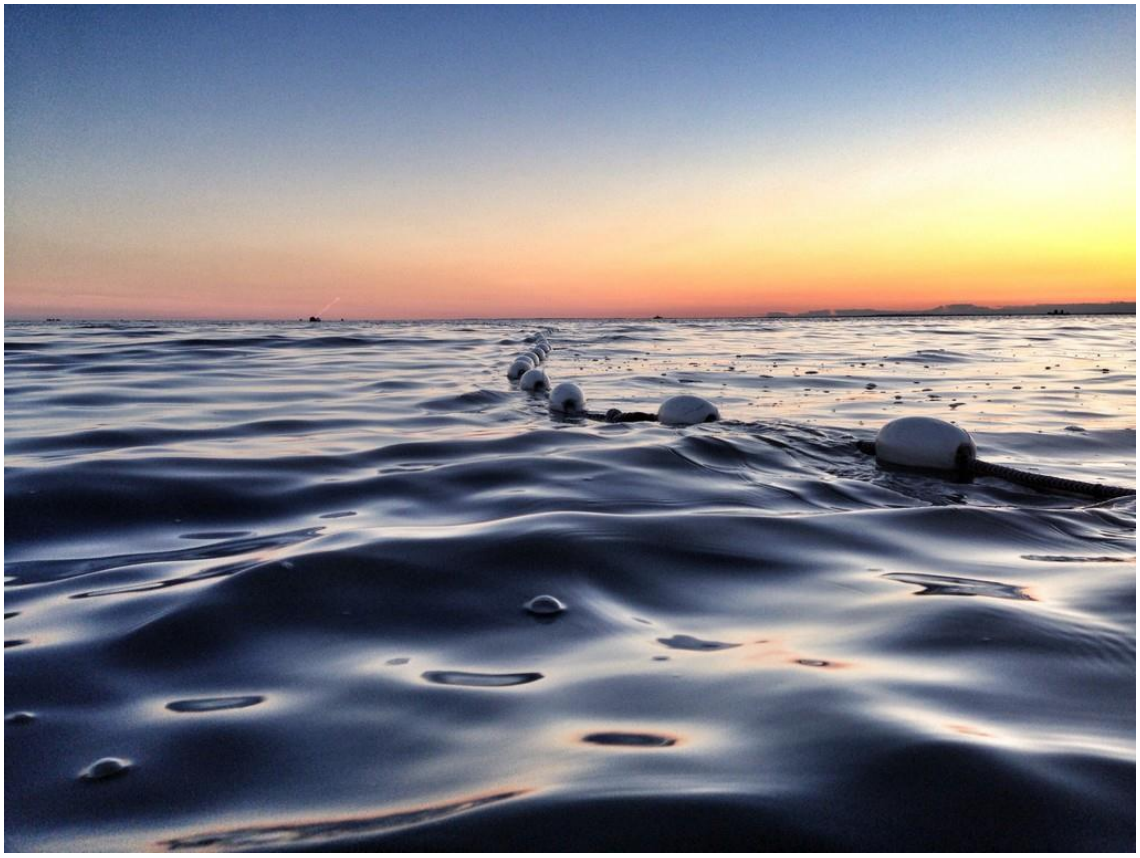
Ecological Risk Assessment:

Marbled and Kittlitz's Murrelet Interactions with the Alaska Salmon Gillnet Fishery



Conducted by the Alaska Fisheries Development Foundation

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December 5, 2022

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Executive Summary

An Ecological Risk Assessment (ERA) consisting of a qualitative Scale, Intensity, Consequence Analysis (SICA) and a semi quantitative Productivity-Susceptibility Analysis (PSA) was used to determine relative risk to Marbled murrelets and Kittlitz's murrelets from the Alaska salmon gillnet fishery. The ERA framework is hierarchical and used to understand relative risk in data-limited fisheries. Despite relatively little information about murrelet-bycatch, it was possible to rule out major risks in many regions of the state based on relatively low fishing effort, low murrelet density, or both.

The analysis was conducted considering the following Operational Objective: *There must be a reasonable level of confidence that if the birds are depressed, the fishery would not prevent them from recovering given favorable environmental conditions.* It is important to identify an objective(s) that is logical to stakeholders and quantifiable. In this case, the Operational Objective comes from the MSC Assessment standards.

The ERA evaluates the source of the risk, the potential consequences of the risk and the likelihood of those consequences occurring. Consequences and likelihood are assessed against specific criteria such as life history characteristics and the likelihood of, in this case, murrelets encountering salmon gillnets. Consequence and likelihood are then combined to produce an estimated level of risk (low, medium, or high) associated with the potential hazard.

Of the 13 Commercial Salmon Management Areas in Alaska, all of which were evaluated for relative risk to murrelets from interactions with the salmon gillnet fishery, 11 were ruled out as low risk during the scoping process or the SICA. Two Management Areas were moved forward from the SICA to the PSA and assigned a risk level of "low" at the end of the analysis. Based on these findings, the authors of this report believe that the Operational Objective is met by the status quo of gillnet-murrelet interactions in the Alaska gillnet salmon fishery. However, the authors also recognize that due to the data-limited nature of this issue, continuing to collect data on interactions and murrelet population distribution when possible will be beneficial to both the industry and bird conservation efforts. Therefore, the authors are currently working with seabird researchers and software developers of the data collection application, SkipperScience, to fund data collection from gillnet fishermen regarding seabird distribution and interactions with the fishery.

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Glossary of Terms

ADF&G: Alaska Department of Fish and Game
AMMOP: Alaska Mammal Marine Observing Program
AT: MRAG Assessment Team
BRMU: *Brachyramphus* murrelet genus (includes both Kittlitz's and Marbled murrelet)
ERA: Ecological Risk Assessment
IBA: Important Bird Area
KIMU: Kittlitz's murrelet
MAMU: Marbled murrelet
MRAG: private consulting body that assesses fisheries for the MSC
MSC: Marine Stewardship Council
PSA: Productivity, Susceptibility Analysis
SICA: Scale, Intensity, Consequence Analysis
US Fish and Wildlife Service: USFWS

Background

The Alaska Fisheries Development foundation currently serves as the Client for the Marine Stewardship Council (MSC) Alaska Salmon Client Group. The current version of the MSC standard requires assessment teams to consider bycatch of endangered, threatened, or protected (ETP) species. ETP designation applies to the International Union for the Conservation of Nature (IUCN) red listed seabirds which include Kittlitz's Murrelets (KIMU) and Marbled Murrelets (MAMU) for Alaska. The IUCN lists these two species as near threatened and endangered, respectively. However, neither KIMU nor MAMU in Alaska are formally designated as an endangered, threatened or sensitive species under the US Endangered Species Act or the State of Alaska. In response to this update to the MSC standard, a condition was set on the Alaska salmon fishery regarding seabird-gillnet interactions and the potential for bycatch. The performance indicator for the condition requires that "there is a regular review of the potential effectiveness and practicality of alternative measures to minimize UoA and enhancement related mortality of ETP species and they are implemented as appropriate." (Stern-Pirlot et al., 2020, p. 35).

The following Ecological Risk Assessment (ERA) serves to address this condition by creating a framework for analyzing the risk to murrelets based on available data and information from key stakeholders. The ERA framework was chosen for this fishery due to the relative lack of data regarding seabird population distributions in Alaska and interactions with gillnets in the Alaska salmon fishery and provides a precautionary approach to uncertainty. The ERA provides a way to analyze what data does exist along with collecting additional information from key stakeholders in order to provide as complete a picture as possible. The Scale, Intensity, Consequence Analysis and the Productivity-Susceptibility analyses, used in combination with a stakeholder workshop, provide a way for experts and other stakeholders to reach consensus on the level of risk to murrelets from entanglement in gillnets by combining consequence and likelihood to produce an estimated level of risk.

Much of the basis for this ERA has already occurred through information gathered during the Seabird Workshop hosted by AFDF in 2019 along with background research conducted by the MRAG Assessment Team during the 2019 assessment.

The ERA report will be provided to the AT in order to help them determine whether or not the condition on seabird bycatch for the Alaska Salmon fishery can be closed or must be continued. The ERA process takes a precautionary approach to uncertainty and is a commonly used methodology for understanding relative risk of impacts for data-poor fisheries. It draws heavily on expert and stakeholder input to reach reasonable conclusions about relative risk. The ERA is a hierarchical process consisting of three steps that narrow down to units that are potentially high(er) risk. The following descriptions come from Bell, et al. (2016). All other scoring rubrics and methodology come from Hobday, et al. (2007 or 2011) with the exception of the PSA scoring guide, which is the new MSC standard specifically for birds as of October 26th, 2022 (Marine Stewardship Council, 2022).

1. Scoping

   The scoping process provides background information relating to the fishery and the potential risks. It allows stakeholders to agree on the scope of the issue and identifies and removes irrelevant components (i.e., regions) from further analysis.

2. Scale, Intensity, Consequence Analysis (SICA)

   The SICA is a qualitative screening process that further helps to remove low risk components while identifying those that need further analysis. The SICA aims to identify which hazards may lead to a significant impact on species or habitat of concern. Where judgments about risk are uncertain, the highest level of risk that is still regarded as plausible is chosen. For this reason, the measures of risk produced during the SICA cannot be regarded as absolute. SICA scores were reviewed during a stakeholder workshop and stakeholder feedback informed the final consequence scores included in this document, which in determined which regions were moved forward to the PSA.

3. Productivity, Susceptibility Analysis (PSA)

   The PSA is a semi-quantitative process using available biological and spatial data as well as expert opinion when data is not available to further evaluate potential risk from components identified during the SICA. Where there is no published information and expert opinion cannot make a reliable judgment, a precautionary approach to uncertainty is taken and the highest score (3) is given for that component. Thus, PSA analysis is more likely to result in false positives than in false negatives and the list of high-risk species should not be interpreted as all being at high risk from fishing, rather that these are species that require a more detailed exploration before they can be classified as low risk (Walker et al., 2007a). **Assessment of the <u>actual impact</u> of the fishery on the species is not made. If fisheries are identified as medium or high risk in the PSA, this only indicates a need for further information in order to understand absolute risk.** The final categorization of fisheries as relatively low, moderate, or high risk is

calculated from the PSA scores and will occur after the workshop following Hobday, et al. (2007) methodology.

Much of the information used in the following ERA came from the 2019 and 2022 AFDF Seabird Workshops including both verbal and written materials such as PowerPoint presentations, from participants. Other sources include existing research and reference documents identified during the workshop and while conducting research for this Assessment. These sources are included (with links to PowerPoint presentations, which can also be found here) in the References section at the end of this document. It is important to note that comparison between regions is challenging due to the lack of consistent data between regions about bird abundance, fishing effort, and recorded bycatch.

2022 Workshop and Stakeholder Involvement

As part of the ERA process, AFDF hosted a virtual workshop with stakeholders on October 24th, 2022 to review draft scores for the SICA and PSA as well as to receive updates on research progress such as for the Alaska Marine Mammal Observing Program from NOAA Fisheries and about other relevant projects from USFWS. Workshop participants were given the opportunity to comment verbally during the workshop and AFDF staff took notes as well as recording the meeting in order to capture this feedback. A workshop recording is available upon request. The Workshop Agenda and a list of participants can be found in Appendix 1. Workshop participants were invited to submit further, written feedback about the ERA by November 7th, 2022 to make sure that they had sufficient opportunity to share their thoughts. One fishermen from Southeast Alaska submitted further comments (see Appendix 4). There was general agreement with the SICA and PSA scores suggested by AFDF during the workshop, although several participants provided valuable feedback and different data sources that did impact revised scoring after the workshop.

Some key stakeholders were unable to attend the workshop, however a survey (Appendix 2) was sent out to fishermen in Prince William Sound and Southeast Alaska in order to gather more information. The Yakutat Area Biologist also verbally provided answers to the survey questions for Yakutat during a phone conversation with AFDF staff but was unable to attend the Workshop.

Scoping

Context of the Analysis:

- This ERA focuses solely on drift and set gillnetting, which has been identified in the literature as the primary fishery of concern for seabird entanglement.
- For the purpose of this ERA, the units of analysis are the 13 Commercial Salmon Management Areas for Alaska as laid out by the Alaska Department of Fish and Game (see map, below).
- Both Kittlitz's (KIMU) and Marbled (MAMU) murrelets are of concern. Due to their nearly complete overlap of global populations (see PowerPoint slide below from Kuletz, et al.,

2019), very similar life history, difficulty in differentiating the two species, and similar risk from bycatch, this ERA considers the *Brachyramphus* murrelet (BRMU) genus, to which both species belong.

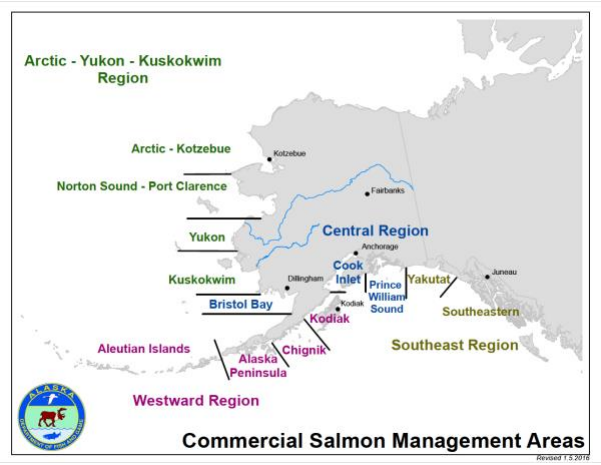

Figure 1: Alaska Commercial Salmon Management Areas (ADF&G).

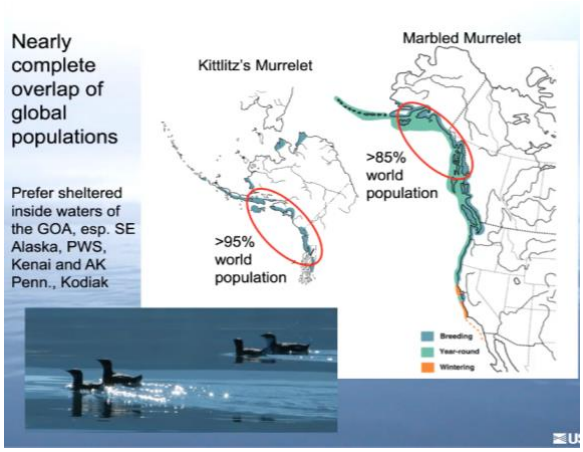

Figure 2: KIMU and MAMU populations (Kuletz et al., 2019).

Summary of AMMOP Data

The Alaska Mammal Marine Observing Program (AMMOP) recorded bycatch of seabirds in its studies in several relevant regions, during two-year study periods over 10 years. While the AMMOP data does not specifically fit into any of the scoring categories for the ERA, we believe that it is valuable data to consider as part of the Assessment. A presentation on the results of the AMMOP study was provided during the 2019 workshop and a summary is provided below. Note that the last three columns are based on extrapolated take rather than observed take unless otherwise noted. For example, while there were no BRMU taken in the South Unimak AMMOP, it was extrapolated that 21 BRMU may be taken by the fishery in a season. We provided the table below to summarize the study findings. All data below are from Manley (2006, 2007, 2009, 2015, 2019) and Wynne, et al. (1991 & 1992).

Table 1: Summary of AMMOP Data

Region	**Year**	**Observed Number of Seabirds taken**	**Observed Number of Murrelets taken**	**Estimated Total Seabird Take**	**Estimated Total Murrelet Take**	**% of Murrelet Take out of total Estimated Take (two-year average)**	**Estimated Annual Mortality Rate of MAMU** (Av. annual estimated MAMU take/Kuletz et al. 2019 pop estimates)	**Notes**
South Unimak	1990	16	0	337	21	6%	No data	Only one year of observer coverage
Kodiak	2002	34	4	529	56	12%	99/10,350=.95%	BRMU all taken in Uganik Bay; no take of any birds in Alitak Bay District
	2005	55	7	1091	142			

Cook Inlet	1999	4	0	272	0	11%	18.5/35,660=.05% *Note that USFWS biologists said this was not a valid calculation because of low observer coverage and therefore low confidence in mortality numbers.	BRMU observed in proximity to nets on only 4 of 2,194 sets.
	2000	2	2	74	37			
Prince William Sound	1991	53	23	993	260	60% (calculated based on two-year averages of observed take due to lack of data on extrapolated BRMU take for 1990).	750/33,745=2.2%	Because of the low take rates, extrapolation of the observer data is statistically difficult and results in wide confidence intervals. The vast majority of fatalities were in the Copper River District.
	1990	41	31	1468	1110 (calculated by AFDF staff, not provided in AMMOP report)			
Yakutat	2007	19	11	305	176	55%	115/5,980=1.9%	Over both years, 27/29 takes occurred in Yakutat Bay area. Factors that influenced take: 1) late in the season 2) sets hauled between midnight and 6:00 am
	2008	10	5	137	54			
Southeast	2012	12	0	165	0	5%	39/144,180=.03%	Take tended to occur later in the fishing season, number of birds in areas was best explanation for differences between two years
	2013	92	6	1360	78			

Scoping: Presence or Absence of Risk

In the Scoping process, each Commercial Salmon Management Area was considered for presence or absence of risk. Five regions were determined to have the potential presence of risk and were therefore carried forward to the SICA.

Table 2: Presence or Absence of Risk

Region	Presence or Absence of risk 0=no, 1=yes	Rationale
Arctic-Kotzebue	0	Outside MAMU range during fishing season; minimal occurrence of KIMU during fishing season (Kuletz et al., 2019 and Day et al., 2011)
Norton Sound - Port Clarence	0	Outside MAMU range during fishing season; minimal occurrence of KIMU during fishing season (Kuletz et al. 2019 and Day et al., 2011)
Yukon	0	Outside MAMU range during fishing season; minimal occurrence of KIMU during fishing season; fishery primarily occurs in rivers where murrelets are not foraging (Kuletz et al., 2019 and Day et al., 2011)
Kuskokwim	0	Outside MAMU range during fishing season; minimal occurrence of KIMU during fishing season (Kuletz et al. 2019 and Day et al., 2011)
Bristol Bay	0	On the edge of MAMU range during fishing season; agreement between biologists that the turbid water, super high density of boat activity, and large tidal swings do not support murrelet foraging and therefore murrelet bycatch is of exceedingly low concern (Stern-Pirlot et al., 2020, Carter et al., 1995).
Aleutian Islands	0	Very low proportion of MAMU and KIMU populations; currently no fishery in this region (Madison et al. 2011 & Kuletz et al. 2019)
Chignik	0	Purse seine only, not of concern for bycatch of BRMU in this region (Stern-Pirlot et al., 2020)
Alaska Peninsula	0	Very small part of BRMU population (Madison et al. 2011 & Kuletz et al. 2019)
Kodiak	1	Overlap of fishing area with important bird area; BRMU nesting on KI (Audubon et al., 2011)
Cook Inlet	1	CI is part of region containing 95% of global BRMU population along with high fishing effort in UCI (Kuletz et al., 2019, Gaudet, 2019)
Prince William Sound	1	High populations of BRMU; high fishing effort (Kuletz et al., 2019, Gaudet, 2019)
Yakutat	1	High populations of BRMU overlapping with fishing area (Kuletz et al., 2019, Gaudet, 2019)
Southeast	1	High populations of BRMU; high fishing effort (Kuletz et al., 2019, Gaudet, 2019)

Scale, Intensity, Consequence Analysis (SICA)

The table below is the summary of the SICA scores. Guidelines for assigning scores as well as scoring rubrics were from Hobday et al. (2007). When relevant, methodology and additional justifications for determining each component of the SICA based on the available information as well as other information that was considered relative to understanding scale, intensity, or consequence is included in the section after Table 3. The scale, intensity, and consequence scores are considered in regard to the Operational Objective. In this case, the Operational Objective comes from the MSC requirements:

There must be a reasonable level of confidence that if the birds are depressed, the fishery would not prevent them from recovering given favorable environmental conditions.

Per Hobday, et al. (2007) these scores are qualitative in nature and rely on expert opinion along with available data. Further, while the Spatial, Temporal, and Intensity scores help to inform the Consequence score, they are not directly used in its calculation and "the score should be based on existing information and/or the expertise of the risk assessment group." (Hobday, et al., 2007, p. 64). As discussed below, we did not feel that all components of the SICA were particularly applicable or useful in understanding relative risk. However, based on available published information as well as expert opinions and feedback shared during the workshop (and captured in the Rationale column), we believe it is appropriate to move Prince William Sound and Southeast Alaska forward to the PSA, and rule out the other regions from further analysis.

Table 3: SICA Scores and Rationales

Region	1. Spatial Scale of Hazard (1-6)	2. Temporal Scale of Hazard (1-6)	3. Intensity score (1-6)	4. Consequence Score (1-6)	5. Confidence Score (1-2) (low-high)	Rationale
Prince William Sound	4	3	3	3	2	The PWS fishery takes place at a moderate Spatial and there is a well-documented high population of BRMU in PWS (see Appendix 3); areas also has relatively high intensity of fishing effort; AMMOP data suggests high percentage of BRMU taken versus other seabird species and shows by far the highest actual and estimated number of BRMU takes.
Cook Inlet	5	3	2	2	2	Fishery occurs primarily during daylight (lower risk to BRMU), drift fleet gathers primarily as far from shore as possible (according to fishermen during 2019 survey and AMMOP data); minimal overlap with preferred foraging habitat for BRMU, low effort (about 20 permits fished/year) in LCI and where high effort occurs in UCI, much lower bird population. Little overlap of the fishery with IBAs according to AMMOP location data (see maps in Appendix 3). According to AMMOP, even observing BRMU while fishing was very uncommon (only 4 of 2,194 sets); BRMU was only taken during year two of the program; and total bird take was very low (6 birds over 2 seasons). This indicated minor intensity

						and consequence. However, we recognize that this region had low observer coverage, so there is potentially less confidence in extrapolation of this data.
Kodiak	4	3	2	2	2	While BRMU were taken in moderate numbers in the AMMOP studies, the intensity of the fishery is relatively low (av. 147 permits). Of those, about 100 fish in the area where any seabird take was recorded (none recorded in Alitak Bay District where approx. 70 permits are fished) (Manly, 2019). BRMU take was all recorded in Uganik Bay, indicating a very small spatial scale of potential risk. According to the Piatt et al. (2006) MAMU distribution map (see Appendix 3 for maps), the highest bird density occurs on the east side of the island, while the fishing effort occurs on the west side in areas with very low murrelet density. Low estimated mortality rate of .95%. However, we recognize that the Piatt et al. (2006) is missing data for some relevant areas of west Kodiak. Refer to Cocoran, 2016 & 2020 for additional population data.
Yakutat	3	3	1	2	2	Relatively low effort (10 yr av=117 permits fished/year), low effort also demonstrated by maps of Unique Gillnet Vessel Deliveries per Week hotspot maps (high of 542 for Yakutat versus 28,737 and 24,104 for SE and PWS respectively, see maps in Appendix 3). In AMMOP study, over both years 27/29 takes occurred in Yakutat Bay area signifying a likely very small geographic area of concern. Further, BRMU take accounted for approx. 1.4% of Yakutat Bay estimated population (Schane et al., 2011) or MAMU take of 1.9% according to Kuletz et al. (2019) population estimates. According to ADF&G Yakutat Area Biologist, 2/3rd of permits don't start fishing until August (coho season), fishery almost exclusively occurs in Yakutat Bay (approx. 20 permits, early in season (June, July) and Situk River estuary (most of rest of effort, August, Sep., Oct..) with low to effort at the Alsek River (approx. 10 permits). Low overlap other than one area near Pt. Manby for reported fishing focus and high densities of BRMU (Schane et al. 2013). See Appendix 3 for maps.
Southeast	5	3	3	3	2	High fishing effort and relatively large area fished (10-year av=426 permits fished/year). High, extensively distributed BRMU population (see maps in Appendix 3).

1. **Spatial Scale of Hazard:** The spatial scale is calculated using the approximate perimeter of the fishing area. In this case, a combination of AMMOP data (showing locations where sampling occurred and therefore fishing) and expert opinion (fishermen and Alaska Department of Fish and Game Area Biologists) was used along with the Mariculture Map tool to calculate fishing area perimeter. The Mariculture Map allows users to draw polygons on maps and provides a perimeter in miles. Perimeters of all polygons in each region were added and then perimeters were then converted to

nautical miles to reflect the units of the scoring rubric. Note that perimeters of fishing areas were areas where fishermen reported that fishing actually occurred or where fishing was recorded using GPS data from the AMMOP studies (Kodiak and Cook Inlet) rather than based on Alaska Department of Fish and Game (ADF&G) management areas. See example maps below.

We believe that the method that we used to calculate perimeter, while using the best tools available to our team, was inherently very conservative because of the detail with which we drew fishing area polygons. This detail likely increased perimeter artificially while having a minimal effect on area (we believe the area calculations are accurate based on available data). There was concern from AFDF staff as well as workshop participants about the accuracy of using perimeter rather than area to calculate spatial scale, however, the Hobday et al. methodology rubrics used perimeter and we did not believe it was appropriate to try and develop an alternative scoring method.

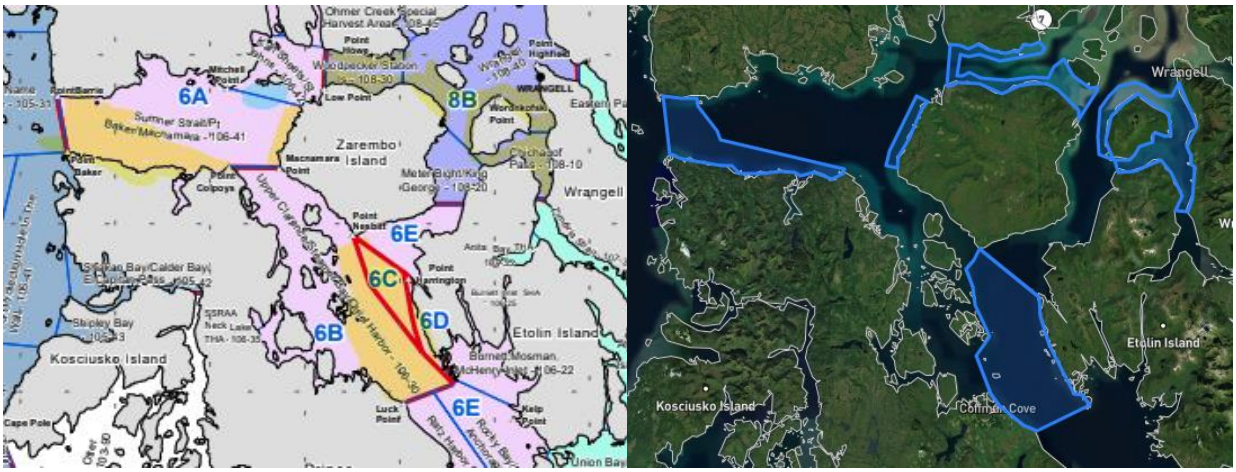

Figure 3: The left-hand map shows a portion of areas highlighted by a Southeast fisherman as areas where fishing occurs, and the right-hand map shows those areas as drawn on the Mariculture Map in order to get an approximate perimeter calculation. See other fishing area maps in Appendix 3.

2. **Temporal Scale of Hazard:** To calculate temporal scale (number of days of fishing per year) of the fishery in each region, data from fishermen identifying length of the season as well as an average of how many days fished was used. For regions where this data was unavailable, data from ADF&G Area Management Reports was used. For example, see the Kodiak Management Area Commercial Salmon Fishery Annual Management Report, 2019, p. 50 for open days of the fishery in 2019. It is important to note that this is an approximation only, and that all regions analyzed in the SICA fell into the Annual category or 1-100 days per year and scored a 3. While we recognize that openings vary significantly from year to year, for the purpose of this analysis, in these regions we believe that those days do not deviate outside the range of 1-100 days.

3. **Intensity Score:** Because in this case, Temporal Scale does not provide a helpful comparison between fisheries, we suggest number of permits fished per year be considered when calculating intensity to get a better comparison between regions.

Therefore, we suggest the following table, based on ranges from the average permits fished in each region over 10 years. Average number of permits were calculated and shared during the 2019 workshop by then AFDF Technical Facilitator David Gaudet. We were given feedback from fishermen in the 2022 Workshop that the following table overestimates fishing effort significantly primarily because the number of permits fished throughout the season varies significantly, with many less than the averages in the table being fished for much of the season. Therefore, total number of permits artificially makes overall effort appear higher than it is. Particularly, it is important to note that fishing effort decreases for Southeast Alaska later in the season, which is when murrelet take was more common. See written comments from a Southeast Fishermen (Appendix 4). However, despite this feedback, we kept table 4 as a basic, albeit over-simplified way of understanding fishing effort *relative to* other regions.

Table 4: 10 Year Average Total Gillnet Permits Fished

Area	Gillent Type	10 Year Average
Kotzebue	Set	80
Norton Sound	Drift or Set	120
Yukon	Lower River Drift or Set	456
	Upper River Set	1
Kuskokwim	Drift of Set	467
Bristol Bay	Drift	1,714
	Set	869
North Peninsula	Area T Drift	-
	Area T Set	-
South Penisula	Drift	120
	Set	67
Kodiak	Set	149
Lower Cook Inlet	Set	20
Upper Cook Inlet	Drift	569
	Set	736
Prince William Sound	Drift	517
	Set	28
Yakutat	Set	117
Southeast	Drift	426
Average Total Permits Fished		6,455

Productivity-Susceptibility Analysis (PSA)

Prince William Sound and Southeast Alaska were moved forward to the PSA section of the ERA based on the consequence scores of 3. Other regions received consequence scores of 2 and were therefore not moved forward in the analysis. The following tables use the Marine Stewardship Council *MSC Fisheries Standard Toolbox v1.0* productivity and susceptibility attributes identified for birds.

Table 5: PSA Scores and Rationales for Prince William Sound

Productivity	***Brachyramphus* murrelet (genus)**	
Attribute	**Rationale**	**Score (1-3)**
Average Age of First breeding	2-3 years old (ADF&G). Average is 2.5, therefore we gave this a score of 1.	1
Average 'optimal' adult survival probability:	We were unable to find a survival probability that was specifically labeled as "optimal", however Boulanger, et al. (2001) shared a range of adult survival rates that averaged 0.84 from other studies. The study further stated that murrelets may have lower survival probability than other small alcids. Therefore, we believe that a score of 2 is appropriate.	2
Fecundity	1 chick/year (ADF&G)	2
Susceptibility	**Region: Prince William Sound**	
Attribute	**Rationale**	**Score (1-3), (low-high)**
Availability	Calculated at approximately 3.6% overlap. However, it is important to note that we did not include the Copper River and Bearing River regions in this calculation of overlap because there is no BRMU distribution data for these areas. While those two regions do see significant fishing and there is also likely a significant BRMU population in that area, based on distribution in other places we believe the overlap would still be under 10%, which is the threshold for increasing the availability score to 2. For PWS, based on the scale of the region and bird distribution data, we calculated overlap by drawing polygons representing the groupings of BRMU in the Piatt, et al (2006) map, polygons representing area actually fished (from fishermen data), and calculated the percentage overlap. Note that according to fishermen, there is an area around Montague Island (Port Chalmers) that is fished by a small number of boats every four years based on ADF&G regulation. We did not include a polygon for this area as we beileve it is a very minimal contribution to the overall availability score. See map in Appendix 3. This is an approximate estimate, but we believe accurately demonstrates low availability.	1
Encounterability	Based on MSC guidelines for air breathing species (MSC, 2022)	3
Selectivity of Gear Type	Based on MSC guidelines for air breathing species (MSC, 2022)	3

Post capture mortality	Post capture mortality rate unknown	3

Table 6: PSA Scores and Rationales for Southeast

Productivity	***Brachyramphus* murrelet (genus)**	
Attribute	**Rationale**	**Score (1-3), (low-high)**
Average Age of First breeding	2-3 years old (ADF&G)	1
Average 'optimal' adult survival probability:	We were unable to find a survival probability that was specifically labeled as "optimal", however Boulanger, et al. (2001) shared a range of adult survival rates that averaged 0.84 from other studies. The study further stated that murrelets may have lower survival probability than other small alcids. Therefore, we believe that a score of 2 is appropriate.	2
Fecundity	1 chick/year (ADF&G)	2
Susceptibility	**Region: Southeast Alaska**	
Attribute	**Rationale**	**Score (1-3), (low-high)**
Availability	The Southeast Alaska management district measures approximately 10,455 sq miles of water. The map from Piatt et al. (2006) in Appendix 3 shows widespread distribution of murrelets throughout the region during summer months. Therefore, we believe 10,455 sq miles is an accurate number to use for calculating murrelet density overlap with fishing. This is also based on the overall extremely relatively high density of murrelets in the region with an estimated nearly 50% of the global population of BRMU. The area actually fished by fishermen is approximately 500 sq miles or approximately 4.8% of the regional waters (based on calculations from fishermen's maps, methodology explained in SICA section for Scale scores) of the total area. Therefore, we believe a score of 1 or 10%< is appropriate with the overlap of 4.8% far below the threshold of 10%, which is the threshold for increasing the availability score to 2.	1
Encounterability	Based on MSC guidelines for air breathing species (MSC, 2022)	3
Selectivity of Gear Type	Based on MSC guidelines for air breathing species (MSC, 2022)	3
Post capture mortality	Post capture mortality rate unknown	3

Risk Category Determination

To determine the Risk Category for Prince William Sound and Southeast Alaska, Productivity and Suceptability scores were automatically calculated using the MSC RBF Worksheets v3.0, which is included in the MSC Fisheries Standard Toolbox v1.0. A summary of that worksheet including the automatically calculated total Suceptability score and PSA score are in Table 7, below. The low risk category was determined for both regions because the PSA score falls below 2.5, the upper threshold for a low risk rating.

Table 7: Summary of PSA Scores and Risk Category Determination

Region	Productivity Scores			Total (av.)	Susceptibility Scores				Total (multiplicative)	PSA Score	Risk Category Name
Prince William Sound	1	2	2	1.67	1	3	3	3	1.65	2.35	LOW
Southeast	1	2	2	1.67	1	3	3	3	1.65	2.35	LOW

Conclusion

The lack of data available not only about gillnet-murrelet interactions and bycatch, but also for murrelet population distribution in Alaska was a significant challenge in conducting this analysis, despite ERAs being considered suitable for data-limited fisheries. Frustration with lack of data was a common theme brought up by fishermen, biologists, and conservationists during the 2022 Seabird Workshop. Therefore, the authors of this paper recommend continued efforts to collect information on seabird-gillnet interactions, as well as more efforts to understand murrelet population distribution and density throughout their Alaska range. Better understanding murrelet-gillnet interactions is important for an industry that is the international gold standard for sustainable fisheries management, as well as for seabird conservation efforts. Projects including log-book style data collection with electronic tools such as the SkipperScience app to help understand bird distributions and interactions (or lack thereof) from fishermen and re-starting the AMMOP program were discussed at the workshop and strongly supported by stakeholders.

However, despite the challenges with adequate data, the authors of this ERA believe that there is sufficient information available to support the PSA results of a “low” relative risk rating for Prince William Sound and Southeast Alaska. Particularly, the Availability score within the PSA, which requires a 10%> overlap of murrelet habitat and areas fished for a “low” score, or score of 1, was far below the 10% threshold (approximately 3.6% overlap for PWS and 4.8% for SE). These percentages demonstrate that the low risk rating for each region is a conservative scoring, as overlap could be double what it is estimated at and still fall within the low risk rating. Other Commercial Salmon Management Areas were removed from further analysis as relatively low risk prior to the PSA step of the analysis. We believe that this ERA shows that the Alaska salmon gillnet fishery meets the Operational Objective that: *There must be a reasonable level of confidence that if the birds are depressed, the fishery would not prevent them from recovering given favorable environmental conditions.* The outcome of a “low” relative risk rating for these two regions is in large part due to the relatively small areas actually fished in each management area of the fishery compared with the murrelet density data that is available. Consequently, either relatively low fishing effort, or low overlap between the areas fished and areas of high murrelet density resulted in the overall determination of low relative risk to KIMU and MAMU within the bounds of the Operational Objective.

References

ADF&G. *Commercial Salmon Management Areas.* Link.

ADF&G. *Species Profile: Marbled Murrelet.* Link.

ADF&G. 2022-2024 Prince William Sound Area Commercial Salmon Fishing Regulations. 2021. Link.

ADF&G. Kodiak Management Area Commercial Salmon Fishery Annual Management Report. 2019. Link.

ADF&G. Upper Cook Inlet Commercial Fisheries Annual Management Report. 2021. Link.

Audubon. Audubon Important Bird Areas: Alaska. Link.

Bell, J.D., Lyle, J.M., Andre, J., and K. Hartmann. Tasmania Scale Fishery: Ecological Risk Assessment. *Institute for Marine and Antarctic Studies, University of Tasmania.* 2016. Link.

Boulanger, John, Martin, Kathy, Kaiser, Gary & Derocher, Andrew. (2001). Evaluating uncertainty in estimating population trends of Marbled Murrelets. Society for Canadian Ornithologists, Special Publ No. 2, Biology and Conservation of Forest Birds. Link.

Carter, H., McAllister, M., Isleib, M.E. *Chapter 27: Mortality of Marbled Murrelets in Gill Nets in North America.* USDA Forest Service Gen. Tech. Rep. PSW-152. 1995.

Corcoran, R.M. 2016. Nearshore Marine Bird and Mammal Surveys in the Kodiak Archipelago, 2011-2013. Refuge report no. 2016-1, Kodiak National Wildlife Refuge, U.S. Fish and Wildlife Service, Kodiak, AK.

Corcoran, R.M. 2020. Nearshore Marine Bird and Mammal Surveys in the Kodiak Archipelago, 2014–2016. Refuge report no. 2020–3, Kodiak National Wildlife Refuge, U.S. Fish and Wildlife Service, Kodiak, AK.

Day, R.H., Gall, A.E., Prichard, A.K., Divoky, G.J. & Rojek, N.A. 2011. The status and distribution of Kittlitz's Murrelet Brachyramphus brevirostris in northern Alaska. Marine Ornithology 39: 53–63.

Guadet, D. Alaska Salmon Gillnet Fisheries. 2019. PowerPoint Presentation, AFDF Seabird Workshop. Link.

Hobday, A.J., A.D.M. Smith, I.C. Stobutzki, C. Bulman, R. Daley, J.M. Dambacher, R.A. Deng, J. Dowdney, M. Fuller, D. Furlani, S.P. Griffiths, D. Johnson, R. Kenyon, I.A. Knuckey,

S.D. Ling, R. Pitcher, K.J. Sainsbury, M. Sporcic, T. Smith, C. Turnbull, T.I. Walker, S.E. Wayte, H. Webb, A. Williams, B.S. Wise, S. Zhou, *Ecological risk assessment for the effects of fishing*. Fisheries Research, Volume 108, Issues 2–3, 2011, Pages 372-384. Link.

Hobday, A.J., Smith, A.D.M., Webb, H., Daley, R., Wayte, S., Bulman, C., Dowdney, J., Williams, A., Sporcic, M., Dambacher, J., Fuller, M., Walker, T., 2007. *Ecological Risk Assessment for the Effects of Fishing: Report.* Report R04/1072 for the Australian Fisheries Management Authority, Canberra. July 2007. Link.

Kaler, Robb. Population Estimates and Trends for Marbled and Kittlitz's Murrelets in Alaska. AFDF Seabird Workshop. PowerPoint presentation. 2019. Link.

Kuletz, K., Lubunski, E., Kaler, R. Brachyramphus Murrelets: An overview of life history, habitats, foraging, distribution, threats to Alaska populations. 2019. Powerpoint Presentation, AFDF Seabird Workshop. Link.

Madison, E. N., Piatt, J. F., Arimitsu, M. L., Romano, M. D., van Pelt, T. I., Nelson, S. K., Williams, J. C., & DeGange, A. R. (2011). Status and distribution of the Kittlitz's Murrelet Brachyramphus brevirostris along the Alaska Peninsula and Kodiak and Aleutian Islands, Alaska. *Marine Ornithology: Journal of Seabird Research and Conservation*, *39*(1), 111–122. Link.

Manley, B. Alaska Marine Mammal Observing Program: A Summary of Seabird Encounters with Gillnets. 2019. Powerpoint Presentation, AFDF Seabird Workshop. Link.

Manley, B. Incidental Catch and Interactions of Marine Mammals and Birds in the Cook Inlet Salmon Driftnet and Setnet Fisheries, 1999 and 2000. 2006. EcoSystems Technology Inc.2003 Central Avenue, Cheyenne, Wyoming 82001. Available from NOAA, Juneau. Link.

Manley, B. Incidental Take and Interactions of Marine Mammals and Birds in the Kodiak Island Salmon Set Gillnet Fishery, 2002 and 2005. 2007. Western EcoSystems Technology Inc., Cheyenne, Wyoming. Available from NOAA Juneau. Link.

Manley, B. Incidental take and interactions of marine mammals and birds in the Yakutat salmon set gillnet fishery, 2007 and 2008. 2009. Western Ecosystems Technology Inc.,Cheyenne, Wyoming. Available from NOAA Juneau.165. Link.

Manly, B. 2015. Incidental Takes and Interactions of Marine Mammals and Birds in Districts 6, 7 and 8 of the Southeast Alaska Salmon Drift Gillnet Fishery, 2012 and 2013. Western EcoSystems Technology Inc. Laramie, Wyoming. Available from NOAA. Juneau Ak. Link.

Marine Stewardship Council. MSC Fisheries Standard Toolbox v1.0. 2022. Link.

Piatt, J.F., Kuletz, K.J., Burger, A.E., Hatch, S.A., Friesen, V.L., Birt, T.P. , Arimitsu, M.L., Drew, G.S., Harding, A.M.A., and K.S. Bixler, 2007, Status review of the Marbled Murrelet (Brachyramphus marmoratus) in Alaska and British Columbia: U.S. Geological Survey Open File Report 2006. 1387, 258 p. Link.

Piatt, J.F. and N. Naslund. Abundance, Distribution, and Population Status of Marbled Murrelets in Alaska. 1995. USDA Forest Service Gen. Tech. Rep Chapter 28. PSW-152. Link.

Schoen, S.K., Kissling, M.L., Hatch, N.R., Shanley, C.S., Stephensen, S.W., Jansen, J.K., Catterson, N.T. & Oehlers, S.A. 2013. Marine birds of Yakutat Bay, Alaska: evaluating summer distribution, abundance, and threats at sea. Marine Ornithology 41: 55–61.

Stern-Pirlot, A., Beamesderfer, R., and Marshall, S. *Marine Stewardship Council Fisheries Assessments Alaska Salmon Fishery Surveillance Report*. 2020. Link.

University of Alaska Anchorage, Alaska Center for Conservation Science, Alaska Natural Heritage Program. Alaska Species Ranking System: Marbled Murrelet. 2019. Link.

Wynne, K., D. Hicks and N. Munro. 1991. 1990 Salmon gillnet Fishery observer programs in Prince William Sound and South Unimak Island. NMFS, Juneau. Link.

Wynne, K., D. Hicks and N. Munro. 1992. 1991 Marine Mammal Observer Program for the salmon Drift Gillnet Fishery of Prince William Sound. NMFS. Juneau. 167. Link.

Appendix 1: Workshop Materials and Stakeholder Involvement

Murrelet Species Interaction with Alaska Salmon Gillnet Fisheries

Agenda

Monday, October 24th, 2022 @ 1:00am – 5:00pm AST on Zoom
Join via Internet:
https://us02web.zoom.us/j/83675089370?pwd=NnA3QlpWQlltRVhXUkFKOXdVL1Vpdz09
Join via Phone: +1 253 215 8782
Meeting ID: 836 7508 9370

Participants

Client

- Julie Decker, AFDF
- Tommy Sheridan, Technical Facilitator and Workshop Facilitator
- Hannah Wilson, AFDF
- Ben Americus, AFDF

Biologists/Researchers

- Kathy Kuletz, USFWS
- Robb Kaeler, USFWS
- Liz Labunski, USFWS
- Shannon Fitzgerald, NOAA
- Jennifer Ferdinand, NOAA
- Josh Moffit, NOAA
- Hannah-Marie Garcia, SkipperScience
- Lauren Divine, SkipperScience

Gear Group Representatives

- Kathy Hansen, Southeast Alaska Fishermen's Alliance
- Max Worhatch, United Southeast Alaska Gillnetters
- Darin Gillman, Cordova District Fishermen United
- Dan Anderson, United Cook Inlet Drift Association

ENGOs

- Yann Rouxel, Birdlife International
- Brad Keitt, American Bird Conservancy

Agenda

1. Welcome (Sheridan, 15 minutes)
    a. Meeting particulars (breaks, opportunity for questions/discussion, etc.)
    b. Participants – introductions
2. Workshop Purpose and Background (Wilson, 15 minutes)
    a. Previous workshop recap
    b. Brief Introduction of ERA process
    c. Workshop Goals
3. AMMOP Update (Ferdinand, 15 minutes)
4. Murrelet Life History and Research updates (USFWS Staff, 45 min)
        i. Life history overview
        ii. Research Updates
            1. Bycatch analysis (AMMOP data)
            2. Exxon Valdez Oil Spill (EVOS) Trustee Council's funded research of Kittlitz's and Marbled murrelet population and distribution in EVOS regions
            3. EVOS Trustee Council biennial July PWS marine bird surveys
5. BREAK (15 minutes)
6. SkipperScience Application (Garcia, 15 min)
7. ERA Data Review and Scoring (Wilson, 1 hr 45 min)
    a. Overview
    b. Review of spatial data (new and existing)
    c. SICA/PSA Scoring
8. Closing Comments (Sheridan/Wilson,15 min)
    a. Reminder to provide written feedback by Nov. 7th
    b. General comments from the group
    c. Thank you!

Appendix 2: Survey Form and Summary of Results*

*Note that maps in which fishermen drew areas of actual fishing effort were not included but can be made available upon request. The maps used in this ERA were aggregates of this information and can be seen in Appendix 3.

Survey (Example from Prince William Sound)

To Prince William Sound Fishermen,

The Alaska Fisheries Development Foundation is currently the Client for MSC and RFM certification for Alaska Salmon, and the goal of this survey is to collect information on specific areas of fishing effort throughout the season in Prince William Sound and potential murrelett interactions. This data collection is part of our work to satisfy a condition on the fishery about gillnet-seabird interactions and bycatch. The more information you are willing to provide, the better we will be able to address this issue, hopefully demonstrating that there is minimal threat to Marbled and Kitletzes murrelets from the Alaska gillnet salmon fishery. We plan to present and confirm this information at our Seabird Workshop on October 24, 2022. We hope that you are able to attend to provide further insight into this issue. Thank you for your assistance in this important issue for the fishery and please don't hesitate to contact me with any questions!

Sincerely,

Hannah Wilson
Development Director
Alaska Fisheries Development Foundation
hwilson@afdf.org
907-276-7315 ext.103

Instructions: Please fill out the following questions with as much detail as possible. For the mapping section, please outline the areas where your (and your member group's) fishing is concentrated and you've seen murreletts as specifically as possible. Note that these questions

1. Approximately what hours of the day do you fish?
2. Which months of the year do you fish?
3. On average, how many days per week do you fish during the season?
4. Seabird Interactions:
    a. How often during the season do you see murreletts?
    b. What time of day do you see them most often?
    c. How often (if ever) do you catch murreletts in your net?
    d. Any other information about murrelett interactions or sightings that you would like to share:

5. On the map on the following page (source: ADF&G), please draw in as much detail as possible the areas where:
    a. You fish. If these locations change throughout the season, please note what months you are in which areas.
    b. Where you have seen murreletts (please use a different color).

Summary of Survey Results

Region	Approximately what hrs of the day do you fish, what months of the year, days per week during the season?	How often do you see murrelets during the season?	What time of day do you see them most often?	How often do you catch murrelets in your net?	Other murrelet information
Southeast	Generally, and this is true for most of the fleet, daylight hours. Certain areas, particularly district 6, effort is low during certain stages of the tide. Common property fisheries begin in late June and run through the end of September. Fishing days is dependent on abundance of fish. High abundance sees more days, low abundances sees less. If I were to guess it would be about 3 days per week.	Pretty often. Seems to be plenty around.	Never noticed a particular time of day I see them most.	Very rarely. In forty years I've caught maybe a dozen. I can't remember the last time I caught one. On those rare occasions I don't remember catching more than one.	In September of 2020 and September 2021, I observed large concentrations of Murrelets. They were remarkable, because in my lifetime I had never seen anything like it. One was in district 6 while returning to port after a gillnet opening. The other was in district 10 while longlining…Both places are similar in that they are large upwellings due to strong tides and drastic depth changes. I have fished throughout the region for 4 decades, and see Murrelets throughout the region, in all months of the year.
	No response	I see murrelets from Nemo Pt to North Clarence and all the way to Pt. Baker. I fish in these areas at different times.	I see them at all times day and night. June, July and August I've seen them.	I catch 3-5 a year.	One year at Limestone, out in the main drag, we were catching 4-6 murrelets a set during the day! The water was a brownish color and they couldn't see our nets. There was a constant trail of floating murrelets during the 3-day opening. It was about 12 years ago.
	No response	Daily	No response	I catch one every few years. It is very rare.	They are quite common. I most often see them in pairs.
	3 am-10pm, May 20th-Oct. 1st. Fishing 3-4 days/week.	Some seasons 5-10 murrelets throughout the season. Some seasons, zero.	Dusk	I have gillnetted salmon 49 years in a row, [in] SE, WA and Bristol Bay. I rarely catch seabirds. I have not caught one in over 10 years. However, I [have] occasionally	It seems like the times I caught them, I was fishing more towards the outer coast. They seem to be following bait.

				[caught] them: from 1-12 in a set.	
	We did not fish in 2022 and the following information is from gillnetting 1985 to 2021. We tended to fish between 4:00 am to 10:00 pm. Most of our fishing has been in district 11…not much recently would sometimes fish in District 15. We only fished District 1 for a couple of openings in 1985 and District 6, 2 weeks each in 1985 & 1986. Gillnetting starts on the third Sunday of June and goes until the end of Sept/first week of October. We fish 2-4 days/week.	None in the last five or so years, since the 2000's with the significant increase in air pollution from cruise ships we are not seeing many sea birds of any kind, particularly scoters where in the fall we would see large rafts of them let alone any type of interaction	Mid afternoon	Normally you only catch one of the pair if you actually catch one. Since 1985 we have never caught many, probably a handful over all those years, but we work our net constantly and don't let it soak for more than 20 minutes generally.	We have seen more murrelets in areas outside of the gillnet area when traveling or prosecuting other fisheries such as in District 11 you see them at Olivers Inlet and Greens Cove. Within the gillnet fishing area our personal sighting has been generally around Grand Island and the West side of lower Stephens Passage. The murrelets tend to stay out of turbid water.
Prince William Sound	I fish 7 am-7 pm May-September. On the Copper River Flats an average of two days a week. In the Prince William Sound area is on average about three and half days a week.	Semi-frequent. Every few days I have seen a few pairs swimming around.	In the daylight hours, mid-day till dusk	Never have I caught a Marbled or Kittletz's Murrelet.	Often see Murrelets near Glacial Moraines, Pakingham Area and North of Coghill Point up towards Yale and Harvard Glaciers.

Appendix 3: Fishing Effort and Murrelet Population Distribution Maps by Region

Southeast Alaska

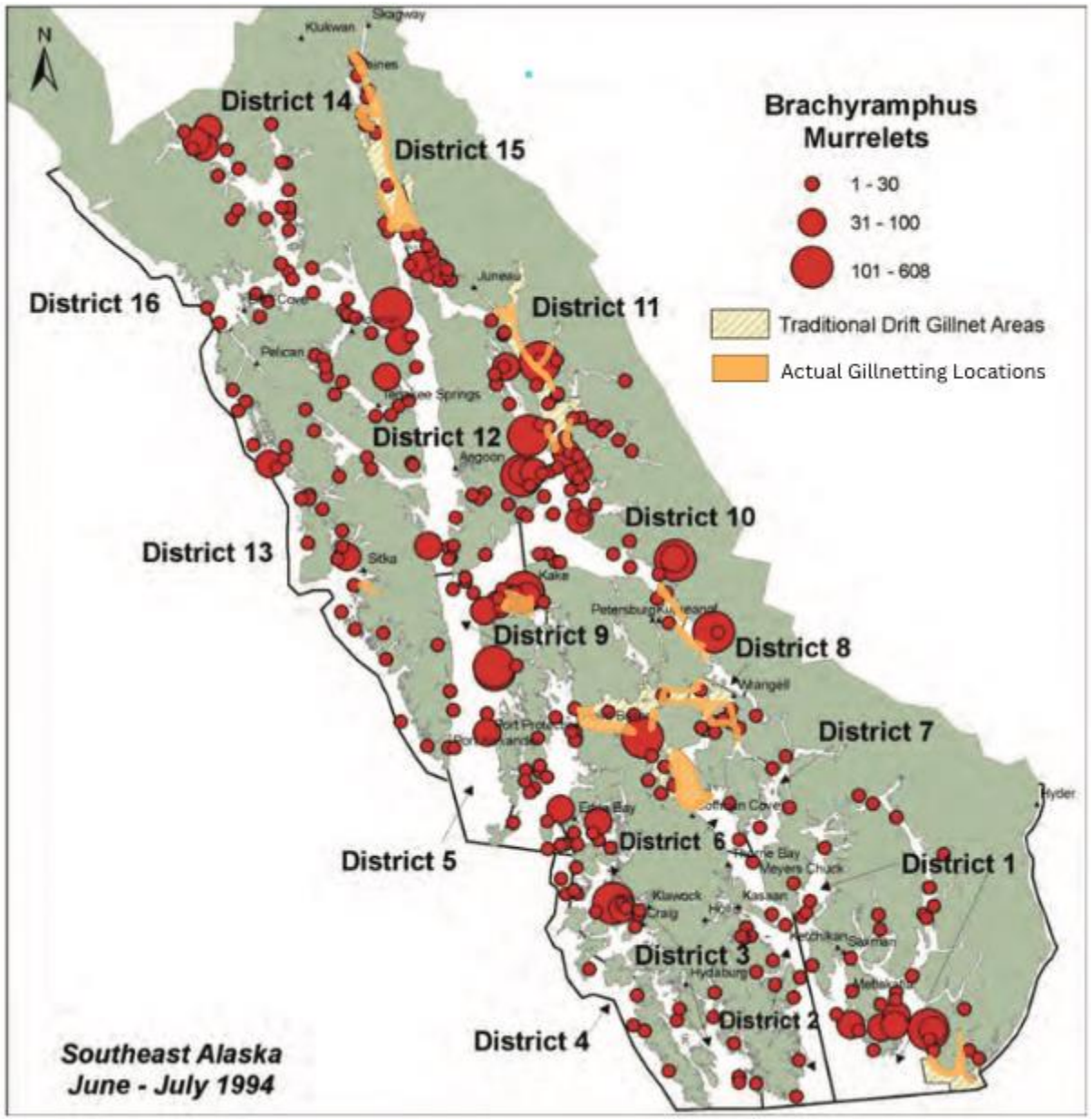

Figure 4: Brachyramphus *murrelet distribution in Southeast Alaska in June and July 1994 relative to gillnet fishing districts in Southeast and overlaid with actual area fished (base map from Piatt, et al. 2006).*

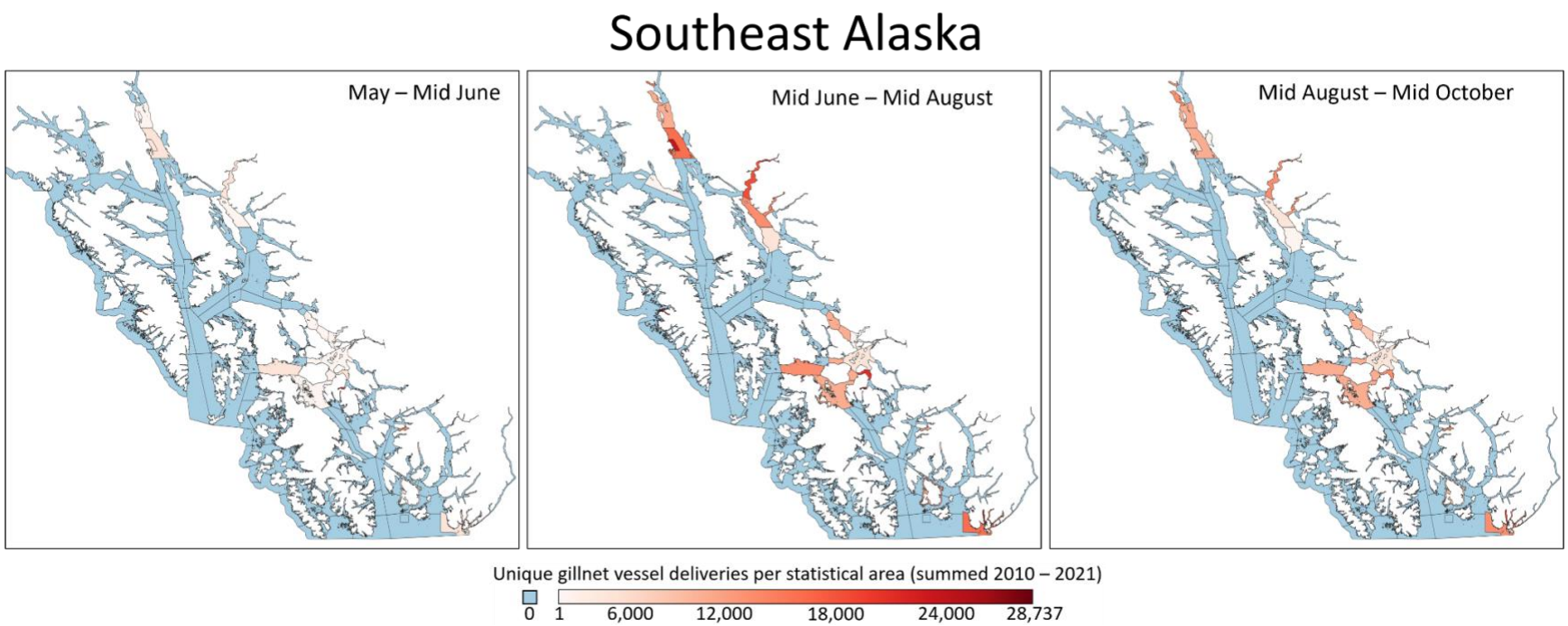

Figure 5: Unique gillnet vessel delivers per ADF&G statistical area for different months of the fishing season (ADF&G data).

This map series shows unique gillnet vessel delivers per ADF&G statistical area for different months of the fishing season. It is helpful in showing relative effort in different parts of Southeast Alaska throughout the fishing season. It particularly helps to exemplify that effort changes dramatically throughout the season and that the highest effort occurs from mid-June through mid-August, a much shorter amount of time than the duration of the entire fishing season.

Kodiak

Figure 6: Actual areas fished on Kodiak Island based on AMMOP data.

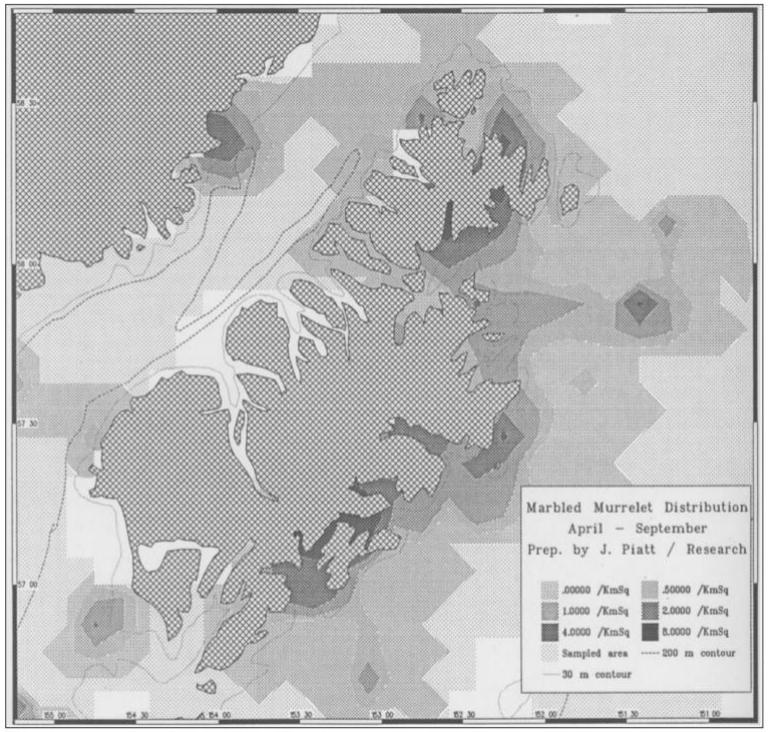

Figure 5—Distribution of Marbled Murrelets around the Kodiak Archipelago in summer (April-September). Density contour polygons calculated from data grouped in 5' latitude-longitude blocks and scaled geometrically.

Figure 7: Distribution of Marbled Murrelets around the Kodiak Archipelago (April-September). (Piatt & Nasuland, 1995).

Cook Inlet

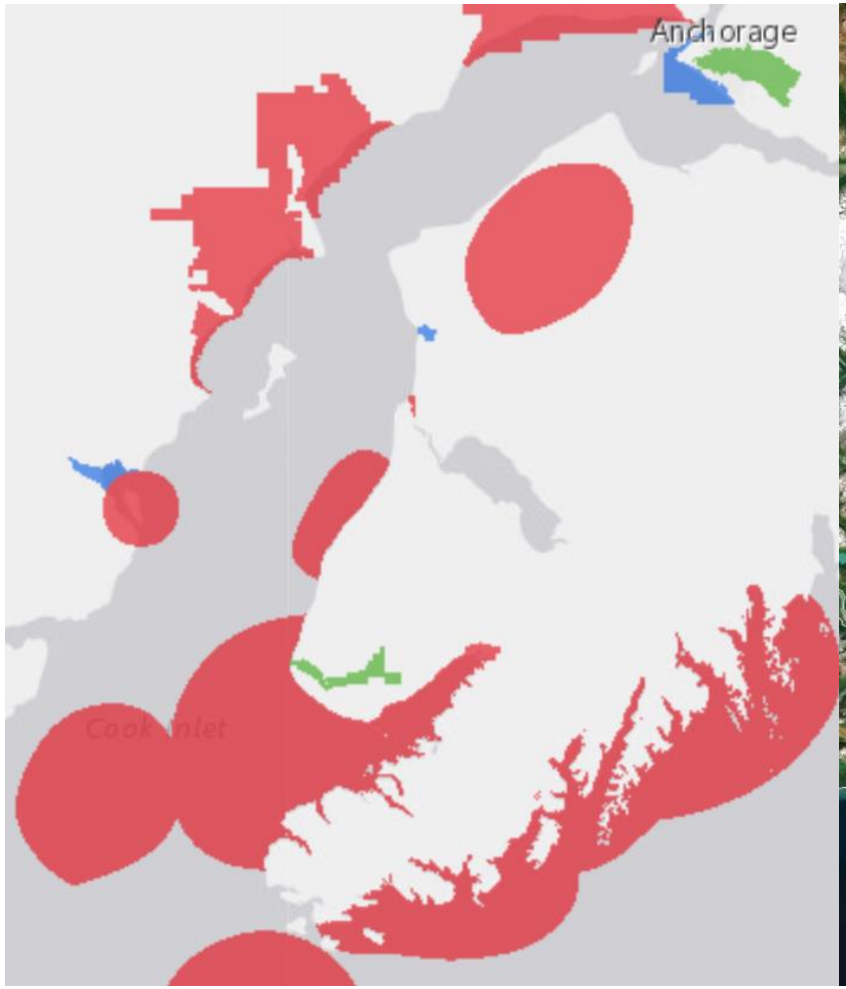

Figure 9: Important Bird Areas in Cook Inlet (Audbon Society).

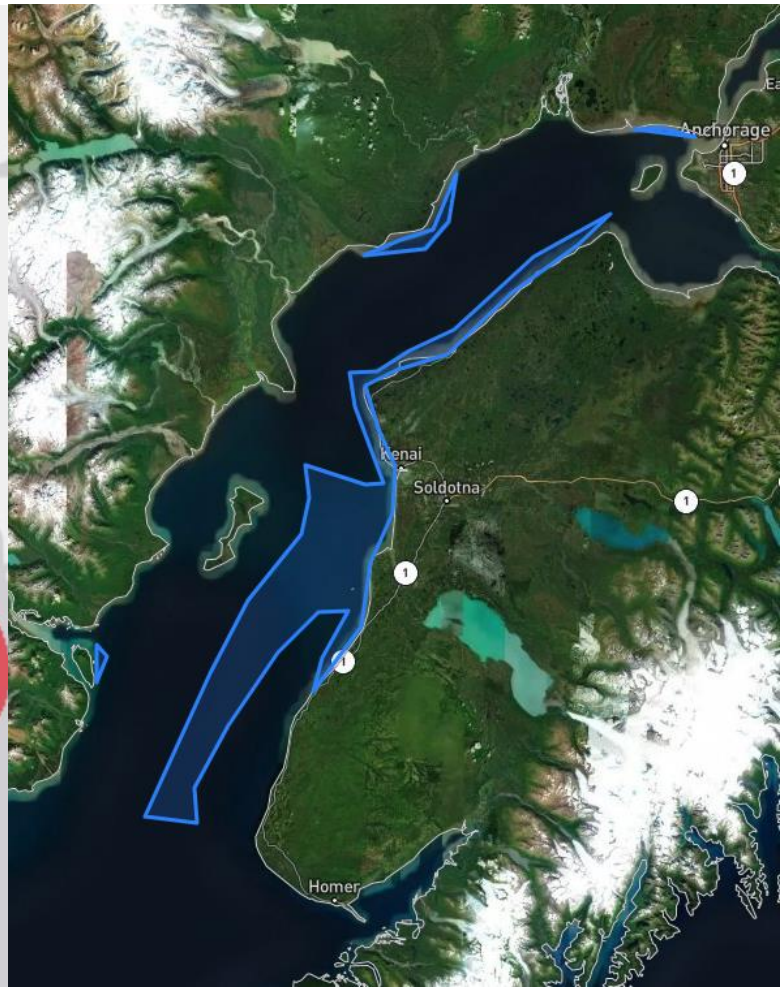

Figure 8: Actual area fished in Cook Inlet (note that approximate 20 setnet permits are held in Kachemak Bay, which are not reflected in this map).

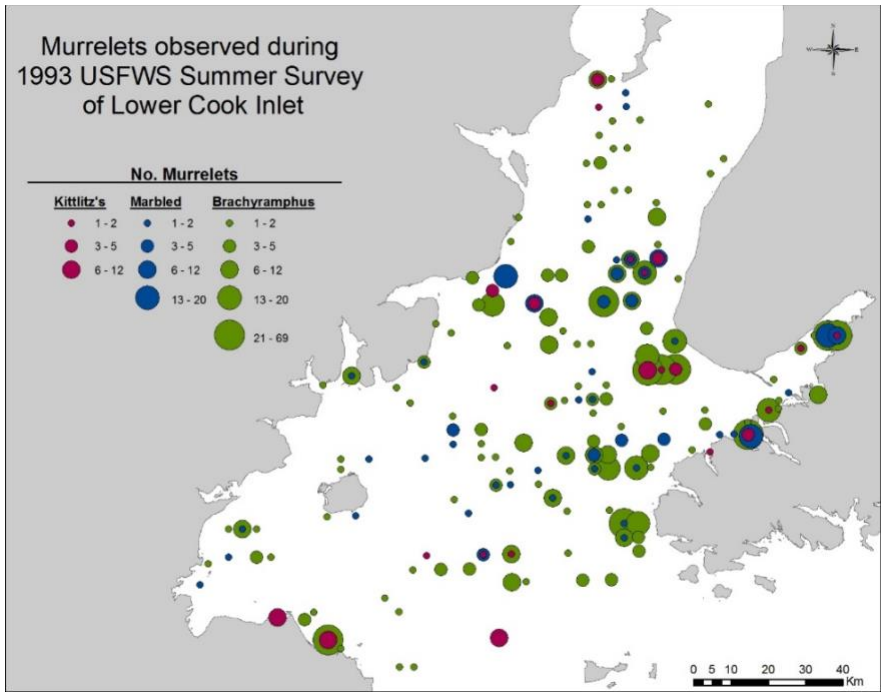

Figure 10: Murrelets observed during the 1993 USFWS Summer Survey of Lower Cook Inlet (Kuletz, et al, 2019).

Prince William Sound

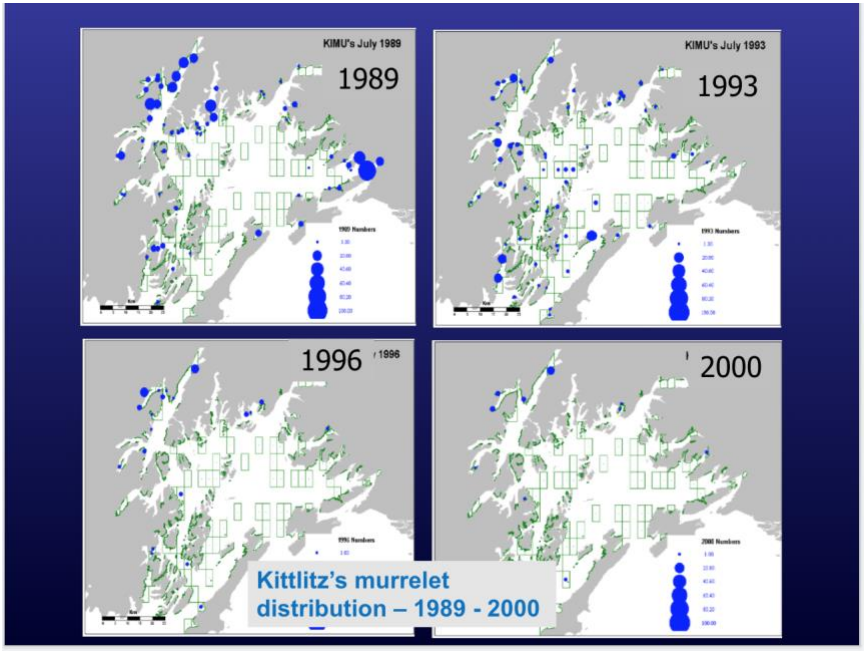

Figure 11: KIMU Distribution 1989-2000 (Kuletz et al., 2019).

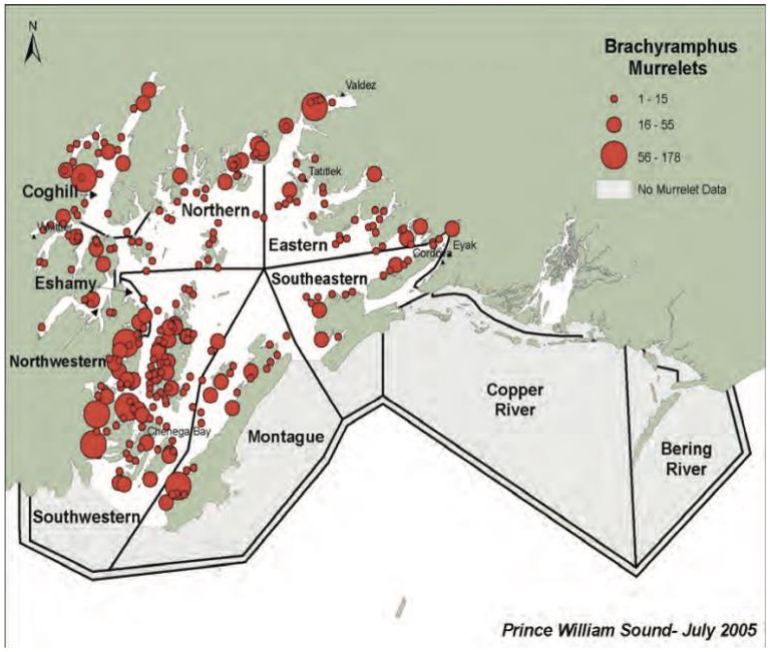

Figure 12: Brachyramphus *murrelet distribution in PWS in July 2005, relatival to salmon fishing districts. Does not include outer waters of the Sound, nor the Copper River and Bering River districts. (Piatt et al., 2006).*

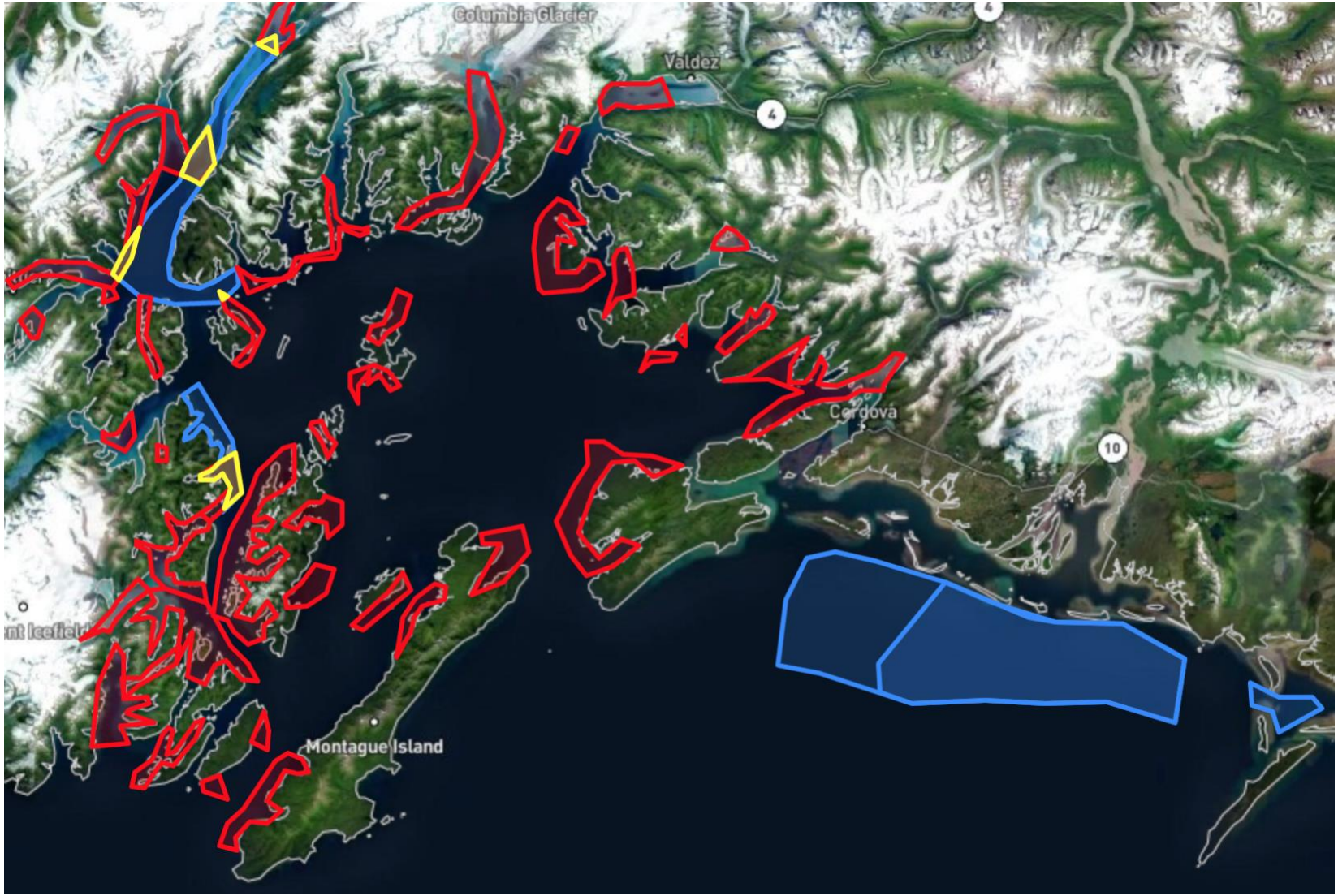

Figure 13: Polygons of significant BRMU density from Figure 12 (Piatt, et al., 2006) in, actual areas fished in blue, and overlap of fishing and bird areas in yellow.

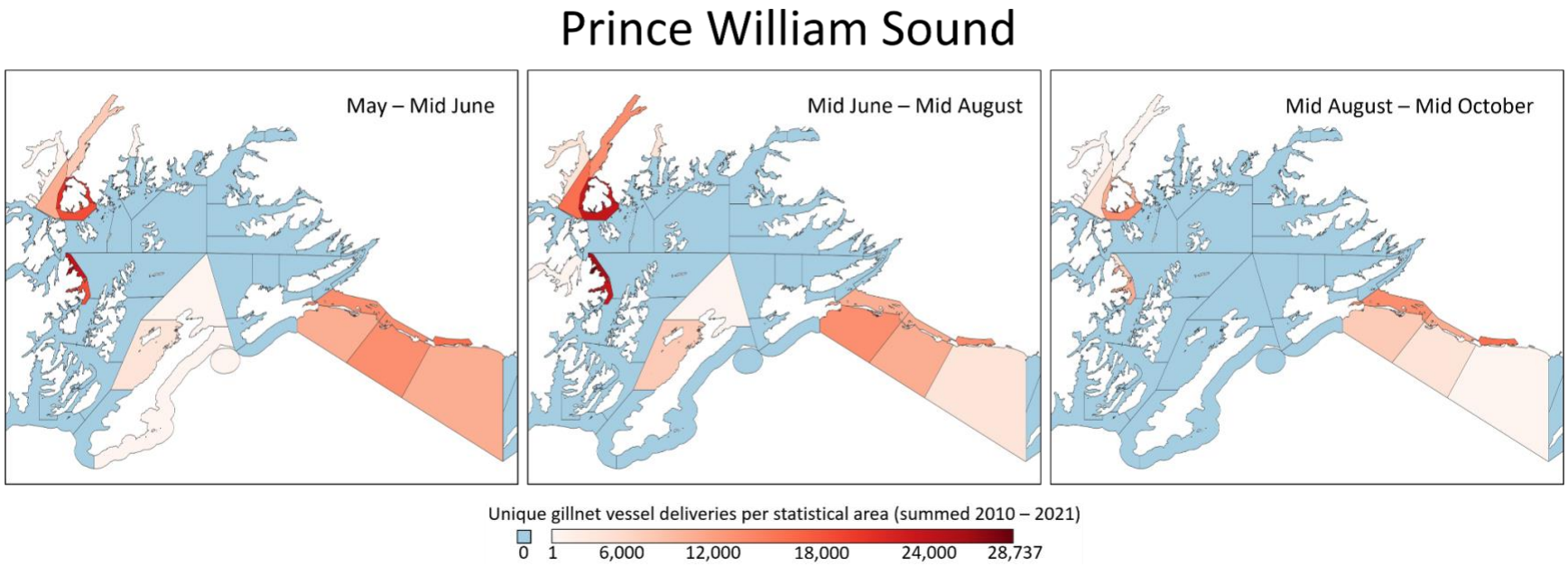

Figure 14: Unique gillnet vessel delivers per ADF&G statistical area for different months of the fishing season (ADF&G data) in Prince William Sound.

Yakutat

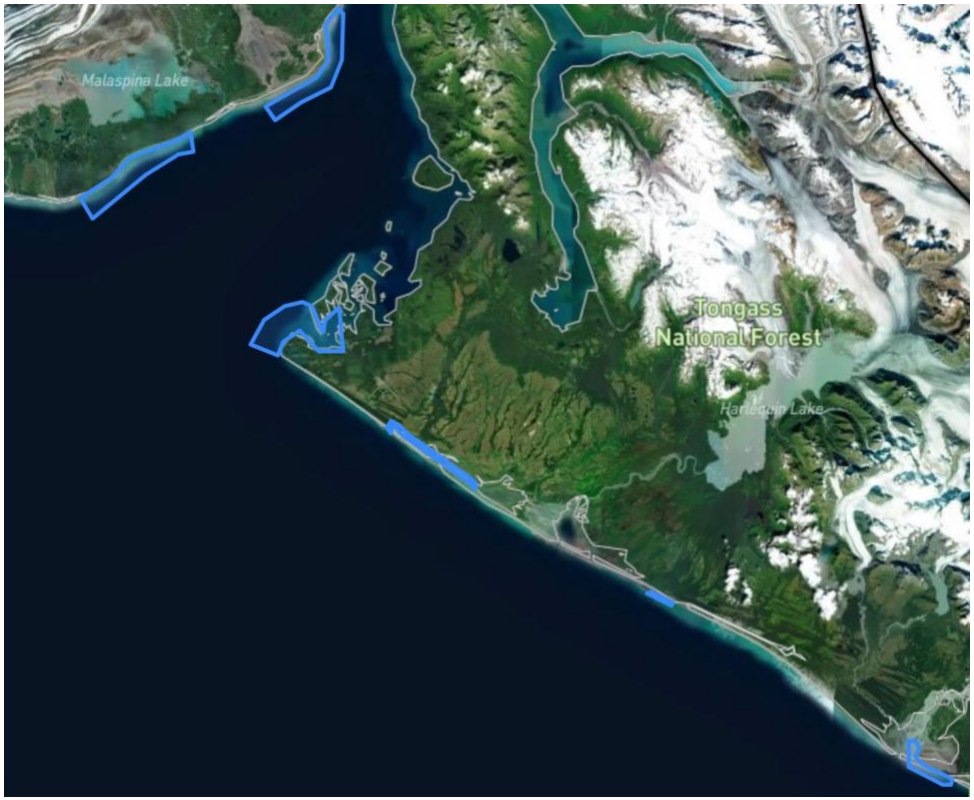

Figure 15: Actual areas fished in Yakutat area. Information from Yakutat Area Biologist.

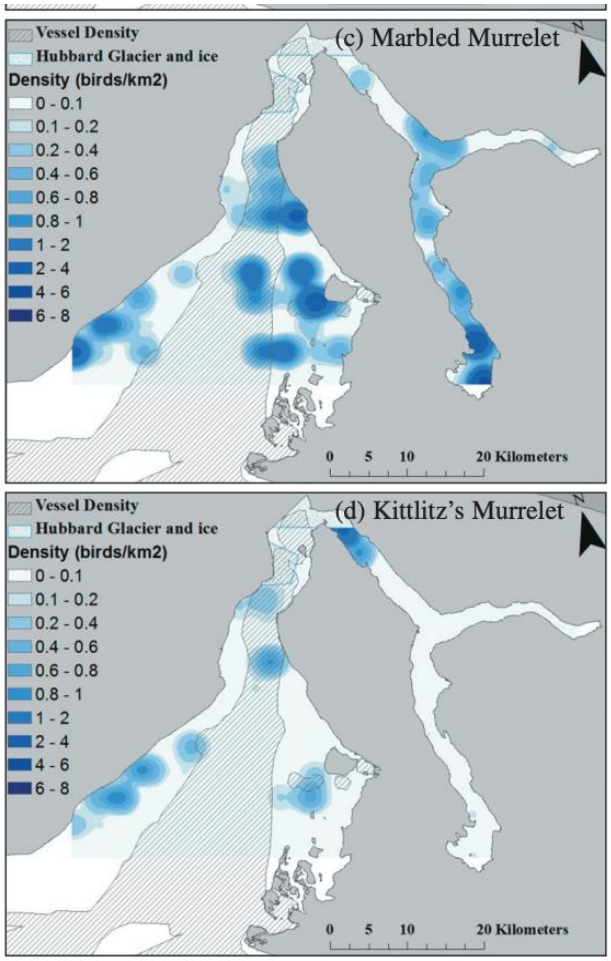

Figure16: Densities of KIMU and MAMU in Yakutat Bay. (Schane, et al., 2013).

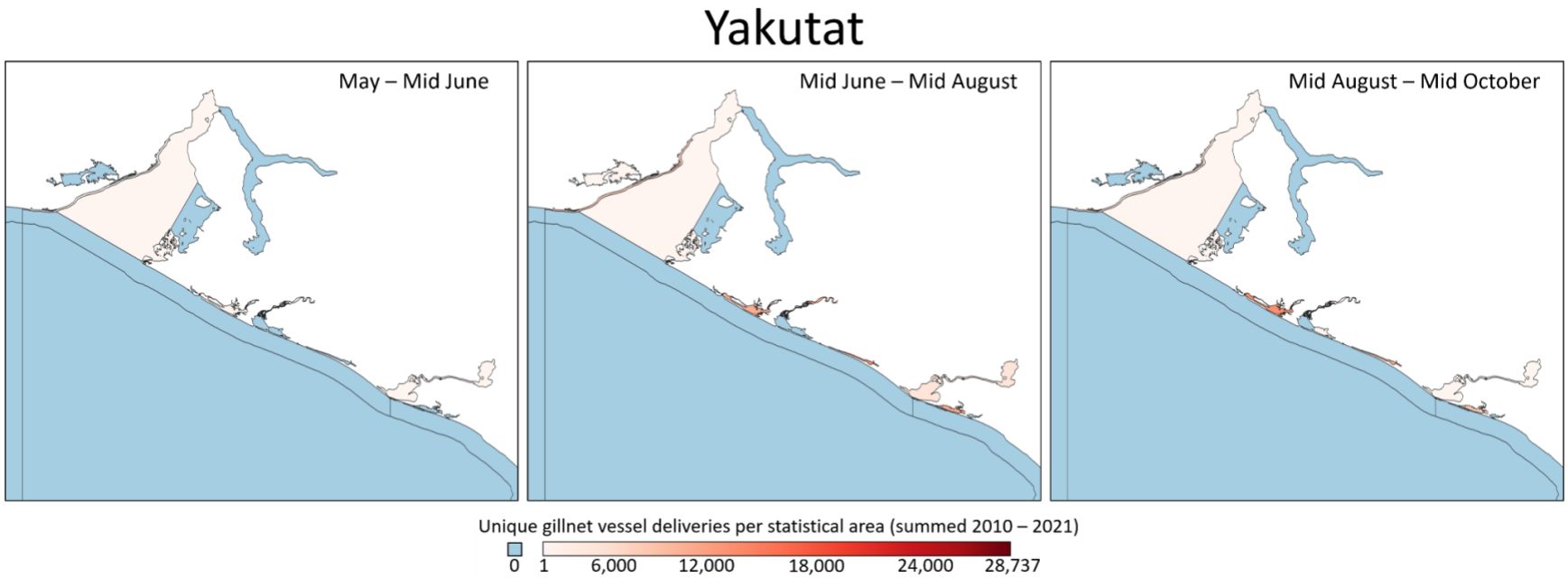

Figure 17: Unique gillnet vessel delivers per ADF&G statistical area for different months of the fishing season (ADF&G data) in Yakutat Area.

Appendix 4: Workshop Written Feedback

United Southeast Alaska Gillnetters Comments Regarding Murrelet Workshop October 24, 2022

I would like to express my appreciation for being included in this and the past workshop that occurred in December 2019. It has been very enlightening, and I appreciate all that I have learned about these birds.

It appears to me that there is an assumption that since there has been a notable population decline in PWS, that it is applicable to the southeast Alaska region as well. In the December 2019 workshop, I asked if there were a lack of food sources, would the birds leave for better forage areas. Kathy Kuletz said that these birds had a strong propensity to return to the same area to nest year after year, and if there were a lack of food available, they would just not be as successful in breeding. This would in my mind, lead to a digression in the population just on a generational basis. I will add here that there has been a remarkable lack of herring in the PWS since the inception of this survey.

In reading the draft provided me prior to this meeting, I have to question the Spatial Scale of Hazard. Scores based on linier nm makes little sense, and square milage would be a better measure. The southeast Alaska management area, basically all state waters in the region, districts 1-15, measures 13,810 square miles. The area gillnets can prosecute their fishery by regulation measures 1,549 square miles, or 11.2% of the region. It is also noteworthy that not all of the area represented by the 11.2% is open to fishing all the time, for instance, section 11-c of district 11 hasn't been open for the last nine years. District 8 has seen very little fishing time through the month of July since 2018, due to king salmon management concerns. Very large portions of district 15 have also been closed due to king salmon conservation. This is far below the >30% attributed to our fishery in the scoring. It is not logical that our fishery bycatch of these birds would lend itself to the inability to recover from catastrophic population declines, given the small area we actually fish.

The data used in Table 6 of the draft, using an average of permits fished is simplistic and represents at best a worse case scenario. As I mentioned in the October meeting, it merely represents the unique permits fished in a season. I took the liberty to refine it.

Number Of Gillnet Permits fished By SW for Traditional and Hatchery Terminal Areas in SEAK

	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
19						2	4	1	3	1
20					10	3	10	2	6	2
21					14	8	16	9	19	17
22				21	28	30	10	13	20	41
23	21	32	33	39	59	58	27	39	58	67
24	34	39	40	53	75	74	42	60	68	80
25	45	77	69	258	293	303	116	122	329	356
26	215	192	234	336	374	360	317	336	370	406
27	283	262	293	360	388	387	364	373	394	425
28	294	284	317	390	400	390	387	379	408	435
29	300	317	315	391	396	387	386	389	401	430
30	325	313	300	389	390	385	402	392	398	427
31	337	299	273	372	369	352	377	371	388	416
32	320	278	286	341	335	320	362	364	349	390
33	301	214	239	316	290	298	328	339	318	345

34	279	251	230	271	294	222	283	297	241	337
35	260	254	151	297	299	272	265	294	288	316
36	226	247	190	295	293	292	287	264	298	310
37	201	227	189	254	246	247	283	273	283	304
38	146	180	153	189	216	196	257	243	253	239
39	119	110	76	96	67	121	175	170	164	166
40	59	41	3	53	5	59	113	70	93	86
41	14	12		9	4		25	4	8	10
Total	373	371	368	419	421	421	425	421	432	451

One can plainly see in the spreadsheet above, the highest effort of our fleet occurs in statistical weeks 26-31. The average for those particular weeks over the last ten years shows that the most vessels are in stat week 30 with 372, followed by stat week 29 with 371. There is less in the earlier weeks, inclining, and less in the latter weeks, declining as the season progresses. The 6 assigned to our fishery should likely be a 5, and if all weeks were accounted for, may actually be a 4.

It has been noted that murrelet interactions occur later in the season. The declining effort shown above reduces those interactions, especially if you consider that Deep Inlet, a terminal harvest area near Sitka draws many boats most years, reducing the number of vessels fishing in traditional common property areas.

Number Of Gillnet Permits fished By SW for Deep Inlet Hatchery Terminal Area

	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
22						9				21
23	6	11	12	15	9	17	15	17	28	29
24	14	16	18	21	11	18	20	24	32	29
25	15	22	25	22	20	20	20	24	29	23
26	15	25	24	21	14	20	24	20	25	22
27	15	27	23	21	10	10	27	20	22	14
28	11	23	24	19	9	13	25	22	24	17
29	10	20	24	26	14	21	0	24	24	36
30	13	21	23	18	19	24	27	32	22	29
31	20	17	25	20	28	24	39	42	30	56
32	31	17	25	42	33	28	40	42	42	99
33	62	40	35	55	63	64	0	62	46	103
34	92	92	60	63	69	0	0	90	24	90
35	98	94	0	76	84	83	0	85	24	81
36	71	68	36	68	56	84	72	65	20	36
37	45	39		38	28	17	67	35		16
38		15		15	19	13	39	14		
39				7	0	1				
40					0					
41					4					

The above sheet shows effort in Deep Inlet for the last ten years. All the vessels in this table are also represented in the previous table. It shows that later in the season, even as effort is waning throughout the region, a large component of that effort is concentrated in one area, minimizing impacts in those traditional areas.

The statistical data used above in the spreadsheets was courtesy of ADF&G. The Geographic Information System (GIS), was also ADF&G, using ArcGIS Pro.

I believe the risk assessed our fishery has been amplified in the draft. Reliable data that reflects actual effort and area is important. I feel the refinements expressed and shown in these comments represents the real effort and shows the areas we actually fish compared to the range of murrelets in our region gives a more realistic snapshot of risk. Based on this alone should, in my mind, reduce our draft score of 3 to a 2.

Again, I appreciate the allowance to participate in this matter. If I can be of further assistance in the future, let me know.

Max Worhatch, Executive Director United Southeast Alaska Gillnetters